R13 MODIFICATION APPLICATION

SWN Production Company, LLC
Charles Frye Pad

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April 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

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SWN Production Company, LLC (SWN) is submitting this R13 modification application to the West Virginia Department of Environmental Protection (WVDEP) for a natural gas production well pad located in Ohio County, West Virginia (Charles Frye Pad). Specifically, Southwestern is proposing to install three (3) gas processing units with burners rated at 1.0 MMBtu/hr each, one (1) 145-horsepower (hp) compressor engine, and one (1) vapor recovery unit for the control of vapors from produced water and condensate tanks and liquid loading. The Frye Pad is currently permitted and operating under Permit No. R13-2922D

1.1. FACILITY AND PROJECT DESCRIPTION

The Charles Frye Pad is a natural gas production facility which extracts natural gas and liquids (condensate and produced water) from well deposits underneath the surface. Upon physical separation and heat treatment, the natural gas stream is transported from the well to gas line for additional processing and compression, as necessary. The liquids are stored in storage vessels in the facility.

The Charles Frye Pad currently consists of the following equipment:

- One (1) natural gas-fired 145-hp Caterpillar G3306NA flash gas compressor engine;
- Three (3) 1.0-MMBtu/hr natural gas-fired GPU burners;
- Two (2) 0.5-MMBtu/hr natural gas-fired heater treaters;
- Three (3) 1.5-MMBtu/hr line heaters;
- Six (6) 400-bbl condensate storage tanks;
- Six (6) 400-bbl produced water storage tanks;
- One (1) 15.0-MMBtu/hr vapor combustor with one (1) 50-SCFH natural gas-fired pilot.

As part of this application, Southwestern is proposing to install three (3) gas processing units with burners rated at 1.0 MMBtu/hr each, one (1) 145-hp compressor engine, and one (1) vapor recovery unit for the control of vapors from produced water and condensate tanks and liquid loading.

Additionally, this application seeks to increase the current condensate and produced water throughputs for the facility respectively.

A process flow diagram is includes as Attachment F.

1.2. SOURCE STATUS

WVDEP must make stationary source determinations on a case-by-case basis using the guidance under the Clean Air Act (CAA) and EPA's and WVDEP's implementing regulations. WVDEP has previously determined that the Charles Frye Pad is a separate stationary source. There have been no changes to the information provided (outside of ownership change to SWN) that would change that determination. Therefore, the Charles Frye Pad will remain a separate stationary source with respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD).

1.3. PROPOSED EMISSION SOURCE CALCULATION

Emissions from the proposed project will result from natural gas combustion in the new GPU burners, flashing, working, and breathing, losses from storage tanks, as well as loading emissions associated with the increase production of condensate and water from the additional wells. Emissions from combustion are calculated using published emission factors from U.S EPA's AP-42 for natural gas combustion equipment and the maximum heat input

for the units. Emissions from the storage tanks have been calculations using Bryan Research Engineering ProMax ® software. Detailed emission calculations for the equipment affected by this project are presented in Attachment N.

1.4. R-13 APPLICATION ORGANIZATION

This R-13 permit application is organized as follows:

- Section 2: R-13 Application Forms;
- Attachment A: Business Certificate;
- Attachment B: Map;
- Attachment C: Installation and Start Up Schedule;
- Attachment D: Regulatory Discussion;
- Attachment E: Plot Plan
- Attachment F: Detailed Process Flow Diagram;
- Attachment G: Process Description;
- Attachment I: Emission Units Table;
- Attachment J: Emission Points Data Summary Sheet;
- Attachment K: Fugitive Emissions Data Summary Sheet;
- Attachment L: Emission Unit Data Sheets;
- Attachment M: Air Pollution Control Device Sheet;
- Attachment N: Supporting Emission Calculations;
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans; and
- Attachment P: Legal Notice

2. R-13 APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable R-13 application forms including the required attachments.

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

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☒ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
SWN Production Company LLC

2. Federal Employer ID No. ***(FEIN):***
2 6- 4 3 8 8 7 2 7

3. Name of facility *(if different from above):*
Charles Frye Pad

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
10000 Energy Drive

Spring TX 77389

5B. Facility's present physical address:
Ohio County, West Virginia—near the town of Wheeling

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

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

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

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

- If **YES,** please explain: Southwestern is leasing the land on which the site is constructed

- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Oil and natural gas production well pad

10. North American Industry Classification System **(NAICS)** code for the facility:
211111

11A. DAQ Plant ID No. (for existing facilities only):
069-00109

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-2922D

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

12A.

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

From Interstate 70 east of Wheeling, WV, take Exit 10 and turn left onto CR 65 (Cabella Drive). Travel 0.32 miles if exiting from I-70 east (0.55 miles if exiting from I-70 west) and turn right onto CR 41/1 (McCutcheon Road). Travel 0.72 miles on CR 41/1 and entrance to well pad will be on the left.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
See Above	Wheeling	Ohio
12.E. UTM Northing (KM): 4,433.73136	12F. UTM Easting (KM): 536.04931	12G. UTM Zone: 17T

13. Briefly describe the proposed change(s) at the facility:
Southwestern proposes to install three (3) gas processing units with burners rated at 1.0 MMBtu/hr each, one (1) 145-horsepower compressor engine, and one (1) vapor recovery unit for the control of vapors from produced water and condensate tanks and liquid loading.

14A. Provide the date of anticipated installation or change: / / – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: As soon as possible

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☒ **YES** ☐ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

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

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

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☒ Bulk Liquid Transfer Operations	☒ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	
☒ General Emission Unit, specify GPU Burners		

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☒ Other Collectors, specify Vapor Recovery Unit

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's *"**Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: _____

(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: Paul Geiger		35C. Title: Sr. Vice President Ops Management
35D. E-mail: Paul_Geiger@swn.com	36E. Phone: 832-796-2920	36F. FAX:
36A. Printed name of contact person (if different from above): Kristi Evans		36B. Title: HSE Coordinator
36C. E-mail: Kristi_Evans@swn.com	36D. Phone: 304-884-1652	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☒ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☒ **Attachment E: Plot Plan**
☒ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☐ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☒ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☐ **Attachment Q: Business Confidential Claims**
☐ **Attachment R: Authority Forms**
☐ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
☐ ***For Title V Administrative Amendments:***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
☐ ***For Title V Minor Modifications:***
  ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  ☐ ***EPA has 45 day review period of a draft permit.***

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

ATTACHMENT A

Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT

BUSINESS REGISTRATION
CERTIFICATE

ISSUED TO:
SWN PRODUCTION COMPANY, LLC
5400D BIG TYLER RD
CHARLESTON, WV 25313-1103

BUSINESS REGISTRATION ACCOUNT NUMBER: **2307-3731**

This certificate is issued on: **12/8/2014**

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

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

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

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

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

atL006 v.4
L1180094016

ATTACHMENT B

Map

ATTACHMENT B – AREA MAP

Figure 1 - Map of Charles Frye Wellpad

UTM Northing (KM):	4,433.73136
UTM Easting (KM):	536.04931
Elevation:	~1,275 ft

ATTACHMENT C

Installation and Start Up Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

Unit	Installation Schedule	Startup Schedule
Three (3) 1.00 MMBtu/hr GPU Burners	2015	Upon issuance of permit
One (1) Vapor Recovery Unit	2015	Upon issuance of permit
One (1) 145 hp Compressor Engine	2015	Upon issuance of permit

ATTACHMENT D

Regulatory Discussion

ATTACHMENT D – REGULATORY DISCUSSION

This section documents the applicability determinations made for Federal and State air quality regulations. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- Prevention of Significant Deterioration (PSD) permitting;
- Title V of the 1990 Clean Air Act Amendments;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and
- West Virginia State Implementation Plan (SIP) regulations.

This review is presented to supplement and/or add clarification to the information provided in the WVDEP R13 permit application forms, which fulfill the requirement to include citations and descriptions of applicable statutory and administrative code requirements.

In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the wellpad. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the wellpad. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

Prevention of Significant Deterioration (PSD) Source Classification

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD) and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). PSD and NNSR regulations apply when a major source makes a change, such as installing new equipment or modifying existing equipment, and a significant increase in emissions results from the change. The wellpad will remain a minor source with respect to the NSR program after the project since potential emissions are below all the NSR/PSD thresholds. As such, NSR/PSD permitting is not triggered by this construction activity. SWN will monitor future construction activities at the site closely and will compare any future increase in emissions with the NSR/PSD thresholds to ensure these activities will not trigger this program.

Title V Operating Permit Program

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. 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 HAP, and 100 tpy of all other regulated pollutants.[1] The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

New Source Performance Standards

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the wellpad.

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[1] On June 23, 2014, the U.S Supreme Court decision in the case of *Utility Air Regulatory Group v. EPA* effectively changed the permitting procedures for GHGs under the PSD and Title V programs.

NSPS Subparts D, Da, Db, and Dc

These subparts apply to steam generating units of various sizes, all greater than 10 MMBtu/hr. The proposed project does not include any steam generating units, therefore the requirements of these subparts do not apply.

NSPS Subparts K, Ka, and Kb

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m^3 (~19,813 gallons). All of the tanks at the wellpad have a capacity of 19,813 gallons or less. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the wellpad.

NSPS Subpart JJJJ – Spark Ignition Engines

The compressor engine at the wellpad was manufactured after July 1, 2007 and is subject to the emission standards, testing and recordkeeping requirements of New Source Performance Standards (NSPS) for Spark Ignition Engines (40 CFR 60, Subpart JJJJ). The proposed engine is the same as the existing unit in the R13 permit. Therefore, by complying with the JJJJ requirements outlined in the existing R13 permit, the facility will maintain compliance with this subpart.

NSPS Subpart OOOO — Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution*, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. This NSPS was originally published in the Federal Register on August 16, 2012, and subsequently amended. The list of potentially affected facilities includes:

- Gas wellheads
- Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment
- Continuous bleed natural gas-driven pneumatic controllers with a bleed rate of > 6 scfh located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment (excluding natural gas processing plants)
- Continuous bleed natural gas-driven pneumatic controllers located at natural gas processing plants
- Storage vessels in the production, processing, or transmission and storage segments
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

There are six (6) existing condensate storage vessels and six (6) existing produced water storage vessels at the wellpad. Emissions from the storage vessels will be controlled by one (1) vapor recovery unit (VRU) and one (1) enclosed combustor (the combustor will operate as the primary control measure only in instances when the VRU is down). The enclosed combustor has a destruction efficiency greater than 95 percent. The storage vessels at the facility will each have potential VOC emissions less than 6 tpy. As such, per 60.5365(e), the tanks are not storage vessel affected facilities under the rule.

The pneumatic controllers were ordered and installed after August 23, 2011 and are therefore potentially subject to NSPS OOOO. Per 60.5365(d)(2), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOO.

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subparts OOOO) and associated equipment (Subparts D-Dc and K-Kb), the applicability of a particular NSPS to the wellpad can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the proposed project.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The wellpad is an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. The potentially applicable NESHAP regulations are discussed in this section.

40 CFR 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

The original rule, published on February 26, 2004, initially affected new (constructed or reconstructed after December 19, 2002) reciprocating internal combustion engines (RICE) with a site-rating greater than 500 brake horsepower (HP) located at a major source of hazardous air pollutant (HAP) emissions. Subsequent amendements included RICE located at area sources.

40 CFR §63.6590(c) states that an affected source located at an area HAP source that is subject to regulations under 40 CFR Part 60, Subpart JJJJ must meet the requirements of Subpart ZZZZ by meeting the requirements of Subpart JJJJ. No further requirements apply for such engines under this part. The wellpad is a minor (area) source of hazardous air pollutants and the new proposed engine is considered a new stationary RICE. Therefore, the requirements contained in §63.6590(c) are applicable. SWN will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart JJJJ.

West Virginia SIP Regulations

The wellpad is potentially subject to regulations contained in the West Virginia Code of State Regulations, Chapter 45 (Code of State Regulations). The Code of State Regulations fall under two main categories, those regulations that are generally applicable (e.g., permitting requirements), and those that have specific applicability (e.g., PM standards for manufacturing equipment).

45 CSR 2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The compressor engine, GPU burners, heater treaters, and line heaters are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from units shall not exceed 10 percent. Per 45 CSR 2-4, PM emissions from the unit will not exceed a level of 0.09 multiplied by the heat design input in MMBtu/hr of the unit.

45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

According to 45 CSR 4-3:

No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

The wellpad is generally subject to this requirement. However, due to the nature of the process at the wellpad, production of objectionable odor from the wellpad during normal operation is unlikely.

45 CSR 6: Control of Air Pollution from the Combustion of Refuse

45 CSR 6 applies to activities involving incineration of refuse, defined as "the destruction of combustible refuse by burning in a furnace designed for that purpose. For the purposes of this rule, the destruction of any combustible liquid or gaseous material by burning in a flare or flare stack, thermal oxidizer or thermal catalytic oxidizer stack shall be considered incineration." The enclosed combustor is an incinerator and therefore must comply with this regulation. Per 45 CSR 6-4.3, opacity of emissions from this unit shall not exceed 20 percent, except as provided by 4.4. PM emissions from this unit will not exceed the levels calculated in accordance with 6-4.1.

45 CSR 16: Standards of Performance for New Stationary Sources

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 CPR Part 60 by reference. As such, by complying with all applicable requirements of 40 CFR Part 60 at the wellpad, SWN will be complying with 45 CSR 16.

45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

According to 45 CSR 17-3.1:

No person shall cause, suffer, allow or permit fugitive particulate matter to be discharged beyond the boundary lines of the property lines of the property on which the discharge originates or at any public or residential location, which causes or contributes to statutory air pollution.

Due to the nature of the activities at the wellpad, it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, SWN will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

45 CSR 21-28: Petroleum Liquid Storage in Fixed Roof Tanks

45 CSR 21-28 applies to any fixed roof petroleum liquid storage tank with a capacity greater than 40,000 gallons. The capacity of each storage tank at the wellpad is less than 40,000 gallons; therefore, 45 CSR 21-28 does not apply to the petroleum liquid storage tanks at this wellpad.

45 CSR 34: Emissions Standards for Hazardous Air Pollutants

45 CSR 34-1 incorporates the federal Clean Air Act (CAA) national emissions standards for hazardous air pollutants (NESHAPs) as set forth in 40 CPR Parts 61 and 63 by reference. As such, by complying with all applicable requirements of 40 CFR Parts 61 and 63 at the wellpad, SWN will be complying with 45 CSR 34.

Non-Applicability of Other SIP Rules

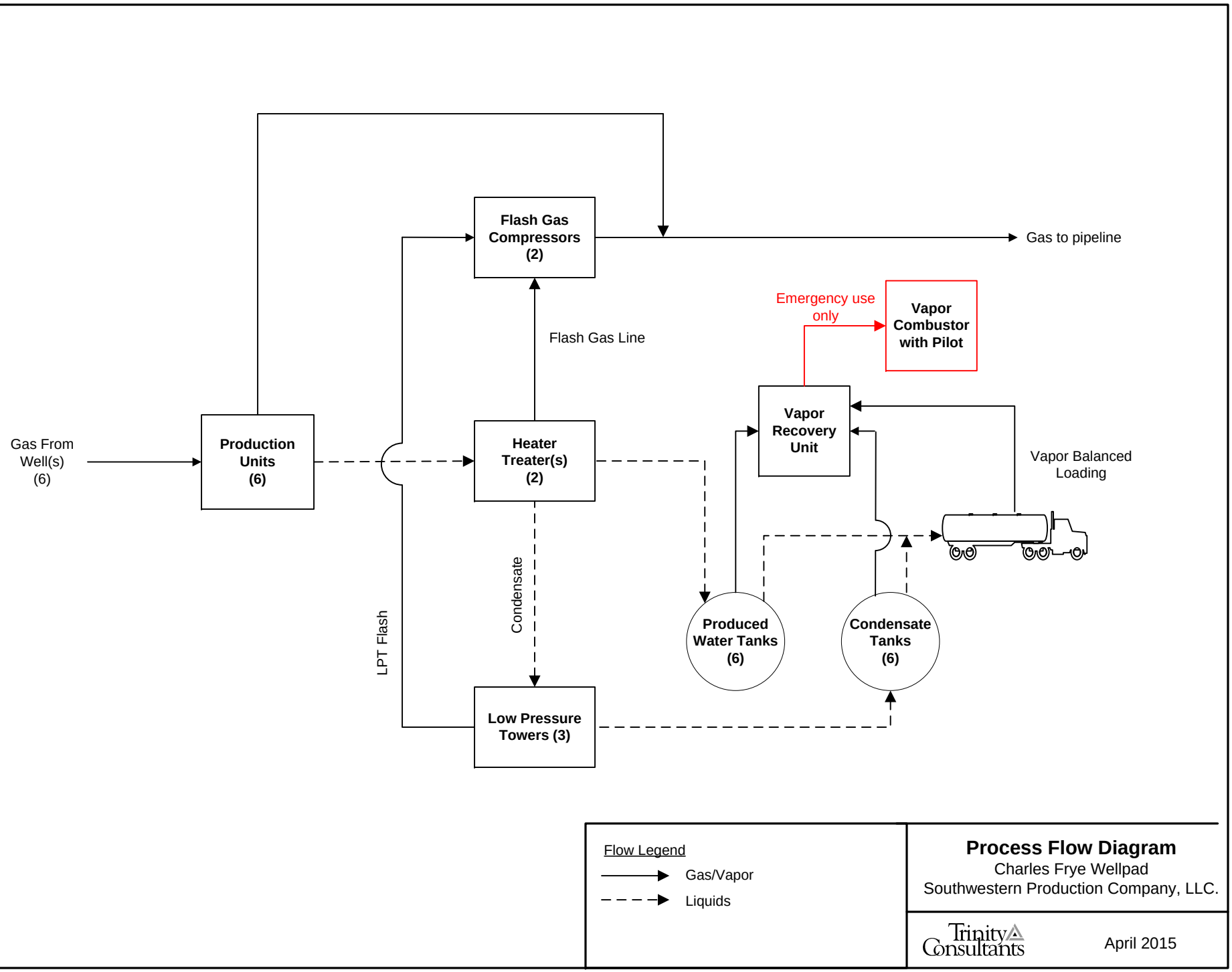
A thorough examination of the West Virginia SIP rules with respect to applicability at the wellpad reveals many SIP regulations that do not apply or impose additional requirements on operations. Such SIP rules include those specific to a particular type of industrial operation that is categorically not applicable to the wellpad.

ATTACHMENT E

Plot Plan

ATTACHMENT F

Detailed Process Flow Diagram


Flash Gas Compressors (2)
Gas to pipeline
Emergency use only
Vapor Combustor with Pilot
Flash Gas Line
Vapor Recovery Unit
Vapor Balanced Loading
Gas From Well(s) (6)
Production Units (6)
Heater Treater(s) (2)
Condensate
LPT Flash
Produced Water Tanks (6)
Condensate Tanks (6)
Low Pressure Towers (3)
Flow Legend
Gas/Vapor
Liquids
Process Flow Diagram
Charles Frye Wellpad
Southwestern Production Company, LLC.
Trinity Consultants
April 2015

ATTACHMENT G

Process Description

ATTACHMENT G – PROCESS DESCRIPTION

Southwestern Production Company, LLC (SWN) is proposing to construct and operate three (3) additional natural gas wells at its existing Charles Frye wellpad. SWN will also install additional gas processing units in support of natural gas production activities. A vapor recovery unit will also be installed at the wellpad to control emissions from the existing condensate and produced water storage tanks at the pad, as well as to collect vapors from liquid loading into trucks. One additional 145 horsepower compressor engine will be added to the site.

The facility is an oil and natural gas exploration and production facility, responsible for the production of condensate and natural gas. Storage of condensate and produced water also occurs on-site. A description of the facility process flow is as follows: Condensate, gas and water pass from the wellhead to the gas production unit, where the first stage of separation occurs. Fluids (condensate and produced water) are sent to the heater treaters, and gas is sent to the sales line. The flash gas from the heater treater is captured via a natural gas-fired engine-driven flash gas compressor. Produced water from the heater treater flows into the produced water storage tanks. Condensate flows into low pressure separators, where additional flash gas is routed to the compressor. Condensate is then sent to condensate storage tanks. Vapors from the produced water storage tanks and condensate storage tanks will be routed to a vapor recovery unit (VRU). An existing combustor at the facility will be used to control emissions from the tanks in the event of any downtime of the VRU. Vapors from the combustor will destroyed with a minimum 98% efficiency. The vapor combustor has natural gas-fired pilots to ensure a constant flame for combustion.

The natural gas stream exits the facility for transmission via pipeline. Condensate and produced water are transported offsite via truck. Loading emissions will be controlled with vapor return, with a minimum of 70% capture efficiency, and will be routed to the VRU.

A process flow diagram is included as Attachment D.

ATTACHMENT I

Emission Units Table

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
EU-MC4219	EP-MC4219	Caterpillar G3306 NA Engine	2013	145 hp	Existing – No change	NSCR
EU-MC4220	EP-MC4220	Caterpillar G3306 NA Engine	2015	145 hp	New	NSCR
EU-GPU1	EP-GPU1	GPU Burner	2012	1.0 MMBtu/hr	Existing – No change	None
EU-GPU2	EP-GPU2	GPU Burner	2012	1.0 MMBtu/hr	Existing – No change	None
EU-GPU3	EP-GPU3	GPU Burner	2012	1.0 MMBtu/hr	Existing – No change	None
EU-GPU4	EP-GPU4	GPU Burner	2015	1.0 MMBtu/hr	New	None
EU-GPU5	EP-GPU5	GPU Burner	2015	1.0 MMBtu/hr	New	None
EU-GPU6	EP-GPU6	GPU Burner	2015	1.0 MMBtu/hr	New	None
EU-HT1	EP-HT1	Heater Treater	2012	0.5 MMBtu/hr	Existing – No change	None
EU-HT2	EP-HT2	Heater Treater	2012	0.5 MMBtu/hr	Existing – No change	None
EU-LH1	EP-LH1	Line Heater	2012	1.5 MMBtu/hr	Existing – No change	None
EU-LH2	EP-LH2	Line Heater	2012	1.5 MMBtu/hr	Existing – No change	None
EU-LH3	EP-LH3	Line Heater	2012	1.5 MMBtu/hr	Existing – No change	None
EU-TANKS-COND	EP-TANKS-COND	Six (6) Condensate Tanks	2012	400 bbl each	Existing – Increase throughput	APC-VRU APC-COMB-TKLD
EU-TANKS-PW	EP-TANKS-PW	Six (6) Produced Water Tanks	2012	400 bbl each	Existing – Increase throughput	APC-VRU APC-COMB-TKLD
EU-LOAD-COND	EP-LOAD-COND	Condensate Truck Loading	2012	22,075,200 gal/yr	Existing – Increase throughput	APC-VRU APC-COMB-TKLD
EU-LOAD-PW	EP-LOAD-PW	Produced Water Truck Loading	2012	15,330,00 gal/yr	Existing – Increase throughput	APC-VRU APC-COMB-TKLD
APC-COMB-TKLD	APC-COMB-TKLD	Vapor Combustor	2012	15.0 MMBtu/hr	Existing – No change	NA
EU-PILOT	EP-PILOT	Vapor Combustor Pilot	2012	50 scf/hr	Existing – No change	NA
EU-FUG	EP-FUG	Fugitive Emissions	2012	NA	Existing – No change	None
APC-VRU	APC-VRU	Vapor Recovery Unit	2015		New	NA

[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] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheet

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
EP-MC4219	Upward vertical stack	EP-MC4219	Caterpillar G3306 NA Engine	---	NSCR	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ VOC CO_2e	4.31 4.31 <0.01 0.02 0.16 164	18.90 18.90 <0.01 0.11 0.67 717	0.32 0.64 <0.01 0.02 0.16 164	1.40 2.80 <0.01 0.11 0.67 717	Gas/Vapor	O[A]	NA
EP-MC4220	Upward vertical stack	EP-MC4220	Caterpillar G3306 NA Engine	---	NSCR	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ VOC CO_2e	4.31 4.31 <0.01 0.02 0.16 164	18.90 18.90 <0.01 0.11 0.67 717	0.32 0.64 <0.01 0.02 0.16 164	1.40 2.80 <0.01 0.11 0.67 717	Gas/Vapor	O[A]	NA
EP-GPU1 – EP-GPU6 (total)	Upward vertical stack	EP-GPU1 – EP-GPU6	GPU Burners	NA	None	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ VOC CO_2e	0.66 0.56 <0.01 0.05 0.04 703	2.90 2.44 0.02 0.22 0.16 3,078	0.66 0.56 <0.01 0.05 0.04 703	2.90 2.44 0.02 0.22 0.16 3,078	Gas/Vapor	O[B]	NA
EP-HTR1 – EP-HTR2 (total)	Upward vertical stack	EU-HTR1 – EU-HTR2	Heater Treaters	NA	None	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ VOC CO_2e	0.11 0.09 <0.01 <0.01 <0.01 117	0.48 0.41 <0.01 0.04 0.03 513	0.11 0.09 <0.01 <0.01 <0.01 117	0.48 0.41 <0.01 0.04 0.03 513	Gas/Vapor	O[B]	NA
EP-LH1 – EP-LH4 (total)	Upward vertical stack	EU-LH1 – EU-LH4	Line Heaters	NA	None	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ VOC CO_2e	0.50 0.42 <0.01 0.04 0.03 527	2.18 1.83 0.01 0.17 0.12 2,308	0.50 0.42 <0.01 0.04 0.03 527	2.18 1.83 0.01 0.17 0.12 2,308	Gas/Vapor	O[B]	NA
EP-TANKS-COND	Tank vent(s)	EU-TANKS-COND	Six (6) Condensate Tanks	---	VRU APC-COMB-TKLD	NA	NA	VOC HAP	37.44 0.82	164.00 3.59	1.87 0.04	8.20 0.18	Gas/Vapor	O[C]	NA
EP-TANKS-PW	Tank vent(s)	EU-TANKS-PW	Six (6) Produced Water Tanks	---	VRU APC-COMB-TKLD	NA	NA	VOC HAP	3.95 0.02	17.30 0.08	0.20 <0.01	0.86 <0.01	Gas/Vapor	O[C]	NA

