# Chevron Appalachia, LLC

## G70-D General Permit Application
## Taylor Pad B Natural Gas Production Site

Moundsville, West Virginia

**Prepared By:**

**ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.**
**Hurricane, West Virginia**

**December 2017**

Chevron Appalachia, LLC
700 Cherrington Parkway
Coraopolis, PA 15108

December 7, 2017

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

**HAND DELIVERED**

Re: G70-D General Permit Registration Application
Chevron Appalachia, LLC
Taylor Pad B Natural Gas Production Site

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G70-D General Permit Registration Application for the authority to construct the Taylor Pad B natural gas production site to be located in Marshall County, West Virginia.

A legal advertisement will be published in the next few days and proof of publication will be forwarded as soon as it is received. Please see the attached check for payment of the application fee.

If you have any questions concerning this permit application, please contact Ms. Erica Blumenschein, P.E., Environmental Specialist - Air, of my staff at (412) 865-3148 or by email at eblumenschein@chevron.com.

Sincerely,

Gary Orr
Appalachia Area Manager for Chevron Appalachia, LLC

Enclosures:

# 1.0 INTRODUCTION NARRATIVE

Chevron Appalachia, LLC (Chevron) submits this G70-D General Permit application to the West Virginia Department of Environmental Protection's Division of Air Quality (WVDAQ) for construction of the Taylor Pad B (Taylor B) natural gas production site to be located in Marshall County, West Virginia. This application addresses the operational activities associated with the production of natural gas, condensate, and produced water at the Taylor B site.

The Taylor B site is currently permitted under Permit R13-3141, which was issued on March 4, 2014, with the authority to operate the following at the Taylor B site:

- One (1) Natural Gas Well;
- One (1) Gas Production Unit/Heater rated at 0.75 MMBtu/hr input (BAP-0110);
- Two (2) 400 bbl Produced Water Storage Tanks (ABJ-0130A and ABJ-0130B);
- One (1) 400 bbl Condensate Storage Tank (ABJ-0135);
- One (1) Vapor Destruction Unit with a capacity of 10.50 MMBtu/hr heat input (ZZZ-060); and
- One (1) Tank Truck Loading Area (LR-1).

Due to developmental plans at the Taylor B site, Chevron would like to submit a G70-D General Permit application to request the authority to operate the following equipment at the Taylor B site:

- Nine (9) Natural Gas Wells;
- Ten (10) Gas Production Unit/Heater rated at 1.25 MMBtu/hr input (BAP-0110 – BAP-0910, BAP-0012);
- One (1) 400 bbl Blowdown Process Vessel (ABJ-0014);
- Three (3) 400 bbl Produced Water Storage Tanks (ABJ-0011A, ABJ-0011B, and ABJ-0011C);
- Two (2) Vapor Destruction Units with a capacity of 15.63 MMBtu/hr heat input each (EAW-0060 and EAW-0061);
- Three (3) Pneumatic Pumps rated at 10 gal/min each (PBA-0088A, PBA-0088B, and PBA-0061);
- One (1) CAT G3408 TALE Natural Gas Compression Engine rated at 425 hp (CBA-0050);
- One (1) Glycol Dehydration Unit rated at 38 MMscf/day (MBA-0085);
- One (1) Glycol Flash Tank (MBD-0086);
- One (1) Glycol Reboiler rated at 0.50 MMBtu/hr input (BBC-0086);
- One (1) Glycol Dehydrator Regenerator Overhead Vent (HAL-0088);
- One (1) BTEX Eliminator Burner rated at 0.98 MMBtu/hr heat input (EAW-0088);
- One (1) Blowdown Fluid Loadout (ZZZ-0014); and
- One (1) Produced Water Loadout (ZZZ-0011).

## Statement of Aggregation

The Taylor Pad B natural gas production site is located in Marshall County, WV and operated by Chevron. Stationary sources of air pollutants may require aggregation of total emission levels if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties. Chevron operates the Taylor B site with the same industrial grouping as nearby facilities, and some of these facilities are under common control. The Taylor B site is not subject to the aggregation of stationary emission sources because these sites do meet the definition of contiguous or adjacent facilities.

The Taylor B site operates under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding sites operated by Chevron that share the same two-digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the Taylor B site does share the same SIC codes as the surrounding wells and compressor stations.

Chevron is the sole operator of the Taylor B site. Chevron is also the sole operator of other production sites and compressor stations in the area. Therefore, Chevron does qualify as having nearby operations under common control.

Based on the EPA's Source Determination Guidance for Certain Emission Units in the Oil and Natural Gas Sector, effective on August 2, 2016, the term "adjacent" is defined as follows:

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

The Taylor B site does share open air frac water tanks with Chevron's nearby Taylor Pad C; however, the site with the shared open air frac water tanks and the Taylor B site are not with ¼ mile of each other. Based upon this reasoning, Chevron is not subject to the aggregation of stationary emission sources since the stationary sources are not considered contiguous or adjacent facilities.

Please see Attachment G – Site Map of this permit application to see the locations of Taylor Pad C and the shared open air frac water tanks in comparison to the Taylor B site.

# 2.0 REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the Taylor B site and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-D permit application forms. The West Virginia State Regulations address federal regulations, including Prevention of Significant Deterioration permitting, Title V permitting, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants.

The regulatory requirements in reference to the Taylor B site are described in detail in the below section.

## West Virginia State Air Regulations

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

The line heaters associated with the gas production units at the Taylor B site are indirect heat exchangers that combust natural gas but are exempt from this regulation since the heat input capacities are less than 10 MMBtu/hr.

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

Operations conducted at the Taylor B site are subject to this requirement. Based on the nature of the process at the site, the presence of objectionable odors is unlikely.

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

The vapor destruction units located at the Taylor B site will be subject to this regulation. Per 45 CSR 6-4.3, opacity of emissions from the enclosed combustion device shall not exceed 20 percent, except as provided by 4.4. Particulate matter emissions from these units will not exceed the levels calculated in accordance with 6-4.1.

§45-6-4.1 Determination for Maximum Allowable Particulate Emissions

**15.63 MMBtu/hr Vapor Destruction Units (EAW-0060 and EAW-0061)**

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

*$\rho_{WG}$ = 0.06966 lb/scf – Density of Waste Gas Firing Incinerator*
*Incinerator Rating = 15.63 MMBtu/hr*
*Waste Gas Heating Value = 1,518.48 Btu/scf*

Incinerator Capacity Calculation:

$$\frac{15.63\ mmBtu}{hr}\ X\ \frac{10^6 Btu}{mmBtu}\ X\ \frac{scf}{1{,}518.48\ Btu} X\ \frac{0.06966\ lb\ Test\ Tank\ Vent\ Gas}{scf}\ X\ \frac{ton}{2000\ lbs} = 0.359\ tons/hr$$

If the Incinerator Capacity is less than 15,000 lbs/hr, then F = 5.43

Emissions (lb/hr) = 5.43 * (0.359 tons/hr)

Emissions (lb/hr) = 1.94 lbs/hr

Vapor Destruction Units EAW-0060 and EAW-0061 utilize a ProMax simulation to determine emissions from the combustion of refuse natural gas. Based upon the type of fuel combusted and the emission factors utilized, the PM emissions from the enclosed combustion devices will be below the maximum allowable particulate emissions mandated by 45 CSR 06.

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

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

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

This G70-D permit application is being submitted for the operational activities associated with Chevron's production of natural gas at the Taylor B site.

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

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD). The G70-D applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the Taylor B site will not exceed emission thresholds established by this permitting program. Chevron will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with the PSD thresholds to ensure these activities will not trigger this program.

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

45 CSR 16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section.

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

Federal construction permitting programs regulate new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). The G70-D applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the Taylor B site will not exceed emission thresholds established by this permitting program. Chevron Appalachia, LLC will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with the NSR thresholds to ensure these activities will not trigger this program.

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

No hazardous waste will be burned at this well site; therefore, it is not subject to this hazardous waste rule.

*45 CSR 30 – Requirements for Operating Permits*

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds for the Title V operating permit program regulations are 10 tons per year (tpy) of a single hazardous air pollutant (HAP), 25 tpy of any combination of HAPs, or 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants at the proposed facility are below the corresponding major source threshold(s). Therefore, the Taylor site will not be a major source under the Title V program.

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

45 CSR 34 applies to all registrants that are subject to any of the NESHAP requirements. The NESHAP Rules are discussed further in the Federal Regulation section of this document.

## Federal Regulations

**New Source Performance Standards**

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

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide ($SO_2$) emissions from affected facilities that commence construction, modification or reconstruction between August 23, 2011 and September 18, 2015. The applicable provisions and requirements of Subpart OOOO are included under the G70-D permit. The Taylor B site will be constructed after September 18, 2015 and, therefore, will not be subject to this rule.

*Subpart OOOOa (Standards Of Performance For Crude Oil And Natural Gas Facilities For Which Construction, Modification, Or Reconstruction Commenced After September 18, 2015)*

Subpart OOOOa establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC), sulfur dioxide ($SO_2$), and greenhouse gas (GHG) emissions from affected facilities in the crude oil and natural gas source category that commence construction, modification, or reconstruction after September 18, 2015. Based upon the Federal applicability of Subpart OOOOa, the Taylor B site will be subject to this rule.

The Taylor B site is expected to be subject to Subpart OOOOa for the affected facility types listed below:

- Each gas well affected facility, which is a single gas well;
- The Taylor B site will qualify as a collection of fugitive components facility. As a fugitive component affected facility, in order to comply, LDAR monitoring at the Taylor B site must be performed within 60 days of startup of production and then semi-annually thereafter; and
- Pneumatic pump affected facility, for which each pneumatic pump must reduce natural gas emissions by ninety five (95) percent if located at a greenfield site. The Taylor B site meets the definition of a greenfield site for Subpart OOOOa and will route Pneumatic Pumps PBA-0088A, PBA-0088B, and PBA-0061 emissions to Vapor Destruction Units EAW-0060 or EAW-0061. Please note that the Kimray pneumatic pump associated with the dehydration unit is exempt from the requirements a of pneumatic pump affected facility.

The Taylor B site is not expected to be subject to Subpart OOOOa for the following facility types listed below:

- Storage Vessels: Emissions from each storage vessel were determined to be below 6 tons per year (tpy) of VOC. Therefore, Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C are not affected storage vessels. Blowdown Vessel ABJ-0014 does not meet the definition of storage tank under 40CFR60.5430(a) based upon the exemption for process vessels. The vessel receives fluids from the 3 phase separators and is intended to provide separation of any carryover of slop/condensate prior to transfer to the produced water tanks. Emissions from this process vessel are not included in the evaluation against the 6 tpy per tank applicability thresholds; and
- Pneumatic Controllers: All pneumatic controllers installed at the Taylor B site are either low-continuous bleed or intermittent bleed and do not qualify as affected sources.

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

The Taylor B site will have a CAT G3408 TALE natural gas compressor engine that was constructed after January 1, 2011 and is subject to this rule. The engine is a non-emergency, spark-ignition, lean-burn reciprocating internal combustion engine with a horsepower rating of 425 bhp. This unit is subject to the following emission standards:

- NOx – 1.0 g/bhp-hr
- CO – 2.0 g/bhp-hr

- VOCs – 0.7 g/bhp-hr

Since the compressor engine does not possess an EPA Certificate of Conformity, Chevron will comply with the rule by demonstrating the emission standards are met in an initial performance test. No continuous emissions testing requirements apply to this unit.

No additional NSPS are expected to be applicable to this facility.

**National Emissions Standards for Hazardous Air Pollutants**

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

The 425 bhp CAT G3408 TALE compression engine will comply with Subpart ZZZZ by complying with the NSPS JJJJ regulations specified above.

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

The Taylor B site will contain a natural gas dehydration unit that is upstream from a point of custody transfer and is subject to requirements under Subpart HH. Since the emissions from the storage vessels and natural gas dehydration unit are below major source thresholds, the Taylor B site should be considered an area source for MACT applicability under this NESHAP. Based on PTE calculations provided within this application, the dehydration unit is expected to emit less than 0.9 megagrams of benzene (or 1 ton of benzene) per year, which classifies the unit as a small dehydration unit. Small dehydration units are exempt from the control requirements expressed in §63.764(e).

No additional NESHAP are expected to be applicable to this facility.

General Permit G70-D will establish an emission cap on the following regulated and hazardous air pollutants (consistent with the PTE of the facility):

| Regulated Pollutant | Potential Annual Emissions (tpy) | Maximum Annual Emission Limit (tpy) |
|---|---|---|
| CO | 20.52 | 80 |
| NOx | 19.99 | 50 |
| PM-10 | 0.73 | 20 |
| $SO_2$ | 0.11 | 20 |
| VOC | 31.09 | 80 |
| Total HAPs | 5.59 | 20 |
| Highest Individual HAP **(Xylene)** | 1.95 | 8 |

The fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source for the purposes of 45CSR30-2.26.b or for eligibility of this General Permit.

west virginia department of environmental protection

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

# G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

## SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): **Chevron Appalachia, LLC**

Federal Employer ID No. (FEIN): **25-0527925**

Applicant's Mailing Address: **700 Cherrington Parkway**

City: **Coraopolis** | State: **PA** | ZIP Code: **15108**

Facility Name: **Taylor Pad B Natural Gas Production Site**

Operating Site Physical Address: **County Hwy 17/1**
If none available, list road, city or town and zip of facility.

City: **Moundsville** | Zip Code: **26041** | County: **Marshall**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **39.85693**
Longitude: **-80.68801**

SIC Code: **1311**

NAICS Code: **211111**

DAQ Facility ID No. (For existing facilities)
**051-00185**

## CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature: _____

Name and Title: **Gary Orr, Appalachia Area Manager** Phone: **412-865-2509** Fax:

Email: **orrga@chevron.com** Date: 12-8-17

**west virginia** department of environmental protection

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

# G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

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

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

If applicable:
Environmental Contact
Name and Title: **Erica Blumenschein, Environmental Specialist - Air** Phone: **412-865-3148** Fax:
Email: **eblumenschein@chevron.com** Date:

## OPERATING SITE INFORMATION

Briefly describe the proposed new operation and/or any change(s) to the facility: **Construction of additional eight (8) natural gas wells and associated well equipment at the site.**

Directions to the facility: **From WV Route 2 North heading into Moundsville, WV, take a right on 12th Street. 12th Street becomes Fork Ridge Road. Take a left at the fork to continue onto Fork Ridge Road. After taking Fork Ridge Road for 5.6 miles, take a right onto Co Hwy 17/1. Take a left at the first split in Co Hwy 17/1 and follow the access road to Taylor Pad B.**

## ATTACHMENTS AND SUPPORTING DOCUMENTS

**I have enclosed the following required documents:**

Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22).

☒ Check attached to front of application.
☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address):
☐ I wish to pay by credit card. Contact for payment (incl. name and email address):

☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update)
☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1]
☒$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2]

[1] Only one NSPS fee will apply.
[2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ.
*NSPS and NESHAP fees apply to new construction or if the source is being modified.*

☒ Responsible Official or Authorized Representative Signature (if applicable)

☒ Single Source Determination Form **(must be completed)** – Attachment A

☐ Siting Criteria Waiver (if applicable) – Attachment B | ☒ Current Business Certificate – Attachment C

| | | |
|---|---|---|
| dep | **west virginia** department of environmental protection | Division of Air Quality<br>601 57th Street SE<br>Charleston, WV 25 4<br>Phone (304) 926-0475<br>Fax (304) 926-0479<br>www.dep.wv.gov |

# G70-D GENERAL PERMIT REGISTRATION APPLICATION

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

| | |
|---|---|
| ☒CONSTRUCTION<br>☐MODIFICATION<br>☐RELOCATION | ☐CLASS I ADMINISTRATIVE UPDATE<br>☐CLASS II ADMINISTRATIVE UPDATE |

| | |
|---|---|
| ☒ Process Flow Diagram – Attachment D | ☒ Process Description – Attachment E |
| ☒ Plot Plan – Attachment F | ☒ Area Map – Attachment G |
| ☒ G70-D Section Applicability Form – Attachment H | ☒ Emission Units/ERD Table – Attachment I |
| ☒ Fugitive Emissions Summary Sheet – Attachment J | |
| ☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K | |
| ☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L | |
| ☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M | |
| ☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N | |
| ☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O | |
| ☒ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P | |
| ☒ Pneumatic Controllers Data Sheet – Attachment Q | |
| ☒ Pneumatic Pump Data Sheet – Attachment R | |
| ☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S | |
| ☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T | |
| ☒ Facility-wide Emission Summary Sheet(s) – Attachment U | |
| ☒ Class I Legal Advertisement – Attachment V | |
| ☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments | |

# Attachment A

## ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

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

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

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

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

# Attachment B
## (Not Applicable)

# Attachment C

# State of West Virginia

# Certificate

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

the attached true and exact copy of the Articles of Amendment to the Articles of Organization of

**ATLAS AMERICA, LLC**

are filed in my office, signed and verified, as required by the provisions of West Virginia Code §31B-2-204 and conform to law. Therefore, I issue this

## CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

**CHEVRON APPALACHIA, LLC**

***Given under my hand and the Great Seal of the State of West Virginia on this day of April 28, 2011***

Natalie E Tennant

***Secretary of State***

Natalie E. Tennant
Secretary of State
1900 Kanawha Blvd E.
Bldg 1, Suite 157-K
Charleston, WV 25305

Penney Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
www.wvsos.com
Hrs: 8:30 a.m. – 5:00 p.m. ET

**FILE ONE ORIGINAL**
**(Two if you want a filed stamped copy returned to you)**
**FEE: $25.00**

# WV APPLICATION FOR AMENDED CERTIFICATE OF AUTHORITY OF A LIMITED LIABILITY COMPANY

**In accordance with the provisions of the West Virginia Code, the undersigned limited liability company hereby applies for an Amended Certificate of Authority and submits the following statement:**

1. Name under which the organization was authorized to transact business in WV: Atlas America, LLC

2. Date Certificate of Authority was issued in West Virginia: 03/08/2007

3. Change of Name Information or Text of Amendment: (Attach one certified copy of the name change as filed in the home state)

   Change of name from: Atlas America, LLC

   To: Chevron Appalachia, LLC

   Name the organization elects to use in WV: _____
   (Due to home state name not being available)

   Other amendment (use additional pages if necessary)

FILED
APR 28 2011
IN THE OFFICE OF
SECRETARY OF STATE

4. Contact name and number to reach in case of a problem with filing: (optional, however, listing one may help to avoid a return or rejection of filing if there is a problem with the document)