EP-LOAD-COND	Fugitive	EU-LOAD-COND	Condensate Tank Loading	---	VRU APC-COMB-TKLD	NA	NA	VOC HAP	N/A N/A	64.25 1.25	N/A N/A	19.28 0.38	Gas/Vapor	O[C]	
EP-LOAD-PW	Fugitive	EU-LOAD-PW	Produced Water Tank Loading	---	VRU APC-COMB-TKLD	NA	NA	VOC HAP	N/A N/A	9.94 0.02	N/A N/A	2.98 0.01	Gas/Vapor	O[C]	
EP-PILOT	Upward vertical stack	EU-PILOT	Vapor Combustor Pilot	NA	NA	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ CO_2e	0.01 <0.01 <0.01 <0.01 5.30	0.02 0.02 <0.01 <0.01 23.21	0.01 <0.01 <0.01 <0.01 5.30	0..02 0.02 <0.01 <0.01 23.21	Gas/Vapor	O[D]	NA
EP-FUG	Fugitive	EU-FUG	Fugitive Components	NA	NA	NA	NA	VOC HAP CO_2e	0.91 0.02 47	3.98 0.07 207	0.91 0.02 47	3.98 0.07 207	Gas/Vapor	O[D]	NA
APC-COMB-TKLD	Upward vertical stack	APC-COMB-TKLD	Vapor Combustor	NA	NA	NA	NA	NO_X CO SO_2 $PM/PM_{10}/PM_{2.5}$ CO_2e	1.66 1.39 0.01 0.13 1757	7.26 6.10 0.04 0.55 7695	1.66 1.39 0.01 0.13 1757	7.26 6.10 0.04 0.55 7695	Gas/Vapor	O[D]	NA

A – Emissions calculated using permit limits, AP-42, and 40 CFR Part 98 Subpart C.
B - Emissions calculated using AP-42 and 40 CFR Part 98 Subpart C.
C – Emissions Calculated using Promax
D – Emission calculated using AP-42

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
EP-MC4219	~0.7	~1,101	~678	~29.4	~1,250	~12	4,433.73136	536.04931
EP-MC4220	~0.7	~1,101	~678	~29.4	~1,250	~12	4,433.73136	536.04931
EP-GPU1 – EP-GPU4 (each)	~1.0	~500	~992.4	~21.1	~1,250	~10.75	4,433.73136	536.04931
EP-HTR1 – EP-HTR2 (each)	~0.7	~450	~13,067	~277.3	~1,250	~10	4,433.73136	536.04931
EP-LH1 – EP-LH4 (each)	~1.0	~500	Unknown	Unknown	~1,250	~10	4,433.73136	536.04931
EP-TANKS-COND	NA	Ambient	NA	NA	~1,250	~20	4,433.73136	536.04931
EP-TANKS-PW	NA	Ambient	NA	NA	~1,250	~20	4,433.73136	536.04931
EP-LOAD-COND	NA	Ambient	NA	NA	~1,250	~3	4,433.73136	536.04931
EP-LOAD-PW	NA	Ambient	NA	NA	~1,250	~3	4,433.73136	536.04931
EP-PILOT	NA	NA	NA	NA	~1,250	~25	4,433.73136	536.04931
EP-FUG	NA	Ambient	NA	NA	~1,250	NA	4,433.73136	536.04931
APC-COMB-TKLD	NA	~5.5	NA	NA	~1,250	~30	4,433.73136	536.04931

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No (no change to existing) ☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No (no change to existing) ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☐ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	---	---	---	---	---
Unpaved Haul Roads	PM PM_{10} $PM_{2.5}$	2.57 0.66 0.07	11.27 2.87 0.29	2.57 0.66 0.07	11.27 2.87 0.29	O[A]
Storage Pile Emissions	NA	---	---	---	---	---
Loading/Unloading Operations	VOC HAP	5.08 0.09	22.26 0.38	5.08 0.09	22.26 0.38	O[B]
Wastewater Treatment Evaporation & Operations	NA	---	---	---	---	---
Equipment Leaks	VOC HAP CO2e	NA	4.03 0.07 346	NA	4.03 0.07 346	O[C]
General Clean-up VOC Emissions	NA	---	---	---	---	---
Other	NA	---	---	---	---	---

[A] AP-42, Section 13.2.2.

[B] AP-42 Section 5.2.

[C] Protocol for Equipment Leak Estimates (EPA-453/R-95-017), Table 2-1, Nov. 1995.

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

Emission Unit Data Sheets

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.
Identification Number (as assigned on *Equipment List Form*):

1. Name or type and model of proposed affected source: One (1) 145-hpNA Flash Gas Compressor Engine with a Non-Selective Catalytic Reduction (NSCR) Catalytic Converter.
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas - 1,382 scf/hr (each), 12.1 MMscf/yr (each) (assuming 905 Btu/scf)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

1.25 MMBtu/hr natural gas fired spark ignition engine

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 1.25 $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used: [1]			
@		°F and	psia
a.	NO_X	4.31 lb/hr	grains/ACF
b.	SO_2	<0.01 lb/hr	grains/ACF
c.	CO	4.31 lb/hr	grains/ACF
d.	PM_{10}	0.02 lb/hr	grains/ACF
e.	Hydrocarbons	0.70 lb/hr	grains/ACF
f.	VOCs [2]	0.07 lb/hr	grains/ACF
g.	Pb	--- lb/hr	grains/ACF
h.	Specify other(s)		
	Benzene	1.58E-03 lb/hr	grains/ACF
	Toluene	5.58E-04 lb/hr	grains/ACF
	Formaldehyde	0.09 lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

[1] Emissions are provided on a per-unit basis.
[2] Excludes formaldehyde.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
The engine equipped with a non-selective catalytic reduction (NSCR) air pollution control device will be fitted with a closed-loop, automatic air/fuel ratio controller to ensure emissions of regulated pollutants do not exceed the potential to emit for any engine/NSCR combination under varying load. Such controls shall ensure proper and efficient operation of the engine and NSCR air pollution control device. The permittee will check the air/fuel ratio every 1,500 service hours and adjust in accordance to the manufacturer's specifications. The automatic air/fuel ratio controller or closed-loop automatic feedback controller will provide a warning or indication to the operator in case of an over rich air/fuel ratio situation which results in performance degradation or failure of the catalyst element. The permittee will monitor the temperature to the inlet of the catalyst and in accordance with manufacturer's specifications a high temperature alarm shall shut off the engine before thermal deactivation of the catalyst occurs. The permittee will also check for thermal deactivation of the catalyst before normal operations are resumed. The permittee will maintain these records for five (5) years.	In accordance with 40 CFR Part 60 NSPS Subpart JJJJ requirements
REPORTING	TESTING
In accordance with 40 CFR Part 60 NSPS Subpart JJJJ requirements	In accordance with 40 CFR Part 60 NSPS Subpart JJJJ requirements

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NA

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): EU-GPU4, EU-GPU5,EU-GPU6

1. Name or type and model of proposed affected source: Three (3) 1.00 MMBtu/hr GPU Burners
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas – 1,105 scf/hr (each), 9.68 MMscf/yr (each) (assuming 905 Btu/scf)

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Natural gas

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

1.00 MMBtu/hr GPU Burners (each)

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 1.00 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used: [1]			
@		°F and	psia
a.	NO_X	0.11 lb/hr	grains/ACF
b.	SO_2	0.001 lb/hr	grains/ACF
c.	CO	0.09 lb/hr	grains/ACF
d.	PM_{10}	0.01 lb/hr	grains/ACF
e.	Hydrocarbons	0.01 lb/hr	grains/ACF
f.	VOCs	0.01 lb/hr	grains/ACF
g.	Pb	NA lb/hr	grains/ACF
h.	Specify other(s)		
	Benzene	2.3E-06 lb/hr	grains/ACF
	Toluene	3.8E-06 lb/hr	grains/ACF
	Formaldehyde	8.3E-05 lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

[1] Emissions are provided on a per-unit basis.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None.	None.
REPORTING	TESTING
None.	None.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
N/A

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Condensate Storage	2. Tank Name Six (6) 400-bbl Condensate Storage Tanks
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) EU-TANKS-COND	4. Emission Point Identification No. (as assigned on *Equipment List Form*) EP-TANKS-COND
5. Date of Commencement of Construction (for existing tanks) 2012	
6. Type of change ☐ New Construction ☐ New Stored Material ☒ Other Tank Modification	
7. Description of Tank Modification (if applicable) Increase in throughput due to additional wells at pad.	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 bbls/tank	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	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" and considers design liquid levels and overflow valve heights. 16,800 gallon	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
22,075,200 (total for all tanks)	60,480 (total for all tanks)

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
219 per tank

15. Maximum tank fill rate (gal/min)

16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
☒ Fixed Roof X vertical ___ horizontal ___ flat roof X 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
☐ Underground
☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color White	20B. Roof Color	20C. Year Last Painted

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): -0.03 to 0.03

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft) 0.06

25. Complete the following section 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; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

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 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Huntington, WV	
28. Daily Average Ambient Temperature (°F)	54.84
29. Annual Average Maximum Temperature (°F)	64.87
30. Annual Average Minimum Temperature (°F)	44.82
31. Average Wind Speed (miles/hr)	6.58
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))	1,246
33. Atmospheric Pressure (psia)	14.33

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F) 44.82		34B. Maximum (°F) 64.87	
35. Average operating pressure range of tank:			
35A. Minimum (psig) -0.03		35B. Maximum (psig) 0.03	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F) 61.79		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition	Condensate		
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)	98.21		
39E. Vapor Molecular Weight (lb/lb-mole)	53.84		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit (primary); Vapor Combustor (secondary)

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
See Attachment N for detailed emission calculations					

[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 if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Produced Water	2. Tank Name Six (6) 400-bbl Produced Water Storage Tanks
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) EU-TANKS-PW	4. Emission Point Identification No. (as assigned on *Equipment List Form*) EP-TANKS-PW
5. Date of Commencement of Construction (for existing tanks) 2012	
6. Type of change ☐ New Construction ☐ New Stored Material ☒ Other Tank Modification	
7. Description of Tank Modification (if applicable) Increase in throughput due to additional wells at pad.	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 bbls/tank	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	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" and considers design liquid levels and overflow valve heights. 16,800	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
15,330,000 (total for all tanks)	42,000 (total for all tanks)

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
152 per tank

15. Maximum tank fill rate (gal/min)

16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
☒ Fixed Roof X vertical ___ horizontal ___ flat roof X 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
☐ Underground
☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color White	20B. Roof Color	20C. Year Last Painted

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): -0.03 to 0.03

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft) 0.06

25. Complete the following section 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; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

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 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Huntington, WV	
28. Daily Average Ambient Temperature (°F)	54.84
29. Annual Average Maximum Temperature (°F)	64.87
30. Annual Average Minimum Temperature (°F)	44.82
31. Average Wind Speed (miles/hr)	6.8
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))	1,246
33. Atmospheric Pressure (psia)	14.33

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:			
34A. Minimum (°F) 44.82		34B. Maximum (°F) 64.87	
35. Average operating pressure range of tank:			
35A. Minimum (psig) -0.03		35B. Maximum (psig) 0.03	
36A. Minimum Liquid Surface Temperature (°F)		36B. Corresponding Vapor Pressure (psia)	
37A. Average Liquid Surface Temperature (°F)		37B. Corresponding Vapor Pressure (psia)	
38A. Maximum Liquid Surface Temperature (°F) 61.79		38B. Corresponding Vapor Pressure (psia)	
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition	Produced Water		
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)	18.02		
39E. Vapor Molecular Weight (lb/lb-mole)	33.66		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit (primary); Vapor Combustor (secondary)

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
See Attachment N for detailed emission calculations					

[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 if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): EU-LOAD-COND

1. Loading Area Name: Condensate Truck Loading

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	One (1)
Number of liquids loaded	One (1)
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	One (1)

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
Point is kept clear. Scotches are provided. Lines kept in good working order and tested periodically.

6. Are cargo vessels pressure tested for leaks at this or any other location?
☒ Yes ☐ No
If YES, describe:

Vessel pressure tested in accordance with DOT requirements, if applicable.

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

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	5	5	5	5
weeks/quarter	13	13	13	13

Pump ID No.		NA
Liquid Name		Condensate
Max. daily throughput (1000 gal/day)		~60.48
Max. annual throughput (1000 gal/yr)		22,075
Loading Method [1]		SUB
Max. Fill Rate (gal/min)		TBD
Average Fill Time (min/loading)		~60
Max. Bulk Liquid Temperature (^{o}F)		61.79
True Vapor Pressure [2]		6.867
Cargo Vessel Condition [3]		U
Control Equipment or Method [4]		O = Vapor return with VRU and combustion controls
Minimum control efficiency (%)		70% Capture/95% Control
Maximum Emission Rate	Loading (lb/hr)	VOC: 4.40 HAP: 0.09
	Annual (lb/yr)	VOC: 38,549 HAP: 753
Estimation Method [5]		ProMax Software

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the

proposed emissions limits.	
MONITORING None proposed	RECORDKEEPING None proposed
REPORTING None proposed	TESTING None proposed
MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.	
RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.	
REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.	
TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.	
10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty NA	

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): EU-LOAD-PW	
1. Loading Area Name: Produced Water Truck Loading	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): ☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks	
3. Loading Rack or Transfer Point Data:	
Number of pumps	One (1)
Number of liquids loaded	One (1)
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	One (1)
4. Does ballasting of marine vessels occur at this loading area? ☐ Yes ☐ No ☒ Does not apply	
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: Point is kept clear. Scotches are provided. Lines kept in good working order and tested periodically.	
6. Are cargo vessels pressure tested for leaks at this or any other location? ☒ Yes ☐ No If YES, describe: Vessel pressure tested in accordance with DOT requirements, if applicable.	
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):	

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	5	5	5	5
weeks/quarter	13	13	13	13

Pump ID No.		NA
Liquid Name		Produced Water
Max. daily throughput (1000 gal/day)		84
Max. annual throughput (1000 gal/yr)		42,000
Loading Method [1]		SUB
Max. Fill Rate (gal/min)		125
Average Fill Time (min/loading)		~60
Max. Bulk Liquid Temperature (^{o}F)		61.79
True Vapor Pressure [2]		0.2409
Cargo Vessel Condition [3]		U
Control Equipment or Method [4]		O = Vapor return with VRU and combustion controls
Minimum control efficiency (%)		70% Capture/95% Control
Maximum Emission Rate	Loading (lb/hr)	VOC: 0.68 HAP: <0.01
	Annual (lb/yr)	VOC: 5,963 HAP: 11
Estimation Method [5]		ProMax Software

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance

with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING None proposed	RECORDKEEPING None proposed
REPORTING None proposed	TESTING None proposed
MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.	
RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.	
REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.	
TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.	
10. Describe all operating ranges and maintenance procedures required by manufacturer to maintain warranty NA	

ATTACHMENT M

Air Pollution Control Device Sheet

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): APC-VRU

Equipment Information

1. Manufacturer: Model No.	2. Control Device Name: VRU Type: Electric Vapor Recovery Unit
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: VOC- 95% - assume 5% downtime HAP-95% - assume 5% downtime	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: N/A SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. N/A	
13. Description of method of handling the collected material(s) for reuse of disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☒ No
Are particulates present?	☐ Yes	☒ No
Are metals present?	☐ Yes	☒ No

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	25.85 mmHg	
Heat Content (BTU/scf):		
Oxygen Content (%):		
Moisture Content (%):		
Relative Humidity (%):		

16. Type of pollutant(s) controlled: ☐ Particulate (type):	☐ SO_x ☐ Odor ☒ Other (all hydrocarbons)
17. Inlet gas velocity: ft/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: ACF @ and PSIA	20. Gas stream temperature: Inlet: < 85 °F Outlet: < 90 °F
21. Gas flow rate: Design Maximum: ACFM Average Expected: ACFM	22. Particulate Grain Loading in grains/scf: Inlet: Outlet:

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A VOC	41.39		100	2.07		95
B HAP	0.84		100	0.04		95
C						
D						
E						

24. Dimensions of stack: Height ft. Diameter ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

Particulate Distribution

26. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	**Weight % for Size Range**	**Weight % for Size Range**
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system: N/A

29. Have you included ***Other Collectors Control Device*** in the Emissions Points Data Summary Sheet?

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: Monthly AVO closed vent system inspections per NSPS Subpart OOOO	RECORDKEEPING: Records of inspections
REPORTING: Annual reports of deviations	TESTING: None

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
>95% for VOC, 95% for HAP

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

ATTACHMENT N

Supporting Emission Calculations

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Site Wide Summary

Emission Source	Value	Units	Emission Unit ID(s)	Emission Point ID(s)	Control Device
Wells	6	per pad	---	---	---
Compressor Engine	2	per pad	EU-MC4219, EU-MC4220	EP-MC4219, EP-MC4220	NSCR Catalyst
Condensate Tanks	6	per pad	EU-TANKS-COND	EP-TANKS-COND	Vapor Recovery Unit
Produced Water Tanks	6	per pad	EU-TANKS-PW	EP-TANKS-PW	Vapor Recovery Unit
Line Heaters	3	per pad	EU-LH1 - EU-LH3	EP-LH1 - EP-LH3	None
GPU Burners	6	per pad	EU-GPU1 - EU-GPU3, EU-GPU4 - EU-GPU6	EP-GPU1 - EP-GPU3, EP-GPU4 - EP-GPU6	None
Heater Treaters	2	per pad	EU-HT1 - EU-HT2	EP-HT1 - EP-HT2	None
Dehydrator(s)	0	per pad	---	---	---
Reboiler(s)	0	per pad	---	---	---
Dehy Drip Tank	0	per pad	---	---	---
Vapor Combustor	1	per pad	APC-COMB-TKLD	APC-COMB-TKLD	---
Vapor Combustor Pilot	1	per pad	EU-PILOT	EP-PILOT	
Vapor Recovery Unit	1	per pad	APC-VRU	APC-VRU	---
Length of lease road	1,475	feet	---	---	---
Low Pressure Towers	3	per pad	---	---	---

Constituent	Condensate Tanks (tpy)	Produced Water Tanks (tpy)	Combustor (tpy)	Compressor Engines (tpy)	Line Heaters (tpy)	GPU Burners (tpy)	Heater Treaters (tpy)	Fugitive Components (tpy)	Condensate Loading (tpy)	Produced Water Loading (tpy)	Haul Roads (tpy)	Total Emissions (tpy)
Criteria Pollutants												
NO_X	---	---	7.28	2.80	2.178	2.90	0.48	---	---	---	---	**15.65**
CO	---	---	6.12	5.60	1.829	2.44	0.41	---	---	---	---	**16.39**
PM Total	---	---	0.55	0.21	0.166	0.22	0.04	---	---	---	11.27	**12.46**
PM_{10} Total	---	---	0.55	0.21	0.166	0.22	0.04	---	---	---	2.87	**4.06**
$PM_{2.5}$ Total	---	---	0.55	0.21	0.166	0.22	0.04	---	---	---	0.29	**1.48**
SO_2	---	---	0.04	0.01	0.013	0.02	0.00	---	---	---	---	**0.08**
VOC	8.20	0.86	---	2.10	0.120	0.16	0.03	4.03	19.27	2.98	---	**37.75**
Greenhouse Gases												
CO_2	---	---	7,709.91	1358.16	2,306.02	3,074.69	512.45	0.08	---	---	---	**14,961**
CH_4	---	---	0.15	5.24	0.04	5.8E-02	0.01	13.84	---	---	---	**19**
N_2O	---	---	0.01	0.00	0.00	5.8E-03	0.00	---	---	---	---	**0**
CO_2e	---	---	7,717.87	1,489.79	2,308.40	3,077.86	512.98	346.00	---	---	---	**15,453**
Hazardous Air Pollutants												
Methylnaphthalene (2-)	---	---	---	---	5.2E-07	7.0E-07	1.2E-07	---	---	---	---	1.3E-06
Methylchloranthrene (3-)	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Dimethybenz(a)anthracene (7,12-)	---	---	---	---	3.5E-07	4.6E-07	7.7E-08	---	---	---	---	8.9E-07
Acenaphthene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Acenaphthylene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Anthracene	---	---	---	---	5.2E-08	7.0E-08	1.2E-08	---	---	---	---	1.3E-07
Benz(a)anthracene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Benzene	1.7E-03	8.5E-04	---	1.7E-02	4.6E-05	6.1E-05	1.0E-05	---	2.6E-03	3.4E-03	---	2.6E-02
Benzo(a)pyrene	---	---	---	---	2.6E-08	3.5E-08	5.8E-09	---	---	---	---	6.7E-08
Benzo(b)fluoranthene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Benzo(g,h,i)perylene	---	---	---	---	2.6E-08	3.5E-08	5.8E-09	---	---	---	---	6.7E-08
Benzo(k)fluoranthene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Chrysene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Dibenzo(a,h)anthracene	---	---	---	---	2.6E-08	3.5E-08	5.8E-09	---	---	---	---	6.7E-08
Dichlorobenzene	---	---	---	---	2.6E-05	3.5E-05	5.8E-06	---	---	---	---	6.7E-05
Fluoranthene	---	---	---	---	6.5E-08	8.7E-08	1.5E-08	---	---	---	---	1.7E-07
Fluorene	---	---	---	---	6.1E-08	8.1E-08	1.4E-08	---	---	---	---	1.6E-07
Formaldehyde	---	---	---	---	1.6E-03	2.2E-03	3.6E-04	---	---	---	---	4.2E-03
Hexane, n-	1.7E-01	2.2E-03	---	---	3.9E-02	5.2E-02	8.7E-03	---	3.6E-01	1.6E-04	---	6.4E-01
Indeno(1,2,3-cd)pyrene	---	---	---	---	3.9E-08	5.2E-08	8.7E-09	---	---	---	---	1.0E-07
Naphthalene	---	---	---	1.1E-03	1.3E-05	1.8E-05	3.0E-06	---	---	---	---	1.1E-03
Phenanthrene	---	---	---	---	3.7E-07	4.9E-07	8.2E-08	---	---	---	---	9.5E-07
Pyrene	---	---	---	---	1.1E-07	1.5E-07	2.4E-08	---	---	---	---	2.8E-07
Toluene	2.4E-03	4.8E-04	---	6.1E-03	7.4E-05	9.9E-05	1.6E-05	---	4.0E-03	1.3E-03	---	1.5E-02
Arsenic	---	---	---	---	4.4E-06	5.8E-06	9.7E-07	---	---	---	---	1.1E-05
Beryllium	---	---	---	---	2.6E-07	3.5E-07	5.8E-08	---	---	---	---	6.7E-07
Cadmium	---	---	---	---	2.4E-05	3.2E-05	5.3E-06	---	---	---	---	6.1E-05
Chromium	---	---	---	---	3.0E-05	4.1E-05	6.8E-06	---	---	---	---	7.8E-05
Cobalt	---	---	---	---	1.8E-06	2.4E-06	4.1E-07	---	---	---	---	4.7E-06
Manganese	---	---	---	---	8.3E-06	1.1E-05	1.8E-06	---	---	---	---	2.1E-05
Mercury	---	---	---	---	5.7E-06	7.6E-06	1.3E-06	---	---	---	---	1.4E-05
Nickel	---	---	---	---	4.6E-05	6.1E-05	1.0E-05	---	---	---	---	1.2E-04
Selenium	---	---	---	---	5.2E-07	7.0E-07	1.2E-07	---	---	---	---	1.3E-06
Ethylbenzene	8.1E-04	9.2E-05	---	2.7E-04	---	---	---	---	1.4E-03	1.3E-04	---	2.7E-03
Trimethylpentane (2,2,4-)	---	---	---	---	---	---	---	---	---	---	---	0.0E+00
Xylene	2.3E-03	2.6E-04	---	2.1E-03	---	---	---	---	3.9E-03	3.2E-04	---	8.9E-03
1,1,2,2-Tetrachloroethane	---	---	---	2.8E-04	---	---	---	---	---	---	---	---
1,1,2-Trichloroethane	---	---	---	1.7E-04	---	---	---	---	---	---	---	---
1,3-Butadiene	---	---	---	7.3E-03	---	---	---	---	---	---	---	---
1,3-Dichloropropene	---	---	---	1.4E-04	---	---	---	---	---	---	---	---
Acetaldehyde	---	---	---	3.1E-02	---	---	---	---	---	---	---	---
Acrolein	---	---	---	2.9E-02	---	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	1.9E-04	---	---	---	---	---	---	---	---
Chlorobenzene	---	---	---	1.4E-04	---	---	---	---	---	---	---	---
Chloroform	---	---	---	1.5E-04	---	---	---	---	---	---	---	---
Ethylene Dibromide	---	---	---	2.3E-04	---	---	---	---	---	---	---	---
Methanol	---	---	---	3.4E-02	---	---	---	---	---	---	---	---
Methylene Chloride	---	---	---	4.5E-04	---	---	---	---	---	---	---	---
PAH	---	---	---	1.5E-03	---	---	---	---	---	---	---	---
Styrene	---	---	---	1.3E-04	---	---	---	---	---	---	---	---
Vinyl Chloride	---	---	---	7.9E-05	---	---	---	---	---	---	---	---
Total HAP	0.18	0.00	---	0.89	0.04	0.05	0.01	0.07	0.38	0.01	---	**1.63**

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Condensate Storage Tanks

Throughput Parameter	Value	Units
Operational Hours	8,760	hrs/yr
Total Condensate Throughput	1,440	bbl/day

Description	Potential Throughput (gal/yr)
Condensate	22,075,200

Condesnate Storage Tanks (400 bbl, each) - Uncontrolled *(Total)*

Constituent	Working Emissions tpy	Breathing Emissions tpy	Flashing Emissions tpy	Total Emissions [1] lb/hr	Total Emissions [1] tpy
Propane	17.75	3.86	22.39	15.068	66.00
Isobutane	3.87	0.84	5.22	3.400	14.89
n-Butane	12.02	2.61	16.01	10.494	45.96
Isopentane	2.49	0.54	3.48	2.228	9.76
n-Pentane	3.33	0.72	4.74	3.013	13.19
n-Hexane	0.86	0.19	1.25	0.786	3.44
Methylcyclopentane	0.06	0.01	0.10	0.060	0.26
Benzene	0.01	0.00	0.01	0.008	0.03
Cyclohexane	0.08	0.02	0.14	0.079	0.35
n-Heptane	0.25	0.05	0.39	0.240	1.05
n-Octane	0.13	0.03	0.21	0.127	0.56
n-Nonane	0.03	0.01	0.04	0.025	0.11
n-Decane	0.01	0.00	0.01	0.007	0.03
n-Undecane	0.00	0.00	0.01	0.005	0.02
Dodecane	0.00	0.00	0.00	<0.01	<0.01
Triethylene Glycol	0.00	0.00	0.00	<0.01	<0.01
Cyclopentane	0.01	0.00	0.01	0.005	0.02
Isohexane	0.00	0.00	0.00	<0.01	<0.01
3-Methylpentane	0.81	0.18	1.16	0.732	3.21
Neohexane	1.05	0.23	1.48	0.944	4.13
2,3-Dimethylbutane	0.12	0.03	0.17	0.106	0.46
Methylcyclohexane	0.09	0.02	0.15	0.090	0.40
Isooctane	0.00	0.00	0.00	<0.01	<0.01
Decane, 2-Methyl-	0.00	0.00	0.00	<0.01	<0.01
Toluene	0.01	0.00	0.02	0.011	0.05
m-Xylene	0.01	0.00	0.02	0.011	0.05
Ethylbenzene	0.00	0.00	0.01	0.004	0.02
Total Emissions:	42.975	9.341	57.017	37.443	163.999
Total VOC Emissions:	42.975	9.341	57.017	37.443	163.999
Total HAP Emissions:	0.888	0.193	1.310	0.819	3.586

[1] Emissions calculated using ProMax Software. ProMax software provides estiamtes for working, breathing, and flashing losses associated with total throughput (i.e emissions from all tanks at the facility). A 50 percent compliance margin was added to total storage tank emissions

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Condensate Storage Tanks

Condensate Storage Tanks (400 bbl, each) - Controlled *(Total)*

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.753	3.300
Isobutane	0.170	0.745
n-Butane	0.525	2.298
Isopentane	0.111	0.488
n-Pentane	0.151	0.660
n-Hexane	0.039	0.172
Methylcyclopentane	0.003	0.013
Benzene	0.000	0.002
Cyclohexane	0.004	0.017
n-Heptane	0.012	0.052
n-Octane	0.006	0.028
n-Nonane	0.001	0.006
n-Decane	0.000	0.002
n-Undecane	0.000	0.001
Dodecane	<0.01	<0.01
Triethylene Glycol	<0.01	<0.01
Cyclopentane	0.000	0.001
Isohexane	<0.01	<0.01
3-Methylpentane	0.037	0.160
Neohexane	0.047	0.207
2,3-Dimethylbutane	0.005	0.023
Methylcyclohexane	0.005	0.020
Isooctane	<0.01	<0.01
Decane, 2-Methyl-	<0.01	<0.01
Toluene	0.001	0.002
m-Xylene	0.001	0.002
Ethylbenzene	0.000	0.001
Total Emissions:	1.872	8.200
Total VOC Emissions:	1.872	8.200
Total HAP Emissions:	0.041	0.179

[1] Vapors will be routed to the vapor combustor with a 98% control efficiency in the event of any VRU downtime. An overall control efficiency of 95% is used for the purpose of establishing PTE.

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Condensate Storage Tanks

Control Efficiency of Combustor	98%
Pilot Rating	0.05 MMBtu/hr
Combustor Rating	15 MMBtu/hr

Enclosed Combustor Emissions [1]

Pollutant [2]	Emission Factor (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.110	1.66	7.26	0.01	0.02
CO	0.093	1.39	6.10	0.00	0.02
PM/PM_{10}	0.008	0.13	0.55	3.8E-04	0.002
SO_2	6.6E-04	0.01	0.04	3.0E-05	1.31E-04
CO_2 (Natural Gas Firing)	116.997	1754.96	7686.72	5.294	23.188
CH_4 (Natural Gas Firing)	0.002	0.03	0.14	1.0E-04	4.37E-04
N_2O (Natural Gas Firing)	2.2E-04	0.00	0.01	1.0E-05	4.37E-05

[1] Emission factors from AP-42 Ch. 1.4 for natural gas combustion were used as they were determined to be most representative of the process. Ch. 5.3 (Natural Gas Processing) was consulted, however, factors contained there are appropriate for amine gas sweetening processes, which is not the case at this facility. Also, Ch. 13.5 (Industrial Flares) was consulted, but since the control device in this case is an enclosed combustor vs. an elevated flare, these factors were also determined to be inappropriate.

[2] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Produced Water Storage Tanks

Throughput Parameter	Value	Units
Operational Hours	8,760	hrs/yr
Total Throughput	1,000	bbl/day

Description	Potential Throughput (gal/yr)
Produced Water	15,330,000

Produced Water Tanks (400 bbl each) - Uncontrolled *(Total)*

Constituent	Working Emissions tpy	Breathing Emissions tpy	Flashing Emissions tpy	Total Emissions [1] lb/hr	Total Emissions [1] tpy
Propane	7.54	0.00	1.65	3.148	13.79
Isobutane	0.08	0.00	0.15	0.080	0.35
n-Butane	0.73	0.00	0.82	0.530	2.32
Isopentane	0.03	0.00	0.13	0.052	0.23
n-Pentane	0.03	0.00	0.19	0.073	0.32
n-Hexane	0.00	0.00	0.03	0.010	0.04
Methylcyclopentane	0.00	0.00	0.01	0.003	0.01
Benzene	0.01	0.00	0.00	0.004	0.02
Cyclohexane	0.00	0.00	0.01	0.005	0.02
n-Heptane	0.00	0.00	0.01	0.003	0.01
n-Octane	0.00	0.00	0.00	0.001	0.01
n-Nonane	0.00	0.00	0.00	0.001	0.00
n-Decane	0.00	0.00	0.00	0.000	0.00
n-Undecane	0.00	0.00	0.00	0.000	0.00
Dodecane	0.00	0.00	0.00	<0.01	<0.01
Triethylene Glycol	0.00	0.00	0.00	<0.01	<0.01
Cyclopentane	0.00	0.00	0.00	0.000	0.00
Isohexane	0.00	0.00	0.00	<0.01	<0.01
3-Methylpentane	0.00	0.00	0.06	0.021	0.09
Neohexane	0.00	0.00	0.02	0.009	0.04
2,3-Dimethylbutane	0.00	0.00	0.01	0.002	0.01
Methylcyclohexane	0.00	0.00	0.01	0.004	0.02
Isooctane	0.00	0.00	0.00	<0.01	<0.01
Decane, 2-Methyl-	0.00	0.00	0.00	<0.01	<0.01
Toluene	0.00	0.00	0.00	0.002	0.01
m-Xylene	0.00	0.00	0.00	0.001	0.01
Ethylbenzene	0.00	0.00	0.00	0.000	0.00
Total Emissions:	8.431	<0.01	3.101	3.949	17.298
Total VOC Emissions:	8.431	<0.01	3.101	3.949	17.298
Total HAP Emissions:	0.015	<0.01	0.037	0.018	0.077

[1] Emissions calculated using ProMax Software. ProMax software provides estiamtes for working, breathing, and flashing losses associated with total throughput (i.e emissions from all tanks at the facility). A 50 percent compliance margin was added to total storage tank emissions

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Produced Water Storage Tanks

Produced Water Tanks (400 bbl each) - Controlled *(Total)*

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.157	0.689
Isobutane	0.004	0.017
n-Butane	0.026	0.116
Isopentane	0.003	0.011
n-Pentane	0.004	0.016
n-Hexane	0.000	0.002
Methylcyclopentane	0.000	0.001
Benzene	0.000	0.001
Cyclohexane	0.000	0.001
n-Heptane	0.000	0.001
n-Octane	0.000	0.000
n-Nonane	0.000	0.000
n-Decane	0.000	0.000
n-Undecane	0.000	0.000
Dodecane	<0.01	<0.01
Triethylene Glycol	<0.01	<0.01
Cyclopentane	0.000	0.000
Isohexane	<0.01	<0.01
3-Methylpentane	0.001	0.005
Neohexane	0.000	0.002
2,3-Dimethylbutane	0.000	0.000
Methylcyclohexane	0.000	0.001
Isooctane	<0.01	<0.01
Decane, 2-Methyl-	<0.01	<0.01
Toluene	0.000	0.000
m-Xylene	0.000	0.000
Ethylbenzene	0.000	0.000
Total Emissions:	0.197	0.865
Total VOC Emissions:	0.197	0.865
Total HAP Emissions:	0.001	0.004

[1] Vapors will be routed to the vapor combustor with a 98% control efficiency in the event of any VRU downtime. An overall control efficiency of 95% is used for the purpose of establishing PTE.

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Compressor Engine

Engine Information:

Manufacturer:	Caterpillar
Model No.:	G3306NA
Engine ID	EU-MC4219 & EU-MC4220
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	145
Control Device:	NSCR Catalyst

Engine Fuel Information:

Fuel Type:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	905
Specific Fuel Consumption (Btu/bhp-hr):	8,625
Maximum Fuel Consumption at 100% Load (scf/hr):	1,382
Heat Input (MMBtu/hr):	1.25
Potential Fuel Consumption (MMBtu/yr):	10,955
Max. Fuel Consumption at 100%(MMscf/hr):	0.0014
Max. Fuel Consumption (MMscf/yr):	12.1
Max. Annual Hours of Operation (hr/yr):	8,760

Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	1.00	g/bhp-hr	0.32	1.40	Vendor Data
VOC (excludes HCHO)	0.22	g/bhp-hr	0.07	0.67	Vendor Data
CO	2.00	g/bhp-hr	0.64	2.80	Vendor Data
SO_X	0.001	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.02	0.11	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.02	0.11	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.27	g/bhp-hr	0.09	0.38	Vendor Data
GHG (CO_2e)	See Table Below		170	745	40 CFR 98, Tables C-1 & C-2
Other (Total HAP)	See Table Below		0.10	0.44	AP-42, Table 3.2-3 (Aug-2000)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type.

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Compressor Engine

Greenhouse Gas (GHG) & Hazardous Air Pollutant (HAP) Emissions Calculations:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	485.00	g/bhp-hr	155.04	679.08	Vendor Data
CH_4	1.870	g/bhp-hr	0.60	2.62	Vendor Data (THC-NMHC)
N_2O	0.0001	kg/MMBtu	0.00	0.00	40 CFR 98, Tables C-2
GHG (CO_2e)			**170**	**745**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	0.00	0.02	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	0.00	0.01	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	0.00	0.01	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	0.00	0.02	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	0.00	0.00	AP-42, Table 3.2-3 (Aug-2000)
Total HAP			**0.10**	**0.44**	

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Line Heaters

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	905	BTU/scf
Heat Input	1.50	MMBtu/hr (each)
Fuel Consumption	1.66E-03	MMscf/hr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	1.7E-01	7.3E-01
CO	84	1.4E-01	6.1E-01
SO_2	0.6	9.9E-04	4.4E-03
PM Total	7.6	1.3E-02	5.5E-02
PM Condensable	5.7	9.4E-03	4.1E-02
PM_{10} (Filterable)	1.9	3.1E-03	1.4E-02
$PM_{2.5}$ (Filterable)	1.9	3.1E-03	1.4E-02
VOC	5.5	9.1E-03	4.0E-02
Lead	5.00E-04	8.3E-07	3.6E-06
CO_2 (Natural Gas Firing)[4]	105,883	175	769
CH_4 (Natural Gas Firing)[4]	2.0	3.3E-03	1.4E-02
N_2O (Natural Gas Firing)[4]	0.20	3.3E-04	1.4E-03

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Line Heaters

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	4.0E-08	1.7E-07
3-Methylchloranthrene	1.8E-06	3.0E-09	1.3E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.7E-08	1.2E-07
Acenaphthene	1.8E-06	3.0E-09	1.3E-08
Acenaphthylene	1.8E-06	3.0E-09	1.3E-08
Anthracene	2.4E-06	4.0E-09	1.7E-08
Benz(a)anthracene	1.8E-06	3.0E-09	1.3E-08
Benzene	2.1E-03	3.5E-06	1.5E-05
Benzo(a)pyrene	1.2E-06	2.0E-09	8.7E-09
Benzo(b)fluoranthene	1.8E-06	3.0E-09	1.3E-08
Benzo(g,h,i)perylene	1.2E-06	2.0E-09	8.7E-09
Benzo(k)fluoranthene	1.8E-06	3.0E-09	1.3E-08
Chrysene	1.8E-06	3.0E-09	1.3E-08
Dibenzo(a,h) anthracene	1.2E-06	2.0E-09	8.7E-09
Dichlorobenzene	1.2E-03	2.0E-06	8.7E-06
Fluoranthene	3.0E-06	5.0E-09	2.2E-08
Fluorene	2.8E-06	4.6E-09	2.0E-08
Formaldehyde	7.5E-02	1.2E-04	5.4E-04
Hexane	1.8E+00	3.0E-03	1.3E-02
Indo(1,2,3-cd)pyrene	1.8E-06	3.0E-09	1.3E-08
Naphthalene	6.1E-04	1.0E-06	4.4E-06
Phenanthrene	1.7E-05	2.8E-08	1.2E-07
Pyrene	5.0E-06	8.3E-09	3.6E-08
Toluene	3.4E-03	5.6E-06	2.5E-05
Arsenic	2.0E-04	3.3E-07	1.5E-06
Beryllium	1.2E-05	2.0E-08	8.7E-08
Cadmium	1.1E-03	1.8E-06	8.0E-06
Chromium	1.4E-03	2.3E-06	1.0E-05
Cobalt	8.4E-05	1.4E-07	6.1E-07
Manganese	3.8E-04	6.3E-07	2.8E-06
Mercury	2.6E-04	4.3E-07	1.9E-06
Nickel	2.1E-03	3.5E-06	1.5E-05
Selenium	2.4E-05	4.0E-08	1.7E-07
Total HAP		**3.1E-03**	**1.4E-02**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.
[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).
[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Heater Treaters

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	905	BTU/scf
Heat Input	0.50	MMBtu/hr (each)
Fuel Consumption	5.52E-04	MMscf/hr (each)
Annual Fuel Consumption	4.84	MMscf/yr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	5.52E-02	2.4E-01
CO	84	4.64E-02	2.0E-01
SO_2	0.6	3.31E-04	1.5E-03
PM Total	7.6	4.20E-03	1.8E-02
PM Condensable	5.7	3.15E-03	1.4E-02
PM_{10} (Filterable)	1.9	1.05E-03	4.6E-03
$PM_{2.5}$ (Filterable)	1.9	1.05E-03	4.6E-03
VOC	5.5	3.04E-03	1.3E-02
Lead	5.00E-04	2.8E-07	1.2E-06
CO_2 (Natural Gas Firing)[4]	105,883	58	256
CH_4 (Natural Gas Firing)[4]	2.0	1.1E-03	4.8E-03
N_2O (Natural Gas Firing)[4]	0.20	1.1E-04	4.8E-04

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Heater Treaters

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	1.3E-08	5.8E-08
3-Methylchloranthrene	1.8E-06	9.9E-10	4.4E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	8.8E-09	3.9E-08
Acenaphthene	1.8E-06	9.9E-10	4.4E-09
Acenaphthylene	1.8E-06	9.9E-10	4.4E-09
Anthracene	2.4E-06	1.3E-09	5.8E-09
Benz(a)anthracene	1.8E-06	9.9E-10	4.4E-09
Benzene	2.1E-03	1.2E-06	5.1E-06
Benzo(a)pyrene	1.2E-06	6.6E-10	2.9E-09
Benzo(b)fluoranthene	1.8E-06	9.9E-10	4.4E-09
Benzo(g,h,i)perylene	1.2E-06	6.6E-10	2.9E-09
Benzo(k)fluoranthene	1.8E-06	9.9E-10	4.4E-09
Chrysene	1.8E-06	9.9E-10	4.4E-09
Dibenzo(a,h) anthracene	1.2E-06	6.6E-10	2.9E-09
Dichlorobenzene	1.2E-03	6.6E-07	2.9E-06
Fluoranthene	3.0E-06	1.7E-09	7.3E-09
Fluorene	2.8E-06	1.5E-09	6.8E-09
Formaldehyde	7.5E-02	4.1E-05	1.8E-04
Hexane	1.8E+00	9.9E-04	4.4E-03
Indo(1,2,3-cd)pyrene	1.8E-06	9.9E-10	4.4E-09
Naphthalene	6.1E-04	3.4E-07	1.5E-06
Phenanthrene	1.7E-05	9.4E-09	4.1E-08
Pyrene	5.0E-06	2.8E-09	1.2E-08
Toluene	3.4E-03	1.9E-06	8.2E-06
Arsenic	2.0E-04	1.1E-07	4.8E-07
Beryllium	1.2E-05	6.6E-09	2.9E-08
Cadmium	1.1E-03	6.1E-07	2.7E-06
Chromium	1.4E-03	7.7E-07	3.4E-06
Cobalt	8.4E-05	4.6E-08	2.0E-07
Manganese	3.8E-04	2.1E-07	9.2E-07
Mercury	2.6E-04	1.4E-07	6.3E-07
Nickel	2.1E-03	1.2E-06	5.1E-06
Selenium	2.4E-05	1.3E-08	5.8E-08
Total HAP		**1.0E-03**	**4.6E-03**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.
[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).
[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

GPU Burners

Parameter	Value	Units
Fuel Used	Natural Gas	
Higher Heating Value (HHV)	905	BTU/scf
Heat Input	1.00	MMBtu/hr (each)
Fuel Consumption [1]	1.10E-03	MMscf/hr (each)
Annual Fuel Consumption	9.68	MMscf/yr (each)
Potential Annual Hours of Operation	8,760	hr/yr

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
NO_x	100	1.10E-01	4.8E-01
CO	84	9.28E-02	4.1E-01
SO_2	0.6	6.63E-04	2.9E-03
PM Total	7.6	8.40E-03	3.7E-02
PM Condensable	5.7	6.30E-03	2.8E-02
PM_{10} (Filterable)	1.9	2.10E-03	9.2E-03
$PM_{2.5}$ (Filterable)	1.9	2.10E-03	9.2E-03
VOC	5.5	6.08E-03	2.7E-02
Lead	5.00E-04	5.52E-07	2.4E-06
CO_2 (Natural Gas Firing)[4]	105,883	117.00	512
CH_4 (Natural Gas Firing)[4]	2.0	0.00	9.7E-03
N_2O (Natural Gas Firing)[4]	0.20	0.00	9.7E-04

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

GPU Burners

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
Methylnaphthalene (2-)	2.4E-05	2.7E-08	1.2E-07
3-Methylchloranthrene	1.8E-06	2.0E-09	8.7E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.8E-08	7.7E-08
Acenaphthene	1.8E-06	2.0E-09	8.7E-09
Acenaphthylene	1.8E-06	2.0E-09	8.7E-09
Anthracene	2.4E-06	2.7E-09	1.2E-08
Benz(a)anthracene	1.8E-06	2.0E-09	8.7E-09
Benzene	2.1E-03	2.3E-06	1.0E-05
Benzo(a)pyrene	1.2E-06	1.3E-09	5.8E-09
Benzo(b)fluoranthene	1.8E-06	2.0E-09	8.7E-09
Benzo(g,h,i)perylene	1.2E-06	1.3E-09	5.8E-09
Benzo(k)fluoranthene	1.8E-06	2.0E-09	8.7E-09
Chrysene	1.8E-06	2.0E-09	8.7E-09
Dibenzo(a,h) anthracene	1.2E-06	1.3E-09	5.8E-09
Dichlorobenzene	1.2E-03	1.3E-06	5.8E-06
Fluoranthene	3.0E-06	3.3E-09	1.5E-08
Fluorene	2.8E-06	3.1E-09	1.4E-08
Formaldehyde	7.5E-02	8.3E-05	3.6E-04
Hexane	1.8E+00	2.0E-03	8.7E-03
Indo(1,2,3-cd)pyrene	1.8E-06	2.0E-09	8.7E-09
Naphthalene	6.1E-04	6.7E-07	3.0E-06
Phenanthrene	1.7E-05	1.9E-08	8.2E-08
Pyrene	5.0E-06	5.5E-09	2.4E-08
Toluene	3.4E-03	3.8E-06	1.6E-05
Arsenic	2.0E-04	2.2E-07	9.7E-07
Beryllium	1.2E-05	1.3E-08	5.8E-08
Cadmium	1.1E-03	1.2E-06	5.3E-06
Chromium	1.4E-03	1.5E-06	6.8E-06
Cobalt	8.4E-05	9.3E-08	4.1E-07
Manganese	3.8E-04	4.2E-07	1.8E-06
Mercury	2.6E-04	2.9E-07	1.3E-06
Nickel	2.1E-03	2.3E-06	1.0E-05
Selenium	2.4E-05	2.7E-08	1.2E-07
Total HAP		**2.1E-03**	**9.1E-03**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3, & 1.4-4.

[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Fugitive Equipment Leaks

VOC Fugitive Emissions from Component Leaks

Equipment Type	Emission Factors [1] (lb/hr/source)	Facility Equipment Count [2, 3] (units)	Hourly Fugitive VOC Emissions (lb/hr)	Annual Fugitive VOC Emissions (tpy)	Hourly Fugitive HAP Emissions (lb/hr)	Annual Fugitive HAP Emissions (tpy)
Gas/Vapor Service:						
Connectors	4.41E-04	506	0.05	0.23	0.00	0.00
Valves	9.92E-03	123	0.29	1.28	0.01	0.02
Flanges	8.60E-04	506	0.10	0.46	0.00	0.01
Compressor Seals	1.94E-02	6	0.03	0.12	0.00	0.00
Relief Valves	1.94E-02	40	0.19	0.81	0.00	0.01
Open-Ended Lines	4.41E-05	0	0.00	0.00	0.00	0.00
Light Liquid Service:						
Connectors	4.63E-04	558	0.06	0.27	0.00	0.00
Valves	5.51E-03	141	0.19	0.81	0.00	0.01
Flanges	2.40E-04	558	0.03	0.14	0.00	0.00
Pump Seals	2.87E-02	0	0.00	0.00	0.00	0.00
Relief Valves	1.65E-02	0	0.00	0.00	0.00	0.00
Emission Totals:			**0.94**	**4.13**	**0.02**	**0.07**

Notes:
1. All emission factors are from U.S. EPA's *Protocol for Equipment Leak Emission Estimates* (Table 2-4)
2. "Other" equipment types include compressor seals, relief valves, diaphragms, drains, meters, etc.
3. The component count is estimated based on design.
4. VOC and HAP emissions are based on fractions of site specific gas analysis.

GHG Fugitive Emissions from Component Leaks

Component	Component Count [1]	GHG Emission Factor [2] (scf/hr/component)	CH_4 Emissions [3,4] (tpy)	CO_2 Emissions [3,4] (tpy)	CO_2e Emissions [5] (tpy)
Gas/Vapor Service:					
Connectors	506	3.00E-03	0.20	0.00	5.03
Valves	123	2.70E-02	0.44	0.00	11.00
Flanges	506	3.00E-03	0.20	0.00	5.03
Compressor Seals	6	1.33E+01	10.57	0.06	264.25
Relief Valves	40	4.00E-02	0.21	0.00	5.30
Light Liquid Service:					
Connectors	558	7.00E-03	0.52	0.00	12.93
Valves	141	5.00E-02	0.93	0.01	23.34
Flanges	558	3.00E-03	0.22	0.00	5.54
Pump Seals	0	1.00E-02	0.00	0.00	0.00
Relief Valves	0	3.00E-01	0.00	0.00	0.00
Total			**13.29**	**0.08**	**332.42**

Notes:
1. Population emission factors for gas service in the Eastern U.S. from *Table W-1A of Subpart W - Default Whole Gas Emission Factors for Onshore Production* , 40 CFR 98, Subpart W.
2. Calculated in accordance with Equations W-31, W-35 and W-36 in Subpart W of 40 CFR 98.
3. Mole fractions of CH_4 and CO_2 based on gas analysis:
   CH_4: 71% CO_2: 0.15%
4. Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:
   Carbon Dioxide (CO_2): 1
   Methane (CH_4): 25

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Fugitive Equipment Leaks

VOC/GHG Fugitive Emissions from Blowdowns:

Blowdown Type	Number of Events	Gas Volume (scf/event)	VOC Emissions (tpy)	HAP Emissions (tpy)	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (tpy)
Compressor	48	1,000	0.11	0.00	0.73	0.00	18.14
Total			**0.11**	**0.00**	**0.73**	**0.00**	**18.14**

Notes:

1. The number of compressor blowdowns assumes 2 blowdowns per compressor per month.
2. CH_4 and CO_2 emissions are based on fractions of these pollutants in the site-specific gas analysis.
3. Emissions are calculated in accordance with Equations W-31, W-35 and W-36 in Subpart W of 40 CFR 98.
4. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).