   Jerome L. Suarez — Contact Name
   800-927-9801 x2207 — Phone Number

   Business e-mail address, if any: jsuarez@cscinfo.com

5. Signature of person executing document:

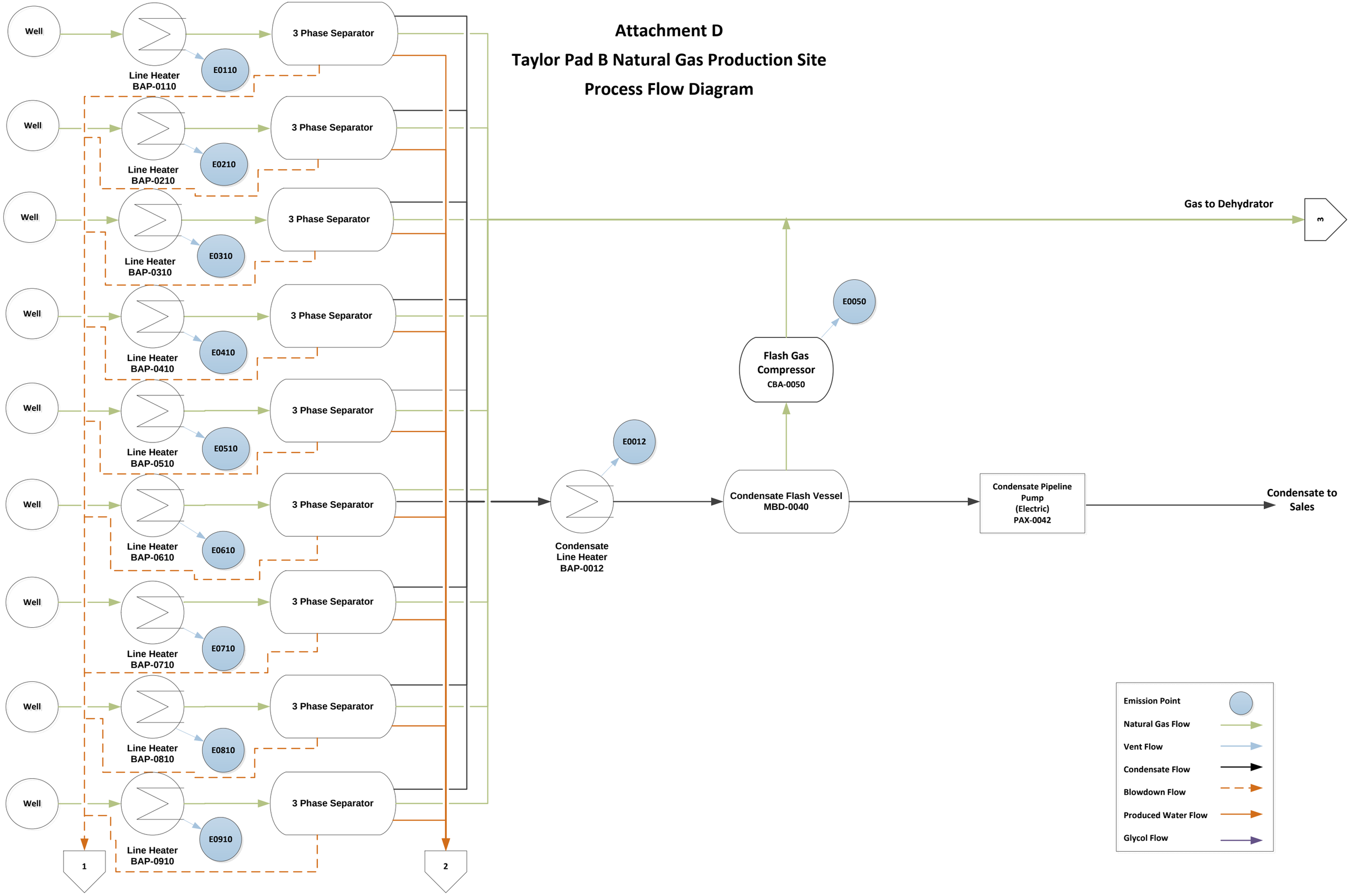
   _____ — Signature
   Assistant Secretary — Title/Capacity
   (Example: member, manager, etc.)

# Attachment D

# Attachment D

# Taylor Pad B Natural Gas Production Site

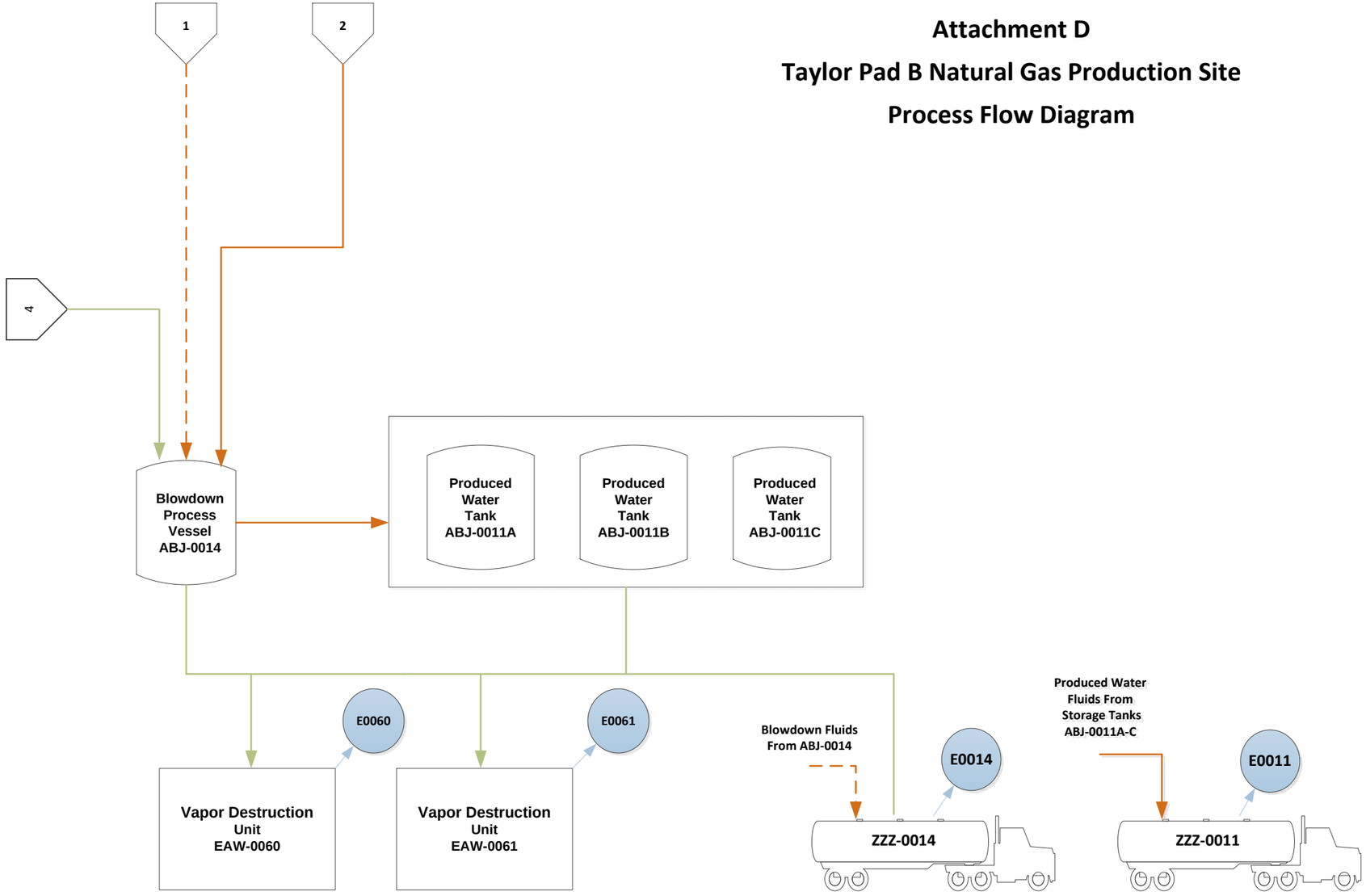
# Process Flow Diagram

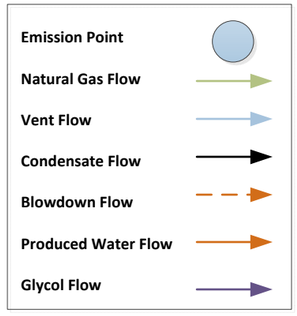


# Attachment D

# Taylor Pad B Natural Gas Production Site

# Process Flow Diagram

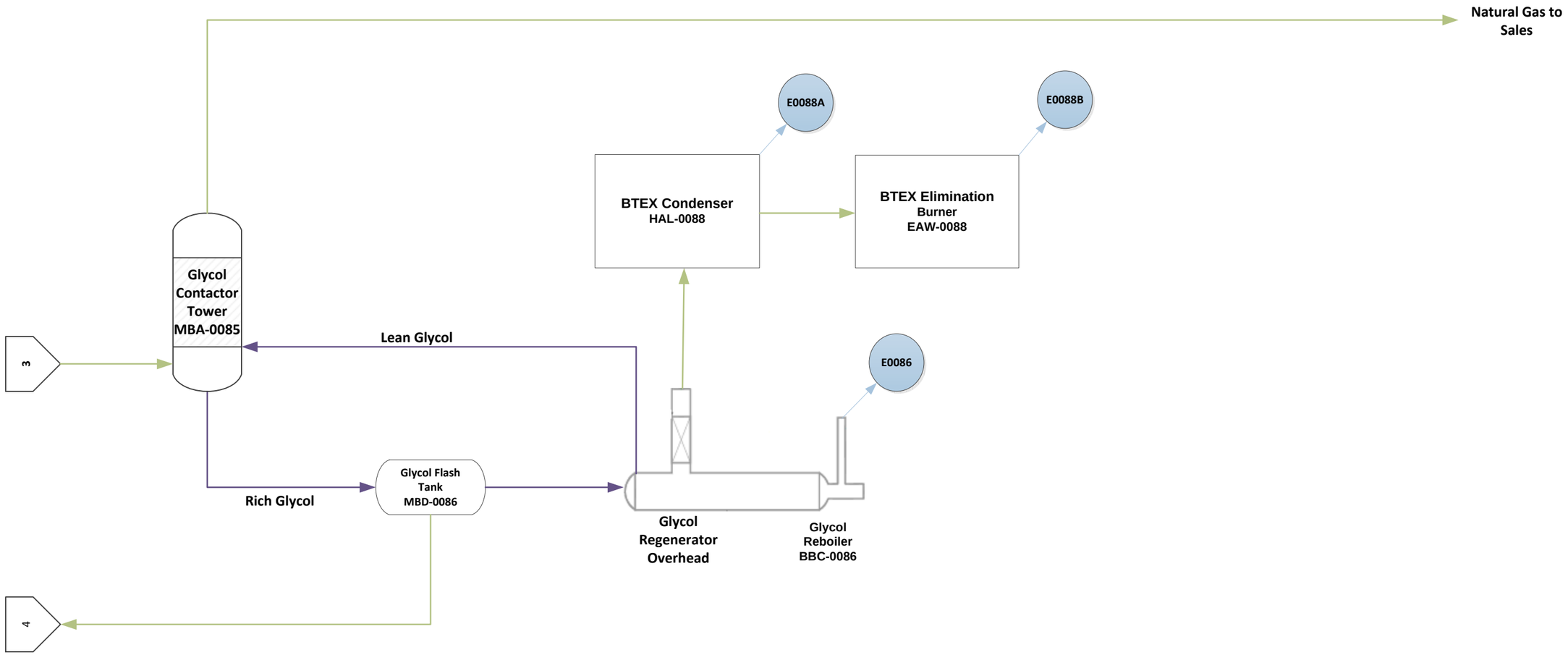


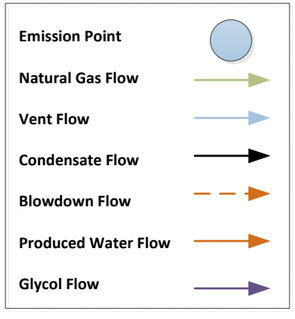



# Attachment D

# Taylor Pad B Natural Gas Production Site

# Process Flow Diagram



# Attachment E

# Attachment E

# Process Description

This permit application is being filed by Chevron Appalachia, LLC (Chevron) and addresses operational activities associated with the Taylor Pad B natural gas production site. Incoming raw natural gas from each of the nine wells enter the site surface and is first routed through a line heater (BAP-0110 - BAP-0910) to assist with the phase separation process in the downstream separators. In the first stage separators, condensate and water is removed from the raw gas.

The raw gas is routed through a Triethylene Glycol (TEG) Dehydration Unit for removal of entrained fluids prior to exiting the site via a natural gas sales line. The Glycol Flash Tank (MBD-0086) will route flash vapors through the Blowdown Process Vessel (ABJ-0014) to the Vapor Destruction Units (EAW-0060 and EAW-0061). The rich glycol stream will then flow to the Glycol Reboiler (BBC-0086), where water and hydrocarbons will be removed from the glycol stream and routed to the glycol regenerator overhead. The vapor stream from the glycol regenerator overhead vent (HAL-0088) will be sent to the BTEX Condenser to remove the water from the vapor stream. The vapor stream will then be routed to the BTEX Elimination Burner (EAW-0088). For maximum potential to emit (PTE) purposes, the emission calculations included within this permit application assume that all emissions from the dehydrator regenerator overhead vent go to atmosphere in the event that the BTEX Elimination System, which includes the associated BTEX Condenser and BTEX Elimination Burner, is inoperable. As such, Chevron demonstrates compliance with MACT HH and the G70-D permit without the mandate to condense or combust the vapors. The use of the BTEX Elimination System is a Chevron voluntary Best Management Practice, and is not intended to compromise the operational viability of the facility during periods of condenser fan failure or burner flare-out.

Condensate is removed from the raw gas in the first stage separators and is transferred to the Condensate Flash Vessel (MBD-0040). The condensate is routed through a line heater (BAP-0012) prior to the Condensate Flash Vessel to aid in fluid separation. At these pressure and temperature conditions, light hydrocarbon constituents volatilize within the condensate flash vessel and are directed to the Flash Gas Compressor (CBA-0050). Flash Gas Compressor (CBA-0050) will be powered by a 425 hp 4-Stroke Lean Burn Caterpillar G3406 TALE engine. The Flash Gas Compressor will increase the pressure of the recovered gas and the gas will be compressed into the raw gas line to the Glycol Contactor Tower (MBA-0085). The remaining condensate fluid flows from the condensate flash vessel to a condensate sales line. An electric

Condensate Pipeline Pump (PAX-0042) is used to lift the condensate through the condensate sales line.

From the first stage separators, produced water flows into the Blowdown Process Vessel (ABJ-0014) and then is transferred to Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C in series. The Blowdown Process Vessel (ABJ-0014) is intended to provide separation of any carryover of slop/condensate prior to transfer to the produced water tanks. Tank emissions from the Produced Water Tanks and the Blowdown Process Vessel are directed to the Vapor Destruction Units (EAW-0060 and EAW-0061). From the storage tanks, the produced water is pumped into tank trucks (ZZZ-0011) on an as needed basis and managed off-site. Vapors from the loading of produced water to the tank trucks are released to atmosphere.

Chevron conducts blowdown activities at the Taylor B site for maintenance and operational purposes. These blowdown events may be total inventory blowdowns or blowdowns for singular equipment depending on operational need. All of the fluids from full site blowdowns and singular equipment blowdowns will be routed to the Blowdown Process Vessel (ABJ-0014). Blowdown fluids are loaded into tank trucks (ZZZ-0014) on an as needed basis and are managed off-site. Vapors from the loading of blowdown fluids to the tank trucks are routed to the Vapor Destruction Units (EAW-0060 and EAW-0061).

Chevron utilizes multiple pneumatic pumps to assist in routing fluids to the Blowdown Process Vessel (ABJ-0014). The BTEX Condenser pneumatic pumps (PBA-0088A and PBA-0088B) are used in parallel to pump produced water collected in BTEX Condenser (HAL-0088). The knockout drum pneumatic pump (PBA-0061) is used to pump fluids knocked out of the tank vent gas stream before the tank vent gas stream is sent to the Vapor Destruction Units (EAW-0060 and EAW-0061). Exhaust gas from the use of these pneumatic pumps is routed to the Vapor Destruction Units (EAW-0060 and EAW-0061).

A process flow diagram is included as Attachment D.

# Attachment F

# Attachment F

# Plot Plan

# Taylor Pad B Natural Gas Production Site


VAPOR DESTRUCTION UNIT EAW-0060

VAPOR DESTRUCTION UNIT EAW-0061

PRODUCED WATER TANK ABJ-0011A

PRODUCED WATER TANK ABJ-0011B

PRODUCED WATER TANK ABJ-0011C

BLOWDOWN PROCESS VESSEL ABJ-0014

BTEX ELIMINATION BURNER EAW-0088

BTEX CONDENSER HAL-0088

GLYCOL CONTACTOR TOWER MBA-0085

GLYCOL REBOILER BBC-0086

**Coordinates**
**Latitude:** 39.85693
**Longitude:** -80.68801
**Elevation:** 1,231 ft
**Drawn:** 10/30/2017

WELL — LINE HEATER BAP-0910 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0810 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0710 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0610 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0510 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0410 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0310 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0210 — FLOWLINE — 3-PHASE SEPARATOR

WELL — LINE HEATER BAP-0110 — FLOWLINE — 3-PHASE SEPARATOR

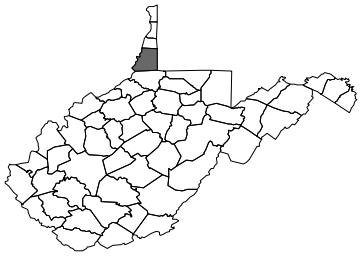
**TRUCK ENTRANCE**

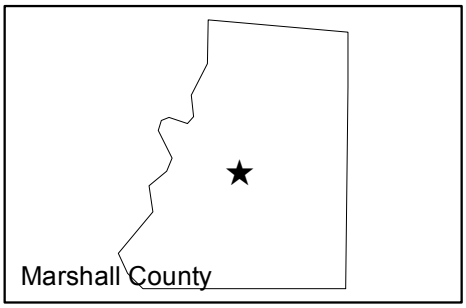
FLASH GAS COMPRESSOR CBA-0050

CONDENSATE FLASH VESSEL

LINE HEATER BAP-0012

# Attachment G

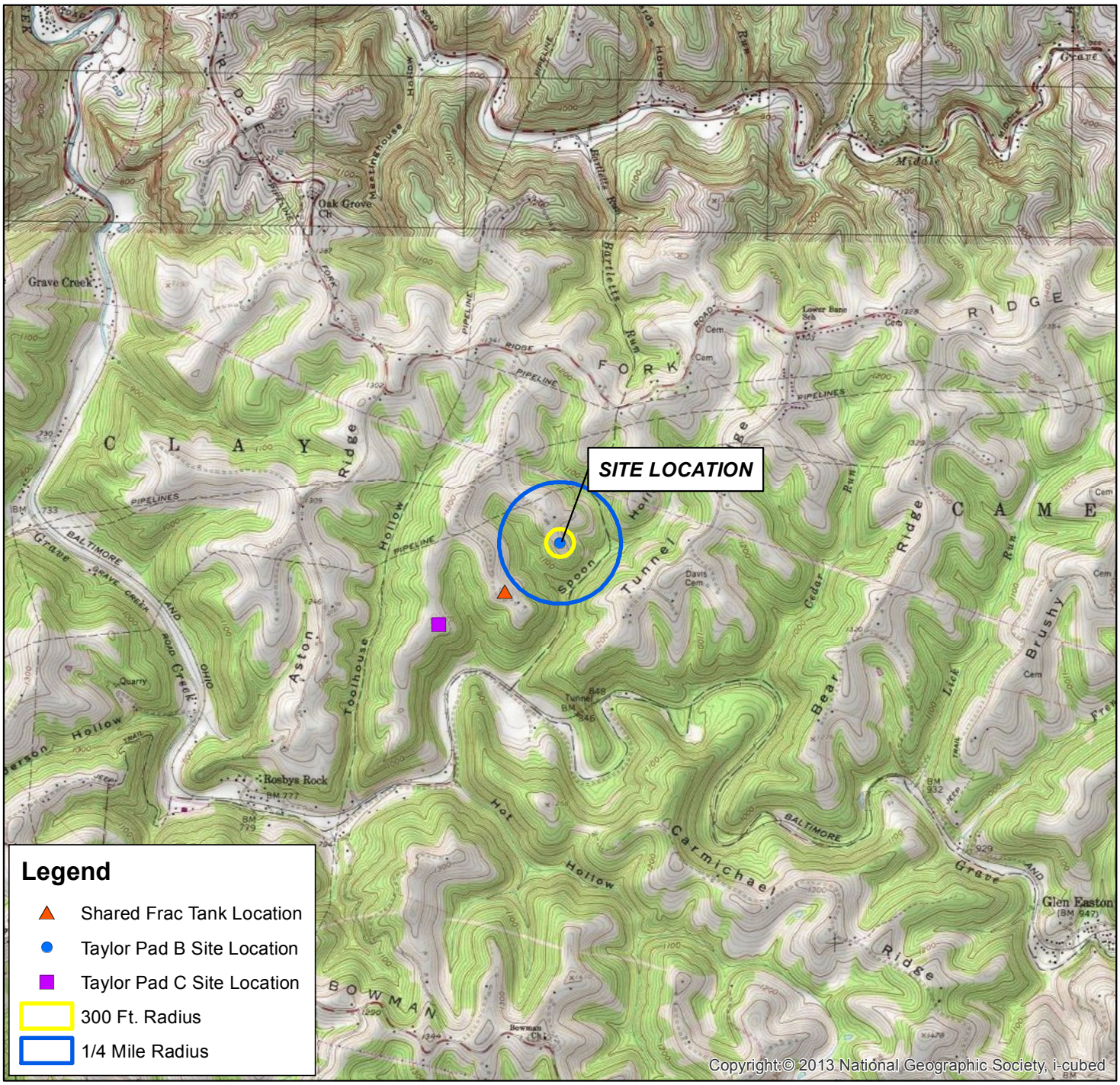



0 1,000 2,000 4,000 6,000
Feet

N

LAT. 39.85693 LON. -80.68801
MARSHALL COUNTY
WEST VIRGINIA




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

# SITE LOCATION MAP

**Chevron Appalachia, LLC**

Taylor B Well Pad
Marshall County, West Virginia

| | | |
|---|---|---|
| ERM | | GIS Review: GM |
| | | CHK'D: GM |
| | | 0334598 |
| Drawn By: SRV-11/13/17 | **Environmental Resources Management** | ATTACHMENT G |