Fugitive Component Emissions Data:

Pollutant	Atmospheric Emissions		Emissions Estimation Method
	lbs/hr	tpy	
VOC	0.97	4.24	EPA Protocol, Table 2-4 and Site-Specific Gas Analysis
HAPs	0.02	0.08	EPA Protocol, Table 2-4 and Site-Specific Gas Analysis
GHG (CO_2e)	80	351	40 CFR 98, Table W-1A and Site-Specific Gas Analysis

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Condensate Loading

Liquid Loading Losses:

Description	Maximum Throughput[1] (gal)
Liquids Hauling	22,075,200

[1] Sum of the annual throughput from each well at the pad

[2] Vapor balance capture efficiency is 70% and control Efficiency is 98%

Constituent	Total Emissions [1] lb/hr	tpy
Propane	1.771	7.756
Isobutane	0.416	1.822
n-Butane	1.286	5.633
Isopentane	0.252	1.105
n-Pentane	0.334	1.462
n-Hexane	0.083	0.365
Methylcyclopentane	0.006	0.027
Benzene	0.001	0.003
Cyclohexane	0.008	0.033
n-Heptane	0.024	0.105
n-Octane	0.012	0.055
n-Nonane	0.002	0.011
n-Decane	0.001	0.003
n-Undecane	0.000	0.002
Dodecane	0.000	0.000
Triethylene Glycol	0.000	0.000
Cyclopentane	0.001	0.002
Isohexane	0.000	0.000
3-Methylpentane	0.078	0.343
Neohexane	0.103	0.451
2,3-Dimethylbutane	0.011	0.050
Methylcyclohexane	0.009	0.039
Isooctane	0.000	0.000
Decane, 2-Methyl-	0.000	0.000
Toluene	0.001	0.004
m-Xylene	0.001	0.004
Ethylbenzene	0.000	0.001
Total Emissions:	4.401	19.275
Total VOC Emissions:	4.401	19.275
Total HAP Emissions:	0.09	0.38

[1] Liquid loading emissions were estimated using ProMax Run for submerged loading dedicated normal service and overall reduction efficiency of 69 perce

Company Name: SWN Production Company, LLC
Facility Name: Charles Frye Wellpad
Project Description: R13 Modification

Produced Water Loading

Liquid Loading Losses:

Description	Maximum Throughput[1] (gal)
Liquids Hauling	15,330,000

[1] Sum of the annual throughput from each well at the pad.
[2] Vapor balance capture efficiency is 70% and control Efficiency is 98%

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.609	2.667
Isobutane	0.007	0.030
n-Butane	0.059	0.258
Isopentane	0.002	0.009
n-Pentane	0.002	0.009
n-Hexane	0.000	0.000
Methylcyclopentane	0.000	0.000
Benzene	0.001	0.003
Cyclohexane	0.000	0.001
n-Heptane	0.000	0.000
n-Octane	0.000	0.000
n-Nonane	0.000	0.000
n-Decane	0.000	0.000
n-Undecane	0.000	0.000
Dodecane	0.000	0.000
Triethylene Glycol	0.000	0.000
Cyclopentane	0.000	0.000
Isohexane	0.000	0.000
3-Methylpentane	0.000	0.001
Neohexane	0.000	0.000
2,3-Dimethylbutane	0.000	0.000
Methylcyclohexane	0.000	0.000
Isooctane	0.000	0.000
Decane, 2-Methyl-	0.000	0.000
Toluene	0.000	0.001
m-Xylene	0.000	0.000
Ethylbenzene	0.000	0.000
Total Emissions:	0.681	2.982
Total VOC Emissions:	0.681	2.982
Total HAP Emissions:	0.00	0.01

[1] Liquid loading emissions were estimated using ProMax Run for submerged loading dedicated normal service and overall reduction efficiency of 69 percent

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

Unpaved Roads: $E\ (lb/VMT) = k(s/12)^a(W/3)^b)*[(365-p)/365]$

	PM		PM_{10}	$PM_{2.5}$	
k Factor (lb/VMT)	4.9		1.5	0.15	AP-42 Table 13.2.2-2 (Final, 11/06)
Silt content, s	4.8	%			AP-42 Table 13.2.2-1 (11/06), for Sand and Gravel Processing
Number of Rain Days, p	150				AP-42 Figure 13.2.1-2
a	0.7		0.9	0.9	AP-42 Table 13.2.2-2 (Final, 11/06)
b	0.45		0.45	0.45	AP-42 Table 13.2.2-2 (Final, 11/06)

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile/trip)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.56	9,351	5,225	0	11.19	2.85	0.285
Employee Vehicles	3	3	3	0.56	200	112	0	0.08	0.02	0.002
Total Potential Emissions								**11.27**	**2.87**	**0.29**

Company Name: **SWN Production Company, LLC**
Facility Name: **Charles Frye Wellpad**
Project Description: **R13 Modification**

Gas Analysis

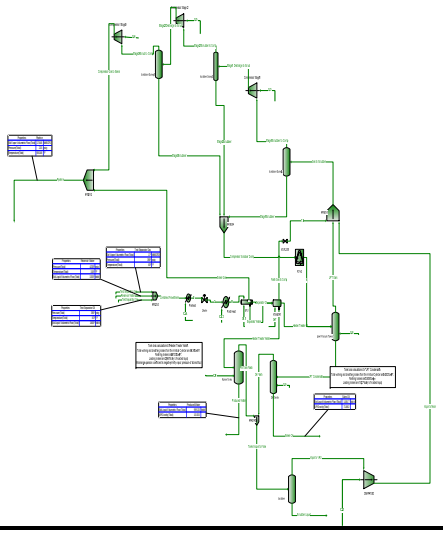
Sample Location: Charles Frye Wellpad
HHV (Btu/scf): 905

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.149	44.01	6.6E-02	2.9E-03	0.29
Nitrogen	0.513	28.01	1.4E-01	6.5E-03	0.65
Methane	71.427	16.04	1.1E+01	5.1E-01	51.48
Ethane	17.491	30.07	5.3E+00	2.4E-01	23.63
Propane	6.802	44.10	3.0E+00	1.3E-01	13.48
Isobutane	0.668	58.12	3.9E-01	1.7E-02	1.74
n-Butane	1.828	58.12	1.1E+00	4.8E-02	4.77
Isopentane	0.327	72.15	2.4E-01	1.1E-02	1.06
n-Pentane	0.440	72.15	3.2E-01	1.4E-02	1.43
Cyclopentane	<0.001	70.1	0.0E+00	0.0E+00	0.00
n-Hexane	0.107	86.18	9.2E-02	4.1E-03	0.41
Cyclohexane	<0.001	84.16	0.0E+00	0.0E+00	0.00
Other Hexanes	0.135	86.18	1.2E-01	5.2E-03	0.52
Heptanes	0.078	100.21	7.8E-02	3.5E-03	0.35
Methylcyclohexane	<0.001	98.19	0.0E+00	0.0E+00	0.00
2,2,4-Trimethylpentane	<0.001	114.23	0.0E+00	0.0E+00	0.00
Benzene*	0.001	78.11	7.8E-04	3.5E-05	0.00
Toluene*	0.002	92.14	1.8E-03	8.3E-05	0.01
Ethylbenzene*	0.000	106.17	2.1E-04	9.5E-06	0.00
Xylenes*	0.001	106.16	1.1E-03	4.8E-05	0.00
C8 + Heavies	0.031	114.23	3.5E-02	1.6E-03	0.16
Oxygen			0.000	0.000	0.000
Totals	100		22.26	1.00	100

TOC (Total)	99.34				99.06
VOC (Total)	10.42				23.9
HAP (Total)	0.11				0.43

Charles Frye Pad
Plant Schematic

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Connections

	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
From Block	MIX-101	Water Tanks	--	GPU	Oil Tanks
To Block	--	--	MIX-102	MIX-101	--

Stream Composition

Mole Fraction	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
Nitrogen	0.00497228	4.79172E-09	0 *	0.00509241	1.57798E-09
Methane	0.698097	6.49224E-06	0 *	0.710836	1.68976E-05
CO2	0.00144937	1.81217E-06	0 *	0.001453	1.20041E-06
Ethane	0.179396	8.02153E-06	0 *	0.175966	0.00215892
Propane	0.0759153	6.44672E-06	0 *	0.069141	0.0349731
Isobutane	0.00746816	1.45921E-07	0 *	0.00668619	0.0225237
n-Butane	0.0199785	2.0462E-06	0 *	0.0182349	0.108585
Isopentane	0.00304298	1.52767E-07	0 *	0.0029561	0.0524918
n-Pentane	0.0041293	2.21825E-07	0 *	0.00406755	0.0966998
n-Hexane	0.000945381	1.12634E-08	0 *	0.000964448	0.0767692
Methylcyclopentane	7.60176E-05	3.15539E-08	0 *	7.74725E-05	0.00615833
Benzene	1.20624E-05	5.92002E-07	0 *	1.22742E-05	0.000969428
Cyclohexane	0.000106372	1.01856E-07	0 *	0.000108588	0.0107002
n-Heptane	0.00029099	2.35246E-09	0 *	0.000298454	0.0683248
n-Octane	0.00015236	8.56205E-10	0 *	0.000156453	0.110946
n-Nonane	2.98098E-05	1.32726E-09	0 *	3.06158E-05	0.0673008
n-Decane	9.23883E-06	2.14886E-10	0 *	9.48879E-06	0.0586629
n-Undecane	6.04083E-06	2.81336E-10	0 *	6.20429E-06	0.125248
Dodecane	0	0	0 *	0	0
Water	0.00172792	0.999972	1 *	0.00167796	0.00362548
Triethylene Glycol	0	0	0 *	0	0
Oxygen	0	0	0 *	0	0
Argon	0	0	0 *	0	0
Carbon Monoxide	0	0	0 *	0	0
Cyclopentane	8.01722E-06	7.20328E-09	0 *	8.01408E-06	0.000275309
Isohexane	0	0	0 *	0	0
3-Methylpentane	0.00085767	7.17691E-08	0 *	0.000872727	0.0564215
Neohexane	0.00106256	7.68864E-09	0 *	0.00107079	0.0414851
2,3-Dimethylbutane	0.000121246	3.97011E-09	0 *	0.000122982	0.00644661
Methylcyclohexane	0.000109198	2.89906E-08	0 *	0.00011199	0.0248843
Isooctane	0	0	0 *	0	0
Decane, 2-Methyl-	0	0	0 *	0	0
Toluene	1.66207E-05	6.93508E-07	0 *	1.70511E-05	0.0048068
m-Xylene	1.51314E-05	5.81811E-07	0 *	1.55387E-05	0.0151249
Ethylbenzene	5.2281E-06	1.8472E-07	0 *	5.36858E-06	0.00439997

Molar Flow	Pipeline lbmol/h	Produced Water lbmol/h	Reservoir Water lbmol/h	Sales Gas lbmol/h	Sales Oil lbmol/h
Nitrogen	9.63363	3.8622E-06	0 *	9.60642	2.31986E-07
Methane	1352.54	0.00523285	0 *	1340.94	0.00248418
CO2	2.8081	0.00146063	0 *	2.74096	0.000176478
Ethane	347.573	0.00646547	0 *	331.946	0.317392
Propane	147.083	0.00519616	0 *	130.429	5.14153
Isobutane	14.4693	0.000117614	0 *	12.613	3.31131
n-Butane	38.7078	0.00164927	0 *	34.3986	15.9635
Isopentane	5.89567	0.000123132	0 *	5.57644	7.71703
n-Pentane	8.00039	0.000178794	0 *	7.6731	14.2162
n-Hexane	1.83165	9.07844E-06	0 *	1.81935	11.2862
Methylcyclopentane	0.147282	2.5433E-05	0 *	0.146146	0.905361
Benzene	0.0233705	0.000477163	0 *	0.0231543	0.14252
Cyclohexane	0.206091	8.20973E-05	0 *	0.204843	1.57308

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Molar Flow	Pipeline lbmol/h	Produced Water lbmol/h	Reservoir Water lbmol/h	Sales Gas lbmol/h	Sales Oil lbmol/h
n-Heptane	0.563783	1.89612E-06	0 *	0.56301	10.0447
n-Octane	0.295193	6.90114E-07	0 *	0.295136	16.3106
n-Nonane	0.0577555	1.06979E-06	0 *	0.0577543	9.89417
n-Decane	0.0178999	1.73201E-07	0 *	0.0178999	8.62427
n-Undecane	0.0117039	2.26761E-07	0 *	0.0117039	18.4132
Dodecane	0	0	0 *	0	0
Water	3.34779	805.993	809.874 *	3.16534	0.532996
Triethylene Glycol	0	0	0 *	0	0
Oxygen	0	0	0 *	0	0
Argon	0	0	0 *	0	0
Carbon Monoxide	0	0	0 *	0	0
Cyclopentane	0.0155331	5.80596E-06	0 *	0.0151179	0.0404743
Isohexane	0	0	0 *	0	0
3-Methylpentane	1.66171	5.7847E-05	0 *	1.64633	8.29476
Neohexane	2.05867	6.19716E-06	0 *	2.01997	6.0989
2,3-Dimethylbutane	0.234911	3.19997E-06	0 *	0.231996	0.947743
Methylcyclohexane	0.211567	2.33668E-05	0 *	0.21126	3.65834
Isooctane	0	0	0 *	0	0
Decane, 2-Methyl-	0	0	0 *	0	0
Toluene	0.032202	0.000558978	0 *	0.0321656	0.706667
m-Xylene	0.0293166	0.000468949	0 *	0.0293125	2.22357
Ethylbenzene	0.0101293	0.000148887	0 *	0.0101274	0.646857

Mass Fraction	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
Nitrogen	0.00615534	7.45079E-09	0 *	0.00640207	4.50088E-10
Methane	0.494899	5.7811E-06	0 *	0.511767	2.7601E-06
CO2	0.00281874	4.42679E-06	0 *	0.00286974	5.37907E-07
Ethane	0.238376	1.33882E-05	0 *	0.237454	0.000660977
Propane	0.14793	1.5779E-05	0 *	0.136824	0.0157021
Isobutane	0.0191817	4.70764E-07	0 *	0.0174402	0.0133295
n-Butane	0.0513141	6.60137E-06	0 *	0.0475638	0.0642602
Isopentane	0.00970194	6.11791E-07	0 *	0.00957147	0.0385612
n-Pentane	0.0131655	8.88349E-07	0 *	0.0131702	0.071037
n-Hexane	0.00360015	5.38761E-08	0 *	0.00372987	0.0673597
Methylcyclopentane	0.000282714	1.47401E-07	0 *	0.000292605	0.00527711
Benzene	4.16371E-05	2.56676E-06	0 *	4.30271E-05	0.000771014
Cyclohexane	0.000395602	4.7581E-07	0 *	0.000410127	0.00916906
n-Heptane	0.0012885	1.30841E-08	0 *	0.0013421	0.0697083
n-Octane	0.000769088	5.42872E-09	0 *	0.00080203	0.129038
n-Nonane	0.000168952	9.44879E-09	0 *	0.000176219	0.0878871
n-Decane	5.80893E-05	1.69708E-09	0 *	6.05887E-05	0.084985
n-Undecane	4.17262E-05	2.44091E-09	0 *	4.35217E-05	0.199334
Dodecane	0	0	0 *	0	0
Water	0.00137561	0.99994	1 *	0.00135661	0.000665022
Triethylene Glycol	0	0	0 *	0	0
Oxygen	0	0	0 *	0	0
Argon	0	0	0 *	0	0
Carbon Monoxide	0	0	0 *	0	0
Cyclopentane	2.48471E-05	2.80412E-08	0 *	2.52236E-05	0.000196595
Isohexane	0	0	0 *	0	0
3-Methylpentane	0.00326613	3.43294E-07	0 *	0.00337515	0.049506
Neohexane	0.00404638	3.67771E-08	0 *	0.00414115	0.0364003
2,3-Dimethylbutane	0.000461724	1.89903E-08	0 *	0.000475615	0.00565646
Methylcyclohexane	0.000473799	1.57998E-07	0 *	0.000493469	0.0248774
Isooctane	0	0	0 *	0	0
Decane, 2-Methyl-	0	0	0 *	0	0
Toluene	6.76736E-05	3.54681E-06	0 *	7.0506E-05	0.00450948
m-Xylene	7.09889E-05	3.42853E-06	0 *	7.40333E-05	0.0163495

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Mass Fraction	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
Ethylbenzene	2.45277E-05	1.08853E-06	0 *	2.55784E-05	0.00475621

Mass Flow	Pipeline lb/h	Produced Water lb/h	Reservoir Water lb/h	Sales Gas lb/h	Sales Oil lb/h
Nitrogen	269.871	0.000108193	0 *	269.109	6.4987E-06
Methane	21698.1	0.0839477	0 *	21511.9	0.0398523
CO2	123.583	0.0642818	0 *	120.628	0.00776669
Ethane	10451.2	0.194411	0 *	9981.3	9.54367
Propane	6485.73	0.229128	0 *	5751.34	226.719
Isobutane	840.988	0.006836	0 *	733.093	192.461
n-Butane	2249.78	0.0958589	0 *	1999.32	927.836
Isopentane	425.366	0.00888385	0 *	402.333	556.774
n-Pentane	577.218	0.0128998	0 *	553.605	1025.68
n-Hexane	157.843	0.000782337	0 *	156.784	972.589
Methylcyclopentane	12.3951	0.00214042	0 *	12.2996	76.1947
Benzene	1.82551	0.037272	0 *	1.80863	11.1325
Cyclohexane	17.3445	0.00690927	0 *	17.2395	132.39
n-Heptane	56.4922	0.000189995	0 *	56.4147	1006.5
n-Octane	33.7194	7.88307E-05	0 *	33.713	1863.14
n-Nonane	7.40743	0.000137206	0 *	7.40728	1268.98
n-Decane	2.54683	2.46433E-05	0 *	2.54682	1227.08
n-Undecane	1.82942	3.54446E-05	0 *	1.82942	2878.13
Dodecane	0	0	0 *	0	0
Water	60.3114	14520.2	14590.1 *	57.0245	9.60207
Triethylene Glycol	0	0	0 *	0	0
Oxygen	0	0	0 *	0	0
Argon	0	0	0 *	0	0
Carbon Monoxide	0	0	0 *	0	0
Cyclopentane	1.08938	0.000407189	0 *	1.06026	2.83858
Isohexane	0	0	0 *	0	0
3-Methylpentane	143.198	0.00498499	0 *	141.873	714.804
Neohexane	177.407	0.000534042	0 *	174.072	525.575
2,3-Dimethylbutane	20.2435	0.000275759	0 *	19.9923	81.6721
Methylcyclohexane	20.773	0.0022943	0 *	20.7428	359.198
Isooctane	0	0	0 *	0	0
Decane, 2-Methyl-	0	0	0 *	0	0
Toluene	2.96704	0.0515034	0 *	2.96369	65.1112
m-Xylene	3.11239	0.0497859	0 *	3.11196	236.066
Ethylbenzene	1.07537	0.0158066	0 *	1.07518	68.6736

Std. Liquid Volumetric Fraction	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
Nitrogen	0.00272042	9.23353E-09	0 *	0.00280631	3.84232E-10
Methane	0.588556	1.92781E-05	0 *	0.603636	6.34028E-06
CO2	0.00123008	5.4169E-06	0 *	0.00124209	4.53418E-07
Ethane	0.238593	3.75751E-05	0 *	0.235726	0.00127789
Propane	0.104011	3.1109E-05	0 *	0.0954155	0.0213254
Isobutane	0.0121533	8.36359E-07	0 *	0.0109595	0.0163129
n-Butane	0.0313231	1.12991E-05	0 *	0.0287963	0.0757676
Isopentane	0.00553433	9.7857E-07	0 *	0.00541524	0.0424883
n-Pentane	0.00744379	1.40839E-06	0 *	0.00738554	0.0775809
n-Hexane	0.00193332	8.11263E-08	0 *	0.00198659	0.0698709
Methylcyclopentane	0.000133795	1.95603E-07	0 *	0.000137343	0.00482393
Benzene	1.67855E-05	2.9015E-06	0 *	1.7204E-05	0.000600385
Cyclohexane	0.00018006	6.07259E-07	0 *	0.000185143	0.00806113
n-Heptane	0.00066764	1.90101E-08	0 *	0.000689723	0.0697679
n-Octane	0.000388169	7.68287E-09	0 *	0.000401482	0.125798
n-Nonane	8.34201E-05	1.30817E-08	0 *	8.62959E-05	0.0838193

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Std. Liquid Volumetric Fraction	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
n-Decane	2.81997E-05	2.3101E-09	0 *	2.91723E-05	0.0796898
n-Undecane	2.00027E-05	3.28106E-09	0 *	2.06927E-05	0.184575
Dodecane	0	0	0 *	0	0
Water	0.000490554	0.999878	1 *	0.000479819	0.000458078
Triethylene Glycol	0	0	0 *	0	0
Oxygen	0	0	0 *	0	0
Argon	0	0	0 *	0	0
Carbon Monoxide	0	0	0 *	0	0
Cyclopentane	1.18167E-05	3.73938E-08	0 *	1.18976E-05	0.000180595
Isohexane	0	0	0 *	0	0
3-Methylpentane	0.00174096	5.13102E-07	0 *	0.00178435	0.0509714
Neohexane	0.002207	5.62464E-08	0 *	0.0022402	0.0383489
2,3-Dimethylbutane	0.000247219	2.8511E-08	0 *	0.000252573	0.00585001
Methylcyclohexane	0.000218312	2.04135E-07	0 *	0.000225515	0.0221412
Isooctane	0	0	0 *	0	0
Decane, 2-Methyl-	0	0	0 *	0	0
Toluene	2.76809E-05	4.06799E-06	0 *	2.86034E-05	0.00356287
m-Xylene	2.91376E-05	3.94597E-06	0 *	3.01385E-05	0.0129622
Ethylbenzene	1.00343E-05	1.24869E-06	0 *	1.03785E-05	0.00375842

Volumetric Flow	Pipeline ft^3/h	Produced Water gpm	Reservoir Water gpm	Sales Gas ft^3/h	Sales Oil gpm
Nitrogen	245.326	2.92812E-07	0	244.477	2.23514E-08
Methane	32736.9	0.000415098	0	32472	0.000245413
CO2	65.0801	0.000101614	0	63.6067	1.01867E-05
Ethane	7548.69	0.000655882	0	7231.55	0.0403051
Propane	2900.58	0.000660647	0	2587.11	0.849888
Isobutane	263.551	1.80143E-05	0	231.704	0.679735
n-Butane	683.317	0.000249397	0	612.823	3.17838
Isopentane	94.5262	2.15113E-05	0	90.5302	1.80237
n-Pentane	125.872	3.12938E-05	0	122.338	3.29341
n-Hexane	25.0508	1.80341E-06	0	25.3788	2.97472
Methylcyclopentane	2.12952	4.4728E-06	0	2.1498	0.205194
Benzene	0.353289	6.99244E-05	0	0.355242	0.0250318
Cyclohexane	2.95925	1.40438E-05	0	2.9925	0.341939
n-Heptane	6.59505	4.23641E-07	0	6.76886	2.97998
n-Octane	2.90096	1.7021E-07	0	3.02184	5.33218
n-Nonane	0.439882	2.89216E-07	0	0.470719	3.53823
n-Decane	0.100314	5.11199E-08	0	0.111648	3.36307
n-Undecane	0.0418041	7.25204E-08	0	0.0485068	7.75892
Dodecane	0	0	0	0	0
Water	75.1025	29.1406	29.6033	74.8118	0.0141879
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0.24591	8.73002E-07	0	0.242393	0.00762033
Isohexane	0	0	0	0	0
3-Methylpentane	23.3816	1.13896E-05	0	23.5968	2.17775
Neohexane	30.3382	1.22758E-06	0	30.26	1.63962
2,3-Dimethylbutane	3.3723	6.283E-07	0	3.38934	0.249903
Methylcyclohexane	2.68024	4.61323E-06	0	2.74067	0.939639
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.419245	9.56302E-05	0	0.428433	0.148524
m-Xylene	0.324994	9.16838E-05	0	0.337182	0.540885
Ethylbenzene	0.115023	2.89536E-05	0	0.119025	0.15706

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Stream Properties

Property	Units	Pipeline	Produced Water	Reservoir Water	Sales Gas	Sales Oil
Temperature	°F	69.3477	85	150 *	70 *	85 *
Pressure	psig	215	0.5	4230 *	215 *	0.5
Mole Fraction Vapor		0.999897	0	0	1	0
Mole Fraction Light Liquid		1.51617E-05	1	1	0	0.996949
Molecular Weight	lb/lbmol	22.6292	18.0159	18.0153	22.2827	98.2133
Mass Density	lb/ft^3	0.977766	62.1218	61.4467	0.958963	42.6185
Molar Flow	lbmol/h	1937.47	806.015	809.874	1886.42	147.014
Mass Flow	lb/h	43843.4	14521.1	14590.1	42034.6	14438.7
Vapor Volumetric Flow	ft^3/h	44840.4	233.751	237.443	43833.4	338.79
Liquid Volumetric Flow	gpm	5590.49	29.143	29.6033	5464.94	42.2388
Std Vapor Volumetric Flow	MMSCFD	17.6457	7.34089	7.37603	17.1808	1.33895
Std Liquid Volumetric Flow	sgpm	245.777	29.0304	29.1667 *	237.582	41.9038
Specific Gravity			0.996036	0.985212	0.769362	0.683328
API Gravity			10.0152	9.5073		71.882
Enthalpy	Btu/h	-6.83315E+07	-9.89151E+07	-9.82871E+07	-6.61807E+07	-1.35828E+07
Kinematic Viscosity	cSt		0.833349	0.467278	0.691723	0.565849
Net Ideal Gas Heating Value	Btu/ft^3	1227.5	0.0518629	0	1210	4979.43
Net Liquid Heating Value	Btu/lb	20506.2	-1058.61	-1059.76	20531.1	19081.4

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Connections

	Test Separator Gas	Test Separator Oil			
From Block	--	--			
To Block	MIX-102	MIX-102			

Stream Composition

Mole Fraction	Test Separator Gas		Test Separator Oil				
Nitrogen	0.00513133	*	0.00026	*			
Methane	0.714456	*	0.08861	*			
CO2	0.00149039	*	0.00013	*			
Ethane	0.174955	*	0.09965	*			
Propane	0.0680377	*	0.11788	*			
Isobutane	0.00668174	*	0.0248	*			
n-Butane	0.0182848	*	0.09597	*			
Isopentane	0.00316082	*	0.03603	*			
n-Pentane	0.00440114	*	0.06541	*			
n-Hexane	0.00107028	*	0.05195	*			
Methylcyclopentane	8.00208E-05	*	0.00422	*			
Benzene	1.00026E-05	*	0.00069	*			
Cyclohexane	0.000100026	*	0.00744	*			
n-Heptane	0.000250065	*	0.04738	*			
n-Octane	0.000220057	*	0.07566	*			
n-Nonane	6.00156E-05	*	0.04597	*			
n-Decane	2.00052E-05	*	0.0402	*			
n-Undecane	1.00026E-05	*	0.08599	*			
Dodecane	0	*	0	*			
Water	0	*	0	*			
Triethylene Glycol	0	*	0	*			
Oxygen	0	*	0	*			
Argon	0	*	0	*			
Carbon Monoxide	0	*	0	*			
Cyclopentane	3.00078E-05	*	0	*			
Isohexane	0	*	0	*			
3-Methylpentane	0.00103027	*	0.03753	*			
Neohexane	0.000290075	*	0.03558	*			
2,3-Dimethylbutane	9.00234E-05	*	0.00474	*			
Methylcyclohexane	0.000110029	*	0.01712	*			
Isooctane	0	*	0	*			
Decane, 2-Methyl-	0	*	0	*			
Toluene	2.00052E-05	*	0.00328	*			
m-Xylene	1.00026E-05	*	0.01044	*			
Ethylbenzene	0	*	0.00307	*			

Molar Flow	Test Separator Gas lbmol/h		Test Separator Oil lbmol/h				
Nitrogen	9.57798	*	0.0556531	*			
Methane	1333.58	*	18.967	*			
CO2	2.78191	*	0.0278266	*			
Ethane	326.566	*	21.3301	*			
Propane	126.997	*	25.2323	*			
Isobutane	12.4719	*	5.30845	*			
n-Butane	34.1297	*	20.5424	*			
Isopentane	5.89989	*	7.71224	*			
n-Pentane	8.21503	*	14.001	*			
n-Hexane	1.99775	*	11.1199	*			
Methylcyclopentane	0.149364	*	0.903293	*			
Benzene	0.0186705	*	0.147695	*			
Cyclohexane	0.186705	*	1.59254	*			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Molar Flow	Test Separator Gas lbmol/h	Test Separator Oil lbmol/h			
n-Heptane	0.466763 *	10.1417 *			
n-Octane	0.410752 *	16.1951 *			
n-Nonane	0.112023 *	9.8399 *			
n-Decane	0.0373411 *	8.60483 *			
n-Undecane	0.0186705 *	18.4062 *			
Dodecane	0 *	0 *			
Water	0 *	0 *			
Triethylene Glycol	0 *	0 *			
Oxygen	0 *	0 *			
Argon	0 *	0 *			
Carbon Monoxide	0 *	0 *			
Cyclopentane	0.0560116 *	0 *			
Isohexane	0 *	0 *			
3-Methylpentane	1.92306 *	8.03331 *			
Neohexane	0.541445 *	7.61592 *			
2,3-Dimethylbutane	0.168035 *	1.0146 *			
Methylcyclohexane	0.205376 *	3.66454 *			
Isooctane	0 *	0 *			
Decane, 2-Methyl-	0 *	0 *			
Toluene	0.0373411 *	0.702086 *			
m-Xylene	0.0186705 *	2.23469 *			
Ethylbenzene	0 *	0.657135 *			

Mass Fraction	Test Separator Gas	Test Separator Oil			
Nitrogen	0.00646446 *	9.33158E-05 *			
Methane	0.515445 *	0.0182125 *			
CO2	0.00294972 *	7.33003E-05 *			
Ethane	0.236583 *	0.0383896 *			
Propane	0.134921 *	0.0665966 *			
Isobutane	0.0174649 *	0.0184676 *			
n-Butane	0.0477933 *	0.0714651 *			
Isopentane	0.0102557 *	0.033305 *			
n-Pentane	0.0142801 *	0.060463 *			
n-Hexane	0.00414778 *	0.0573568 *			
Methylcyclopentane	0.00030286 *	0.00455021 *			
Benzene	3.51371E-05 *	0.000690529 *			
Cyclohexane	0.000378575 *	0.00802218 *			
n-Heptane	0.00112685 *	0.0608257 *			
n-Octane	0.00113044 *	0.110728 *			
n-Nonane	0.000346158 *	0.075538 *			
n-Decane	0.000128005 *	0.073281 *			
n-Undecane	7.03122E-05 *	0.172205 *			
Dodecane	0 *	0 *			
Water	0 *	0 *			
Triethylene Glycol	0 *	0 *			
Oxygen	0 *	0 *			
Argon	0 *	0 *			
Carbon Monoxide	0 *	0 *			
Cyclopentane	9.46437E-05 *	0 *			
Isohexane	0 *	0 *			
3-Methylpentane	0.00399272 *	0.041436 *			
Neohexane	0.00112416 *	0.0392831 *			
2,3-Dimethylbutane	0.000348879 *	0.00523332 *			
Methylcyclohexane	0.000485838 *	0.0215362 *			
Isooctane	0 *	0 *			
Decane, 2-Methyl-	0 *	0 *			
Toluene	8.28933E-05 *	0.00387196 *			
m-Xylene	4.77562E-05 *	0.0142003 *			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Mass Fraction	Test Separator Gas	Test Separator Oil			
Ethylbenzene	0 *	0.00417576 *			

Mass Flow	Test Separator Gas lb/h	Test Separator Oil lb/h			
Nitrogen	268.312 *	1.55903 *			
Methane	21393.9 *	304.278 *			
CO2	122.43 *	1.22463 *			
Ethane	9819.53 *	641.377 *			
Propane	5600.01 *	1112.63 *			
Isobutane	724.895 *	308.539 *			
n-Butane	1983.69 *	1193.97 *			
Isopentane	425.67 *	556.429 *			
n-Pentane	592.704 *	1010.16 *			
n-Hexane	172.157 *	958.263 *			
Methylcyclopentane	12.5704 *	76.0207 *			
Benzene	1.45839 *	11.5367 *			
Cyclohexane	15.713 *	134.027 *			
n-Heptane	46.7706 *	1016.22 *			
n-Octane	46.9195 *	1849.94 *			
n-Nonane	14.3675 *	1262.02 *			
n-Decane	5.31295 *	1224.31 *			
n-Undecane	2.91836 *	2877.04 *			
Dodecane	0 *	0 *			
Water	0 *	0 *			
Triethylene Glycol	0 *	0 *			
Oxygen	0 *	0 *			
Argon	0 *	0 *			
Carbon Monoxide	0 *	0 *			
Cyclopentane	3.92825 *	0 *			
Isohexane	0 *	0 *			
3-Methylpentane	165.721 *	692.274 *			
Neohexane	46.6592 *	656.304 *			
2,3-Dimethylbutane	14.4805 *	87.4335 *			
Methylcyclohexane	20.165 *	359.807 *			
Isooctane	0 *	0 *			
Decane, 2-Methyl-	0 *	0 *			
Toluene	3.44055 *	64.6891 *			
m-Xylene	1.98216 *	237.246 *			
Ethylbenzene	0 *	69.7647 *			

Std. Liquid Volumetric Fraction	Test Separator Gas	Test Separator Oil			
Nitrogen	0.00282821 *	7.35727E-05 *			
Methane	0.606806 *	0.0386384 *			
CO2	0.00127426 *	5.70642E-05 *			
Ethane	0.23441 *	0.0685469 *			
Propane	0.093908 *	0.0835324 *			
Isobutane	0.010954 *	0.0208735 *			
n-Butane	0.0288797 *	0.0778217 *			
Isopentane	0.0057912 *	0.0338918 *			
n-Pentane	0.00799254 *	0.0609853 *			
n-Hexane	0.00220494 *	0.0549474 *			
Methylcyclopentane	0.000141883 *	0.00384151 *			
Benzene	1.40222E-05 *	0.00049661 *			
Cyclohexane	0.000170572 *	0.00651372 *			
n-Heptane	0.000577989 *	0.0562243 *			
n-Octane	0.00056479 *	0.0996964 *			
n-Nonane	0.000169191 *	0.066535 *			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Std. Liquid Volumetric Fraction	Test Separator Gas	Test Separator Oil			
n-Decane	6.15137E-05 *	0.0634625 *			
n-Undecane	3.33662E-05 *	0.147266 *			
Dodecane	0 *	0 *			
Water	0 *	0 *			
Triethylene Glycol	0 *	0 *			
Oxygen	0 *	0 *			
Argon	0 *	0 *			
Carbon Monoxide	0 *	0 *			
Cyclopentane	4.45562E-05 *	0 *			
Isohexane	0 *	0 *			
3-Methylpentane	0.00210679 *	0.0394014 *			
Neohexane	0.000606962 *	0.0382225 *			
2,3-Dimethylbutane	0.000184914 *	0.00499868 *			
Methylcyclohexane	0.000221601 *	0.0177024 *			
Isooctane	0 *	0 *			
Decane, 2-Methyl-	0 *	0 *			
Toluene	3.35642E-05 *	0.00282533 *			
m-Xylene	1.94039E-05 *	0.0103977 *			
Ethylbenzene	0 *	0.00304752 *			

Volumetric Flow	Test Separator Gas ft^3/h	Test Separator Oil gpm			
Nitrogen	145.481	0.00629492			
Methane	18584.6	2.12844			
CO2	35.9408	0.00201302			
Ethane	3756.03	2.90403			
Propane	1214.17	4.31255			
Isobutane	101.264	1.10365			
n-Butane	257.636	4.13785			
Isopentane	35.2939	1.7975			
n-Pentane	46.768	3.23685			
n-Hexane	7.43111	2.90006			
Methylcyclopentane	0.658505	0.201618			
Benzene	0.0930515	0.0255949			
Cyclohexane	0.798672	0.339443			
n-Heptane	0.865401	2.95928			
n-Octane	0.117481	5.18678			
n-Nonane	-0.1178	3.4375			
n-Decane	-0.0485117	3.27108			
n-Undecane	-0.00259842	7.55245			
Dodecane	0	0			
Water	0	0			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0.319514	0			
Isohexane	0	0			
3-Methylpentane	7.8702	2.08497			
Neohexane	2.57176	2.0236			
2,3-Dimethylbutane	0.734809	0.264236			
Methylcyclohexane	0.553845	0.917095			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0.111369	0.144209			
m-Xylene	0.0245282	0.528655			
Ethylbenzene	0	0.154956			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Stream Properties

Property	Units	Test Separator Gas	Test Separator Oil			
Temperature	°F	83 *	83 *			
Pressure	psig	390 *	390 *			
Mole Fraction Vapor		0.999775	0			
Mole Fraction Light Liquid		0.000224912	1			
Molecular Weight	lb/lbmol	22.2364	78.052			
Mass Density	lb/ft^3	1.71517	40.3512			
Molar Flow	lbmol/h	1866.57	214.05			
Mass Flow	lb/h	41505.7	16707.1			
Vapor Volumetric Flow	ft^3/h	24199.2	414.041			
Liquid Volumetric Flow	gpm	3017.04	51.6207			
Std Vapor Volumetric Flow	MMSCFD	17 *	1.94949			
Std Liquid Volumetric Flow	sgpm	235.044	52.5 *			
Specific Gravity			0.646976			
API Gravity			82.8853			
Enthalpy	Btu/h	-6.52631E+07	-1.65566E+07			
Kinematic Viscosity	cSt		0.409605			
Net Ideal Gas Heating Value	Btu/ft^3	1209.23	3985.93			
Net Liquid Heating Value	Btu/lb	20562.8	19224.5			

Remarks

Process Streams Report
Stream: Pipeline
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 12:56 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Connections

From:	To:
MIX-101	--

Composition

Mole Fraction	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Nitrogen	0.00497228	0.00497279	0.000131498	9.75364E-07	2.018E-05
Methane	0.698097	0.698168	0.0573713	0.000265435	0.00866783
CO2	0.00144937	0.00144951	0.000305958	1.10395E-05	5.44329E-05
Ethane	0.179396	0.179413	0.0830779	7.2569E-05	0.0122857
Propane	0.0759153	0.0759213	0.12225	3.2389E-05	0.0180151
Isobutane	0.00746816	0.00746848	0.0294701	1.06971E-06	0.00433706
n-Butane	0.0199785	0.0199789	0.113574	6.61867E-06	0.0167166
Isopentane	0.00304298	0.00304265	0.0421892	6.02503E-07	0.00620812
n-Pentane	0.0041293	0.00412859	0.0752264	7.87321E-07	0.0110693
n-Hexane	0.000945381	0.000944619	0.0566803	6.87659E-08	0.00833983
Methylcyclopentane	7.60176E-05	7.59568E-05	0.00452971	5.39398E-08	0.000666534
Benzene	1.20624E-05	1.20528E-05	0.000709837	4.87288E-07	0.000104859
Cyclohexane	0.000106372	0.000106264	0.00782437	1.17156E-07	0.00115136
n-Heptane	0.00029099	0.000290265	0.0497823	2.28735E-08	0.00732485
n-Octane	0.00015236	0.000151157	0.0803448	6.96519E-09	0.0118217
n-Nonane	2.98098E-05	2.90812E-05	0.0482528	3.96883E-09	0.00709979
n-Decane	9.23883E-06	8.63373E-06	0.0399686	8.13452E-10	0.00588086
n-Undecane	6.04083E-06	4.91446E-06	0.0743241	6.87871E-10	0.0109358
Dodecane	0	0	0	0	0
Water	0.00172792	0.00164024	0.000362075	0.999606	0.85258
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	8.01722E-06	8.01488E-06	0.000208505	1.02655E-08	3.06875E-05
Isohexane	0	0	0	0	0
3-Methylpentane	0.00085767	0.000857125	0.0417997	1.91618E-07	0.00615046
Neohexane	0.00106256	0.0010622	0.0311765	6.74402E-08	0.00458728
2,3-Dimethylbutane	0.000121246	0.000121186	0.00479695	1.80421E-08	0.000705825
Methylcyclohexane	0.000109198	0.000108934	0.0181291	4.94623E-08	0.0026675
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	1.66207E-05	1.65695E-05	0.00348354	5.23517E-07	0.000513005
m-Xylene	1.51314E-05	1.49682E-05	0.0108645	4.4036E-07	0.00159895
Ethylbenzene	5.2281E-06	5.18062E-06	0.00316603	1.44932E-07	0.000465964

Molar Flow	Total lbmol/h	Vapor lbmol/h	Light Liquid lbmol/h	Heavy Liquid lbmol/h	Mixed Liquid lbmol/h
Nitrogen	9.63363	9.63362	3.86278E-06	1.66076E-07	4.02886E-06
Methane	1352.54	1352.54	0.0016853	4.51958E-05	0.0017305
CO2	2.8081	2.80809	8.98759E-06	1.8797E-06	1.08673E-05
Ethane	347.573	347.571	0.00244044	1.23564E-05	0.0024528
Propane	147.083	147.08	0.00359113	5.5149E-06	0.00359665
Isobutane	14.4693	14.4684	0.000865693	1.8214E-07	0.000865875
n-Butane	38.7078	38.7044	0.00333626	1.12696E-06	0.00333739
Isopentane	5.89567	5.89443	0.00123932	1.02588E-07	0.00123942
n-Pentane	8.00039	7.99818	0.0022098	1.34058E-07	0.00220993
n-Hexane	1.83165	1.82998	0.001665	1.17088E-08	0.00166501
Methylcyclopentane	0.147282	0.147149	0.000133062	9.18436E-09	0.000133071
Benzene	0.0233705	0.0233495	2.08517E-05	8.29707E-08	2.09346E-05
Cyclohexane	0.206091	0.205861	0.000229843	1.99483E-08	0.000229863
n-Heptane	0.563783	0.562321	0.00146237	3.89468E-09	0.00146237
n-Octane	0.295193	0.292832	0.00236015	1.18597E-09	0.00236015
n-Nonane	0.0577555	0.056338	0.00141744	6.75774E-10	0.00141744
n-Decane	0.0178999	0.0167258	0.00117409	1.38507E-10	0.00117409
n-Undecane	0.0117039	0.00952061	0.00218329	1.17124E-10	0.00218329

Process Streams Report
Stream: Pipeline
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 12:56 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h	Light Liquid lbmol/h	Heavy Liquid lbmol/h	Mixed Liquid lbmol/h
Dodecane	0	0	0	0	0
Water	3.34779	3.17758	1.06361E-05	0.170203	0.170214
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0.0155331	0.015527	6.12488E-06	1.7479E-09	6.12663E-06
Isohexane	0	0	0	0	0
3-Methylpentane	1.66171	1.66048	0.00122788	3.26268E-08	0.00122791
Neohexane	2.05867	2.05776	0.00091582	1.14831E-08	0.000915832
2,3-Dimethylbutane	0.234911	0.23477	0.000140912	3.07204E-09	0.000140915
Methylcyclohexane	0.211567	0.211035	0.000532547	8.42196E-09	0.000532555
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.032202	0.0320995	0.00010233	8.91395E-08	0.000102419
m-Xylene	0.0293166	0.0289973	0.000319148	7.49803E-08	0.000319223
Ethylbenzene	0.0101293	0.0100363	9.30031E-05	2.46777E-08	9.30278E-05

Mass Fraction	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Nitrogen	0.00615534	0.00615609	4.62985E-05	1.5165E-06	2.08809E-05
Methane	0.494899	0.49496	0.0115678	0.000236341	0.00513622
CO2	0.00281874	0.00281908	0.000169235	2.69654E-05	8.8485E-05
Ethane	0.238376	0.238403	0.031397	0.00012111	0.0136453
Propane	0.14793	0.147944	0.0677529	7.9269E-05	0.0293423
Isobutane	0.0191817	0.0191829	0.0215281	3.45079E-06	0.00931105
n-Butane	0.0513141	0.051316	0.0829666	2.13512E-05	0.0358881
Isopentane	0.00970194	0.0097011	0.0382573	2.41267E-06	0.0165444
n-Pentane	0.0131655	0.0131635	0.0682154	3.15276E-06	0.0294992
n-Hexane	0.00360015	0.00359732	0.0613901	3.28902E-07	0.0265462
Methylcyclopentane	0.000282714	0.000282494	0.00479134	2.51955E-07	0.00207199
Benzene	4.16371E-05	4.16049E-05	0.000696881	2.11258E-06	0.000302541
Cyclohexane	0.000395602	0.00039521	0.00827629	5.47241E-07	0.0035791
n-Heptane	0.0012885	0.00128532	0.0626952	1.27209E-07	0.0271104
n-Octane	0.000769088	0.000763033	0.115349	4.41588E-08	0.0498788
n-Nonane	0.000168952	0.000164826	0.0777823	2.82518E-08	0.0336342
n-Decane	5.80893E-05	5.42858E-05	0.0714745	6.42378E-09	0.0309066
n-Undecane	4.17262E-05	3.39466E-05	0.146014	5.96759E-09	0.0631387
Dodecane	0	0	0	0	0
Water	0.00137561	0.00130583	8.19829E-05	0.999493	0.567333
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	2.48471E-05	2.48404E-05	0.000183789	3.99586E-08	7.9496E-05
Isohexane	0	0	0	0	0
3-Methylpentane	0.00326613	0.00326412	0.0452731	9.16491E-07	0.0195773
Neohexane	0.00404638	0.00404508	0.0337671	3.22561E-07	0.0146016
2,3-Dimethylbutane	0.000461724	0.000461504	0.00519555	8.6294E-08	0.00224668
Methylcyclohexane	0.000473799	0.000472665	0.0223722	2.69547E-07	0.00967422
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	6.76736E-05	6.74667E-05	0.00403409	2.6772E-06	0.00174592
m-Xylene	7.09889E-05	7.02246E-05	0.0144969	2.59477E-06	0.00627014
Ethylbenzene	2.45277E-05	2.43054E-05	0.00422454	8.53998E-07	0.00182724

Mass Flow	Total lb/h	Vapor lb/h	Light Liquid lb/h	Heavy Liquid lb/h	Mixed Liquid lb/h
Nitrogen	269.871	269.871	0.00010821	4.65234E-06	0.000112862
Methane	21698.1	21698	0.0270364	0.000725051	0.0277614

Process Streams Report
Stream: Pipeline
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 12:56 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Mass Flow	Total lb/h	Vapor lb/h	Light Liquid lb/h	Heavy Liquid lb/h	Mixed Liquid lb/h
CO2	123.583	123.583	0.000395539	8.27248E-05	0.000478264
Ethane	10451.2	10451.1	0.0733817	0.000371544	0.0737532
Propane	6485.73	6485.57	0.158353	0.000243183	0.158596
Isobutane	840.988	840.938	0.050316	1.05864E-05	0.0503265
n-Butane	2249.78	2249.59	0.193911	6.55016E-05	0.193976
Isopentane	425.366	425.276	0.0894155	7.40163E-06	0.0894229
n-Pentane	577.218	577.059	0.159434	9.67209E-06	0.159444
n-Hexane	157.843	157.699	0.143482	1.00901E-06	0.143483
Methylcyclopentane	12.3951	12.3839	0.0111984	7.72951E-07	0.0111992
Benzene	1.82551	1.82387	0.00162876	6.481E-06	0.00163524
Cyclohexane	17.3445	17.3252	0.0193435	1.67884E-06	0.0193452
n-Heptane	56.4922	56.3456	0.146532	3.90255E-07	0.146533
n-Octane	33.7194	33.4498	0.269597	1.35471E-07	0.269597
n-Nonane	7.40743	7.22564	0.181794	8.66715E-08	0.181794
n-Decane	2.54683	2.37978	0.167051	1.9707E-08	0.167051
n-Undecane	1.82942	1.48815	0.341267	1.83075E-08	0.341267
Dodecane	0	0	0	0	0
Water	60.3114	57.2449	0.000191612	3.06626	3.06645
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	1.08938	1.08895	0.000429556	1.22586E-07	0.000429678
Isohexane	0	0	0	0	0
3-Methylpentane	143.198	143.092	0.105813	2.81163E-06	0.105816
Neohexane	177.407	177.328	0.0789211	9.89558E-07	0.0789221
2,3-Dimethylbutane	20.2435	20.2314	0.0121431	2.64734E-07	0.0121434
Methylcyclohexane	20.773	20.7207	0.0522886	8.26919E-07	0.0522895
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	2.96704	2.9576	0.00942854	8.21317E-06	0.00943675
m-Xylene	3.11239	3.0785	0.0338823	7.96029E-06	0.0338903
Ethylbenzene	1.07537	1.0655	0.00987367	2.61991E-06	0.00987629

Std. Liquid Volumetric Fraction	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Nitrogen	0.00272042	0.00272056	3.68181E-05	1.87782E-06	2.08365E-05
Methane	0.588556	0.588588	0.0247532	0.000787478	0.0137913
CO2	0.00123008	0.00123014	0.000132887	3.29696E-05	8.71847E-05
Ethane	0.238593	0.238605	0.0565452	0.000339629	0.0308369
Propane	0.104011	0.104014	0.0857163	0.000156155	0.0465812
Isobutane	0.0121533	0.0121532	0.0245428	6.12566E-06	0.0133198
n-Butane	0.0313231	0.0313221	0.0911261	3.65157E-05	0.0494619
Isopentane	0.00553433	0.00553347	0.0392674	3.85596E-06	0.0213083
n-Pentane	0.00744379	0.00744214	0.0693987	4.99432E-06	0.0376581
n-Hexane	0.00193332	0.00193167	0.0593189	4.94855E-07	0.0321868
Methylcyclopentane	0.000133795	0.000133682	0.00408	3.34074E-07	0.00221397
Benzene	1.67855E-05	1.67714E-05	0.000505504	2.38614E-06	0.000275379
Cyclohexane	0.00018006	0.000179869	0.00677806	6.97855E-07	0.0036781
n-Heptane	0.00066764	0.000665945	0.0584526	1.84674E-07	0.0317166
n-Octane	0.000388169	0.000385086	0.104754	6.24439E-08	0.0568397
n-Nonane	8.34201E-05	8.13772E-05	0.0691032	3.90824E-08	0.0374955
n-Decane	2.81997E-05	2.63514E-05	0.0624323	8.73708E-09	0.0338759
n-Undecane	2.00027E-05	1.62722E-05	0.125946	8.01506E-09	0.0683387
Dodecane	0	0	0	0	0
Water	0.000490554	0.000465637	5.26048E-05	0.998617	0.456794
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	1.18167E-05	1.18127E-05	0.000157272	5.32425E-08	8.53604E-05

Process Streams Report
Stream: Pipeline
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 12:56 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Std. Liquid Volumetric Fraction	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Isohexane	0	0	0	0	0
3-Methylpentane	0.00174096	0.00173977	0.0434217	1.36871E-06	0.0235613
Neohexane	0.002207	0.00220614	0.0331391	4.92918E-07	0.0179815
2,3-Dimethylbutane	0.000247219	0.000247084	0.00500543	1.29452E-07	0.00271602
Methylcyclohexane	0.000218312	0.000217774	0.0185482	3.47973E-07	0.0100645
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	2.76809E-05	2.75943E-05	0.00296905	3.0681E-06	0.00161241
m-Xylene	2.91376E-05	2.88219E-05	0.0107065	2.98394E-06	0.00581074
Ethylbenzene	1.00343E-05	9.94271E-06	0.00310973	9.78852E-07	0.00168779