J:\Projects\SiteLocationMaps\Chevron_MXD\AttachmentG-SiteLocationMapTaylorPadB_20171113.mxd - 7/12/2016|SRV

# Attachment H

**ATTACHMENT H – G70-D SECTION APPLICABILITY FORM**

# General Permit G70-D Registration
# Section Applicability Form

General Permit G70-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, pneumatic pumps, reciprocating internal combustion engines (RICEs), tank truck/rail car loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

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

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

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

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

# Attachment I

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

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

| Emission Unit ID[1] | Emission Point ID[2] | Emission Unit Description | Year Installed | Manufac. Date[3] | Design Capacity | Type[4] and Date of Change | Control Device(s)[5] | ERD(s)[6] |
|---|---|---|---|---|---|---|---|---|
| BAP-0110 | E0110 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0210 | E0210 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0310 | E0310 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0410 | E0410 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0510 | E0510 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0610 | E0610 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0710 | E0710 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0810 | E0810 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0910 | E0910 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| BAP-0012 | E0012 | Line Heater | 2018 | 2018 | 1.25 MMBtu/hr | New | None | None |
| CBA-0050 | E0050 | Flash Gas Compressor Engine | 2018 | Post 1/1/2011 | 425 bhp | New | Oxidation Catalyst | None |
| EAW-0060 | E0060 | Vapor Destruction Unit | 2018 | 2018 | 15.63 MMBtu/hr | New | None | None |
| EAW-0061 | E0061 | Vapor Destruction Unit | 2018 | 2018 | 15.63 MMBtu/hr | New | None | None |
| PBA-0061 | E0060<br>E0061 | Knockout Drum Pneumatic Pump | 2018 | 2018 | 10 gal/min | New | None | EAW-0060<br>EAW-0061 |
| ABJ-0014 | E0060<br>E0061 | Blowdown Process Vessel | 2018 | 2018 | 400 bbl | New | None | EAW-0060<br>EAW-0061 |
| ABJ-0011A | E0060<br>E0061 | Produced Water Tank | 2018 | 2018 | 400 bbl | New | None | EAW-0060<br>EAW-0061 |
| ABJ-0011B | E0060<br>E0061 | Produced Water Tank | 2018 | 2018 | 400 bbl | New | None | EAW-0060<br>EAW-0061 |
| ABJ-0011C | E0060<br>E0061 | Produced Water Tank | 2018 | 2018 | 400 bbl | New | None | EAW-0060<br>EAW-0061 |
| ZZZ-0014 | E0014<br>E0060<br>E0061 | Blowdown Process Vessel Fluid Loadout | 2018 | 2018 | 26.25 bbl/day | New | None | EAW-0060<br>EAW-0061 |
| ZZZ-0011 | E0011 | Produced Water Loadout | 2018 | 2018 | 2571 bbl/day | New | None | None |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MBD-0086 | E0060<br>E0061 | Glycol Dehydrator Flash Tank | 2018 | 2018 | 38 MMscf/day | New | None | EAW-0060<br>EAW-0061 |
| BBC-0086 | E0086 | Glycol Dehydrator Reboiler | 2018 | 2018 | 0.50 MMBtu/hr | New | None | None |
| HAL-0088 | E0088A | Dehydrator Regenerator Overhead Vent | 2018 | 2018 | 963 scf/hr | New | None | None |
| PBA-0088A | E0060<br>E0061 | BTEX Condenser Pneumatic Pump | 2018 | 2018 | 10 gal/min | New | None | EAW-0060<br>EAW-0061 |
| PBA-0088B | E0060<br>E0061 | BTEX Condenser Pneumatic Pump | 2018 | 2018 | 10 gal/min | New | None | EAW-0060<br>EAW-0061 |
| EAW-0088 | E0088B | BTEX Eliminator Burner | 2018 | 2018 | 0.98 MMBtu/hr | New | None | None |

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

# Attachment J

## ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment: **Taylor Pad B**

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

| Component Type | Closed Vent System | Count | Source of Leak Factors (EPA, other (specify)) | Stream type (gas, liquid, etc.) | Estimated Emissions (tpy) | | |
|---|---|---|---|---|---|---|---|
| | | | | | VOC | HAP | GHG (methane, $CO_2e$) |
| Pumps | ☐ Yes ☐ No | | | ☐ Gas ☐ Liquid ☐ Both | | | |
| Valves | ☐ Yes ☐ No | **392** | **EPA** | ☐ Gas ☐ Liquid ☒ Both | **1.01** | **0.06** | **1.29, 32.19** |
| Safety Relief Valves | ☐ Yes ☐ No | **13** | **EPA** | ☐ Gas ☐ Liquid ☒ Both | **0.05** | **<0.01** | **0.06, 1.58** |
| Open Ended Lines | ☐ Yes ☐ No | **29** | **EPA** | ☐ Gas ☐ Liquid ☒ Both | **0.17** | **<0.01** | **0.21, 5.29** |
| Sampling Connections | ☐ Yes ☐ No | | | ☐ Gas ☐ Liquid ☐ Both | | | |
| Connections (Not sampling) | ☐ Yes ☐ No | **1714** | **EPA** | ☐ Gas ☐ Liquid ☒ Both | **0.49** | **0.03** | **0.63, 15.64** |
| Compressors | ☐ Yes ☐ No | | **Included in Valves and Connections Counts** | ☐ Gas ☐ Liquid ☐ Both | | | |
| Flanges | ☐ Yes ☐ No | | | ☐ Gas ☐ Liquid ☐ Both | | | |
| Other[1] | ☐ Yes ☐ No | | **Other-ProMax** | ☒ Gas ☐ Liquid ☐ Both | **<0.01** | **<0.01** | **<0.01, 0.01** |

[1] Uncontrolled Working and Breathing losses from Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C for a maximum of 200 hrs/year

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

**N/A**

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

**N/A**

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

**N/A**

# Attachment K

## ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

| API Number | Date of Flowback | Date of Well Completion | Green Completion and/or Combustion Device | Subject to OOOO or OOOOa? |
|---|---|---|---|---|
| 047-051-01322 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01793 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01794 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01795 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01823 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01796 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01797 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01798 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| 047-051-01799 | Approx. 07/2018 | Approx. 07/2018 | Green Completion | OOOOa |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

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

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

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

*Where,*

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

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

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

# Attachment L

## ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

**The following information is REQUIRED:**

☒ Composition of the representative sample used for the simulation
☒ For each stream that contributes to flashing emissions:
- ☐ Temperature and pressure (inlet and outlet from separator(s))
- ☐ Simulation-predicted composition
- ☐ Molecular weight
- ☐ Flow rate

☒ Resulting flash emission factor or flashing emissions from simulation
☒ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

*Additional information may be requested if necessary.*

**GENERAL INFORMATION (REQUIRED)**

| | |
|---|---|
| 1. Bulk Storage Area Name<br>**Taylor Pad B Tank Battery** | 2. Tank Name<br>**Produced Water Tanks** |
| 3. Emission Unit ID number<br>**ABJ-0011A, ABJ-0011B, and ABJ-0011C** | 4. Emission Point ID number<br>**E0060 and E0061** |
| 5. Date Installed , Modified or Relocated *(for existing tanks)* **N/A**<br>Was the tank manufactured after August 23, 2011 and on or before September 18, 2015?<br>☐ Yes ☒ No<br>Was the tank manufactured after September 18, 2015?<br>☒ Yes ☐ No | 6. Type of change:<br>☒ New construction ☐ New stored material ☐ Other<br>☐ Relocation |
| 7A. Description of Tank Modification *(if applicable)* **N/A** | |
| 7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.*<br>☐ Yes ☒ No | |
| 7C. Was USEPA Tanks simulation software utilized?<br>☒ Yes ☐ No<br>***If Yes, please provide the appropriate documentation and items 8-42 below are not required.*** | |

**TANK INFORMATION**

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height.
**400 bbls**

| | |
|---|---|
| 9A. Tank Internal Diameter (ft.) **12** | 9B. Tank Internal Height (ft.) **20** |
| 10A. Maximum Liquid Height (ft.) **18** | 10B. Average Liquid Height (ft.) **10** |
| 11A. Maximum Vapor Space Height (ft.) **20** | 11B. Average Vapor Space Height (ft.) **10** |
| 12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **400 bbls** | |
| 13A. Maximum annual throughput (gal/yr) **39,413,430** | 13B. Maximum daily throughput (gal/day) **107,982** |
| 14. Number of tank turnovers per year **2,346** | 15. Maximum tank fill rate (gal/min) **74.99** |

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

17. Is the tank system a variable vapor space system? ☐ Yes ☐ No
If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):
☒ Fixed Roof ☒ Vertical ☐ Horizontal ☐ Flat roof ☒ Cone roof ☐Dome roof ☐ other (describe)

☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical
☐ Other (describe)

**PRESSURE/VACUUM CONTROL DATA**

19. Check as many as apply:
☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)
☒ Conservation Vent (psig) ☐ Condenser[1]
**-0.45 oz/in²** Vacuum Setting **NA** Pressure Setting
☒ Emergency Relief Valve (psig)
**NA** Vacuum Setting **20 oz/in²** Pressure Setting
☒ Thief Hatch Weighted ☒ Yes ☐ No
[1] Complete appropriate Air Pollution Control Device Sheet

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

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

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
*Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.*

**TANK CONSTRUCTION AND OPERATION INFORMATION**

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

| 21A. Shell Color: **Dark Green** | 21B. Roof Color: **Dark Green** | 21C. Year Last Painted: |
|---|---|---|

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

| 22A. Is the tank heated? ☐ Yes ☒ No | 22B. If yes, operating temperature: | 22C. If yes, how is heat provided to tank? |
|---|---|---|

23. Operating Pressure Range (psig): **0-1 psig**
**Must be listed for tanks using VRUs with closed vent system.**

| 24. Is the tank a **Vertical Fixed Roof Tank**?<br>☒ Yes ☐ No | 24A. If yes, for dome roof provide radius (ft): | 24B. If yes, for cone roof, provide slop (ft/ft):<br>**12:1** |
|---|---|---|

25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No

25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings:

26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply

| 26A. Deck Type: ☐ Bolted ☐ Welded | 26B. For bolted decks, provide deck construction: |
|---|---|

26C. Deck seam. Continuous sheet construction:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

| 26D. Deck seam length (ft.): | 26E. Area of deck ($ft^2$): | 26F. For column supported tanks, # of columns: | 26G. For column supported tanks, diameter of column: |
|---|---|---|---|

27. Closed Vent System with VRU? ☐ Yes ☒ No

28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No

**SITE INFORMATION** (See attached ProMax Report)

29. Provide the city and state on which the data in this section are based:

| 30. Daily Avg. Ambient Temperature (°F): | 31. Annual Avg. Maximum Temperature (°F): |
|---|---|
| 32. Annual Avg. Minimum Temperature (°F): | 33. Avg. Wind Speed (mph): |
| 34. Annual Avg. Solar Insulation Factor (BTU/$ft^2$-day): | 35. Atmospheric Pressure (psia): |

**LIQUID INFORMATION** (See attached ProMax Report)

| 36. Avg. daily temperature range of bulk liquid (°F): | 36A. Minimum (°F): | 36B. Maximum (°F): |
|---|---|---|
| 37. Avg. operating pressure range of tank (psig): | 37A. Minimum (psig): | 37B. Maximum (psig): |

| 38A. Minimum liquid surface temperature (°F): | 38B. Corresponding vapor pressure (psia): |
|---|---|
| 39A. Avg. liquid surface temperature (°F): | 39B. Corresponding vapor pressure (psia): |
| 40A. Maximum liquid surface temperature (°F): | 40B. Corresponding vapor pressure (psia): |

41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.

| | | | |
|---|---|---|---|
| 41A. Material name and composition: | | | |
| 41B. CAS number: | | | |
| 41C. Liquid density (lb/gal): | | | |

| | | | |
|---|---|---|---|
| 41D. Liquid molecular weight (lb/lb-mole): | | | |
| 41E. Vapor molecular weight (lb/lb-mole): | | | |
| 41F. Maximum true vapor pressure (psia): | | | |
| 41G. Maximum Reid vapor pressure (psia): | | | |
| 41H. Months Storage per year.<br>From: To: | | | |
| 42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations. | | | |

# Attachment M

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

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

| Emission Unit ID#[1] | Emission Point ID#[2] | Emission Unit Description (manufacturer, model #) | Year Installed/ Modified | Type[3] and Date of Change | Maximum Design Heat Input (MMBTU/hr)[4] | Fuel Heating Value (BTU/scf)[5] |
|---|---|---|---|---|---|---|
| BAP-0110 | E0110 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0210 | E0210 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0310 | E0310 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0410 | E0410 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0510 | E0510 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0610 | E0610 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0710 | E0710 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0810 | E0810 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0910 | E0910 | Line Heater | 2018 | New | 1.25 | 1250 |
| BAP-0012 | E0012 | Line Heater | 2018 | New | 1.25 | 1250 |
| BBC-0086 | E0086 | Glycol Reboiler | 2018 | New | 0.50 | 1250 |
| EAW-0088B | E0088B | BTEX Elimination Burner | 2018 | New | 0.98 | 1250 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

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

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

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

# Attachment N

# ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

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

| | | | |
|---|---|---|---|
| Emission Unit ID#[1] | **CBA-0050** | | |
| Engine Manufacturer/Model | **CAT G3408 TALE** | | |
| Manufacturers Rated bhp/rpm | **425/1800** | | |
| Source Status[2] | **NS** | | |
| Date Installed/ Modified/Removed/Relocated[3] | **2018** | | |
| Engine Manufactured /Reconstruction Date[4] | **Post 1/1/2011** | | |
| Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5] | ☒40CFR60 Subpart JJJJ<br>☐JJJJ Certified?<br>☐40CFR60 Subpart IIII<br>☐IIII Certified?<br>☒40CFR63 Subpart ZZZZ<br>☐ NESHAP ZZZZ/ NSPS JJJJ Window<br>☐ NESHAP ZZZZ Remote Sources | ☐40CFR60 Subpart JJJJ<br>☐JJJJ Certified?<br>☐40CFR60 Subpart IIII<br>☐IIII Certified?<br>☐40CFR63 Subpart ZZZZ<br>☐ NESHAP ZZZZ/ NSPS JJJJ Window<br>☐ NESHAP ZZZZ Remote Sources | ☐40CFR60 Subpart JJJJ<br>☐JJJJ Certified?<br>☐40CFR60 Subpart IIII<br>☐IIII Certified?<br>☐40CFR63 Subpart ZZZZ<br>☐ NESHAP ZZZZ/ NSPS JJJJ Window<br>☐ NESHAP ZZZZ Remote Sources |
| Engine Type[6] | **4SLB** | | |
| APCD Type[7] | **OxCat** | | |
| Fuel Type[8] | **RG** | | |
| $H_2S$ (gr/100 scf) | **<0.01** | | |
| Operating bhp/rpm | **425/1800** | | |
| BSFC (BTU/bhp-hr) | **9,752** | | |
| Hourly Fuel Throughput | 54,860 $ft^3$/hr<br>gal/hr | $ft^3$/hr<br>gal/hr | $ft^3$/hr<br>gal/hr |
| Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator) | 480.57 $MMft^3$/yr<br>gal/yr | $MMft^3$/yr<br>gal/yr | $MMft^3$/yr<br>gal/yr |
| Fuel Usage or Hours of Operation Metered | Yes ☒ No ☐ | Yes ☐ No ☐ | Yes ☐ No ☐ |

| Calculation Methodology[9] | Pollutant[10] | Hourly PTE (lb/hr)[11] | Annual PTE (tons/year)[11] | Hourly PTE (lb/hr)[11] | Annual PTE (tons/year)[11] | Hourly PTE (lb/hr)[11] | Annual PTE (tons/year)[11] |
|---|---|---|---|---|---|---|---|
| **MD** | **$NO_x$** | **0.94** | **4.10** | | | | |
| **MD** | **CO** | **1.64** | **7.18** | | | | |
| **MD** | **VOC** | **0.58** | **2.54** | | | | |
| **AP** | **$SO_2$** | **<0.01** | **0.01** | | | | |
| **AP** | **$PM_{10}$** | **0.04** | **0.17** | | | | |
| **MD** | **Formaldehyde** | **0.28** | **1.23** | | | | |
| **AP** | **Total HAPs** | **0.29** | **1.27** | | | | |
| **OT** | **GHG ($CO_2e$)** | **99.88** | **437.48** | | | | |

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

2 Enter the Source Status using the following codes:

| | | | |
|---|---|---|---|
| NS | Construction of New Source (installation) | ES | Existing Source |
| MS | Modification of Existing Source | RS | Relocated Source |
| REM | Removal of Source | | |

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

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

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

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

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

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

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

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

8 Enter the Fuel Type using the following codes:

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

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

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

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

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

## Engine Air Pollution Control Device
## (Emission Unit ID# CBA-0050, use extra pages as necessary)

Air Pollution Control Device Manufacturer's Data Sheet included?
Yes ☒ No ☐

☐ NSCR ☐ SCR ☒ Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream:

| | |
|---|---|
| Manufacturer: **DCL** | Model #: **DC50** |
| Design Operating Temperature: °F | Design gas volume: scfm |
| Service life of catalyst: | Provide manufacturer data? ☐Yes ☐ No |
| Volume of gas handled: acfm at °F | Operating temperature range for NSCR/Ox Cat: From °F to °F |
| Reducing agent used, if any: | Ammonia slip (ppm): |

Pressure drop against catalyst bed (delta P): inches of $H_2O$

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?
☐ Yes ☐ No

How often is catalyst recommended or required to be replaced (hours of operation)?