Volumetric Flow	Total ft^3/h	Vapor ft^3/h	Light Liquid gpm	Heavy Liquid gpm	Mixed Liquid gpm
Nitrogen	245.326	245.326	4.14347E-07	1.24146E-08	4.26762E-07
Methane	32736.9	32736.9	0.000180963	3.54075E-06	0.000184504
CO2	65.0801	65.0801	6.14706E-07	1.29306E-07	7.44012E-07
Ethane	7548.69	7548.68	0.000323037	1.24115E-06	0.000324278
Propane	2900.58	2900.58	0.000602268	6.95116E-07	0.000602963
Isobutane	263.551	263.549	0.000177504	2.76723E-08	0.000177532
n-Butane	683.317	683.312	0.000663315	1.69072E-07	0.000663484
Isopentane	94.5262	94.5239	0.000286086	1.77877E-08	0.000286104
n-Pentane	125.872	125.868	0.000506142	2.32894E-08	0.000506165
n-Hexane	25.0508	25.0474	0.000431346	2.30936E-09	0.000431349
Methylcyclopentane	2.12952	2.12929	2.95623E-05	1.60426E-09	2.95639E-05
Benzene	0.353289	0.35326	3.60196E-06	1.20806E-08	3.61404E-06
Cyclohexane	2.95925	2.95886	4.88424E-05	3.39002E-09	4.88458E-05
n-Heptane	6.59505	6.59164	0.000424665	8.64149E-10	0.000424666
n-Octane	2.90096	2.89492	0.000753257	2.90523E-10	0.000753257
n-Nonane	0.439882	0.43592	0.000493945	1.81472E-10	0.000493945
n-Decane	0.100314	0.0967404	0.000445546	4.06089E-11	0.000445546
n-Undecane	0.0418041	0.0346276	0.000894736	3.72102E-11	0.000894736
Dodecane	0	0	0	0	0
Water	75.1025	75.0533	-1.1893E-07	0.00613683	0.00613671
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0.24591	0.245901	1.13856E-06	2.60995E-10	1.13882E-06
Isohexane	0	0	0	0	0
3-Methylpentane	23.3816	23.3791	0.000316597	6.37814E-09	0.000316604
Neohexane	30.3382	30.3362	0.000241631	2.25815E-09	0.000241633
2,3-Dimethylbutane	3.3723	3.37201	3.64588E-05	5.98864E-10	3.64594E-05
Methylcyclohexane	2.68024	2.67917	0.00013305	1.65194E-09	0.000133052
Isooctane	0	0	0	0	0
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.419245	0.419076	2.09987E-05	1.51551E-08	2.10138E-05
m-Xylene	0.324994	0.324388	7.55218E-05	1.45696E-08	7.55364E-05
Ethylbenzene	0.115023	0.114847	2.19428E-05	4.76968E-09	2.19476E-05

Properties

Property	Units	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Temperature	°F	69.3477	69.3477	69.3477	69.3477	69.3477
Pressure	psig	215	215	215	215	215
Mole Fraction Vapor		0.999897	1	0	0	0
Mole Fraction Light Liquid		1.51617E-05	0	1	0	0.147137
Molecular Weight	lb/lbmol	22.6292	22.6288	79.564	18.0173	27.0731
Mass Density	lb/ft^3	0.977766	0.977647	40.9659	62.2654	50.8361
Molar Flow	lbmol/h	1937.47	1937.27	0.0293753	0.17027	0.199646
Mass Flow	lb/h	43843.4	43838	2.33722	3.06782	5.40503
Vapor Volumetric Flow	ft^3/h	44840.4	44840.2	0.0570527	0.04927	0.106323

Process Streams Report
Stream: Pipeline
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 12:56 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Properties

Property	Units	Total	Vapor	Light Liquid	Heavy Liquid	Mixed Liquid
Liquid Volumetric Flow	gpm	5590.49	5590.47	0.00711307	0.00614275	0.0132558
Std Vapor Volumetric Flow	MMSCFD	17.6457	17.6439	0.000267539	0.00155076	0.0018183
Std Liquid Volumetric Flow	sgpm	245.777	245.764	0.00728158	0.00613817	0.0134197
Specific Gravity			0.78131	0.656831	0.998339	0.815086
API Gravity				82.2335	10.0498	41.3798
Enthalpy	Btu/h	-6.83315E+07	-6.83083E+07	-2321.57	-20935.5	-23257
Kinematic Viscosity	cSt		0.675564	0.441945	1.0064	0.703514
Net Ideal Gas Heating Value	Btu/ft^3	1227.5	1227.56	4060.19	0.471739	597.807
Net Liquid Heating Value	Btu/lb	20506.2	20507.8	19209	-1049.33	7710.68

Remarks

Process Streams Report
Stream: Produced Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 3:19 PM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015

Connections

From: Water Tanks	To: --

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	4.79172E-09	4.79172E-09			
Methane	6.49224E-06	6.49224E-06			
CO2	1.81217E-06	1.81217E-06			
Ethane	8.02153E-06	8.02153E-06			
Propane	6.44672E-06	6.44672E-06			
Isobutane	1.45921E-07	1.45921E-07			
n-Butane	2.0462E-06	2.0462E-06			
Isopentane	1.52767E-07	1.52767E-07			
n-Pentane	2.21825E-07	2.21825E-07			
n-Hexane	1.12634E-08	1.12634E-08			
Methylcyclopentane	3.15539E-08	3.15539E-08			
Benzene	5.92002E-07	5.92002E-07			
Cyclohexane	1.01856E-07	1.01856E-07			
n-Heptane	2.35246E-09	2.35246E-09			
n-Octane	8.56205E-10	8.56205E-10			
n-Nonane	1.32726E-09	1.32726E-09			
n-Decane	2.14886E-10	2.14886E-10			
n-Undecane	2.81336E-10	2.81336E-10			
Dodecane	0	0			
Water	0.999972	0.999972			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	7.20328E-09	7.20328E-09			
Isohexane	0	0			
3-Methylpentane	7.17691E-08	7.17691E-08			
Neohexane	7.68864E-09	7.68864E-09			
2,3-Dimethylbutane	3.97011E-09	3.97011E-09			
Methylcyclohexane	2.89906E-08	2.89906E-08			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	6.93508E-07	6.93508E-07			
m-Xylene	5.81811E-07	5.81811E-07			
Ethylbenzene	1.8472E-07	1.8472E-07			

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	3.8622E-06	3.8622E-06			
Methane	0.00523285	0.00523285			
CO2	0.00146063	0.00146063			
Ethane	0.00646547	0.00646547			
Propane	0.00519616	0.00519616			
Isobutane	0.000117614	0.000117614			
n-Butane	0.00164927	0.00164927			
Isopentane	0.000123132	0.000123132			
n-Pentane	0.000178794	0.000178794			
n-Hexane	9.07844E-06	9.07844E-06			
Methylcyclopentane	2.5433E-05	2.5433E-05			
Benzene	0.000477163	0.000477163			
Cyclohexane	8.20973E-05	8.20973E-05			
n-Heptane	1.89612E-06	1.89612E-06			
n-Octane	6.90114E-07	6.90114E-07			
n-Nonane	1.06979E-06	1.06979E-06			
n-Decane	1.73201E-07	1.73201E-07			
n-Undecane	2.26761E-07	2.26761E-07			

Process Streams Report
Stream: Produced Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:19 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Dodecane	0	0			
Water	805.993	805.993			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	5.80596E-06	5.80596E-06			
Isohexane	0	0			
3-Methylpentane	5.7847E-05	5.7847E-05			
Neohexane	6.19716E-06	6.19716E-06			
2,3-Dimethylbutane	3.19997E-06	3.19997E-06			
Methylcyclohexane	2.33668E-05	2.33668E-05			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0.000558978	0.000558978			
m-Xylene	0.000468949	0.000468949			
Ethylbenzene	0.000148887	0.000148887			

Mass Fraction	Total	Light Liquid			
Nitrogen	7.45079E-09	7.45079E-09			
Methane	5.7811E-06	5.7811E-06			
CO2	4.42679E-06	4.42679E-06			
Ethane	1.33882E-05	1.33882E-05			
Propane	1.5779E-05	1.5779E-05			
Isobutane	4.70764E-07	4.70764E-07			
n-Butane	6.60137E-06	6.60137E-06			
Isopentane	6.11791E-07	6.11791E-07			
n-Pentane	8.88349E-07	8.88349E-07			
n-Hexane	5.38761E-08	5.38761E-08			
Methylcyclopentane	1.47401E-07	1.47401E-07			
Benzene	2.56676E-06	2.56676E-06			
Cyclohexane	4.7581E-07	4.7581E-07			
n-Heptane	1.30841E-08	1.30841E-08			
n-Octane	5.42872E-09	5.42872E-09			
n-Nonane	9.44879E-09	9.44879E-09			
n-Decane	1.69708E-09	1.69708E-09			
n-Undecane	2.44091E-09	2.44091E-09			
Dodecane	0	0			
Water	0.99994	0.99994			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	2.80412E-08	2.80412E-08			
Isohexane	0	0			
3-Methylpentane	3.43294E-07	3.43294E-07			
Neohexane	3.67771E-08	3.67771E-08			
2,3-Dimethylbutane	1.89903E-08	1.89903E-08			
Methylcyclohexane	1.57998E-07	1.57998E-07			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	3.54681E-06	3.54681E-06			
m-Xylene	3.42853E-06	3.42853E-06			
Ethylbenzene	1.08853E-06	1.08853E-06			

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	0.000108193	0.000108193			
Methane	0.0839477	0.0839477			

Process Streams Report
Stream: Produced Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:19 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Mass Flow	Total lb/h	Light Liquid lb/h			
CO2	0.0642818	0.0642818			
Ethane	0.194411	0.194411			
Propane	0.229128	0.229128			
Isobutane	0.006836	0.006836			
n-Butane	0.0958589	0.0958589			
Isopentane	0.00888385	0.00888385			
n-Pentane	0.0128998	0.0128998			
n-Hexane	0.000782337	0.000782337			
Methylcyclopentane	0.00214042	0.00214042			
Benzene	0.037272	0.037272			
Cyclohexane	0.00690927	0.00690927			
n-Heptane	0.000189995	0.000189995			
n-Octane	7.88307E-05	7.88307E-05			
n-Nonane	0.000137206	0.000137206			
n-Decane	2.46433E-05	2.46433E-05			
n-Undecane	3.54446E-05	3.54446E-05			
Dodecane	0	0			
Water	14520.2	14520.2			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0.000407189	0.000407189			
Isohexane	0	0			
3-Methylpentane	0.00498499	0.00498499			
Neohexane	0.000534042	0.000534042			
2,3-Dimethylbutane	0.000275759	0.000275759			
Methylcyclohexane	0.0022943	0.0022943			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0.0515034	0.0515034			
m-Xylene	0.0497859	0.0497859			
Ethylbenzene	0.0158066	0.0158066			

Std. Liquid Volumetric Fraction	Total	Light Liquid			
Nitrogen	9.23353E-09	9.23353E-09			
Methane	1.92781E-05	1.92781E-05			
CO2	5.4169E-06	5.4169E-06			
Ethane	3.75751E-05	3.75751E-05			
Propane	3.1109E-05	3.1109E-05			
Isobutane	8.36359E-07	8.36359E-07			
n-Butane	1.12991E-05	1.12991E-05			
Isopentane	9.7857E-07	9.7857E-07			
n-Pentane	1.40839E-06	1.40839E-06			
n-Hexane	8.11263E-08	8.11263E-08			
Methylcyclopentane	1.95603E-07	1.95603E-07			
Benzene	2.9015E-06	2.9015E-06			
Cyclohexane	6.07259E-07	6.07259E-07			
n-Heptane	1.90101E-08	1.90101E-08			
n-Octane	7.68287E-09	7.68287E-09			
n-Nonane	1.30817E-08	1.30817E-08			
n-Decane	2.3101E-09	2.3101E-09			
n-Undecane	3.28106E-09	3.28106E-09			
Dodecane	0	0			
Water	0.999878	0.999878			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	3.73938E-08	3.73938E-08			

Process Streams Report
Stream: Produced Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:19 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Std. Liquid Volumetric Fraction	Total	Light Liquid			
Isohexane	0	0			
3-Methylpentane	5.13102E-07	5.13102E-07			
Neohexane	5.62464E-08	5.62464E-08			
2,3-Dimethylbutane	2.8511E-08	2.8511E-08			
Methylcyclohexane	2.04135E-07	2.04135E-07			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	4.06799E-06	4.06799E-06			
m-Xylene	3.94597E-06	3.94597E-06			
Ethylbenzene	1.24869E-06	1.24869E-06			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	2.92812E-07	2.92812E-07			
Methane	0.000415098	0.000415098			
CO2	0.000101614	0.000101614			
Ethane	0.000655882	0.000655882			
Propane	0.000660647	0.000660647			
Isobutane	1.80143E-05	1.80143E-05			
n-Butane	0.000249397	0.000249397			
Isopentane	2.15113E-05	2.15113E-05			
n-Pentane	3.12938E-05	3.12938E-05			
n-Hexane	1.80341E-06	1.80341E-06			
Methylcyclopentane	4.4728E-06	4.4728E-06			
Benzene	6.99244E-05	6.99244E-05			
Cyclohexane	1.40438E-05	1.40438E-05			
n-Heptane	4.23641E-07	4.23641E-07			
n-Octane	1.7021E-07	1.7021E-07			
n-Nonane	2.89216E-07	2.89216E-07			
n-Decane	5.11199E-08	5.11199E-08			
n-Undecane	7.25204E-08	7.25204E-08			
Dodecane	0	0			
Water	29.1406	29.1406			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	8.73002E-07	8.73002E-07			
Isohexane	0	0			
3-Methylpentane	1.13896E-05	1.13896E-05			
Neohexane	1.22758E-06	1.22758E-06			
2,3-Dimethylbutane	6.283E-07	6.283E-07			
Methylcyclohexane	4.61323E-06	4.61323E-06			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	9.56302E-05	9.56302E-05			
m-Xylene	9.16838E-05	9.16838E-05			
Ethylbenzene	2.89536E-05	2.89536E-05			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	85	85			
Pressure	psig	0.5	0.5			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Molecular Weight	lb/lbmol	18.0159	18.0159			
Mass Density	lb/ft^3	62.1218	62.1218			
Molar Flow	lbmol/h	806.015	806.015			
Mass Flow	lb/h	14521.1	14521.1			
Vapor Volumetric Flow	ft^3/h	233.751	233.751			

Process Streams Report
Stream: Produced Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:19 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Properties

Property	Units	Total	Light Liquid			
Liquid Volumetric Flow	gpm	29.143	29.143			
Std Vapor Volumetric Flow	MMSCFD	7.34089	7.34089			
Std Liquid Volumetric Flow	sgpm	29.0304	29.0304			
Specific Gravity		0.996036	0.996036			
API Gravity		10.0152	10.0152			
Enthalpy	Btu/h	-9.89151E+07	-9.89151E+07			
Kinematic Viscosity	cSt	0.833349	0.833349			
Net Ideal Gas Heating Value	Btu/ft^3	0.0518629	0.0518629			
Net Liquid Heating Value	Btu/lb	-1058.61	-1058.61			

Remarks

Process Streams Report
Stream: Reservoir Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:58 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:58 AM, 4/7/2015

Connections

From: --	To: MIX-102

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	0 *	0			
Methane	0 *	0			
CO2	0 *	0			
Ethane	0 *	0			
Propane	0 *	0			
Isobutane	0 *	0			
n-Butane	0 *	0			
Isopentane	0 *	0			
n-Pentane	0 *	0			
n-Hexane	0 *	0			
Methylcyclopentane	0 *	0			
Benzene	0 *	0			
Cyclohexane	0 *	0			
n-Heptane	0 *	0			
n-Octane	0 *	0			
n-Nonane	0 *	0			
n-Decane	0 *	0			
n-Undecane	0 *	0			
Dodecane	0 *	0			
Water	1 *	1			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			
Isohexane	0 *	0			
3-Methylpentane	0 *	0			
Neohexane	0 *	0			
2,3-Dimethylbutane	0 *	0			
Methylcyclohexane	0 *	0			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0 *	0			
m-Xylene	0 *	0			
Ethylbenzene	0 *	0			

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	0 *	0			
Methane	0 *	0			
CO2	0 *	0			
Ethane	0 *	0			
Propane	0 *	0			
Isobutane	0 *	0			
n-Butane	0 *	0			
Isopentane	0 *	0			
n-Pentane	0 *	0			
n-Hexane	0 *	0			
Methylcyclopentane	0 *	0			
Benzene	0 *	0			
Cyclohexane	0 *	0			
n-Heptane	0 *	0			
n-Octane	0 *	0			
n-Nonane	0 *	0			
n-Decane	0 *	0			
n-Undecane	0 *	0			

Process Streams Report
Stream: Reservoir Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 10:58 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 10:58 AM, 4/7/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Dodecane	0 *	0			
Water	809.874 *	809.874			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			
Isohexane	0 *	0			
3-Methylpentane	0 *	0			
Neohexane	0 *	0			
2,3-Dimethylbutane	0 *	0			
Methylcyclohexane	0 *	0			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0 *	0			
m-Xylene	0 *	0			
Ethylbenzene	0 *	0			

Mass Fraction	Total	Light Liquid			
Nitrogen	0 *	0			
Methane	0 *	0			
CO2	0 *	0			
Ethane	0 *	0			
Propane	0 *	0			
Isobutane	0 *	0			
n-Butane	0 *	0			
Isopentane	0 *	0			
n-Pentane	0 *	0			
n-Hexane	0 *	0			
Methylcyclopentane	0 *	0			
Benzene	0 *	0			
Cyclohexane	0 *	0			
n-Heptane	0 *	0			
n-Octane	0 *	0			
n-Nonane	0 *	0			
n-Decane	0 *	0			
n-Undecane	0 *	0			
Dodecane	0 *	0			
Water	1 *	1			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			
Isohexane	0 *	0			
3-Methylpentane	0 *	0			
Neohexane	0 *	0			
2,3-Dimethylbutane	0 *	0			
Methylcyclohexane	0 *	0			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0 *	0			
m-Xylene	0 *	0			
Ethylbenzene	0 *	0			

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	0 *	0			
Methane	0 *	0			

Process Streams Report
Stream: Reservoir Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:58 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:58 AM, 4/7/2015

Mass Flow	Total lb/h	Light Liquid lb/h			
CO2	0 *	0			
Ethane	0 *	0			
Propane	0 *	0			
Isobutane	0 *	0			
n-Butane	0 *	0			
Isopentane	0 *	0			
n-Pentane	0 *	0			
n-Hexane	0 *	0			
Methylcyclopentane	0 *	0			
Benzene	0 *	0			
Cyclohexane	0 *	0			
n-Heptane	0 *	0			
n-Octane	0 *	0			
n-Nonane	0 *	0			
n-Decane	0 *	0			
n-Undecane	0 *	0			
Dodecane	0 *	0			
Water	14590.1 *	14590.1			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			
Isohexane	0 *	0			
3-Methylpentane	0 *	0			
Neohexane	0 *	0			
2,3-Dimethylbutane	0 *	0			
Methylcyclohexane	0 *	0			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0 *	0			
m-Xylene	0 *	0			
Ethylbenzene	0 *	0			

Std. Liquid Volumetric Fraction	Total	Light Liquid			
Nitrogen	0 *	0			
Methane	0 *	0			
CO2	0 *	0			
Ethane	0 *	0			
Propane	0 *	0			
Isobutane	0 *	0			
n-Butane	0 *	0			
Isopentane	0 *	0			
n-Pentane	0 *	0			
n-Hexane	0 *	0			
Methylcyclopentane	0 *	0			
Benzene	0 *	0			
Cyclohexane	0 *	0			
n-Heptane	0 *	0			
n-Octane	0 *	0			
n-Nonane	0 *	0			
n-Decane	0 *	0			
n-Undecane	0 *	0			
Dodecane	0 *	0			
Water	1 *	1			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			

Process Streams Report
Stream: Reservoir Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:58 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:58 AM, 4/7/2015

Std. Liquid Volumetric Fraction	Total	Light Liquid			
Isohexane	0 *	0			
3-Methylpentane	0 *	0			
Neohexane	0 *	0			
2,3-Dimethylbutane	0 *	0			
Methylcyclohexane	0 *	0			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0 *	0			
m-Xylene	0 *	0			
Ethylbenzene	0 *	0			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	0	0			
Methane	0	0			
CO2	0	0			
Ethane	0	0			
Propane	0	0			
Isobutane	0	0			
n-Butane	0	0			
Isopentane	0	0			
n-Pentane	0	0			
n-Hexane	0	0			
Methylcyclopentane	0	0			
Benzene	0	0			
Cyclohexane	0	0			
n-Heptane	0	0			
n-Octane	0	0			
n-Nonane	0	0			
n-Decane	0	0			
n-Undecane	0	0			
Dodecane	0	0			
Water	29.6033	29.6033			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0	0			
Isohexane	0	0			
3-Methylpentane	0	0			
Neohexane	0	0			
2,3-Dimethylbutane	0	0			
Methylcyclohexane	0	0			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0	0			
m-Xylene	0	0			
Ethylbenzene	0	0			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	150 *	150			
Pressure	psig	4230 *	4230			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Molecular Weight	lb/lbmol	18.0153	18.0153			
Mass Density	lb/ft^3	61.4467	61.4467			
Molar Flow	lbmol/h	809.874	809.874			
Mass Flow	lb/h	14590.1	14590.1			
Vapor Volumetric Flow	ft^3/h	237.443	237.443			

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Reservoir Water
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:58 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:58 AM, 4/7/2015

Properties

Property	Units	Total	Light Liquid			
Liquid Volumetric Flow	gpm	29.6033	29.6033			
Std Vapor Volumetric Flow	MMSCFD	7.37603	7.37603			
Std Liquid Volumetric Flow	sgpm	29.1667 *	29.1667			
Specific Gravity		0.985212	0.985212			
API Gravity		9.5073	9.5073			
Enthalpy	Btu/h	-9.82871E+07	-9.82871E+07			
Kinematic Viscosity	cSt	0.467278	0.467278			
Net Ideal Gas Heating Value	Btu/ft^3	0	0			
Net Liquid Heating Value	Btu/lb	-1059.76	-1059.76			

Remarks

Process Streams Report
Stream: Sales Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 11:25 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015

Connections

From:	To:
GPU	MIX-101

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00509241	0.00509241			
Methane	0.710836	0.710836			
CO2	0.001453	0.001453			
Ethane	0.175966	0.175966			
Propane	0.069141	0.069141			
Isobutane	0.00668619	0.00668619			
n-Butane	0.0182349	0.0182349			
Isopentane	0.0029561	0.0029561			
n-Pentane	0.00406755	0.00406755			
n-Hexane	0.000964448	0.000964448			
Methylcyclopentane	7.74725E-05	7.74725E-05			
Benzene	1.22742E-05	1.22742E-05			
Cyclohexane	0.000108588	0.000108588			
n-Heptane	0.000298454	0.000298454			
n-Octane	0.000156453	0.000156453			
n-Nonane	3.06158E-05	3.06158E-05			
n-Decane	9.48879E-06	9.48879E-06			
n-Undecane	6.20429E-06	6.20429E-06			
Dodecane	0	0			
Water	0.00167796	0.00167796			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	8.01408E-06	8.01408E-06			
Isohexane	0	0			
3-Methylpentane	0.000872727	0.000872727			
Neohexane	0.00107079	0.00107079			
2,3-Dimethylbutane	0.000122982	0.000122982			
Methylcyclohexane	0.00011199	0.00011199			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	1.70511E-05	1.70511E-05			
m-Xylene	1.55387E-05	1.55387E-05			
Ethylbenzene	5.36858E-06	5.36858E-06			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	9.60642	9.60642			
Methane	1340.94	1340.94			
CO2	2.74096	2.74096			
Ethane	331.946	331.946			
Propane	130.429	130.429			
Isobutane	12.613	12.613			
n-Butane	34.3986	34.3986			
Isopentane	5.57644	5.57644			
n-Pentane	7.6731	7.6731			
n-Hexane	1.81935	1.81935			
Methylcyclopentane	0.146146	0.146146			
Benzene	0.0231543	0.0231543			
Cyclohexane	0.204843	0.204843			
n-Heptane	0.56301	0.56301			
n-Octane	0.295136	0.295136			
n-Nonane	0.0577543	0.0577543			
n-Decane	0.0178999	0.0178999			
n-Undecane	0.0117039	0.0117039			

Process Streams Report
Stream: Sales Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:25 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Dodecane	0	0			
Water	3.16534	3.16534			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0.0151179	0.0151179			
Isohexane	0	0			
3-Methylpentane	1.64633	1.64633			
Neohexane	2.01997	2.01997			
2,3-Dimethylbutane	0.231996	0.231996			
Methylcyclohexane	0.21126	0.21126			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0.0321656	0.0321656			
m-Xylene	0.0293125	0.0293125			
Ethylbenzene	0.0101274	0.0101274			