How often is performance test required?
☐ Initial
☐ Annual
☐ Every 8,760 hours of operation
☐ Field Testing Required
☐ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT,

USA COMPRESSION

## USAC Unit Caterpillar G3408TALE Engine Emissions

| | | | | | |
|---|---|---|---|---|---|
| Date of Manufacture | TBD | Engine Serial Number | TBD | Date Modified/Reconstructed | None |
| Driver Rated HP | 425 | Rated Speed in RPM | 1800 | Combustion Type | Spark Ignited 4 Stroke |
| Number of Cylinders | 8 | Compression Ratio | 8.5:1 | Combustion Setting | Lean Burn |
| Displacement, $in^3$ | 1099 | Fuel Delivery Method | Carburetor | Combustion Air Treatment | T.C./Aftercooled |

**Raw Engine Emissions (with customer supplied fuel gas with little to no H2S)**

*Fuel Consumption* *7876* *LHV BTU/bhp-hr* *or* *8715* *HHV BTU/bhp-hr*
*Altitude* *1200* *ft*
*Maximum Air Inlet Temp* *90* *F*

| | g/bhp-hr [1] | lb/MMBTU [2] | lb/hr | TPY |
|---|---|---|---|---|
| Nitrogen Oxides (NOx) | 1.00 | | 0.94 | 4.10 |
| Carbon Monoxide (CO) | 1.75 | | 1.64 | 7.18 |
| Volatile Organic Compounds (VOC or NMNEHC excluding CH2O) | 0.32 | | 0.30 | 1.31 |
| Formaldehyde (CH2O) | 0.3 | | 0.28 | 1.23 |
| Particulate Matter (PM) Filterable+Condensable | | 9.99E-03 | 3.70E-02 | 1.62E-01 |
| Sulfur Dioxide (SO2) | | 5.88E-04 | 2.18E-03 | 9.54E-03 |

| | g/bhp-hr [1] | lb/hr | Metric Tonne/yr |
|---|---|---|---|
| Carbon Dioxide (CO2) | 522 | 489 | 1943 |
| Methane (CH4) | 2.37 | 2.22 | 8.82 |

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) with site fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature.
Note that g/bhp-hr values are Nominal and are not representative of Not-To-Exceed Values. Values are based on 100% Load Operation.
For Air Permitting, it is recommended to add a safety margin to NOx, CO, VOC, and CH2O to account for variations in fuel gas composition and load.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

**Catalytic Converter Emissions**

*Catalytic Converter Make and Model:* *DCL DC50 or Equivalent*
*Element Type:* *Oxidation*
*Number of Elements in Housing:* *1*
*Air/Fuel Ratio Control* *YES*

| | % Reduction Required for JJJJ or Non-Attainment/General Permit | g/bhp-hr | lb/hr | TPY |
|---|---|---|---|---|
| Nitrogen Oxides (NOx) | 0 | 1 | **0.94** | **4.10** |
| Carbon Monoxide (CO) | 0 | ≤ 2 | **1.64** | **7.18** |
| Volatile Organic Compounds (VOC or NMNEHC excluding CH2O) | 0 | ≤ 0.7 | **0.30** | **1.31** |
| Formaldehyde (CH2O) | 0 | | **0.28** | **1.23** |
| Particulate Matter (PM) | 0 | | **3.70E-02** | **1.62E-01** |
| Sulfur Dioxide (SO2) | 0 | | **2.18E-03** | **9.54E-03** |

| | % Reduction Required for JJJJ or Non-Attainment/General Permit | lb/hr | Metric Tonne/yr |
|---|---|---|---|
| Carbon Dioxide (CO2) | 0 | **489** | **1943** |
| Methane (CH4) | 0 | **2.22** | **8.82** |

# G3408C
## NON-CURRENT

GAS COMPRESSION APPLICATION

## GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

| | | | |
|---|---|---|---|
| ENGINE SPEED (rpm): | 1800 | RATING STRATEGY: | STANDARD |
| COMPRESSION RATIO: | 8.5:1 | RATING LEVEL: | CONTINUOUS |
| AFTERCOOLER TYPE: | SCAC | FUEL SYSTEM: | LPG IMPCO |
| AFTERCOOLER WATER INLET (°F): | 130 | | WITH AIR FUEL RATIO CONTROL |
| JACKET WATER OUTLET (°F): | 210 | **SITE CONDITIONS:** | |
| ASPIRATION: | TA | FUEL: | National Fuel Sigel CS |
| COOLING SYSTEM: | JW+OC, AC | FUEL PRESSURE RANGE(psig): | 1.5-5.0 |
| CONTROL SYSTEM: | EIS | FUEL METHANE NUMBER: | 68.8 |
| EXHAUST MANIFOLD: | WC | FUEL LHV (Btu/scf): | 1025 |
| COMBUSTION: | LOW EMISSION | ALTITUDE(ft): | 1200 |
| NOx EMISSION LEVEL (g/bhp-hr NOx): | 1.0 | MAXIMUM INLET AIR TEMPERATURE(°F): | 90 |
| SET POINT TIMING: | 36 | STANDARD RATED POWER: | 425 bhp@1800rpm |

| | | | | MAXIMUM RATING | SITE RATING AT MAXIMUM INLET AIR TEMPERATURE | | |
|---|---|---|---|---|---|---|---|
| **RATING** | | **NOTES** | **LOAD** | **100%** | **100%** | **75%** | **50%** |
| ENGINE POWER | (WITHOUT FAN) | (1) | bhp | 425 | 425 | 319 | 213 |
| INLET AIR TEMPERATURE | | | °F | 90 | 90 | 90 | 90 |
| **ENGINE DATA** | | | | | | | |
| FUEL CONSUMPTION (LHV) | | (2) | Btu/bhp-hr | 7876 | 7876 | 8179 | 8813 |
| FUEL CONSUMPTION (HHV) | | (2) | Btu/bhp-hr | 8715 | 8715 | 9050 | 9752 |
| AIR FLOW (@inlet air temp, 14.7 psia) | (WET) | (3)(4) | ft3/min | 963 | 964 | 732 | 521 |
| AIR FLOW | (WET) | (3)(4) | lb/hr | 4174 | 4174 | 3170 | 2256 |
| FUEL FLOW (60ºF, 14.7 psia) | | | scfm | 54 | 54 | 42 | 30 |
| INLET MANIFOLD PRESSURE | | (5) | in Hg(abs) | 66.5 | 66.5 | 51.4 | 36.9 |
| EXHAUST TEMPERATURE - ENGINE OUTLET | | (6) | °F | 863 | 863 | 812 | 779 |
| EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) | (WET) | (7)(4) | ft3/min | 2505 | 2505 | 1831 | 1270 |
| EXHAUST GAS MASS FLOW | (WET) | (7)(4) | lb/hr | 4332 | 4332 | 3293 | 2344 |
| **EMISSIONS DATA - ENGINE OUT** | | | | | | | |
| NOx (as NO2) | | (8)(9) | g/bhp-hr | 1.00 | 1.00 | 1.00 | 1.00 |
| CO | | (8)(9) | g/bhp-hr | 1.75 | 1.75 | 1.86 | 2.08 |
| THC (mol. wt. of 15.84) | | (8)(9) | g/bhp-hr | 3.17 | 3.17 | 3.61 | 4.14 |
| NMHC (mol. wt. of 15.84) | | (8)(9) | g/bhp-hr | 0.80 | 0.80 | 0.91 | 1.04 |
| NMNEHC (VOCs) (mol. wt. of 15.84) | | (8)(9)(10) | g/bhp-hr | 0.32 | 0.32 | 0.36 | 0.41 |
| HCHO (Formaldehyde) | | (8)(9) | g/bhp-hr | 0.30 | 0.30 | 0.31 | 0.35 |
| CO2 | | (8)(9) | g/bhp-hr | 522 | 522 | 542 | 584 |
| EXHAUST OXYGEN | | (8)(11) | % DRY | 8.2 | 8.2 | 8.0 | 7.6 |
| **HEAT REJECTION** | | | | | | | |
| HEAT REJ. TO JACKET WATER (JW) | | (12) | Btu/min | 14531 | 14531 | 12923 | 10532 |
| HEAT REJ. TO ATMOSPHERE | | (12) | Btu/min | 2232 | 2232 | 1738 | 1249 |
| HEAT REJ. TO LUBE OIL (OC) | | (12) | Btu/min | 2298 | 2298 | 2043 | 1665 |
| HEAT REJ. TO AFTERCOOLER (AC) | | (12)(13) | Btu/min | 3289 | 3289 | 2155 | 1128 |

| **COOLING SYSTEM SIZING CRITERIA** | | | |
|---|---|---|---|
| TOTAL JACKET WATER CIRCUIT (JW+OC) | (13) | Btu/min | 18741 |
| TOTAL AFTERCOOLER CIRCUIT (AC) | (13)(14) | Btu/min | 3454 |
| A cooling system safety factor of 0% has been added to the cooling system sizing criteria. | | | |

**CONDITIONS AND DEFINITIONS**

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

PREPARED BY:
Data generated by Gas Engine Rating Pro Version 4.07.01
Ref. Data Set DM5391-04-001, BAZ02464, Printed 18Sep2014

# Attachment O

## ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

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

***Truck/Rail Car Loadout Collection Efficiencies***

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

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

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

| | | |
|---|---|---|
| Emission Unit ID#: **ZZZ-0011** | Emission Point ID#: **E0011** | Year Installed/Modified: **2018** |
| Emission Unit Description: **Produced Water Loadout** | | |
| **Loading Area Data** | | |
| Number of Pumps: **On Tanker Truck** | Number of Liquids Loaded: **1** | Max number of trucks/rail cars loading at one (1) time: **1** |
| Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required<br>If Yes, Please describe: | | |
| Provide description of closed vent system and any bypasses. **N/A** | | |
| Are any of the following truck/rail car loadout systems utilized?<br>☐ Closed System to tanker truck/rail car passing a MACT level annual leak test?<br>☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test?<br>☒ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return? | | |

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

| Time | Jan – Mar | Apr - Jun | Jul – Sept | Oct - Dec |
|---|---|---|---|---|
| Hours/day | **24** | **24** | **24** | **24** |
| Days/week | **7** | **7** | **7** | **7** |

**Bulk Liquid Data (use extra pages as necessary)**

| Liquid Name | **Produced Water** | | |
|---|---|---|---|
| Max. Daily Throughput (1000 gal/day) | **107.98** | | |
| Max. Annual Throughput (1000 gal/yr) | **39,413.43** | | |
| Loading Method[1] | **SP** | | |
| Max. Fill Rate (gal/min) | **74.99** | | |
| Average Fill Time (min/loading) | **56.0** | | |
| Max. Bulk Liquid Temperature (°F) | **70** | | |
| True Vapor Pressure[2] | **0.28** | | |

| | | | | | |
|---|---|---|---|---|---|
| Cargo Vessel Condition[3] | | U | | | |
| Control Equipment or Method[4] | | NA | | | |
| Max. Collection Efficiency (%) | | 0 | | | |
| Max. Control Efficiency (%) | | 0 | | | |
| Max.VOC Emission Rate | Loading (lb/hr) | <0.01 | | | |
| | Annual (ton/yr) | 0.02 | | | |
| Max.HAP Emission Rate | Loading (lb/hr) | <0.01 | | | |
| | Annual (ton/yr) | <0.01 | | | |
| Estimation Method[5] | | O - ProMax | | | |

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

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

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

## ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

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

***Truck/Rail Car Loadout Collection Efficiencies***

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

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

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

| | | |
|---|---|---|
| Emission Unit ID#: **ZZZ-0014** | Emission Point ID#: **E0014, E0060, and E0061** | Year Installed/Modified: **2018** |
| Emission Unit Description: **Blowdown Process Vessel Fluid Loadout** | | |
| **Loading Area Data** | | |
| Number of Pumps: **On Tanker Truck** | Number of Liquids Loaded: **1** | Max number of trucks/rail cars loading at one (1) time: **1** |
| Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required<br>If Yes, Please describe: | | |
| Provide description of closed vent system and any bypasses. **Blowdown Vessel Loadout to VDUs EAW-0060 and EAL-0061.** | | |
| Are any of the following truck/rail car loadout systems utilized?<br>☐ Closed System to tanker truck/rail car passing a MACT level annual leak test?<br>☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test?<br>☒ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return? | | |

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

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

**Bulk Liquid Data (use extra pages as necessary)**

| Liquid Name | **Blowdown Fluids** | | |
|---|---|---|---|
| Max. Daily Throughput (1000 gal/day) | **1.10** | | |
| Max. Annual Throughput (1000 gal/yr) | **9.92** | | |
| Loading Method[1] | **SP** | | |
| Max. Fill Rate (gal/min) | **18.38** | | |
| Average Fill Time (min/loading) | **60** | | |

| | | | | | |
|---|---|---|---|---|---|
| Max. Bulk Liquid Temperature (°F) | | **70** | | |
| True Vapor Pressure[2] | | **0.69** | | |
| Cargo Vessel Condition[3] | | **U** | | |
| Control Equipment or Method[4] | | **ECD** | | |
| Max. Collection Efficiency (%) | | **70** | | |
| Max. Control Efficiency (%) | | **98** | | |
| Max.VOC Emission Rate | Loading (lb/hr) | **0.30** | | |
| | Annual (ton/yr) | **1.30** | | |
| Max.HAP Emission Rate | Loading (lb/hr) | **0.01** | | |
| | Annual (ton/yr) | **0.05** | | |
| Estimation Method[5] | | **O - ProMax** | | |

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

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

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

# Attachment P

# ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET

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

| | |
|---|---|
| Manufacturer: **TBD** | Model: **TBD** |
| Max. Dry Gas Flow Rate: **38 mmscf/day** | Reboiler Design Heat Input: **0.50 MMBTU/hr** |
| Design Type: ☒ TEG ☐ DEG ☐ EG | Source Status[1]: **NS** |
| Date Installed/Modified/Removed[2]: **2018** | Regenerator Still Vent APCD/ERD[3]: **CC** |
| Control Device/ERD ID#[3]: **HAL-0088 and EAW-0088** | Fuel HV (BTU/scf): **1250** |
| $H_2S$ Content (gr/100 scf): | Operation (hours/year): **8760** |
| Pump Rate (gpm): **1.27** | |
| Water Content (wt %) in: Wet Gas: **0.0366** | Dry Gas: **0.0027** |

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

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

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

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

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

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

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

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

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

**Control Device Technical Data**

| Pollutants Controlled | Manufacturer's Guaranteed Control Efficiency (%) – Glycol Flash Tank | Manufacturer's Guaranteed Control Efficiency (%) – BTEX Condenser |
|---|---|---|
| **VOCs** | **98** | **0.04** |
| **HAPs** | **98** | **0.18** |

Emissions Data

| Emission Unit ID / Emission Point ID[4] | Description | Calculation Methodology[5] | PTE[6] | Controlled Maximum Hourly Emissions (lb/hr) | Controlled Maximum Annual Emissions (tpy) |
|---|---|---|---|---|---|
| BBC-0086 | Reboiler Vent | AP | $NO_x$ | 0.04 | 0.18 |
| | | AP | CO | 0.03 | 0.15 |
| | | AP | VOC | <0.01 | <0.01 |

| | | | | | |
|---|---|---|---|---|---|
| | | AP | $SO_2$ | <0.01 | <0.01 |
| | | AP | $PM_{10}$ | <0.01 | 0.01 |
| | | AP | GHG ($CO_2e$) | 58.55 | 256.44 |
| HAL-0088 | Glycol Regenerator Still Vent | GRI-GlyCalc™ | VOC | 4.80 | 21.04 |
| | | GRI-GlyCalc™ | Benzene | 0.06 | 0.26 |
| | | GRI-GlyCalc™ | Toluene | 0.19 | 0.84 |
| | | GRI-GlyCalc™ | Ethylbenzene | 0.11 | 0.49 |
| | | GRI-GlyCalc™ | Xylenes | 0.44 | 1.93 |
| | | GRI-GlyCalc™ | n-Hexane | 0.08 | 0.36 |
| MBD-0086 | Glycol Flash Tank | GRI-GlyCalc™ | VOC | 0.08 | 0.34 |
| | | GRI-GlyCalc™ | Benzene | <0.01 | <0.01 |
| | | GRI-GlyCalc™ | Toluene | <0.01 | <0.01 |
| | | GRI-GlyCalc™ | Ethylbenzene | <0.01 | <0.01 |
| | | GRI-GlyCalc™ | Xylenes | <0.01 | <0.01 |
| | | GRI-GlyCalc™ | n-Hexane | <0.01 | <0.01 |

1 Enter the Source Status using the following codes:
NS Construction of New Source ES Existing Source
MS Modification of Existing Source

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

3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:
NA None CD Condenser FL Flare
CC Condenser/Combustion Combination TO Thermal Oxidizer O Other

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

5 Enter the Potential Emissions Data Reference designation using the following codes:
MD Manufacturer's Data AP AP-42
GR GRI-GLYCalc™ OT Other (please list)

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

# Attachment Q

## ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?**

☐ Yes ☒ No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after September 18, 2015?**

☐ Yes ☒ No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?**

☐ Yes ☒ No

Please list approximate number.

**Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after September 18, 2015?**

☐ Yes ☒ No

Please list approximate number.

# Attachment R

## ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

**Are there any natural gas-driven diaphragm pumps located at a well site that commenced construction, modification or reconstruction after September 18, 2015?**

☒ Yes ☐ No

Please list.

| Source ID # | Date | Pump Make/Model | Pump Size |
|---|---|---|---|
| PBA-0061 | 2018 | Sandpiper G05 | 10 gal/min |
| PBA-0088A | 2018 | Sandpiper G05 | 10 gal/min |
| PBA-0088B | 2018 | Sandpiper G05 | 10 gal/min |
| | | | |
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# Attachment S

## ATTACHMENT S – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary.

Emissions calculations must be performed using the most conservative control device efficiency.

*The following five (5) rows are only to be completed if registering an alternative air pollution control device.*

| | |
|---|---|
| Emission Unit ID: **EAW-0060** | Make/Model: **Midflow – Coyote North 48" Combustor** |
| Primary Control Device ID: | Make/Model: |
| Control Efficiency (%): **98** | APCD/ERD Data Sheet Completed: ☒ Yes ☐ No |
| Secondary Control Device ID: | Make/Model: |
| Control Efficiency (%): | APCD/ERD Data Sheet Completed: ☐ Yes ☐ No |

# VAPOR COMBUSTION
# (Including Enclosed Combustors)

**General Information**

| | | |
|---|---|---|
| Control Device ID#: **EAW-0060** | Installation Date: **TBD**<br>☒ New ☐ Modified ☐ Relocated | |
| Maximum Rated Total Flow Capacity<br>**6,354** scfh scfd | Maximum Design Heat Input (from mfg. spec sheet)<br>**15.63** MMBTU/hr | Design Heat Content<br>**2330** BTU/scf |

**Control Device Information**

Type of Vapor Combustion Control?

☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

| | |
|---|---|
| Manufacturer: **Midflow**<br>Model: **Coyote North 48" Combustor** | Hours of operation per year? **8760** |

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# **E0060**)

| Emission Unit ID# | Emission Source Description | Emission Unit ID# | Emission Source Description |
|---|---|---|---|
| **ABJ-0014** | **Blowdown Process Vessel** | **MBD-0086** | **Glycol Dehydrator Reboiler** |
| **ABJ-0011A-C** | **Produced Water Tanks** | **PBA-0088A-B** | **BTEX Condenser Pneumatic Pumps** |
| **ZZZ-0014** | **Blowdown Process Vessel Fluid Loadout** | **PBA-0061** | **Knockout Drum Pneumatic Pump** |

*If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.*

| Assist Type (Flares only) | Flare Height | Tip Diameter | Was the design per §60.18? |
|---|---|---|---|
| ☐ Steam ☐ Air<br>☐ Pressure ☒ Non | **26** feet | **4** feet | ☒ Yes ☐ No<br>Provide determination. |

**Waste Gas Information**

| Maximum Waste Gas Flow Rate | Heat Value of Waste Gas Stream | Exit Velocity of the Emissions Stream |
|---|---|---|
| **30.60** (scfm) | **1,518.48** BTU/ft$^3$ | **0.04** (ft/s) |

*Provide an attachment with the characteristics of the waste gas stream to be burned.*

**Pilot Gas Information**

| Number of Pilot Lights | Fuel Flow Rate to Pilot Flame per Pilot | Heat Input per Pilot | Will automatic re-ignition be used? |
|---|---|---|---|
| **2** | **31** scfh | **30,000** BTU/hr | ☒ Yes ☐ No |

If automatic re-ignition is used, please describe the method. **Profire 3100 BMS**

| | |
|---|---|
| Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No | If Yes, what type? ☐ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☒ **Other: Kanthal Flame Rod** |

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).*

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

## ATTACHMENT S – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary.

Emissions calculations must be performed using the most conservative control device efficiency.

*The following five (5) rows are only to be completed if registering an alternative air pollution control device.*

| | |
|---|---|
| Emission Unit ID: **EAW-0061** | Make/Model: **Midflow – Coyote North 48" Combustor** |
| Primary Control Device ID: | Make/Model: |
| Control Efficiency (%): **98** | APCD/ERD Data Sheet Completed: ☒ Yes ☐ No |
| Secondary Control Device ID: | Make/Model: |
| Control Efficiency (%): | APCD/ERD Data Sheet Completed: ☐ Yes ☐ No |

# VAPOR COMBUSTION
# (Including Enclosed Combustors)

**General Information**

| | | |
|---|---|---|
| Control Device ID#: **EAW-0061** | Installation Date: **TBD**<br>☒ New ☐ Modified ☐ Relocated | |
| Maximum Rated Total Flow Capacity<br>**6,354** scfh scfd | Maximum Design Heat Input (from mfg. spec sheet)<br>**15.63** MMBTU/hr | Design Heat Content<br>**2330** BTU/scf |

**Control Device Information**

Type of Vapor Combustion Control?

☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

| | |
|---|---|
| Manufacturer: **Midflow**<br>Model: **Coyote North 48" Combustor** | Hours of operation per year? **8760** |

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# **E0061**)

| Emission Unit ID# | Emission Source Description | Emission Unit ID# | Emission Source Description |
|---|---|---|---|
| **ABJ-0014** | **Blowdown Process Vessel** | **MBD-0086** | **Glycol Dehydrator Reboiler** |
| **ABJ-0011A-C** | **Produced Water Tanks** | **PBA-0088A-B** | **BTEX Condenser Pneumatic Pumps** |
| **ZZZ-0014** | **Blowdown Process Vessel Fluid Loadout** | **PBA-0061** | **Knockout Drum Pneumatic Pump** |

*If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.*

| Assist Type (Flares only) | Flare Height | Tip Diameter | Was the design per §60.18? |
|---|---|---|---|
| ☐ Steam ☐ Air<br>☐ Pressure ☒ Non | **26** feet | **4** feet | ☒ Yes ☐ No<br>Provide determination. |

**Waste Gas Information**

| Maximum Waste Gas Flow Rate | Heat Value of Waste Gas Stream | Exit Velocity of the Emissions Stream |
|---|---|---|
| **30.60** (scfm) | **1,518.48** BTU/ft$^3$ | **0.04** (ft/s) |

*Provide an attachment with the characteristics of the waste gas stream to be burned.*

**Pilot Gas Information**

| Number of Pilot Lights | Fuel Flow Rate to Pilot Flame per Pilot | Heat Input per Pilot | Will automatic re-ignition be used? |
|---|---|---|---|
| **2** | **31** scfh | **30,000** BTU/hr | ☒ Yes ☐ No |

If automatic re-ignition is used, please describe the method. **Profire 3100 BMS**

| | |
|---|---|
| Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No | If Yes, what type? ☐ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☒ **Other: Kanthal Flame Rod** |

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).*

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

# Coyote North 48" Combustor

## SPECS

- EPA QUAD OOOO APPROVED
- 6,354 SCF/H Destruction (@2330 BTU)
- Fully Arrested Design
- Refractory Lined
- Carbon Steel Construction
- High Turn Down Rate
- Inline Flame Arrestor

## CONTROLS

- Profire Burner Management System
- Automatic Ignition & Flame Sensing
- High Temperature Shutdown
- Actuated Butterfly Valve Process Control


## OPTIONS

- Solar Power Package
- Modbus Communication & Data Logging
- Process Line Pressure Sensing


812 S Washington St.
Millersburg, OH 44654
Phone: (330) 674-2399
Fax: 1(880) 875-1914
Email: info@midflowservices.com
www.midflowservices.com

# Attachment T

# Line Heaters

## BAP-0110 - BAP-0910, BAP-0012

| Pollutant | Emission Factor | Emission Factor Units | Emission Factor Basis / Source | Heater Rating (MMBtu/hr) | Heat Value of Natural Gas (Btu/scf) | Annual Operating Hours | Max. Hourly Emissions. (lb/hr) | Max. Annual Emissions. (tpy) |
|---|---|---|---|---|---|---|---|---|
| VOCs | 5.5 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | 0.02 |
| Hexane | 1.8 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| Formaldehyde | 0.075 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| Benzene | 0.0021 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| Toluene | 0.0034 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| Pb | 0.0005 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| CO | 84 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | 0.08 | 0.37 |
| NOx | 100 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | 0.10 | 0.44 |
| $PM_{10}$ | 7.6 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | 0.03 |
| $SO_2$ | 0.6 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| $CO_2$ | 53.06 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1.25 | 1,250 | 8,760 | 146.22 | 640.45 |
| $CH_4$ | 0.001 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1.25 | 1,250 | 8,760 | <0.01 | 0.01 |
| $N_2O$ | 0.0001 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1.25 | 1,250 | 8,760 | <0.01 | <0.01 |
| Total HAPs | | | | | | | <0.01 | <0.01 |
| Total $CO_2e$ | | | | | | | 146.37 | 641.11 |

**Notes:**

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

**Example Equations:**

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

# Flash Gas Compressor Engine - CBA-0050

| Pollutant | Emission Factor | Emission Factor Units | Emission Factor Basis / Source | Heat Value of Natural Gas (Btu/scf) | Rated bhp | BSFC (Btu/hp-hr) | Annual Operating Hours | Max. Hourly Emissions. (lb/hr) | Max. Annual Emissions. (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| VOCs | 0.32 | g/bhp-hr | Manufacturer Guarantee | 1,250 | 425 | 9,752 | 8,760 | 0.58 | 2.54 |
| Formaldehyde | 0.30 | g/bhp-hr | Manufacturer Guarantee | 1,250 | 425 | 9,752 | 8,760 | 0.28 | 1.23 |
| Benzene | 1.58E-03 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | <0.01 | 0.03 |
| Toluene | 5.58E-04 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | <0.01 | 0.01 |
| Ethylbenzene | 2.48E-05 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | <0.01 | <0.01 |
| Xylenes | 1.95E-04 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | <0.01 | <0.01 |
| CO | 1.75 | g/bhp-hr | Manufacturer Guarantee | 1,250 | 425 | 9,752 | 8,760 | 1.64 | 7.18 |
| NOx | 1.00 | g/bhp-hr | Manufacturer Guarantee | 1,250 | 425 | 9,752 | 8,760 | 0.94 | 4.10 |
| PMFil-10/2.5 | 9.50E-03 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | 0.04 | 0.17 |
| PMCondensable | 9.91E-03 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | 0.04 | 0.18 |
| $SO_2$ | 5.88E-04 | lb/MMBtu | AP-42 Chapter 3.2 | 1,250 | 425 | 9,752 | 8,760 | <0.01 | 0.01 |
| $CO_2$ | 53.06 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1,250 | 425 | 9,752 | 8,760 | 99.78 | 437.03 |
| $CH_4$ | 0.001 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1,250 | 425 | 9,752 | 8,760 | <0.01 | <0.01 |
| $N_2O$ | 1.00E-04 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 1,250 | 425 | 9,752 | 8,760 | <0.01 | <0.01 |
| Total HAPs | | | | | | | | 0.29 | 1.27 |
| Total $CO_2e$ | | | | | | | | 99.88 | 437.48 |

**Notes:**

-Engine emissions are controlled through the operation of a catalytic converter and meet Center for Responsible Shale Development emission standards.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

- AP-42, Chapter 3.2 references are from the August 2000 revision.

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-$CO_2$ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP $CO_2$=1, GWP $CH_4$=25, GWP $N_2O$=298

**Example Equations:**

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x BSFC **(Btu/hp-hr)** ÷ 1,000,000 x Engine Rating **(bhp)**

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(g/bhp-hr)** x Engine Rating **(hp)** x (1 lb/453.6 g)

# Glycol Reboiler
# BBC-0086

| Pollutant | Emission Factor | Emission Factor Units | Emission Factor Basis / Source | Heater Rating (MMBtu/hr) | Heat Value of Natural Gas (Btu/scf) | Annual Operating Hours | Max. Hourly Emissions. (lb/hr) | Max. Annual Emissions. (tpy) |
|---|---|---|---|---|---|---|---|---|
| VOCs | 5.5 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Hexane | 1.8 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Formaldehyde | 0.075 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Benzene | 0.0021 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Toluene | 0.0034 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Pb | 0.0005 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| CO | 84 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | 0.03 | 0.15 |
| NOx | 100 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | 0.04 | 0.18 |
| $PM_{10}$ | 7.6 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | 0.01 |
| $SO_2$ | 0.6 | lb/$10^6$ scf | AP-42 Chapter 1.4 | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| $CO_2$ | 53.06 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 0.5 | 1,250 | 8,760 | 58.49 | 256.18 |
| $CH_4$ | 0.001 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| $N_2O$ | 0.0001 | kg $CO_2$ / MMBtu | 40 CFR Subpart C | 0.5 | 1,250 | 8,760 | <0.01 | <0.01 |
| Total HAPs | | | | | | | <0.01 | <0.01 |
| Total $CO_2e$ | | | | | | | 58.55 | 256.44 |

**Notes:**

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

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

-AP-42, Chapter 1.4 references are from the July 1998 revision.

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-$CO_2$ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP $CO_2$=1, GWP $CH_4$=25, GWP $N_2O$=298

**Example Equations:**

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

# Dehydrator Emissions

Regenerator Overhead Vent

| Pollutant | Max. Hourly Controlled Emissions (lb/hr) | Max. Annual Controlled Emissions (tons/yr) |
|---|---|---|
| VOCs | 4.80 | 21.04 |
| HAPs | 0.89 | 3.88 |
| Benzene | 0.06 | 0.26 |
| Ethylbenzene | 0.11 | 0.49 |
| Toluene | 0.19 | 0.84 |
| Xylenes | 0.44 | 1.93 |
| n-Hexane | 0.08 | 0.36 |
| Methane | 10.68 | 46.79 |
| $CO_2e$ | 267.07 | 1169.77 |

Glycol Flash Tank MBD-0086

| Pollutant | Max. Hourly Controlled Emissions (lb/hr) | Max. Annual Controlled Emissions (tons/yr) |
|---|---|---|
| VOCs | 7.81 | 34.19 |
| HAPs | 0.11 | 0.50 |
| Benzene | <0.01 | 0.01 |
| Ethylbenzene | <0.01 | <0.01 |
| Toluene | <0.01 | 0.02 |
| Xylenes | <0.01 | 0.02 |
| n-Hexane | 0.10 | 0.44 |
| Methane | 20.23 | 88.59 |
| $CO_2e$ | 505.66 | 2214.77 |

**-** The gas from Glycol Flash Tank MBD-0086 included within Taylor Pad B will be routed to Vapor Destruction Units EAW-0060 and EAW-0061 through Blowdown Process Vessel ABJ-0014. The emission rates displayed above for the Flash Tank are pre-control emission rates. Post-control emissions are calculated in the Vapor Destruction Unit emission calculations included with this submittal.

**-** The emission rates displayed above for the uncontrolled Regenerator Overhead Vent are pre-control emission rates. For maximum potential to emit (PTE) purposes, the emission calculations included within this permit application assume that all emissions from the Regenerator Overhead Vent go to atmosphere in the case that the BTEX Elimination Condenser and Burner System is not operational.

**-** The gas composition utilized as the input to the dehydration unit contactor is displayed as the "Gas to Dehy and Sales" vapor line in the ProMax simulation. The FESCO analysis was utilized as the representative sample for the wellstream for input into ProMax. Based upon the known conditions of the first stage separators, the gas stream from the separator is a simulated representation of the expected gas conditions.

- Emission rates for the dehydrator were calculated using GRI-GLYCalc 4.0. The GRI-GLYCalc output sheets for Taylor Pad B are attached.
- $CO_2$ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1. GWP $CO_2$=1, GWP $CH_4$=25, GWP $N_2O$=298

# BTEX Condenser Pneumatic Pumps (PBA-0088A and PBA-0088B)

| Pollutant | Annual Pneumatic Pump Gas Exhaust (scf/yr) | Annual Pneumatic Pump Gas Exhaust (lb/yr) | Weight Fraction of Pneumatic Pump Exhaust Gas (%) | Max. Uncontrolled Hourly Emissions (lb/hr) | Max. Uncontrolled Annual Emissions (tons/yr) |
|---|---|---|---|---|---|
| VOCs | 15,851.22 | 1,104.26 | 39.51 | 1.20 | 0.22 |
| Total HAPs | | | 2.17 | 0.07 | 0.01 |
| Hexane | | | 1.96 | 0.06 | 0.01 |
| Benzene | | | 0.02 | <0.01 | <0.01 |
| Toluene | | | 0.07 | <0.01 | <0.01 |
| Ethylbenzene | | | 0.03 | <0.01 | <0.01 |
| Xylenes | | | 0.08 | <0.01 | <0.01 |
| $CO_2$ | | | 2.38 | 0.07 | 0.01 |
| $CH_4$ | | | 35.70 | 1.08 | 0.20 |
| Total $CO_2e$ | -- | -- | -- | 27.07 | 4.94 |

**Notes:**

- Emission rates displayed above represent the max. hourly and max. annual emissions for one BTEX Condenser Pneumatic Pump.

- The BTEX Condenser Pneumatic Pumps (PBA-0088A and PBA-0088B) are used in parallel at the Taylor B site to pump produced water from the dehydrator condenser (HAL-0088) to Blowdown Process Vessel (ABJ-0014). The rate of produced water from the dehydrator condenser (HAL-0088) as calculated by GRI-GLYCalc is 1.88 bbl/day. Per Chevron operations, the pump rate for BTEX Condenser Pneumatic Pumps PBA-0088A and PBA-0088B will be 10 gal/min and the gas exhaust flow rate from the pumps will be 11 scf/min.

- For a conservative estimate of the weight fractions and mass density of the pneumatic pump exhaust gas, data from the Tank Vent Gas stream from the Produced Water ProMax simulation was utilized.

- Maximum uncontrolled hourly emission (lb/hr) rates are assuming one pneumatic pump event per day. Using the pump rate of 10 gal/min and the volume of the BTEX accumulator, it was determined that a single pump event will take 4.7 minutes. Therefore, the assumption that maximum uncontrolled hourly emission rates are based off a single pneumatic pump event is valid.

- The emission rates displayed above are are pre-control emission rates. Post-control emissions are calculated in the Vapor Destruction Units EAW-0060 and EAW-0061 emission calculations included with this submittal.

- CO2 equivalency solved for using Global Warming Potentials found in 40CFR98 Subpart W Table A-1 (Updated January 2014). GWP CO2=1, GWP CH4=25, GWP N2O=298

**Example Calculations:**

Annual Gas Exhaust **(scf/yr)** = Produced Water Throughput from Condenser **(gal/yr)** ÷ Pump Rate **(gal/min)** x Gas Exhaust Flow Rate **(scf/min)**

Mass of Annual Gas Exhaust **(lb/yr)** = Annual Gas Exhaust **(scf/yr)** x Density of Exhaust Gas **(lb/scf)**

# Knockout Drum Pneumatic Pump (PBA-0061)

| Pollutant | Annual Pneumatic Pump Gas Exhaust (scf/yr) | Annual Pneumatic Pump Gas Exhaust (lb/yr) | Weight Fraction of Pneumatic Pump Exhaust Gas (%) | Max. Uncontrolled Hourly Emissions (lb/hr) | Max. Uncontrolled Annual Emissions (tons/yr) |
|---|---|---|---|---|---|
| VOCs | 66,757.41 | 4,650.60 | 39.51 | 5.03 | 0.92 |
| Total HAPs | | | 2.17 | 0.28 | 0.05 |
| Hexane | | | 1.96 | 0.25 | 0.05 |
| Benzene | | | 0.02 | <0.01 | <0.01 |
| Toluene | | | 0.07 | <0.01 | <0.01 |
| Ethylbenzene | | | 0.03 | <0.01 | <0.01 |
| Xylenes | | | 0.08 | 0.01 | <0.01 |
| $CO_2$ | | | 2.38 | 0.30 | 0.06 |
| $CH_4$ | | | 35.70 | 4.55 | 0.83 |
| Total $CO_2e$ | -- | -- | -- | 114.02 | 20.81 |

**Notes:**

- Emission rates displayed above represent the max. hourly and max. annual emissions for one Knockout Drum Pneumatic Pump.

- The Knockout Drum Pneumatic Pump (PBA-0061) is used at the Taylor B site to pump fluids from the knockout drum to Blowdown Process Vessel (ABJ-0014). The knockout drum is used to condense tank vapors before they enter Vapor Destruction Units EAW-0060 and EAW-0061. As a conservative estimate, the knockout drum is assumed to be emptied once per day. The knockout drum has a volume of 166.27 gallons. Per Chevron operations, the pump rate for Pneumatic Pump PBA-0061 will be 10 gal/min and the gas exhaust flow rate from the pumps will be 11 scf/min.

- For a conservative estimate of the weight fractions and mass density of the pneumatic pump exhaust gas, data from the Tank Vent Gas stream from the Produced Water ProMax simulation was utilized.

- Maximum uncontrolled hourly emission (lb/hr) rates are assuming one pneumatic pump event per day. Using the pump rate of 10 gal/min and the volume of the knockout drum, it was determined that a single pump event will take 16.6 minutes. Therefore, the assumption that maximum uncontrolled hourly emission rates are based off a single pneumatic pump event is valid.