Mass Fraction	Total	Vapor			
Nitrogen	0.00640207	0.00640207			
Methane	0.511767	0.511767			
CO2	0.00286974	0.00286974			
Ethane	0.237454	0.237454			
Propane	0.136824	0.136824			
Isobutane	0.0174402	0.0174402			
n-Butane	0.0475638	0.0475638			
Isopentane	0.00957147	0.00957147			
n-Pentane	0.0131702	0.0131702			
n-Hexane	0.00372987	0.00372987			
Methylcyclopentane	0.000292605	0.000292605			
Benzene	4.30271E-05	4.30271E-05			
Cyclohexane	0.000410127	0.000410127			
n-Heptane	0.0013421	0.0013421			
n-Octane	0.00080203	0.00080203			
n-Nonane	0.000176219	0.000176219			
n-Decane	6.05887E-05	6.05887E-05			
n-Undecane	4.35217E-05	4.35217E-05			
Dodecane	0	0			
Water	0.00135661	0.00135661			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	2.52236E-05	2.52236E-05			
Isohexane	0	0			
3-Methylpentane	0.00337515	0.00337515			
Neohexane	0.00414115	0.00414115			
2,3-Dimethylbutane	0.000475615	0.000475615			
Methylcyclohexane	0.000493469	0.000493469			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	7.0506E-05	7.0506E-05			
m-Xylene	7.40333E-05	7.40333E-05			
Ethylbenzene	2.55784E-05	2.55784E-05			

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	269.109	269.109			
Methane	21511.9	21511.9			

Process Streams Report
Stream: Sales Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:25 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015	

Mass Flow	Total lb/h	Vapor lb/h			
CO2	120.628	120.628			
Ethane	9981.3	9981.3			
Propane	5751.34	5751.34			
Isobutane	733.093	733.093			
n-Butane	1999.32	1999.32			
Isopentane	402.333	402.333			
n-Pentane	553.605	553.605			
n-Hexane	156.784	156.784			
Methylcyclopentane	12.2996	12.2996			
Benzene	1.80863	1.80863			
Cyclohexane	17.2395	17.2395			
n-Heptane	56.4147	56.4147			
n-Octane	33.713	33.713			
n-Nonane	7.40728	7.40728			
n-Decane	2.54682	2.54682			
n-Undecane	1.82942	1.82942			
Dodecane	0	0			
Water	57.0245	57.0245			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	1.06026	1.06026			
Isohexane	0	0			
3-Methylpentane	141.873	141.873			
Neohexane	174.072	174.072			
2,3-Dimethylbutane	19.9923	19.9923			
Methylcyclohexane	20.7428	20.7428			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	2.96369	2.96369			
m-Xylene	3.11196	3.11196			
Ethylbenzene	1.07518	1.07518			

Std. Liquid Volumetric Fraction	Total	Vapor			
Nitrogen	0.00280631	0.00280631			
Methane	0.603636	0.603636			
CO2	0.00124209	0.00124209			
Ethane	0.235726	0.235726			
Propane	0.0954155	0.0954155			
Isobutane	0.0109595	0.0109595			
n-Butane	0.0287963	0.0287963			
Isopentane	0.00541524	0.00541524			
n-Pentane	0.00738554	0.00738554			
n-Hexane	0.00198659	0.00198659			
Methylcyclopentane	0.000137343	0.000137343			
Benzene	1.7204E-05	1.7204E-05			
Cyclohexane	0.000185143	0.000185143			
n-Heptane	0.000689723	0.000689723			
n-Octane	0.000401482	0.000401482			
n-Nonane	8.62959E-05	8.62959E-05			
n-Decane	2.91723E-05	2.91723E-05			
n-Undecane	2.06927E-05	2.06927E-05			
Dodecane	0	0			
Water	0.000479819	0.000479819			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	1.18976E-05	1.18976E-05			

Process Streams Report
Stream: Sales Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 11:25 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015

Std. Liquid Volumetric Fraction	Total	Vapor
Isohexane	0	0
3-Methylpentane	0.00178435	0.00178435
Neohexane	0.0022402	0.0022402
2,3-Dimethylbutane	0.000252573	0.000252573
Methylcyclohexane	0.000225515	0.000225515
Isooctane	0	0
Decane, 2-Methyl-	0	0
Toluene	2.86034E-05	2.86034E-05
m-Xylene	3.01385E-05	3.01385E-05
Ethylbenzene	1.03785E-05	1.03785E-05

Volumetric Flow	Total ft^3/h	Vapor ft^3/h
Nitrogen	244.477	244.477
Methane	32472	32472
CO2	63.6067	63.6067
Ethane	7231.55	7231.55
Propane	2587.11	2587.11
Isobutane	231.704	231.704
n-Butane	612.823	612.823
Isopentane	90.5302	90.5302
n-Pentane	122.338	122.338
n-Hexane	25.3788	25.3788
Methylcyclopentane	2.1498	2.1498
Benzene	0.355242	0.355242
Cyclohexane	2.9925	2.9925
n-Heptane	6.76886	6.76886
n-Octane	3.02184	3.02184
n-Nonane	0.470719	0.470719
n-Decane	0.111648	0.111648
n-Undecane	0.0485068	0.0485068
Dodecane	0	0
Water	74.8118	74.8118
Triethylene Glycol	0	0
Oxygen	0	0
Argon	0	0
Carbon Monoxide	0	0
Cyclopentane	0.242393	0.242393
Isohexane	0	0
3-Methylpentane	23.5968	23.5968
Neohexane	30.26	30.26
2,3-Dimethylbutane	3.38934	3.38934
Methylcyclohexane	2.74067	2.74067
Isooctane	0	0
Decane, 2-Methyl-	0	0
Toluene	0.428433	0.428433
m-Xylene	0.337182	0.337182
Ethylbenzene	0.119025	0.119025

Properties

Property	Units	Total	Vapor
Temperature	°F	70 *	70
Pressure	psig	215 *	215
Mole Fraction Vapor		1	1
Mole Fraction Light Liquid		0	0
Molecular Weight	lb/lbmol	22.2827	22.2827
Mass Density	lb/ft^3	0.958963	0.958963
Molar Flow	lbmol/h	1886.42	1886.42
Mass Flow	lb/h	42034.6	42034.6
Vapor Volumetric Flow	ft^3/h	43833.4	43833.4

Process Streams Report
Stream: Sales Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 11:25 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 9:38 AM, 4/15/2015

Properties

Property	Units	Total	Vapor			
Liquid Volumetric Flow	gpm	5464.94	5464.94			
Std Vapor Volumetric Flow	MMSCFD	17.1808	17.1808			
Std Liquid Volumetric Flow	sgpm	237.582	237.582			
Specific Gravity		0.769362	0.769362			
API Gravity						
Enthalpy	Btu/h	-6.61807E+07	-6.61807E+07			
Kinematic Viscosity	cSt	0.691723	0.691723			
Net Ideal Gas Heating Value	Btu/ft^3	1210	1210			
Net Liquid Heating Value	Btu/lb	20531.1	20531.1			

Remarks

Process Streams Report
Stream: Sales Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:23 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Connections

From:	To:
Oil Tanks	--

Composition

Mole Fraction	Total	Light Liquid	Heavy Liquid	Mixed Liquid	
Nitrogen	1.57798E-09	1.58278E-09	1.12992E-11	1.57798E-09	
Methane	1.68976E-05	1.6949E-05	7.6867E-08	1.68976E-05	
CO2	1.20041E-06	1.20396E-06	4.0184E-08	1.20041E-06	
Ethane	0.00215892	0.00216552	1.90036E-06	0.00215892	
Propane	0.0349731	0.0350801	8.86821E-06	0.0349731	
Isobutane	0.0225237	0.0225927	8.33546E-07	0.0225237	
n-Butane	0.108585	0.108917	6.63138E-06	0.108585	
Isopentane	0.0524918	0.0526524	7.75746E-07	0.0524918	
n-Pentane	0.0966998	0.0969957	1.0852E-06	0.0966998	
n-Hexane	0.0767692	0.0770041	1.08764E-07	0.0767692	
Methylcyclopentane	0.00615833	0.00617718	7.08212E-08	0.00615833	
Benzene	0.000969428	0.000972393	6.33802E-07	0.000969428	
Cyclohexane	0.0107002	0.0107329	1.66622E-07	0.0107002	
n-Heptane	0.0683248	0.0685339	2.82466E-08	0.0683248	
n-Octane	0.110946	0.111286	1.11242E-08	0.110946	
n-Nonane	0.0673008	0.0675068	6.62312E-09	0.0673008	
n-Decane	0.0586629	0.0588424	1.38169E-09	0.0586629	
n-Undecane	0.125248	0.125631	1.30659E-09	0.125248	
Dodecane	0	0	0	0	
Water	0.00362548	0.000576633	0.999977	0.00362548	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	0.000275309	0.000276151	1.29451E-08	0.000275309	
Isohexane	0	0	0	0	
3-Methylpentane	0.0564215	0.0565942	2.91066E-07	0.0564215	
Neohexane	0.0414851	0.0416121	9.72505E-08	0.0414851	
2,3-Dimethylbutane	0.00644661	0.00646634	2.50928E-08	0.00644661	
Methylcyclohexane	0.0248843	0.0249604	7.15537E-08	0.0248843	
Isooctane	0	0	0	0	
Decane, 2-Methyl-	0	0	0	0	
Toluene	0.0048068	0.0048215	7.06691E-07	0.0048068	
m-Xylene	0.0151249	0.0151712	5.89413E-07	0.0151249	
Ethylbenzene	0.00439997	0.00441343	1.90049E-07	0.00439997	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h	Heavy Liquid lbmol/h	Mixed Liquid lbmol/h	
Nitrogen	2.31986E-07	2.31981E-07	5.06761E-12	2.31986E-07	
Methane	0.00248418	0.00248414	3.44742E-08	0.00248418	
CO2	0.000176478	0.00017646	1.80222E-08	0.000176478	
Ethane	0.317392	0.317391	8.52296E-07	0.317392	
Propane	5.14153	5.14153	3.97732E-06	5.14153	
Isobutane	3.31131	3.31131	3.73838E-07	3.31131	
n-Butane	15.9635	15.9635	2.97412E-06	15.9635	
Isopentane	7.71703	7.71703	3.47916E-07	7.71703	
n-Pentane	14.2162	14.2162	4.86705E-07	14.2162	
n-Hexane	11.2862	11.2862	4.87797E-08	11.2862	
Methylcyclopentane	0.905361	0.905361	3.17627E-08	0.905361	
Benzene	0.14252	0.142519	2.84255E-07	0.14252	
Cyclohexane	1.57308	1.57308	7.47288E-08	1.57308	
n-Heptane	10.0447	10.0447	1.26683E-08	10.0447	
n-Octane	16.3106	16.3106	4.98912E-09	16.3106	
n-Nonane	9.89417	9.89417	2.97041E-09	9.89417	
n-Decane	8.62427	8.62427	6.19677E-10	8.62427	
n-Undecane	18.4132	18.4132	5.85997E-10	18.4132	

Process Streams Report
Stream: Sales Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:23 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h	Heavy Liquid lbmol/h	Mixed Liquid lbmol/h	
Dodecane	0	0	0	0	
Water	0.532996	0.0845146	0.448481	0.532996	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	0.0404743	0.0404743	5.80579E-09	0.0404743	
Isohexane	0	0	0	0	
3-Methylpentane	8.29476	8.29476	1.30541E-07	8.29476	
Neohexane	6.0989	6.0989	4.36161E-08	6.0989	
2,3-Dimethylbutane	0.947743	0.947743	1.12539E-08	0.947743	
Methylcyclohexane	3.65834	3.65834	3.20912E-08	3.65834	
Isooctane	0	0	0	0	
Decane, 2-Methyl-	0	0	0	0	
Toluene	0.706667	0.706666	3.16945E-07	0.706667	
m-Xylene	2.22357	2.22357	2.64347E-07	2.22357	
Ethylbenzene	0.646857	0.646857	8.52353E-08	0.646857	

Mass Fraction	Total	Light Liquid	Heavy Liquid	Mixed Liquid	
Nitrogen	4.50088E-10	4.50331E-10	1.75692E-11	4.50088E-10	
Methane	2.7601E-06	2.76161E-06	6.84461E-08	2.7601E-06	
CO2	5.37907E-07	5.38153E-07	9.81608E-08	5.37907E-07	
Ethane	0.000660977	0.000661345	3.17171E-06	0.000660977	
Propane	0.0157021	0.0157109	2.17055E-05	0.0157021	
Isobutane	0.0133295	0.0133369	2.68911E-06	0.0133295	
n-Butane	0.0642602	0.0642962	2.13936E-05	0.0642602	
Isopentane	0.0385612	0.0385828	3.10661E-06	0.0385612	
n-Pentane	0.071037	0.0710768	4.34589E-06	0.071037	
n-Hexane	0.0673597	0.0673974	5.20242E-07	0.0673597	
Methylcyclopentane	0.00527711	0.00528006	3.30829E-07	0.00527711	
Benzene	0.000771014	0.000771444	2.74795E-06	0.000771014	
Cyclohexane	0.00916906	0.0091742	7.78349E-07	0.00916906	
n-Heptane	0.0697083	0.0697473	1.57101E-07	0.0697083	
n-Octane	0.129038	0.12911	7.05312E-08	0.129038	
n-Nonane	0.0878871	0.0879363	4.71493E-08	0.0878871	
n-Decane	0.084985	0.0850326	1.09118E-08	0.084985	
n-Undecane	0.199334	0.199446	1.1336E-08	0.199334	
Dodecane	0	0	0	0	
Water	0.000665022	0.000105508	0.999928	0.000665022	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	0.000196595	0.000196705	5.03926E-08	0.000196595	
Isohexane	0	0	0	0	
3-Methylpentane	0.049506	0.0495337	1.39223E-06	0.049506	
Neohexane	0.0364003	0.0364207	4.65171E-07	0.0364003	
2,3-Dimethylbutane	0.00565646	0.00565962	1.20024E-07	0.00565646	
Methylcyclohexane	0.0248774	0.0248913	3.8996E-07	0.0248774	
Isooctane	0	0	0	0	
Decane, 2-Methyl-	0	0	0	0	
Toluene	0.00450948	0.004512	3.61416E-06	0.00450948	
m-Xylene	0.0163495	0.0163586	3.47327E-06	0.0163495	
Ethylbenzene	0.00475621	0.00475887	1.11991E-06	0.00475621	

Mass Flow	Total lb/h	Light Liquid lb/h	Heavy Liquid lb/h	Mixed Liquid lb/h	
Nitrogen	6.4987E-06	6.49856E-06	1.41961E-10	6.4987E-06	
Methane	0.0398523	0.0398518	5.53051E-07	0.0398523	

Process Streams Report
Stream: Sales Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:23 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Mass Flow	Total lb/h	Light Liquid lb/h	Heavy Liquid lb/h	Mixed Liquid lb/h	
CO2	0.00776669	0.0077659	7.93149E-07	0.00776669	
Ethane	9.54367	9.54364	2.56277E-05	9.54367	
Propane	226.719	226.719	0.000175382	226.719	
Isobutane	192.461	192.46	2.17283E-05	192.461	
n-Butane	927.836	927.835	0.000172862	927.836	
Isopentane	556.774	556.774	2.51017E-05	556.774	
n-Pentane	1025.68	1025.68	3.51152E-05	1025.68	
n-Hexane	972.589	972.589	4.20361E-06	972.589	
Methylcyclopentane	76.1947	76.1947	2.67313E-06	76.1947	
Benzene	11.1325	11.1324	2.22037E-05	11.1325	
Cyclohexane	132.39	132.39	6.28914E-06	132.39	
n-Heptane	1006.5	1006.5	1.26939E-06	1006.5	
n-Octane	1863.14	1863.14	5.69899E-07	1863.14	
n-Nonane	1268.98	1268.98	3.80971E-07	1268.98	
n-Decane	1227.08	1227.08	8.81686E-08	1227.08	
n-Undecane	2878.13	2878.13	9.15962E-08	2878.13	
Dodecane	0	0	0	0	
Water	9.60207	1.52255	8.07952	9.60207	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	2.83858	2.83858	4.07177E-07	2.83858	
Isohexane	0	0	0	0	
3-Methylpentane	714.804	714.804	1.12494E-05	714.804	
Neohexane	525.575	525.575	3.75863E-06	525.575	
2,3-Dimethylbutane	81.6721	81.6721	9.6981E-07	81.6721	
Methylcyclohexane	359.198	359.198	3.15091E-06	359.198	
Isooctane	0	0	0	0	
Decane, 2-Methyl-	0	0	0	0	
Toluene	65.1112	65.1111	2.92028E-05	65.1112	
m-Xylene	236.066	236.066	2.80644E-05	236.066	
Ethylbenzene	68.6736	68.6736	9.049E-06	68.6736	

Std. Liquid Volumetric Fraction	Total	Light Liquid	Heavy Liquid	Mixed Liquid	
Nitrogen	3.84232E-10	3.84372E-10	2.17732E-11	3.84232E-10	
Methane	6.34028E-06	6.34264E-06	2.28248E-07	6.34028E-06	
CO2	4.53418E-07	4.53547E-07	1.20117E-07	4.53418E-07	
Ethane	0.00127789	0.00127838	8.90176E-06	0.00127789	
Propane	0.0213254	0.0213336	4.27938E-05	0.0213254	
Isobutane	0.0163129	0.0163192	4.77752E-06	0.0163129	
n-Butane	0.0757676	0.0757968	3.66183E-05	0.0757676	
Isopentane	0.0424883	0.0425047	4.96912E-06	0.0424883	
n-Pentane	0.0775809	0.0776108	6.89005E-06	0.0775809	
n-Hexane	0.0698709	0.0698979	7.83385E-07	0.0698709	
Methylcyclopentane	0.00482393	0.00482579	4.39019E-07	0.00482393	
Benzene	0.000600385	0.000600616	3.10635E-06	0.000600385	
Cyclohexane	0.00806113	0.00806424	9.93389E-07	0.00806113	
n-Heptane	0.0697679	0.0697948	2.28257E-07	0.0697679	
n-Octane	0.125798	0.125846	9.98187E-08	0.125798	
n-Nonane	0.0838193	0.0838516	6.52781E-08	0.0838193	
n-Decane	0.0796898	0.0797205	1.48536E-08	0.0796898	
n-Undecane	0.184575	0.184646	1.52379E-08	0.184575	
Dodecane	0	0	0	0	
Water	0.000458078	7.26632E-05	0.999876	0.000458078	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	0.000180595	0.000180664	6.72006E-08	0.000180595	

Process Streams Report
Stream: Sales Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:23 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Std. Liquid Volumetric Fraction	Total	Light Liquid	Heavy Liquid	Mixed Liquid
Isohexane	0	0	0	0
3-Methylpentane	0.0509714	0.0509911	2.08091E-06	0.0509714
Neohexane	0.0383489	0.0383637	7.11433E-07	0.0383489
2,3-Dimethylbutane	0.00585001	0.00585226	1.802E-07	0.00585001
Methylcyclohexane	0.0221412	0.0221497	5.03836E-07	0.0221412
Isooctane	0	0	0	0
Decane, 2-Methyl-	0	0	0	0
Toluene	0.00356287	0.00356424	4.14529E-06	0.00356287
m-Xylene	0.0129622	0.0129672	3.9975E-06	0.0129622
Ethylbenzene	0.00375842	0.00375987	1.2847E-06	0.00375842

Volumetric Flow	Total gpm	Light Liquid gpm	Heavy Liquid gpm	Mixed Liquid gpm
Nitrogen	2.23514E-08	2.2351E-08	3.842E-13	2.23514E-08
Methane	0.000245413	0.000245411	2.73468E-09	0.000245413
CO2	1.01867E-05	1.01854E-05	1.25377E-09	1.01867E-05
Ethane	0.0403051	0.040305	8.64601E-08	0.0403051
Propane	0.849888	0.849887	5.05683E-07	0.849888
Isobutane	0.679735	0.679735	5.72588E-08	0.679735
n-Butane	3.17838	3.17838	4.49737E-07	3.17838
Isopentane	1.80237	1.80237	6.07811E-08	1.80237
n-Pentane	3.29341	3.29341	8.51867E-08	3.29341
n-Hexane	2.97472	2.97472	9.68995E-09	2.97472
Methylcyclopentane	0.205194	0.205194	5.58599E-09	0.205194
Benzene	0.0250318	0.0250318	4.16554E-08	0.0250318
Cyclohexane	0.341939	0.341939	1.27833E-08	0.341939
n-Heptane	2.97998	2.97998	2.83043E-09	2.97998
n-Octane	5.33218	5.33218	1.23051E-09	5.33218
n-Nonane	3.53823	3.53823	8.03045E-10	3.53823
n-Decane	3.36307	3.36307	1.82896E-10	3.36307
n-Undecane	7.75892	7.75892	1.87407E-10	7.75892
Dodecane	0	0	0	0
Water	0.0141879	-0.00202691	0.0162148	0.0141879
Triethylene Glycol	0	0	0	0
Oxygen	0	0	0	0
Argon	0	0	0	0
Carbon Monoxide	0	0	0	0
Cyclopentane	0.00762033	0.00762033	8.72977E-10	0.00762033
Isohexane	0	0	0	0
3-Methylpentane	2.17775	2.17775	2.57023E-08	2.17775
Neohexane	1.63962	1.63962	8.63983E-09	1.63962
2,3-Dimethylbutane	0.249903	0.249903	2.20965E-09	0.249903
Methylcyclohexane	0.939639	0.939639	6.33566E-09	0.939639
Isooctane	0	0	0	0
Decane, 2-Methyl-	0	0	0	0
Toluene	0.148524	0.148524	5.42231E-08	0.148524
m-Xylene	0.540885	0.540885	5.16823E-08	0.540885
Ethylbenzene	0.15706	0.15706	1.65754E-08	0.15706

Properties

Property	Units	Total	Light Liquid	Heavy Liquid	Mixed Liquid
Temperature	°F	85 *	85	85	85
Pressure	psig	0.5	0.5	0.5	0.5
Mole Fraction Vapor		0	0	0	0
Mole Fraction Light Liquid		0.996949	1	0	0.996949
Molecular Weight	lb/lbmol	98.2133	98.4587	18.0162	98.2133
Mass Density	lb/ft^3	42.6185	42.611	62.1221	42.6185
Molar Flow	lbmol/h	147.014	146.566	0.448492	147.014
Mass Flow	lb/h	14438.7	14430.7	8.0801	14438.7
Vapor Volumetric Flow	ft^3/h	338.79	338.66	0.130068	338.79

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Sales Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 3:23 PM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:55 AM, 4/16/2015	

Properties

Property	Units	Total	Light Liquid	Heavy Liquid	Mixed Liquid	
Liquid Volumetric Flow	gpm	42.2388	42.2226	0.0162163	42.2388	
Std Vapor Volumetric Flow	MMSCFD	1.33895	1.33486	0.0040847	1.33895	
Std Liquid Volumetric Flow	sgpm	41.9038	41.8877	0.0161535	41.9038	
Specific Gravity		0.683328	0.683208	0.996041	0.683328	
API Gravity		71.882	71.9161	10.0145	71.882	
Enthalpy	Btu/h	-1.35828E+07	-1.35278E+07	-55039.6	-1.35828E+07	
Kinematic Viscosity	cSt	0.565849	0.565747	0.833387	0.565849	
Net Ideal Gas Heating Value	Btu/ft^3	4979.43	4994.67	0.0661532	4979.43	
Net Liquid Heating Value	Btu/lb	19081.4	19092.6	-1058.3	19081.4	

Remarks

Process Streams Report
Stream: Test Separator Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 10:56 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 10:56 AM, 4/7/2015	

Connections

From: --	To: MIX-102

Composition

Mole Fraction	Total		Vapor	Light Liquid		
Nitrogen	0.00513133	*	0.00513243	0.000255793		
Methane	0.714456	*	0.714594	0.100947		
CO2	0.00149039	*	0.00149061	0.000485624		
Ethane	0.174955	*	0.174968	0.117211		
Propane	0.0680377	*	0.0680215	0.140222		
Isobutane	0.00668174	*	0.00667637	0.0305585		
n-Butane	0.0182848	*	0.0182626	0.116612		
Isopentane	0.00316082	*	0.00315145	0.0448197		
n-Pentane	0.00440114	*	0.00438424	0.079528		
n-Hexane	0.00107028	*	0.00105777	0.0566534		
Methylcyclopentane	8.00208E-05	*	7.90815E-05	0.00425539		
Benzene	1.00026E-05	*	9.88822E-06	0.000518452		
Cyclohexane	0.000100026	*	9.86112E-05	0.0063889		
n-Heptane	0.000250065	*	0.000242714	0.0329256		
n-Octane	0.000220057	*	0.000202946	0.0762813		
n-Nonane	6.00156E-05	*	4.84633E-05	0.0514124		
n-Decane	2.00052E-05	*	1.25959E-05	0.0329557		
n-Undecane	1.00026E-05	*	3.70724E-06	0.0279941		
Dodecane	0	*	0	0		
Water	0	*	0	0		
Triethylene Glycol	0	*	0	0		
Oxygen	0	*	0	0		
Argon	0	*	0	0		
Carbon Monoxide	0	*	0	0		
Cyclopentane	3.00078E-05	*	2.98439E-05	0.00075854		
Isohexane	0	*	0	0		
3-Methylpentane	0.00103027	*	0.00102025	0.0455421		
Neohexane	0.000290075	*	0.000288304	0.00816453		
2,3-Dimethylbutane	9.00234E-05	*	8.92988E-05	0.00331112		
Methylcyclohexane	0.000110029	*	0.000106803	0.0144478		
Isooctane	0	*	0	0		
Decane, 2-Methyl-	0	*	0	0		
Toluene	2.00052E-05	*	1.92867E-05	0.00321395		
m-Xylene	1.00026E-05	*	8.98412E-06	0.00453733		
Ethylbenzene	0	*	0	0		