- The emission rates displayed above are are pre-control emission rates. Post-control emissions are calculated in the Vapor Destruction Units EAW-0060 and EAW-0061 emission calculations included with this submittal.

- CO2 equivalency solved for using Global Warming Potentials found in 40CFR98 Subpart W Table A-1 (Updated January 2014). GWP CO2=1, GWP CH4=25, GWP N2O=298

**Example Calculations:**

Annual Gas Exhaust **(scf/yr)** = Produced Water Throughput from Condenser **(gal/yr)** ÷ Pump Rate **(gal/min)** x Gas Exhaust Flow Rate **(scf/min)**

Mass of Annual Gas Exhaust **(lb/yr)** = Annual Gas Exhaust **(scf/yr)** x Density of Exhaust Gas **(lb/scf)**

# Uncontrolled Working and Breathing Emissions

**Total Emissions from Uncontrolled Working and Breathing Losses**

| Tanks | Pollutant | Max. Hourly Emissions (lb/hr) | Max. Yearly Emissions (tons/yr) |
|---|---|---|---|
| Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C | VOCs | <0.01 | <0.01 |
| | HAPs | <0.01 | <0.01 |
| | n-Hexane | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 |
| | Toluene | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 |
| | Xylenes | <0.01 | <0.01 |
| | $CO_2$ | <0.01 | <0.01 |
| | $CH_4$ | <0.01 | <0.01 |
| | $CO_2e$ | 0.14 | 0.01 |

**Notes:**

- Working and Breathing emissions will be uncontrolled from the Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C for a maximum of 200 hours per year.
- Emission rates for Working and Breathing tank losses were calculated using ProMax software. ProMax summary sheets are attached.

# Produced Water Emissions

| Pollutant | Max. Uncontrolled Hourly Emissions using ProMax (lb/hr) | Max. Uncontrolled Annual Emissions using ProMax (tons/yr) |
|---|---|---|
| VOCs | 50.54 | 221.36 |
| Total HAPs | 2.77 | 12.14 |
| Hexane | 2.51 | 11.00 |
| Benzene | 0.03 | 0.13 |
| Toluene | 0.08 | 0.36 |
| Ethylbenzene | 0.04 | 0.18 |
| Xylenes | 0.11 | 0.47 |
| $CO_2$ | 3.05 | 13.37 |
| $CH_4$ | 45.66 | 200.01 |
| Total $CO_2e$ | 1,144.66 | 5,013.62 |

**Notes:**

- Produced Water emission rates for Blowdown Process Vessel ABJ-0014 were calculated using ProMax software. ProMax output sheets for Taylor Pad B are attached.

- Blowdown Process Vessel ABJ-0014 operates with 2 methods of loading. The tank will act as as a separation unit process vessel during normal operations and will receive produced water from the separators. Therefore, the produced water flashing emissions will occur at Blowdown Process Vessel ABJ-0014. The produced water will then be sent to Produced Water Tank ABJ-0011A, Produced Water Tank ABJ-0011B, and Produced Water Tank ABJ-0011C in series as needed. Therefore, working and breathing emissions will occur at Blowdown Process Vessel ABJ-0014, Produced Water Tank ABJ-0011A, Produced Water Tank ABJ-0011B, and Produced Water Tank ABJ-0011C. The process vessel will also receive fluids from maintenance blowdown actitivies, as represented in the Test Tank calculations.

- Emissions were calculated using Engineering Estimates to establish input to the ProMax software. Chevron has applied an industry standard assumption that 1% of the produced water realized in the tank will be condensate, based upon imperfect fluid separation.

- The emission rates displayed above are are pre-control emission rates. Post-control emissions are calculated in the Vapor Destruction Units EAW-0060 and EAW-0061 emission calculations included with this submittal.

- $CO_2$ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP $CO_2$=1, GWP $CH_4$=25, GWP $N_2O$=298

- $CO_2$ and $CH_4$ emissions solved for using emissions rates (lb/hr) of "Flash Gas" from the ProMax output sheets.

## Blowdown Events (ABJ-0014)

| Pollutant | Max. Uncontrolled Hourly Emissions using ProMax (lb/hr) | Max. Uncontrolled Annual Emissions using ProMax (tons/yr) |
|---|---|---|
| VOCs | 8053.80 | 36.24 |
| Total HAPs | 370.43 | 1.67 |
| Hexane | 315.35 | 1.42 |
| Benzene | 4.27 | 0.02 |
| Toluene | 16.37 | 0.07 |
| Ethylbenzene | 9.26 | 0.04 |
| Xylenes | 25.18 | 0.11 |
| $CO_2$ | 68.10 | 0.31 |
| $CH_4$ | 11149.11 | 50.17 |
| Total $CO_2e$ | 278,795.78 | 1,254.58 |

**Notes:**

- Emissions from short term maintenance blowdowns are not included in the Site PTE for Max. Hourly Emissions (lb/hr), as displayed in the calculation summary table of this application, since they are irregular and are associated with site maintenance activities.
- Emission rates for blowdown activities routed to Blowdown Process Vessel ABJ-0014 were calculated using ProMax software. ProMax output sheets for Taylor Pad B are attached.
- Maximum Uncontrolled Hourly Emissions are based on one 15 minute blowdown event. The wells are blown down 9 times per year.

- The emission rates displayed above are are pre-control emission rates. Emissions from blowdown events are routed to Vapor Destruction Units EAW-0061 and EAL-0061. Post-control emissions are calculated in the Vapor Destruction Units EAW-0061 and EAL-0061 emission calculations included with this submittal.

- $CO_2$ equivalency solved for using Global Warming Potentials found in 40CFR98 Subpart W Table A-1 (Updated January 2014). GWP $CO_2$=1, GWP $CH_4$=25, GWP $N_2O$=298
- $CO_2$ and $CH_4$ emissions solved for using emissions rates (lb/hr) of flash gas from ProMax summary sheets.

**Equations**

VOCs **(lb/hr)** = Total emission rate output from ProMax **(lb/hr) x .25 (hrs)**

VOCs **(tons/yr)** = Max. Hourly Emissions **(lb/hr)** x 3 blowdowns per year ÷ 2000 (**lbs/ton**)

# Tank Unloading Operations ZZZ-0011 (E0011)

**Total Emissions from Tank Unloading Operations**

| Pollutant | Max. Hourly Emissions (lb/hr) | Max. Yearly Emissions (tons/yr) |
|---|---|---|
| VOCs | <0.01 | 0.02 |
| HAPs | <0.01 | <0.01 |
| Hexane | <0.01 | <0.01 |
| Benzene | <0.01 | <0.01 |
| Toluene | <0.01 | <0.01 |
| Ethylbenzene | <0.01 | <0.01 |
| Xylene | <0.01 | <0.01 |
| $CO_2$ | 0.04 | 0.17 |
| $CH_4$ | 0.03 | 0.11 |
| Total $CO_2e$ | 0.81 | 2.98 |

**Notes:**

- Tank Unloading Operations from Produced Water Tanks ABJ-0011A, ABJ-0011B, and ABJ-0011C will be uncontrolled at the Taylor Pad B site.
- Emission rates for liquid unloading operations were calculated using ProMax software. ProMax summary sheets are attached.

# Tank Unloading Operations ZZZ-0014

**Total Emissions from Tank Unloading Operations**

| Pollutant | Max. Hourly ProMax Emissions (lb/hr) | Max. Yearly ProMaxEmissions (tons/yr) | Loading Event Capture Efficiency (%) | Max. Hourly Emissions Collected by Loading Rack (lb/hr) | Max. Hourly Emissions Collected by Loading Rack (tons/yr) | Max. Hourly Emissions Not Collected by Loading Rack (lb/hr) | Max. Hourly Emissions Not Collected by Loading Rack (tons/yr) |
|---|---|---|---|---|---|---|---|
| VOCs | 0.99 | 4.34 | 70% | 0.69 | 3.04 | 0.30 | 1.30 |
| HAPs | 0.040 | 0.18 | 70% | 0.03 | 0.12 | 0.01 | 0.05 |
| Hexane | 0.036 | 0.16 | 70% | 0.03 | 0.11 | 0.01 | 0.05 |
| Benzene | <0.01 | <0.01 | 70% | <0.01 | <0.01 | <0.01 | <0.01 |
| Toluene | <0.01 | <0.01 | 70% | <0.01 | <0.01 | <0.01 | <0.01 |
| Ethylbenzene | <0.01 | <0.01 | 70% | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene | <0.01 | <0.01 | 70% | <0.01 | <0.01 | <0.01 | <0.01 |
| $CO_2$ | 0.011 | 0.05 | 70% | <0.01 | 0.03 | <0.01 | 0.01 |
| $CH_4$ | 0.36 | 1.59 | 70% | 0.25 | 1.11 | 0.11 | 0.48 |
| Total $CO_2e$ | 9.11 | 39.76 | 70% | 6.38 | 27.83 | 2.73 | 11.93 |

**Notes:**

- The ProMax emission rates displayed above are are pre-control emission rates. It is assumed that 70% of loading emissions are captured during loadout events. Emissions captured from Blowdown Vessel liquid unloading events are routed to Vapor Destruction Units EAW-0061 and EAL-0061. Uncontolled loading emissions from Blowdown Vessel liquid unloading are shown above. Post-control emissions for emissions captured during Blowdown Vessel ABJ-0014 liquid unloading events are calculated in the Vapor Destruction Units EAW-0061 and EAL-0061 emission calculations included with this submittal.

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

# Vapor Destruction Units (EAW-0060 and EAW-0061)

**Emissions from Tanks**

| Input to Vapor Destruction Units | Pollutant | Amount of Gas Sent to Vapor Destruction Units (lbs/hr) | Amount of Gas Sent to Vapor Destruction Units (tons/year) | Vapor Destruction Unit Combustion Efficiency | Max. Hourly Emissions (lb/hr) | Max. Yearly Emissions (tons/yr) |
|---|---|---|---|---|---|---|
| Produced Water Emissions Blowdown Test Tank (ABJ-0014) and Produced Water Tanks (ABJ-0011A, ABJ-0011B, and ABJ-0011C) | VOCs | 25.27 | 110.68 | 98% | 0.51 | 2.21 |
| | HAPs | 1.39 | 6.07 | 98% | 0.03 | 0.12 |
| | Hexane | 1.26 | 5.50 | 98% | 0.03 | 0.11 |
| | Benzene | 0.02 | 0.07 | 98% | <0.01 | <0.01 |
| | Toluene | 0.04 | 0.18 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | 0.02 | 0.09 | 98% | <0.01 | <0.01 |
| | Xylene | 0.05 | 0.23 | 98% | <0.01 | <0.01 |
| | $CO_2$ | 1.53 | 6.68 | 98% | 320.00 | 1401.62 |
| | $CH_4$ | 22.83 | 100.01 | 98% | 0.46 | 2.00 |
| Glycol Dehydration Unit Flash Tank (MBD-0086) | VOCs | 3.90 | 17.09 | 98% | 0.08 | 0.34 |
| | HAPs | 0.06 | 0.25 | 98% | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Toluene | <0.01 | 0.01 | 98% | <0.01 | <0.01 |
| | Xylenes | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Hexane | 0.05 | 0.22 | 98% | <0.01 | <0.01 |
| | $CH_4$ | 10.11 | 44.30 | 98% | 0.20 | 0.89 |
| Blowdown Process Vessel (ABJ-0014) Blowdown Events | VOCs | -- | 18.12 | 98% | -- | 0.36 |
| | Total HAPs | -- | 0.83 | 98% | -- | 0.02 |
| | Hexane | -- | 0.71 | 98% | -- | 0.01 |
| | Benzene | -- | <0.01 | 98% | -- | <0.01 |
| | Toluene | -- | 0.04 | 98% | -- | <0.01 |
| | Ethylbenzene | -- | 0.02 | 98% | -- | <0.01 |
| | Xylenes | -- | 0.06 | 98% | -- | <0.01 |
| | CO2 | -- | 0.15 | 98% | -- | 122.26 |
| | CH4 | -- | 25.09 | 98% | -- | 0.50 |
| Blowdown Process Vessel Liquid Unloading Events (ZZZ-0014) | VOCs | 0.35 | 1.52 | 98% | <0.01 | 0.03 |
| | HAPs | 0.01 | 0.06 | 98% | <0.01 | <0.01 |
| | Hexane | 0.01 | 0.05 | 98% | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Toluene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Xylene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | CO2 | <0.01 | 0.02 | 98% | <0.01 | <0.01 |
| | CH4 | 0.13 | 0.56 | 98% | <0.01 | 0.01 |

**Gas Composition of Vent Gas**

| Gas Stream | Mole Fraction of Produced Water Flash Gas | Mole Fraction of Blowdown Tank Flash Gas |
|---|---|---|
| Methane | 0.60 | 0.44 |
| Ethane | 0.18 | 0.21 |
| Propane | 0.08 | 0.13 |
| Butane | 0.05 | 0.08 |
| Pentanes | 0.02 | 0.04 |
| Carbon Dioxide | 0.014 | 0.003 |

**Vent Gas Properties**

| Vent Gas Properties | Mass Flow Rate (lb/hr) | Density ($lb/ft^3$) |
|---|---|---|
| Produced Water Tanks | 127.90 | 0.07 |
| Blowdown Tank | 100499.00 | 0.06 |

| | | | | | | |
|---|---|---|---|---|---|---|
| BTEX Condenser Pneumatic Pump (PBA-0088A) | VOCs | 0.60 | 0.11 | 98% | 0.01 | <0.01 |
| | HAPs | 0.03 | <0.01 | 98% | <0.01 | <0.01 |
| | Hexane | 0.03 | <0.01 | 98% | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Toluene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Xylene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | CO2 | 0.04 | <0.01 | 98% | <0.01 | <0.01 |
| | CH4 | 0.54 | 0.10 | 98% | 0.01 | <0.01 |
| BTEX Condenser Pneumatic Pump (PBA-0088B) | VOCs | 0.60 | 0.11 | 98% | 0.01 | <0.01 |
| | HAPs | 0.03 | <0.01 | 98% | <0.01 | <0.01 |
| | Hexane | 0.03 | <0.01 | 98% | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Toluene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Xylene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | CO2 | 0.04 | <0.01 | 98% | <0.01 | <0.01 |
| | CH4 | 0.54 | 0.10 | 98% | 0.01 | <0.01 |
| Knockout Drum Pneumatic Pump (PBA-0061) | VOCs | 2.52 | 0.46 | 98% | 0.05 | <0.01 |
| | HAPs | 0.14 | 0.03 | 98% | <0.01 | <0.01 |
| | Hexane | 0.13 | 0.02 | 98% | <0.01 | <0.01 |
| | Benzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Toluene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Ethylbenzene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | Xylene | <0.01 | <0.01 | 98% | <0.01 | <0.01 |
| | CO2 | 0.15 | 0.03 | 98% | <0.01 | <0.01 |
| | CH4 | 2.27 | 0.42 | 98% | 0.05 | <0.01 |
| **Totals** | VOCs | 33.23 | 148.09 | -- | 0.66 | 2.96 |
| | HAPs | 1.66 | 7.25 | -- | 0.03 | 0.15 |
| | Hexane | 1.50 | 6.52 | -- | 0.03 | 0.13 |
| | Benzene | 0.02 | 0.08 | -- | <0.01 | <0.01 |
| | Toluene | 0.05 | 0.23 | -- | <0.01 | <0.01 |
| | Ethylbenzene | 0.02 | 0.11 | -- | <0.01 | <0.01 |
| | Xylene | 0.06 | 0.30 | -- | <0.01 | <0.01 |
| | $CO_2$ | 1.75 | 6.89 | -- | 320.01 | 1523.87 |
| | $CH_4$ | 36.43 | 170.55 | -- | 0.73 | 3.41 |
| | CO2e | 912.42 | 4,270.75 | -- | 338.22 | 1609.15 |

**Emissions from Pilot Operations**

| Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factors (kg X/MMBtu) | Heat Value of Natural Gas (Btu/scf) | VDU Pilot Rating (Btu/hr) | VDU Burner Rating (Btu/hr) | Pilot Max. Hourly Emissions (lb/hr) | Pilot Max. Annual Emissions (tons/yr) | Burner Max. Hourly Emissions (lb/hr) | Burner Max. Annual Emissions (tons/yr) | Max. Hourly Emissions (lb/hr) | Max. Annual Emissions (tons/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs | 5.5 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | -- | -- | <0.01 | <0.01 |
| Hexane | 1.8 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | -- | -- | <0.01 | <0.01 |
| Formaldehyde | 0.075 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| CO | 84 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | 1.05 | 4.60 | 1.05 | 4.61 |
| $NO_x$ | 100 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | 0.01 | 1.25 | 5.48 | 1.25 | 5.49 |
| $PM_{Condensable}$ | 5.70 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | 0.07 | 0.31 | 0.07 | 0.31 |
| $PM_{Filterable}$ | 1.90 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | 0.02 | 0.10 | 0.02 | 0.10 |
| $PM_{Total}$ | 7.6 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | 0.10 | 0.42 | 0.10 | 0.42 |
| $SO_2$ | 0.6 | -- | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | <0.01 | 0.03 | <0.01 | 0.03 |
| $CO_2$ | -- | 52 | 1,250 | 30,000 | 15,630,000 | 3.44 | 15.08 | 1644.05 | 7200.92 | 1647.49 | 7216.00 |
| $CH_4$ | -- | 0.0 | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | 0.03 | 0.14 | 0.03 | 0.14 |
| $N_2O$ | -- | <0.001 | 1,250 | 30,000 | 15,630,000 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Total HAPs | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| $CO_2e$ | | | | | | 3.45 | 15.10 | 1645.78 | 7208.50 | 1649.22 | 7223.60 |

**Total Enclosed Combustion Device Emissions**

| Pollutant | Max. Hourly Emissions (lb/hr) | Max. Yearly Emissions (tons/yr) |
|---|---|---|
| VOCs | 0.66 | 2.96 |
| HAPs | 0.03 | 0.15 |
| Hexane | 0.03 | 0.13 |
| Formaldehyde | <0.01 | <0.01 |
| CO | 1.05 | 4.61 |
| NOx | 1.25 | 5.49 |
| $PM_{Condensable}$ | 0.07 | 0.31 |
| $PM_{Filterable}$ | 0.02 | 0.10 |
| $PM_{Total}$ | 0.10 | 0.42 |
| $SO_2$ | <0.01 | 0.03 |
| $CO_2$ | 1967.50 | 8739.87 |
| $CH_4$ | 0.76 | 3.55 |
| $N_2O$ | <0.01 | 0.01 |
| $CO_2e$ | 1,987.44 | 8,832.75 |

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

**Example Calculations:**
Emissions from Tanks VOCs (lb/hr) = Amount of Gas sent to VDU (lb/hr) x 0.02 = Max. Hourly Emissions (lb/hr)
Emissions from VDU Operations (lb/hr) = Emission factor (lb/106 Btu) x Heat Value of Natural Gas (Btu/scf) ÷ 1,000,000 x VDU Pilot Gas Usage (mcfd) x 1,000 ÷ 24
Emissions from VDU Vapor Destruction CO2 Methodologies shown below sample equation

Emissions from VDU Operations CO2 (tons/yr) = ((VDU Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by VDU x Mole Fraction of Methane x Number of Carbon Atoms in Methane) + … + (VDU Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by VDU x Mole Fraction of Pentanes-plus x Number of Carbon Atoms in Pentanes-plus)) x .0526 (kg/ft3) CO2 x .001 x 1.102 tons/tonnes

$$E_{a,CH_4}(un-combusted) = V_a * (1-\eta) * X_{CH_4} \quad \text{(Eq. W-19)}$$

$$E_{a,CO_2}(un-combusted) = V_a * X_{CO_2} \quad \text{(Eq. W-20)}$$

$$E_{a,CO_2}(combusted) = \sum_{j=1}^{5} (\eta * V_a * Y_j * R_j) \quad \text{(Eq. W-21)}$$

Where:
Ea,CH4(un-combusted) = Contribution of annual un-combusted CH4 emissions from VDU stack in cubic feet, under actual conditions.
Ea,CO2(un-combusted) = Contribution of annual un-combusted CO2 emissions from VDU stack in cubic feet, under actual conditions.
Ea,CO2(combusted) = Contribution of annual combusted CO2 emissions from VDU stack in cubic feet, under actual conditions.
Va = Volume of gas sent to VDU in cubic feet, during the year.
η = Fraction of gas combusted by a burning VDU (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.
XCH4 = Mole fraction of CH4 in gas to the VDU.
XCO2 = Mole fraction of CO2 in gas to the VDU.
$Y_j$ = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).
$R_j$ = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

# BTEX Elimination Burner (EAW-0088B)

**Emissions from Flaring Operations**

| Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factors (kg X/MMBtu) | Heat Value of Natural Gas (Btu/scf) | VDU Pilot Rating (Btu/hr) | VDU Burner Rating (Btu/hr) | Pilot Max. Hourly Emissions (lb/hr) | Pilot Max. Annual Emissions (tons/yr) | Burner Max. Hourly Emissions (lb/hr) | Burner Max. Annual Emissions (tons/yr) | Max. Hourly Emissions (lb/hr) | Max. Annual Emissions (tons/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOCs | 5.5 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | -- | -- | <0.01 | <0.01 |
| Hexane | 1.8 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | -- | -- | <0.01 | <0.01 |
| Formaldehyde | 0.075 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| CO | 84 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | 0.07 | 0.29 | 0.07 | 0.30 |
| $NO_x$ | 100 | -- | 1,250 | 30,000 | 980,000 | <0.01 | 0.01 | 0.08 | 0.34 | 0.08 | 0.35 |
| $PM_{Condensable}$ | 5.70 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | 0.02 |
| $PM_{Filterable}$ | 1.90 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| $PM_{Total}$ | 7.6 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | 0.03 | <0.01 | 0.03 |
| $SO_2$ | 0.6 | -- | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| $CO_2$ | -- | 52 | 1,250 | 30,000 | 980,000 | 3.44 | 15.08 | 103.08 | 451.50 | 106.52 | 466.58 |
| $CH_4$ | -- | 0.0 | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| $N_2O$ | -- | <0.001 | 1,250 | 30,000 | 980,000 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total HAPs | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| $CO_2e$ | | | | | | 3.45 | 15.10 | 103.19 | 451.97 | 106.64 | 467.07 |

**Total Enclosed Combustion Device Emissions**

| Pollutant | Max. Hourly Emissions (lb/hr) | Max. Yearly Emissions (tons/yr) |
|---|---|---|
| VOCs | <0.01 | <0.01 |
| HAPs | <0.01 | <0.01 |
| Hexane | <0.01 | <0.01 |
| Formaldehyde | <0.01 | <0.01 |
| CO | 0.07 | 0.30 |
| NOx | 0.08 | 0.35 |
| $PM_{Condensable}$ | <0.01 | 0.02 |
| $PM_{Filterable}$ | <0.01 | <0.01 |
| $PM_{Total}$ | <0.01 | 0.03 |
| $SO_2$ | <0.01 | <0.01 |
| $CO_2$ | 106.52 | 466.58 |
| $CH_4$ | <0.01 | <0.01 |
| $N_2O$ | <0.01 | <0.01 |
| $CO_2e$ | 106.64 | 467.07 |

**Notes:**

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

**Example Calculations:**

Emissions from Tanks VOCs (lb/hr) = Amount of Gas sent to VDU (lb/hr) x 0.02 = Max. Hourly Emissions (lb/hr)
Emissions from VDU Operations (lb/hr) = Emission factor (lb/106 Btu) x Heat Value of Natural Gas (Btu/scf) ÷ 1,000,000 x VDU Pilot Gas Usage (mcfd) x 1,000 ÷ 24
Emissions from VDU Vapor Destruction CO2 Methodologies shown below sample equation

Emissions from VDU Operations CO2 (tons/yr) = ((VDU Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by VDU x Mole Fraction of Methane x Number of Carbon Atoms in Methane) + … + (VDU Pilot Gas Usage (mcfd) x 1,000 x 365 x Fraction of Gas Combusted by VDU x Mole Fraction of Pentanes-plus x Number of Carbon Atoms in Pentanes-plus)) x .0526 (kg/ft3) CO2 x .001 x 1.102 tons/tonnes

$$E_{a,CH4}(un-combusted) = V_a * (1-\eta) * X_{CH4} \qquad \text{(Eq. W-19)}$$

$$E_{a,CO2}(un-combusted) = V_a * X_{CO2} \qquad \text{(Eq. W-20)}$$

$$E_{a,CO2}(combusted) = \sum_{j=1}^{5} (\eta * V_a * Y_j * R_j) \qquad \text{(Eq. W-21)}$$

Where:

Ea,CH4(un-combusted) = Contribution of annual un-combusted CH4 emissions from VDU stack in cubic feet, under actual conditions.
Ea,CO2(un-combusted) = Contribution of annual un-combusted CO2 emissions from VDU stack in cubic feet, under actual conditions.
Ea,CO2(combusted) = Contribution of annual combusted CO2 emissions from VDU stack in cubic feet, under actual conditions.
Va = Volume of gas sent to VDU in cubic feet, during the year.
η = Fraction of gas combusted by a burning VDU (default is 0.98). For gas sent to an unlit Enclosed Combustion Device, η is zero.
XCH4 = Mole fraction of CH4 in gas to the VDU.
XCO2 = Mole fraction of CO2 in gas to the VDU.
$Y_j$ = Mole fraction of gas hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus).
$R_j$ = Number of carbon atoms in the gas hydrocarbon constituent j: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes plus).

# Fugitive Emissions from Unpaved Haul Roads

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

where

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

| Item Number | Description | Number of Wheels | W: Mean Vehicle Weight (tons) | Mean Vehicle Speed (mph) | Miles per Trip | Maximum Trips per Hour | Maximum Trips per Year | Control Device ID Number | Control Efficiency (%) | PM Emissions (lbs/hr) | PM Emissions (tons/yr) | PM-10 Emissions (lbs/hr) | PM-10 Emissions (tons/yr) | PM-2.5 Emissions (lbs/hr) | PM-2.5 Emissions (tons/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Liquids Hauling | 14 | 30 | 10 | 0.91 | 1 | 9,384 | NA | NA | 3.89 | 18.27 | 0.99 | 4.66 | 0.10 | 0.47 |
| 2 | Employee Vehicles | 4 | 3 | 10 | 0.91 | 1 | 200 | NA | NA | 1.38 | 0.14 | 0.35 | 0.04 | 0.04 | 0.004 |
| | | | | | | | | | **Totals:** | **5.28** | **18.41** | **1.34** | **4.69** | **0.13** | **0.47** |

**Notes:**

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

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

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

**Example Calculations:**

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

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

# Fugitive Leaks

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

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

| Well Specific Equipment Counts | |
|---|---|
| **Facility Equipment Type** | **Count on Site** |
| Wellheads | 9 |
| Separators | 10 |
| Meters/Piping | 10 |
| Compressors | 1 |
| In-line Heaters | 11 |
| Dehydrators | 1 |

| Well Gas Composition | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emissions from Flaring Operations** | **Propane** | **Butane** | **Pentanes** | **Heptane** | **Octane** | **Nonanes** | **Decanes** | **n-Hexane** | **Benzene** | **Toluene** | **Ethylbenzene** | **Xylene** | **$CO_2$** | **$CH_4$** |
| Mole % | 7.187 | 3.30 | 1.50 | 0.35 | 0.53 | 0.33 | 0.289 | 0.39 | 0.01 | 0.026 | 0.023 | 0.070 | 0.15 | 66.90 |
| MW | 44 | 58 | 72 | 100 | 114 | 128.000 | 142 | 86.00 | 78.00 | 92.00 | 106.00 | 106.00 | 44.00 | 16.00 |

| Fugitive Emissions | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Facility Equipment Type** | **Total Count** | **Emission Rate (scf/hr/component)[2]** | **Hours of Operation** | **VOCs (lbs/hr)** | **VOCs (tons/yr)** | **HAPs (lbs/hr)** | **HAPs (tons/yr)** | **$CO_2$ (lbs/hr)** | **$CO_2$ (tons/yr)** | **$CH_4$ (lbs/hr)** | **$CH_4$ (tons/yr)** | **Total $CO_2$e (lbs/hr)** | **Total $CO_2$e (tons/yr)** |
| Valves | 392 | 0.027 | 8760 | 0.23 | 1.01 | 0.01 | 0.06 | <0.01 | <0.01 | 0.29 | 1.29 | 7.35 | 32.19 |
| Connectors | 1714 | 0.003 | 8760 | 0.11 | 0.49 | <0.01 | 0.03 | <0.01 | <0.01 | 0.14 | 0.63 | 3.57 | 15.64 |
| Open-ended Lines | 29 | 0.06 | 8760 | 0.04 | 0.17 | <0.01 | <0.01 | <0.01 | <0.01 | 0.05 | 0.21 | 1.21 | 5.29 |
| Pressure Relief Valves | 13 | 0.04 | 8760 | 0.01 | 0.05 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.06 | 0.36 | 1.58 |
| | | | **Total Emissions:** | **0.39** | **1.72** | **0.02** | **0.10** | **<0.01** | **0.01** | **0.50** | **2.19** | **12.49** | **54.69** |

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

**Notes:**
-The "Wellstream" gas composition in the attached ProMax simulations is utilized to calculate emission from fugitive leaks for the most conservative estimate.

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

## Taylor Pad B Natural Gas Production Site Total Emissions

| | VOCs | | HAPs | | CO | | $NO_x$ | | PM - 10/2.5 | | $SO_2$ | | $CO_2$ | | $CH_4$ | | $N_2O$ | | $CO_2e$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Sources** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** |
| Line Heater (E0110) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0210) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0310) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0410) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0510) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0610) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0710) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0810) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0910) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Line Heater (E0012) | <0.01 | 0.02 | <0.01 | <0.01 | 0.08 | 0.37 | 0.10 | 0.44 | <0.01 | 0.03 | <0.01 | <0.01 | 146.22 | 640.45 | <0.01 | 0.01 | <0.01 | <0.01 | 146.37 | 641.11 |
| Glycol Reboiler (E0086) | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | 0.15 | 0.04 | 0.18 | <0.01 | 0.01 | <0.01 | <0.01 | 58.49 | 256.18 | <0.01 | <0.01 | <0.01 | <0.01 | 58.55 | 256.44 |
| Flash Gas Compressor (E0050) | 0.58 | 2.54 | 0.29 | 1.27 | 1.64 | 7.18 | 0.94 | 4.10 | 0.04 | 0.17 | <0.01 | 0.01 | 99.78 | 437.03 | <0.01 | 0.01 | <0.01 | <0.01 | 99.88 | 437.48 |
| Vapor Destruction Unit (E0060) | 0.66 | 2.96 | 0.03 | 0.15 | 1.05 | 4.61 | 1.25 | 5.49 | 0.02 | 0.10 | <0.01 | 0.03 | 1967.50 | 8739.87 | 0.76 | 3.55 | <0.01 | 0.01 | 1987.44 | 8832.75 |
| Vapor Destruction Unit (E0061) | 0.66 | 2.96 | 0.03 | 0.15 | 1.05 | 4.61 | 1.25 | 5.49 | 0.02 | 0.10 | <0.01 | 0.03 | 1967.50 | 8739.87 | 0.76 | 3.55 | <0.01 | 0.01 | 1987.44 | 8832.75 |
| Dehydrator Regenerator Overhead Vent (E0088A) | 4.80 | 21.04 | 0.89 | 3.88 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10.68 | 46.79 | -- | -- | 267.07 | 1169.77 |
| BTEX Elimination Burner (E0088B) | <0.01 | <0.01 | <0.01 | <0.01 | 0.07 | 0.30 | 0.08 | 0.35 | <0.01 | <0.01 | <0.01 | <0.01 | 106.52 | 466.58 | <0.01 | <0.01 | <0.01 | <0.01 | 106.64 | 467.07 |
| Produced Water Loading Activities (E0011) | <0.01 | 0.02 | <0.01 | <0.01 | -- | -- | -- | -- | -- | -- | -- | -- | 0.04 | 0.17 | 0.03 | 0.11 | -- | -- | 0.81 | 2.98 |
| Blowdown Fluid Loading Activities (E0014) | 0.30 | 1.30 | 0.01 | 0.05 | -- | -- | -- | -- | -- | -- | -- | -- | <0.01 | 0.01 | 0.11 | 0.48 | -- | -- | 2.73 | 11.93 |
| Uncontrolled Working & Breathing Losses | <0.01 | <0.01 | <0.01 | <0.01 | -- | -- | -- | -- | -- | -- | -- | -- | <0.01 | <0.01 | <0.01 | <0.01 | -- | -- | 0.14 | 0.01 |
| Haul Roads | -- | -- | -- | -- | -- | -- | -- | -- | 1.48 | 5.16 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fugitives Leaks | 0.39 | 1.72 | 0.02 | 0.10 | -- | -- | -- | -- | -- | -- | -- | -- | <0.01 | 0.01 | 0.50 | 2.19 | -- | -- | 12.49 | 54.69 |
| **Totals** | **7.47** | **32.81** | **1.30** | **5.69** | **4.69** | **20.52** | **4.56** | **19.99** | **1.65** | **5.89** | **0.02** | **0.11** | **5662.05** | **25044.24** | **12.87** | **56.81** | **0.01** | **0.04** | **5986.78** | **26476.97** |

## Taylor Pad B Natural Gas Production Site Emission Levels - HAP Speciation

| | Total HAPs | | Hexane | | Benzene | | Toluene | | Ethylbenzene | | Xylene | | Formaldehyde | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Emission Sources** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** | **lb/hr** | **tons/yr** |
| Line Heater (E0110) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0210) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0310) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0410) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0510) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0610) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0710) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0810) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0910) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Line Heater (E0012) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Glycol Reboiler (E0086) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Flash Gas Compressor (E0050) | 0.29 | 1.27 | <0.01 | <0.01 | <0.01 | 0.03 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.28 | 1.23 |
| Vapor Destruction Unit (E0060) | 0.03 | 0.15 | 0.03 | 0.13 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Vapor Destruction Unit (E0061) | 0.03 | 0.15 | 0.03 | 0.13 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Dehydrator Regenerator Overhead Vent (E0088A) | 1.30 | 5.69 | 0.08 | 0.36 | 0.06 | 0.26 | 0.19 | 0.84 | 0.11 | 0.49 | 0.44 | 1.93 | <0.01 | <0.01 |
| BTEX Elimination Burner (E0088B) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Produced Water Loading Activities (E0011) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Blowdown Fluid Loading Activities (E0014) | 0.01 | 0.05 | 0.01 | 0.05 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Uncontrolled Working & Breathing Losses | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Haul Roads | -- | -- | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fugitives Leaks | 0.02 | 0.10 | 0.02 | 0.07 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 |
| **Totals** | **1.69** | **5.69** | **0.19** | **0.82** | **0.07** | **0.30** | **0.20** | **0.87** | **0.11** | **0.50** | **0.45** | **1.97** | **0.28** | **1.24** |

**Retrograde Gas PVT Fluid Study**
**for**

# AB Resources, LLC

## Cavenney No. 1-H

**Wildcat**
**Marshall County, West Virginia**

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# TABLE 1-B

## COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH $C_{11+}$

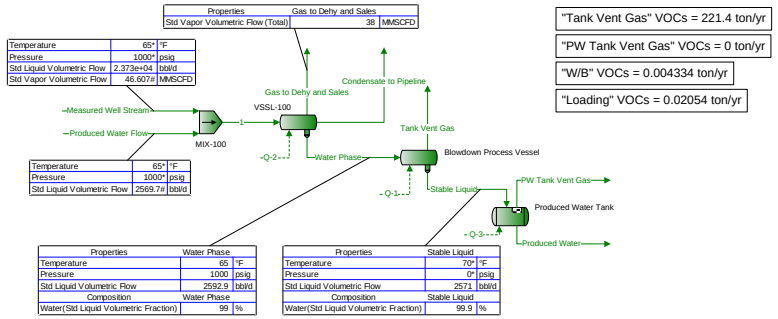
SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

| | SEPARATOR GAS | | SEPARATOR OIL | | WELLSTREAM | |
|---|---|---|---|---|---|---|
| Component | Mole% | * GPM | Mole % | Liquid Volume % | Mole % | * GPM |
| Hydrogen Sulfide | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Nitrogen | 0.452 | 0.000 | 0.021 | 0.006 | 0.420 | 0.000 |
| Carbon Dioxide | 0.160 | 0.000 | 0.017 | 0.007 | 0.149 | 0.000 |
| Methane | 71.877 | 0.000 | 5.379 | 2.282 | 66.896 | 0.000 |
| Ethane | 17.518 | 4.723 | 8.784 | 5.880 | 16.864 | 4.547 |
| Propane | 6.744 | 1.871 | 12.655 | 8.716 | 7.187 | 1.994 |
| Iso-butane | 0.688 | 0.227 | 3.269 | 2.676 | 0.881 | 0.291 |
| N-butane | 1.672 | 0.531 | 11.633 | 9.175 | 2.418 | 0.768 |
| 2-2 Dimethylpropane | 0.010 | 0.004 | 0.067 | 0.065 | 0.014 | 0.006 |
| Iso-pentane | 0.263 | 0.097 | 4.857 | 4.448 | 0.607 | 0.224 |
| N-pentane | 0.323 | 0.118 | 7.835 | 7.104 | 0.886 | 0.323 |
| 2-2 Dimethylbutane | 0.005 | 0.002 | 0.143 | 0.149 | 0.015 | 0.006 |
| Cyclopentane | 0.002 | 0.001 | 0.000 | 0.000 | 0.002 | 0.001 |
| 2-3 Dimethylbutane | 0.007 | 0.003 | 0.368 | 0.378 | 0.034 | 0.014 |
| 2 Methylpentane | 0.046 | 0.019 | 2.187 | 2.272 | 0.206 | 0.086 |
| 3 Methylpentane | 0.026 | 0.011 | 1.429 | 1.460 | 0.131 | 0.054 |
| Other Hexanes | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| n-Hexane | 0.065 | 0.027 | 4.457 | 4.587 | 0.394 | 0.163 |
| Methylcyclopentane | 0.006 | 0.002 | 0.404 | 0.358 | 0.036 | 0.013 |
| Benzene | 0.001 | 0.000 | 0.064 | 0.045 | 0.006 | 0.002 |
| Cyclohexane | 0.007 | 0.002 | 0.680 | 0.579 | 0.057 | 0.020 |
| 2-Methylhexane | 0.011 | 0.005 | 1.419 | 1.651 | 0.116 | 0.055 |
| 3-Methylhexane | 0.010 | 0.005 | 1.527 | 1.754 | 0.124 | 0.057 |
| 2,2,4 Trimethylpentane | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Other Heptanes | 0.009 | 0.004 | 1.202 | 1.309 | 0.098 | 0.043 |
| n-Heptane | 0.016 | 0.007 | 3.178 | 3.669 | 0.253 | 0.118 |
| Methylcyclohexane | 0.009 | 0.004 | 1.666 | 1.676 | 0.133 | 0.054 |
| Toluene | 0.002 | 0.001 | 0.318 | 0.267 | 0.026 | 0.009 |
| Other C-8's | 0.018 | 0.009 | 4.694 | 5.507 | 0.368 | 0.174 |
| n-Octane | 0.008 | 0.004 | 2.037 | 2.611 | 0.160 | 0.083 |
| Ethylbenzene | 0.001 | 0.000 | 0.291 | 0.281 | 0.023 | 0.009 |
| M&P-Xylene | 0.003 | 0.001 | 0.279 | 0.271 | 0.024 | 0.009 |
| O-Xylene | 0.001 | 0.000 | 0.602 | 0.573 | 0.046 | 0.018 |
| Other C-9's | 0.017 | 0.009 | 2.861 | 3.749 | 0.230 | 0.121 |
| n-Nonane | 0.006 | 0.003 | 1.268 | 1.786 | 0.101 | 0.057 |
| Other C10's | 0.012 | 0.007 | 2.882 | 4.150 | 0.227 | 0.132 |
| n-Decane | 0.002 | 0.001 | 0.797 | 1.224 | 0.062 | 0.038 |
| Undecanes Plus | 0.003 | 0.002 | 10.728 | 19.334 | 0.806 | 0.585 |
| TOTAL | 100.000 | 7.701 | 100.000 | 100.000 | 100.000 | 10.072 |