Molar Flow	Total lbmol/h		Vapor lbmol/h	Light Liquid lbmol/h		
Nitrogen	9.57798	*	9.57787	0.000107385		
Methane	1333.58	*	1333.54	0.042379		
CO2	2.78191	*	2.7817	0.000203871		
Ethane	326.566	*	326.517	0.0492064		
Propane	126.997	*	126.938	0.058867		
Isobutane	12.4719	*	12.4591	0.0128288		
n-Butane	34.1297	*	34.0808	0.048955		
Isopentane	5.89989	*	5.88107	0.0188159		
n-Pentane	8.21503	*	8.18164	0.0333868		
n-Hexane	1.99775	*	1.97396	0.0237838		
Methylcyclopentane	0.149364	*	0.147578	0.00178647		
Benzene	0.0186705	*	0.0184529	0.000217653		
Cyclohexane	0.186705	*	0.184023	0.00268214		
n-Heptane	0.466763	*	0.452941	0.0138226		
n-Octane	0.410752	*	0.378728	0.0320238		
n-Nonane	0.112023	*	0.0904396	0.0215836		
n-Decane	0.0373411	*	0.0235058	0.0138352		
n-Undecane	0.0186705	*	0.00691826	0.0117523		

Process Streams Report
Stream: Test Separator Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 10:56 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 10:56 AM, 4/7/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h	Light Liquid lbmol/h		
Dodecane	0 *	0	0		
Water	0 *	0	0		
Triethylene Glycol	0 *	0	0		
Oxygen	0 *	0	0		
Argon	0 *	0	0		
Carbon Monoxide	0 *	0	0		
Cyclopentane	0.0560116 *	0.0556931	0.000318444		
Isohexane	0 *	0	0		
3-Methylpentane	1.92306 *	1.90395	0.0191192		
Neohexane	0.541445 *	0.538018	0.00342757		
2,3-Dimethylbutane	0.168035 *	0.166645	0.00139005		
Methylcyclohexane	0.205376 *	0.19931	0.00606537		
Isooctane	0 *	0	0		
Decane, 2-Methyl-	0 *	0	0		
Toluene	0.0373411 *	0.0359918	0.00134926		
m-Xylene	0.0186705 *	0.0167657	0.00190483		
Ethylbenzene	0 *	0	0		

Mass Fraction	Total	Vapor	Light Liquid		
Nitrogen	0.00646446 *	0.00646893	0.000103053		
Methane	0.515445 *	0.515791	0.02329		
CO2	0.00294972 *	0.00295158	0.000307362		
Ethane	0.236583 *	0.236714	0.0506862		
Propane	0.134921 *	0.134954	0.0889233		
Isobutane	0.0174649 *	0.0174593	0.0255434		
n-Butane	0.0477933 *	0.0477583	0.0974738		
Isopentane	0.0102557 *	0.0102302	0.0465052		
n-Pentane	0.0142801 *	0.014232	0.0825187		
n-Hexane	0.00414778 *	0.00410128	0.0702122		
Methylcyclopentane	0.00030286 *	0.000299448	0.00515046		
Benzene	3.51371E-05 *	3.47519E-05	0.000582411		
Cyclohexane	0.000378575 *	0.000373399	0.00773272		
n-Heptane	0.00112685 *	0.00109425	0.0474475		
n-Octane	0.00113044 *	0.00104304	0.125313		
n-Nonane	0.000346158 *	0.00027966	0.0948301		
n-Decane	0.000128005 *	8.06348E-05	0.0674347		
n-Undecane	7.03122E-05 *	2.60721E-05	0.0629292		
Dodecane	0 *	0	0		
Water	0 *	0	0		
Triethylene Glycol	0 *	0	0		
Oxygen	0 *	0	0		
Argon	0 *	0	0		
Carbon Monoxide	0 *	0	0		
Cyclopentane	9.46437E-05 *	9.41719E-05	0.000765075		
Isohexane	0 *	0	0		
3-Methylpentane	0.00399272 *	0.00395581	0.0564417		
Neohexane	0.00112416 *	0.00111783	0.0101185		
2,3-Dimethylbutane	0.000348879 *	0.000346236	0.00410357		
Methylcyclohexane	0.000485838 *	0.000471821	0.0204012		
Isooctane	0 *	0	0		
Decane, 2-Methyl-	0 *	0	0		
Toluene	8.28933E-05 *	7.99543E-05	0.00425876		
m-Xylene	4.77562E-05 *	4.29142E-05	0.00692764		
Ethylbenzene	0 *	0	0		

Mass Flow	Total lb/h	Vapor lb/h	Light Liquid lb/h		
Nitrogen	268.312 *	268.309	0.00300823		
Methane	21393.9 *	21393.2	0.679863		

Process Streams Report
Stream: Test Separator Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:56 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:56 AM, 4/7/2015

Mass Flow	Total lb/h	Vapor lb/h	Light Liquid lb/h		
CO2	122.43 *	122.421	0.00897226		
Ethane	9819.53 *	9818.05	1.47959		
Propane	5600.01 *	5597.41	2.59578		
Isobutane	724.895 *	724.149	0.745641		
n-Butane	1983.69 *	1980.85	2.84537		
Isopentane	425.67 *	424.312	1.35754		
n-Pentane	592.704 *	590.296	2.40882		
n-Hexane	172.157 *	170.107	2.04958		
Methylcyclopentane	12.5704 *	12.4201	0.150348		
Benzene	1.45839 *	1.44139	0.0170012		
Cyclohexane	15.713 *	15.4873	0.225727		
n-Heptane	46.7706 *	45.3855	1.38505		
n-Octane	46.9195 *	43.2615	3.65804		
n-Nonane	14.3675 *	11.5993	2.7682		
n-Decane	5.31295 *	3.34445	1.9685		
n-Undecane	2.91836 *	1.08138	1.83698		
Dodecane	0 *	0	0		
Water	0 *	0	0		
Triethylene Glycol	0 *	0	0		
Oxygen	0 *	0	0		
Argon	0 *	0	0		
Carbon Monoxide	0 *	0	0		
Cyclopentane	3.92825 *	3.90592	0.0223334		
Isohexane	0 *	0	0		
3-Methylpentane	165.721 *	164.073	1.6476		
Neohexane	46.6592 *	46.3639	0.295372		
2,3-Dimethylbutane	14.4805 *	14.3607	0.119788		
Methylcyclohexane	20.165 *	19.5695	0.595534		
Isooctane	0 *	0	0		
Decane, 2-Methyl-	0 *	0	0		
Toluene	3.44055 *	3.31623	0.124318		
m-Xylene	1.98216 *	1.77993	0.202226		
Ethylbenzene	0 *	0	0		

Std. Liquid Volumetric Fraction	Total	Vapor	Light Liquid		
Nitrogen	0.00282821 *	0.00282933	7.80408E-05		
Methane	0.606806 *	0.607034	0.0474593		
CO2	0.00127426 *	0.00127468	0.000229831		
Ethane	0.23441 *	0.23447	0.0869292		
Propane	0.093908 *	0.0939026	0.107132		
Isobutane	0.010954 *	0.0109471	0.0277309		
n-Butane	0.0288797 *	0.02885	0.101952		
Isopentane	0.0057912 *	0.00577507	0.0454557		
n-Pentane	0.00799254 *	0.00796329	0.0799447		
n-Hexane	0.00220494 *	0.00217957	0.0646065		
Methylcyclopentane	0.000141883 *	0.000140243	0.00417656		
Benzene	1.40222E-05 *	1.38644E-05	0.000402313		
Cyclohexane	0.000170572 *	0.00016819	0.00603074		
n-Heptane	0.000577989 *	0.000561101	0.0421261		
n-Octane	0.00056479 *	0.000520968	0.108373		
n-Nonane	0.000169191 *	0.000136649	0.0802292		
n-Decane	6.15137E-05 *	3.87381E-05	0.0560933		
n-Undecane	3.33662E-05 *	1.23687E-05	0.0516905		
Dodecane	0 *	0	0		
Water	0 *	0	0		
Triethylene Glycol	0 *	0	0		
Oxygen	0 *	0	0		
Argon	0 *	0	0		
Carbon Monoxide	0 *	0	0		
Cyclopentane	4.45562E-05 *	4.43209E-05	0.000623453		

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Test Separator Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 10:56 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 10:56 AM, 4/7/2015	

Std. Liquid Volumetric Fraction	Total	Vapor	Light Liquid		
Isohexane	0 *	0	0		
3-Methylpentane	0.00210679 *	0.00208669	0.0515509		
Neohexane	0.000606962 *	0.000603365	0.00945655		
2,3-Dimethylbutane	0.000184914 *	0.000183459	0.00376479		
Methylcyclohexane	0.000221601 *	0.000215144	0.0161071		
Isooctane	0 *	0	0		
Decane, 2-Methyl-	0 *	0	0		
Toluene	3.35642E-05 *	3.23646E-05	0.00298486		
m-Xylene	1.94039E-05 *	1.74314E-05	0.00487223		
Ethylbenzene	0 *	0	0		

Volumetric Flow	Total ft^3/h	Vapor ft^3/h	Light Liquid gpm		
Nitrogen	145.481	145.481	1.31009E-05		
Methane	18584.6	18584.6	0.00504907		
CO2	35.9408	35.9406	1.59108E-05		
Ethane	3756.03	3755.98	0.00691099		
Propane	1214.17	1214.09	0.0102115		
Isobutane	101.264	101.243	0.00268193		
n-Butane	257.636	257.556	0.00989805		
Isopentane	35.2939	35.2589	0.00437535		
n-Pentane	46.768	46.7063	0.00769556		
n-Hexane	7.43111	7.38171	0.0061598		
Methylcyclopentane	0.658505	0.655344	0.000394104		
Benzene	0.0930515	0.0927538	3.71133E-05		
Cyclohexane	0.798672	0.794155	0.000563123		
n-Heptane	0.865401	0.833366	0.00399398		
n-Octane	0.117481	0.036175	0.0101369		
n-Nonane	-0.1178	-0.177497	0.00744267		
n-Decane	-0.0485117	-0.0901179	0.00518727		
n-Undecane	-0.00259842	-0.0407315	0.00475426		
Dodecane	0	0	0		
Water	0	0	0		
Triethylene Glycol	0	0	0		
Oxygen	0	0	0		
Argon	0	0	0		
Carbon Monoxide	0	0	0		
Cyclopentane	0.319514	0.31904	5.90637E-05		
Isohexane	0	0	0		
3-Methylpentane	7.8702	7.83069	0.00492701		
Neohexane	2.57176	2.5645	0.000905278		
2,3-Dimethylbutane	0.734809	0.731926	0.000359457		
Methylcyclohexane	0.553845	0.541871	0.00149291		
Isooctane	0	0	0		
Decane, 2-Methyl-	0	0	0		
Toluene	0.111369	0.109189	0.000271784		
m-Xylene	0.0245282	0.0209889	0.000441254		
Ethylbenzene	0	0	0		

Properties

Property	Units	Total	Vapor	Light Liquid		
Temperature	°F	83 *	83	83		
Pressure	psig	390 *	390	390		
Mole Fraction Vapor		0.999775	1	0		
Mole Fraction Light Liquid		0.000224912	0	1		
Molecular Weight	lb/lbmol	22.2364	22.2257	69.5338		
Mass Density	lb/ft^3	1.71517	1.71402	38.7265		
Molar Flow	lbmol/h	1866.57	1866.15	0.419812		
Mass Flow	lb/h	41505.7	41476.5	29.1912		
Vapor Volumetric Flow	ft^3/h	24199.2	24198.5	0.753778		

Process Streams Report
Stream: Test Separator Gas
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 10:56 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 10:56 AM, 4/7/2015

Properties

Property	Units	Total	Vapor	Light Liquid		
Liquid Volumetric Flow	gpm	3017.04	3016.95	0.0939775		
Std Vapor Volumetric Flow	MMSCFD	17 *	16.9962	0.0038235		
Std Liquid Volumetric Flow	sgpm	235.044	234.948	0.0955013		
Specific Gravity			0.767395	0.620925		
API Gravity				91.3767		
Enthalpy	Btu/h	-6.52631E+07	-6.52331E+07	-30033.8		
Kinematic Viscosity	cSt		0.407711	0.348456		
Net Ideal Gas Heating Value	Btu/ft^3	1209.23	1208.7	3566.87		
Net Liquid Heating Value	Btu/lb	20562.8	20563.6	19311.7		

Remarks

Process Streams Report
Stream: Test Separator Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:12 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:12 AM, 4/7/2015	

Connections

From: --	To: MIX-102

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	0.00026 *	0.00026			
Methane	0.08861 *	0.08861			
CO2	0.00013 *	0.00013			
Ethane	0.09965 *	0.09965			
Propane	0.11788 *	0.11788			
Isobutane	0.0248 *	0.0248			
n-Butane	0.09597 *	0.09597			
Isopentane	0.03603 *	0.03603			
n-Pentane	0.06541 *	0.06541			
n-Hexane	0.05195 *	0.05195			
Methylcyclopentane	0.00422 *	0.00422			
Benzene	0.00069 *	0.00069			
Cyclohexane	0.00744 *	0.00744			
n-Heptane	0.04738 *	0.04738			
n-Octane	0.07566 *	0.07566			
n-Nonane	0.04597 *	0.04597			
n-Decane	0.0402 *	0.0402			
n-Undecane	0.08599 *	0.08599			
Dodecane	0 *	0			
Water	0 *	0			
Triethylene Glycol	0 *	0			
Oxygen	0 *	0			
Argon	0 *	0			
Carbon Monoxide	0 *	0			
Cyclopentane	0 *	0			
Isohexane	0 *	0			
3-Methylpentane	0.03753 *	0.03753			
Neohexane	0.03558 *	0.03558			
2,3-Dimethylbutane	0.00474 *	0.00474			
Methylcyclohexane	0.01712 *	0.01712			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0.00328 *	0.00328			
m-Xylene	0.01044 *	0.01044			
Ethylbenzene	0.00307 *	0.00307			

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	0.0556531 *	0.0556531			
Methane	18.967 *	18.967			
CO2	0.0278266 *	0.0278266			
Ethane	21.3301 *	21.3301			
Propane	25.2323 *	25.2323			
Isobutane	5.30845 *	5.30845			
n-Butane	20.5424 *	20.5424			
Isopentane	7.71224 *	7.71224			
n-Pentane	14.001 *	14.001			
n-Hexane	11.1199 *	11.1199			
Methylcyclopentane	0.903293 *	0.903293			
Benzene	0.147695 *	0.147695			
Cyclohexane	1.59254 *	1.59254			
n-Heptane	10.1417 *	10.1417			
n-Octane	16.1951 *	16.1951			
n-Nonane	9.8399 *	9.8399			
n-Decane	8.60483 *	8.60483			
n-Undecane	18.4062 *	18.4062			

Process Streams Report
Stream: Test Separator Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:12 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:12 AM, 4/7/2015	

Molar Flow	Total lbmol/h		Light Liquid lbmol/h			
Dodecane	0	*	0			
Water	0	*	0			
Triethylene Glycol	0	*	0			
Oxygen	0	*	0			
Argon	0	*	0			
Carbon Monoxide	0	*	0			
Cyclopentane	0	*	0			
Isohexane	0	*	0			
3-Methylpentane	8.03331	*	8.03331			
Neohexane	7.61592	*	7.61592			
2,3-Dimethylbutane	1.0146	*	1.0146			
Methylcyclohexane	3.66454	*	3.66454			
Isooctane	0	*	0			
Decane, 2-Methyl-	0	*	0			
Toluene	0.702086	*	0.702086			
m-Xylene	2.23469	*	2.23469			
Ethylbenzene	0.657135	*	0.657135			

Mass Fraction	Total		Light Liquid			
Nitrogen	9.33158E-05	*	9.33158E-05			
Methane	0.0182125	*	0.0182125			
CO2	7.33003E-05	*	7.33003E-05			
Ethane	0.0383896	*	0.0383896			
Propane	0.0665966	*	0.0665966			
Isobutane	0.0184676	*	0.0184676			
n-Butane	0.0714651	*	0.0714651			
Isopentane	0.033305	*	0.033305			
n-Pentane	0.060463	*	0.060463			
n-Hexane	0.0573568	*	0.0573568			
Methylcyclopentane	0.00455021	*	0.00455021			
Benzene	0.000690529	*	0.000690529			
Cyclohexane	0.00802218	*	0.00802218			
n-Heptane	0.0608257	*	0.0608257			
n-Octane	0.110728	*	0.110728			
n-Nonane	0.075538	*	0.075538			
n-Decane	0.073281	*	0.073281			
n-Undecane	0.172205	*	0.172205			
Dodecane	0	*	0			
Water	0	*	0			
Triethylene Glycol	0	*	0			
Oxygen	0	*	0			
Argon	0	*	0			
Carbon Monoxide	0	*	0			
Cyclopentane	0	*	0			
Isohexane	0	*	0			
3-Methylpentane	0.041436	*	0.041436			
Neohexane	0.0392831	*	0.0392831			
2,3-Dimethylbutane	0.00523332	*	0.00523332			
Methylcyclohexane	0.0215362	*	0.0215362			
Isooctane	0	*	0			
Decane, 2-Methyl-	0	*	0			
Toluene	0.00387196	*	0.00387196			
m-Xylene	0.0142003	*	0.0142003			
Ethylbenzene	0.00417576	*	0.00417576			

Mass Flow	Total lb/h		Light Liquid lb/h			
Nitrogen	1.55903	*	1.55903			
Methane	304.278	*	304.278			

Process Streams Report
Stream: Test Separator Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:12 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:12 AM, 4/7/2015	

Mass Flow	Total lb/h		Light Liquid lb/h				
CO2	1.22463	*	1.22463				
Ethane	641.377	*	641.377				
Propane	1112.63	*	1112.63				
Isobutane	308.539	*	308.539				
n-Butane	1193.97	*	1193.97				
Isopentane	556.429	*	556.429				
n-Pentane	1010.16	*	1010.16				
n-Hexane	958.263	*	958.263				
Methylcyclopentane	76.0207	*	76.0207				
Benzene	11.5367	*	11.5367				
Cyclohexane	134.027	*	134.027				
n-Heptane	1016.22	*	1016.22				
n-Octane	1849.94	*	1849.94				
n-Nonane	1262.02	*	1262.02				
n-Decane	1224.31	*	1224.31				
n-Undecane	2877.04	*	2877.04				
Dodecane	0	*	0				
Water	0	*	0				
Triethylene Glycol	0	*	0				
Oxygen	0	*	0				
Argon	0	*	0				
Carbon Monoxide	0	*	0				
Cyclopentane	0	*	0				
Isohexane	0	*	0				
3-Methylpentane	692.274	*	692.274				
Neohexane	656.304	*	656.304				
2,3-Dimethylbutane	87.4335	*	87.4335				
Methylcyclohexane	359.807	*	359.807				
Isooctane	0	*	0				
Decane, 2-Methyl-	0	*	0				
Toluene	64.6891	*	64.6891				
m-Xylene	237.246	*	237.246				
Ethylbenzene	69.7647	*	69.7647				

Std. Liquid Volumetric Fraction	Total		Light Liquid				
Nitrogen	7.35727E-05	*	7.35727E-05				
Methane	0.0386384	*	0.0386384				
CO2	5.70642E-05	*	5.70642E-05				
Ethane	0.0685469	*	0.0685469				
Propane	0.0835324	*	0.0835324				
Isobutane	0.0208735	*	0.0208735				
n-Butane	0.0778217	*	0.0778217				
Isopentane	0.0338918	*	0.0338918				
n-Pentane	0.0609853	*	0.0609853				
n-Hexane	0.0549474	*	0.0549474				
Methylcyclopentane	0.00384151	*	0.00384151				
Benzene	0.00049661	*	0.00049661				
Cyclohexane	0.00651372	*	0.00651372				
n-Heptane	0.0562243	*	0.0562243				
n-Octane	0.0996964	*	0.0996964				
n-Nonane	0.066535	*	0.066535				
n-Decane	0.0634625	*	0.0634625				
n-Undecane	0.147266	*	0.147266				
Dodecane	0	*	0				
Water	0	*	0				
Triethylene Glycol	0	*	0				
Oxygen	0	*	0				
Argon	0	*	0				
Carbon Monoxide	0	*	0				
Cyclopentane	0	*	0				

Process Streams Report
Stream: Test Separator Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0	
Location:	Charles Frye Pad	Modified: 11:12 AM, 4/7/2015	
Flowsheet:	Charles Frye Pad	Status: Solved 11:12 AM, 4/7/2015	

Std. Liquid Volumetric Fraction	Total	Light Liquid			
Isohexane	0 *	0			
3-Methylpentane	0.0394014 *	0.0394014			
Neohexane	0.0382225 *	0.0382225			
2,3-Dimethylbutane	0.00499868 *	0.00499868			
Methylcyclohexane	0.0177024 *	0.0177024			
Isooctane	0 *	0			
Decane, 2-Methyl-	0 *	0			
Toluene	0.00282533 *	0.00282533			
m-Xylene	0.0103977 *	0.0103977			
Ethylbenzene	0.00304752 *	0.00304752			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	0.00629492	0.00629492			
Methane	2.12844	2.12844			
CO2	0.00201302	0.00201302			
Ethane	2.90403	2.90403			
Propane	4.31255	4.31255			
Isobutane	1.10365	1.10365			
n-Butane	4.13785	4.13785			
Isopentane	1.7975	1.7975			
n-Pentane	3.23685	3.23685			
n-Hexane	2.90006	2.90006			
Methylcyclopentane	0.201618	0.201618			
Benzene	0.0255949	0.0255949			
Cyclohexane	0.339443	0.339443			
n-Heptane	2.95928	2.95928			
n-Octane	5.18678	5.18678			
n-Nonane	3.4375	3.4375			
n-Decane	3.27108	3.27108			
n-Undecane	7.55245	7.55245			
Dodecane	0	0			
Water	0	0			
Triethylene Glycol	0	0			
Oxygen	0	0			
Argon	0	0			
Carbon Monoxide	0	0			
Cyclopentane	0	0			
Isohexane	0	0			
3-Methylpentane	2.08497	2.08497			
Neohexane	2.0236	2.0236			
2,3-Dimethylbutane	0.264236	0.264236			
Methylcyclohexane	0.917095	0.917095			
Isooctane	0	0			
Decane, 2-Methyl-	0	0			
Toluene	0.144209	0.144209			
m-Xylene	0.528655	0.528655			
Ethylbenzene	0.154956	0.154956			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	83 *	83			
Pressure	psig	390 *	390			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Molecular Weight	lb/lbmol	78.052	78.052			
Mass Density	lb/ft^3	40.3512	40.3512			
Molar Flow	lbmol/h	214.05	214.05			
Mass Flow	lb/h	16707.1	16707.1			
Vapor Volumetric Flow	ft^3/h	414.041	414.041			

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Test Separator Oil
Phases Grouped by Columns

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	Modified: 11:12 AM, 4/7/2015
Flowsheet:	Charles Frye Pad	Status: Solved 11:12 AM, 4/7/2015

Properties

Property	Units	Total	Light Liquid			
Liquid Volumetric Flow	gpm	51.6207	51.6207			
Std Vapor Volumetric Flow	MMSCFD	1.94949	1.94949			
Std Liquid Volumetric Flow	sgpm	52.5 *	52.5			
Specific Gravity		0.646976	0.646976			
API Gravity		82.8853	82.8853			
Enthalpy	Btu/h	-1.65566E+07	-1.65566E+07			
Kinematic Viscosity	cSt	0.409605	0.409605			
Net Ideal Gas Heating Value	Btu/ft^3	3985.93	3985.93			
Net Liquid Heating Value	Btu/lb	19224.5	19224.5			

Remarks

Flowsheet Environment
SRK Environment

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	
Flowsheet:	Charles Frye Pad	

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

Environments Report

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	IG Ref Pressure	14.6959 psia
IG Ref Temperature	60 °F	IG Ref Volume	379.485 ft^3/lbmol
Liq Ref Temperature	60 °F		

Environment [SRK Environment]

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

20150417_SWN_Charlie Frye_Promax.pmx
Project Warnings Report

Client Name:	Southwestern Energy	Job: V1.0
Location:	Charles Frye Pad	

ProMax:ProMax!Project!Flowsheets!Charles Frye Pad !Blocks!Scrubber Dump 2!Properties!PDrop
Warning: A negative pressure drop of -40 psi was encountered in block Scrubber Dump 2.
ProMax:ProMax!Project!Flowsheets!Charles Frye Pad !Blocks!CMPR-100
Warning: The change in entropy is negative.
ProMax:ProMax!Project!Flowsheets!Charles Frye Pad !Blocks!Compressor Stage 1
Warning: The change in entropy is negative.
ProMax:ProMax!Project!Flowsheets!Charles Frye Pad !Blocks!Compressor Stage 2
Warning: The change in entropy is negative.
ProMax:ProMax!Project!Flowsheets!Charles Frye Pad !Blocks!Compressor Stage 3
Warning: The change in entropy is negative.

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O - MONITORING, RECORDING, REPORTING, AND TESTING PLANS

The Monitoring, Recording, Reporting and Testing Plans will be the same as those listed in the current permit, R13-2922D issued June 26, 2013.

ATTACHMENT P

Legal Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Southwestern Production Company, LLC. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for an R13 permit modification for an existing natural gas wellpad (Charles Frye Wellpad) located on County Road 41/1 (at 40.053054°, -80.577353°), near Wheeling, West Virginia in Ohio County, WV.

The applicant estimates the potential increase to discharge the following Regulated Air Pollutants as a result of the change will be:

Particulate Matter (PM) = 11.84 tpy
Sulfur Dioxide (SO2) = 0.05 tpy
Volatile Organic Compounds (VOC) = 2.33 tpy
Carbon Monoxide (CO) = 0 tpy
Nitrogen Oxides (NOx) = 0.96 tpy
Hazardous Air Pollutants (HAPs) = 0 tpy
Greenhouse Gases (CO2e) = 3,824 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 XX day of April, 2015.

By: SWN Production Company, LLC
Paul Geiger – Sr. Vice President Ops Management
10000 Energy Drive
Spring TX 77389