# Flowsheet1
# Plant Schematic

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

Taylor Pad B
Produced Water Tank



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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Connections

| | Condensate to Pipeline | Gas to Dehy and Sales | Loading | Measured Well Stream | Produced Water |
|---|---|---|---|---|---|
| From Block | VSSL-100 | VSSL-100 | -- | -- | Produced Water Tank |
| To Block | -- | -- | -- | MIX-100 | -- |

## Stream Composition

| Mole Fraction | Condensate to Pipeline % | Gas to Dehy and Sales % | Loading % | Measured Well Stream % | Produced Water % |
|---|---|---|---|---|---|
| Nitrogen | 0.0754448 | 0.497824 | 0.0051672 * | 0.42 * | 2.92247E-06 |
| Carbon Dioxide | 0.112012 | 0.155427 | 2.02934 * | 0.149 * | 0.000754365 |
| Methane | 27.0687 | 75.8676 | 3.66737 * | 66.896 * | 0.00153343 |
| Ethane | 20.3937 | 16.0584 | 1.38768 * | 16.864 * | 0.000778108 |
| Propane | 15.966 | 5.20087 | 0.138981 * | 7.187 * | 0.000358094 |
| Isobutane | 2.69094 | 0.471653 | 0.010329 * | 0.881 * | 7.48303E-05 |
| n-Butane | 8.25228 | 1.09842 | 0.0297338 * | 2.418 * | 0.000316648 |
| Neopentane | 0.0500332 | 0.00585081 | 0.000133516 * | 0.014 * | 2.03642E-06 |
| Isopentane | 2.47254 | 0.185071 | 0.00622408 * | 0.607 * | 0.000183485 |
| n-Pentane | 3.79024 | 0.229155 | 0.00846492 * | 0.886 * | 0.000340582 |
| 2-2-Dimethylbutane | 0.0686837 | 0.00285819 | 0.000145507 * | 0.015 * | 9.49654E-06 |
| 2-Methylpentane | 0.978291 | 0.0313262 | 0.00182999 * | 0.206 * | 0.000186507 |
| 3-Methylpentane | 0.628327 | 0.0185149 | 0.00117439 * | 0.131 * | 0.000133689 |
| n-Hexane | 1.92472 | 0.0477868 | 0.00336464 * | 0.394 * | 0.000487305 |
| Methylcyclopentane | 0.176647 | 0.004188 | 0.000289517 * | 0.036 * | 4.59976E-05 |
| Benzene | 0.0293912 | 0.000695482 | 0.000159951 * | 0.006 * | 3.79389E-05 |
| Cyclohexane | 0.284105 | 0.00563158 | 0.000433879 * | 0.057 * | 9.92271E-05 |
| 2-Methylhexane | 0.588566 | 0.00911491 | 0.000200498 * | 0.116 * | 0.000250727 |
| 3-Methylhexane | 0.632508 | 0.00898536 | 0.000768953 * | 0.124 * | 0.000286643 |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 |
| n-Heptane | 1.80603 | 0.0219006 | 0.00183907 * | 0.351 * | 0.000944223 |
| Methylcyclohexane | 0.687459 | 0.00759089 | 0.000725286 * | 0.133 * | 0.000363711 |
| Toluene | 0.134966 | 0.00134042 | 0.00013852 * | 0.026 * | 0.000116129 |
| n-Octane | 2.79284 | 0.0157317 | 0.00122811 * | 0.528 * | 0.00217492 |
| Ethylbenzene | 0.122154 | 0.000569753 | 4.25085E-05 * | 0.023 * | 0.000108305 |
| p-Xylene | 0.12752 | 0.000583208 | 3.87981E-05 * | 0.024 * | 0.000110469 |
| o-Xylene | 0.24511 | 0.000956723 | 5.84195E-05 * | 0.046 * | 0.000227267 |
| n-Nonane | 1.7758 | 0.00420861 | 0.000264742 * | 0.331 * | 0.00161498 |
| n-Decane | 1.55782 | 0.00201323 | 7.16148E-05 * | 0.289 * | 0.00149069 |
| Water | 0.0304126 | 0.0394494 | 92.7035 * | 0 * | 99.9827 |
| Cyclopentane | 0.00911033 | 0.000391595 | 2.3786E-05 * | 0.002 * | 1.57948E-06 |
| 2-3-Dimethylbutane | 0.160534 | 0.00538077 | 0.000323146 * | 0.034 * | 2.92936E-05 |
| Undecanes Plus | 4.36709 | 0.000537169 | 4.27137E-06 * | 0.806 * | 0.00427829 |

| Molar Flow | Condensate to Pipeline lbmol/h | Gas to Dehy and Sales lbmol/h | Loading lbmol/h | Measured Well Stream lbmol/h | Produced Water lbmol/h |
|---|---|---|---|---|---|
| Nitrogen | 0.710626 | 20.7709 | 2.25308E-06 * | 21.4928 * | 6.07716E-05 |
| Carbon Dioxide | 1.05506 | 6.48493 | 0.000884863 * | 7.62483 * | 0.0156867 |
| Methane | 254.965 | 3165.45 | 0.0015991 * | 3423.29 * | 0.0318871 |
| Ethane | 192.091 | 670.008 | 0.000605075 * | 862.987 * | 0.0161804 |
| Propane | 150.386 | 216.998 | 6.06004E-05 * | 367.783 * | 0.00744642 |
| Isobutane | 25.3464 | 19.6789 | 4.50382E-06 * | 45.0837 * | 0.00155606 |
| n-Butane | 77.7295 | 45.8299 | 1.29649E-05 * | 123.737 * | 0.00658456 |
| Neopentane | 0.471271 | 0.244115 | 5.82174E-08 * | 0.716427 * | 4.23464E-05 |
| Isopentane | 23.2893 | 7.72177 | 2.71391E-06 * | 31.0622 * | 0.00381549 |
| n-Pentane | 35.7009 | 9.56111 | 3.691E-06 * | 45.3396 * | 0.00708226 |
| 2-2-Dimethylbutane | 0.646943 | 0.119253 | 6.34459E-08 * | 0.7676 * | 0.000197477 |
| 2-Methylpentane | 9.21468 | 1.30703 | 7.97938E-07 * | 10.5417 * | 0.00387834 |
| 3-Methylpentane | 5.91832 | 0.772504 | 5.12076E-07 * | 6.70371 * | 0.00278 |
| n-Hexane | 18.1292 | 1.99383 | 1.4671E-06 * | 20.1623 * | 0.0101333 |

* User Specified Values
? Extrapolated or Approximate Values


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Molar Flow | Condensate to Pipeline lbmol/h | Gas to Dehy and Sales lbmol/h | Loading lbmol/h | Measured Well Stream lbmol/h | Produced Water lbmol/h |
|---|---|---|---|---|---|
| Methylcyclopentane | 1.66387 | 0.174737 | 1.26239E-07 * | 1.84224 * | 0.000956501 |
| Benzene | 0.276841 | 0.0290178 | 6.97443E-08 * | 0.30704 * | 0.000788923 |
| Cyclohexane | 2.67603 | 0.234968 | 1.89186E-07 * | 2.91688 * | 0.00206339 |
| 2-Methylhexane | 5.5438 | 0.380304 | 8.7424E-08 * | 5.93611 * | 0.00521375 |
| 3-Methylhexane | 5.95769 | 0.374899 | 3.3529E-07 * | 6.34549 * | 0.00596062 |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 |
| n-Heptane | 17.0113 | 0.913766 | 8.01897E-07 * | 17.9618 * | 0.0196347 |
| Methylcyclohexane | 6.47528 | 0.316717 | 3.1625E-07 * | 6.80605 * | 0.00756322 |
| Toluene | 1.27126 | 0.0559267 | 6.03996E-08 * | 1.33051 * | 0.00241485 |
| n-Octane | 26.3062 | 0.656379 | 5.35497E-07 * | 27.0195 * | 0.0452265 |
| Ethylbenzene | 1.15058 | 0.023772 | 1.85352E-08 * | 1.17699 * | 0.00225216 |
| p-Xylene | 1.20113 | 0.0243334 | 1.69173E-08 * | 1.22816 * | 0.00229716 |
| o-Xylene | 2.30873 | 0.0399177 | 2.54729E-08 * | 2.35397 * | 0.00472592 |
| n-Nonane | 16.7266 | 0.175597 | 1.15437E-07 * | 16.9384 * | 0.0335828 |
| n-Decane | 14.6733 | 0.0839986 | 3.12265E-08 * | 14.7891 * | 0.0309983 |
| Water | 0.286461 | 1.64596 | 0.0404219 * | 0 * | 2079.1 |
| Cyclopentane | 0.0858117 | 0.0163386 | 1.03715E-08 * | 0.102347 * | 3.28446E-05 |
| 2-3-Dimethylbutane | 1.5121 | 0.224504 | 1.40903E-07 * | 1.73989 * | 0.000609147 |
| Undecanes Plus | 41.1343 | 0.0224125 | 1.86246E-09 * | 41.2457 * | 0.0889653 |

| Mass Fraction | Condensate to Pipeline % | Gas to Dehy and Sales % | Loading % | Measured Well Stream % | Produced Water % |
|---|---|---|---|---|---|
| Nitrogen | 0.040375 | 0.667192 | 0.00773717 * | 0.440612 * | 4.54025E-06 |
| Carbon Dioxide | 0.0941731 | 0.327252 | 4.77379 * | 0.245569 * | 0.00184116 |
| Methane | 8.29575 | 58.2286 | 3.14475 * | 40.1895 * | 0.00136427 |
| Ethane | 11.7147 | 23.1009 | 2.23033 * | 18.9898 * | 0.00129755 |
| Propane | 13.4496 | 10.9719 | 0.327576 * | 11.8682 * | 0.000875703 |
| Isobutane | 2.98788 | 1.31152 | 0.0320895 * | 1.91761 * | 0.000241203 |
| n-Butane | 9.1629 | 3.05437 | 0.0923747 * | 5.26308 * | 0.00102066 |
| Neopentane | 0.0689612 | 0.0201955 | 0.000514899 * | 0.0378267 * | 8.14815E-06 |
| Isopentane | 3.40792 | 0.638816 | 0.024003 * | 1.64006 * | 0.000734163 |
| n-Pentane | 5.22411 | 0.790984 | 0.0326447 * | 2.39389 * | 0.00136274 |
| 2-2-Dimethylbutane | 0.113072 | 0.0117837 | 0.000670235 * | 0.0484078 * | 4.5385E-05 |
| 2-Methylpentane | 1.61053 | 0.129152 | 0.00842932 * | 0.664801 * | 0.000891338 |
| 3-Methylpentane | 1.03439 | 0.0763333 | 0.00540951 * | 0.422762 * | 0.000638912 |
| n-Hexane | 3.16859 | 0.197015 | 0.0154982 * | 1.27151 * | 0.00232888 |
| Methylcyclopentane | 0.284006 | 0.0168624 | 0.00130238 * | 0.113461 * | 0.000214685 |
| Benzene | 0.0438583 | 0.00259903 | 0.00066783 * | 0.0175513 * | 0.000164348 |
| Cyclohexane | 0.456771 | 0.0226747 | 0.00195179 * | 0.179647 * | 0.000463124 |
| 2-Methylhexane | 1.12665 | 0.0436956 | 0.00107386 * | 0.435287 * | 0.00139329 |
| 3-Methylhexane | 1.21076 | 0.0430745 | 0.00411848 * | 0.465307 * | 0.00159287 |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 |
| n-Heptane | 3.45714 | 0.104988 | 0.00984997 * | 1.31712 * | 0.00524704 |
| Methylcyclohexane | 1.28948 | 0.0356576 | 0.00380645 * | 0.489038 * | 0.00198048 |
| Toluene | 0.237564 | 0.00590868 | 0.000682206 * | 0.089713 * | 0.000593396 |
| n-Octane | 6.0945 | 0.0859725 | 0.00749846 * | 2.25865 * | 0.0137779 |
| Ethylbenzene | 0.247745 | 0.00289386 | 0.000241223 * | 0.091443 * | 0.000637668 |
| p-Xylene | 0.258629 | 0.0029622 | 0.000220167 * | 0.0954188 * | 0.000650409 |
| o-Xylene | 0.497117 | 0.00485933 | 0.000331513 * | 0.182886 * | 0.00133808 |
| n-Nonane | 4.35098 | 0.0258239 | 0.00181493 * | 1.58981 * | 0.011487 |
| n-Decane | 4.23431 | 0.0137041 | 0.000544644 * | 1.53988 * | 0.0117625 |
| Water | 0.0104668 | 0.0340009 | 89.2685 * | 0 * | 99.8917 |
| Cyclopentane | 0.012206 | 0.00131392 | 8.91671E-05 * | 0.00525283 * | 6.14327E-06 |
| 2-3-Dimethylbutane | 0.264282 | 0.0221838 | 0.00148848 * | 0.109724 * | 0.000139997 |
| Undecanes Plus | 15.5505 | 0.00479024 | 4.25564E-05 * | 5.62617 * | 0.0442253 |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Mass Flow | Condensate to Pipeline lb/h | Gas to Dehy and Sales lb/h | Loading lb/h | Measured Well Stream lb/h | Produced Water lb/h |
|---|---|---|---|---|---|
| Nitrogen | 19.9071 | 581.862 | 6.31163E-05 * | 602.087 * | 0.00170242 |
| Carbon Dioxide | 46.4325 | 285.398 | 0.0389424 * | 335.565 * | 0.690363 |
| Methane | 4090.26 | 50781.6 | 0.0256535 * | 54918 * | 0.511548 |
| Ethane | 5776.01 | 20146.5 | 0.018194 * | 25949.2 * | 0.48653 |
| Propane | 6631.38 | 9568.64 | 0.00267221 * | 16217.6 * | 0.328355 |
| Isobutane | 1473.19 | 1143.78 | 0.000261772 * | 2620.36 * | 0.0904419 |
| n-Butane | 4517.81 | 2663.74 | 0.000753551 * | 7191.88 * | 0.382709 |
| Neopentane | 34.0016 | 17.6126 | 4.20031E-06 * | 51.6893 * | 0.00305524 |
| Isopentane | 1680.29 | 557.116 | 0.000195805 * | 2241.1 * | 0.275283 |
| n-Pentane | 2575.77 | 689.822 | 0.000266301 * | 3271.2 * | 0.510976 |
| 2-2-Dimethylbutane | 55.7505 | 10.2767 | 5.46747E-06 * | 66.1482 * | 0.0170176 |
| 2-Methylpentane | 794.078 | 112.634 | 6.87626E-05 * | 908.436 * | 0.334217 |
| 3-Methylpentane | 510.013 | 66.5708 | 4.41283E-05 * | 577.694 * | 0.239567 |
| n-Hexane | 1562.29 | 171.819 | 0.000126428 * | 1737.49 * | 0.873241 |
| Methylcyclopentane | 140.03 | 14.7058 | 1.06242E-05 * | 155.042 * | 0.0804987 |
| Benzene | 21.6245 | 2.26663 | 5.44785E-06 * | 23.9835 * | 0.0616242 |
| Cyclohexane | 225.213 | 19.7748 | 1.59218E-05 * | 245.483 * | 0.173653 |
| 2-Methylhexane | 555.499 | 38.1072 | 8.76005E-06 * | 594.81 * | 0.522428 |
| 3-Methylhexane | 596.972 | 37.5656 | 3.35967E-05 * | 635.831 * | 0.597266 |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 |
| n-Heptane | 1704.56 | 91.5612 | 8.03516E-05 * | 1799.81 * | 1.96744 |
| Methylcyclohexane | 635.782 | 31.0972 | 3.10513E-05 * | 668.26 * | 0.742603 |
| Toluene | 117.132 | 5.153 | 5.56513E-06 * | 122.591 * | 0.2225 |
| n-Octane | 3004.92 | 74.9772 | 6.1169E-05 * | 3086.4 * | 5.16616 |
| Ethylbenzene | 122.152 | 2.52375 | 1.96779E-06 * | 124.955 * | 0.239101 |
| p-Xylene | 127.518 | 2.58335 | 1.79602E-06 * | 130.388 * | 0.243878 |
| o-Xylene | 245.106 | 4.23786 | 2.70433E-06 * | 249.91 * | 0.501728 |
| n-Nonane | 2145.27 | 22.5212 | 1.48053E-05 * | 2172.43 * | 4.30716 |
| n-Decane | 2087.75 | 11.9515 | 4.44296E-06 * | 2104.22 * | 4.41049 |
| Water | 5.16068 | 29.6524 | 0.728212 * | 0 * | 37455.5 |
| Cyclopentane | 6.01822 | 1.14588 | 7.27385E-07 * | 7.17787 * | 0.00230349 |
| 2-3-Dimethylbutane | 130.306 | 19.3467 | 1.21424E-05 * | 149.936 * | 0.0524935 |
| Undecanes Plus | 7667.26 | 4.1776 | 3.47156E-07 * | 7688.04 * | 16.5828 |

## Stream Properties

| Property | Units | Condensate to Pipeline | Gas to Dehy and Sales | Loading | Measured Well Stream | Produced Water |
|---|---|---|---|---|---|---|
| Temperature | °F | 65 | 65 * | 70.3624 * | 65 * | 70 * |
| Pressure | psia | 1014.7 | 1014.7 * | 0.396963 | 1014.7 * | 14.6959 * |
| Mole Fraction Vapor | % | 0 | 100 | 100 * | 81.5581 | 0 |
| Mole Fraction Light Liquid | % | 100 | 0 | 0 | 18.4419 | 0.013837 |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 99.9862 |
| Molecular Weight | lb/lbmol | 52.3459 | 20.9021 | 18.7085 | 26.7029 | 18.0317 |
| Mass Density | lb/ft^3 | 35.4262 | 5.09723 | 0.00130614 | 7.3825 | 62.2595 |
| Molar Flow | lbmol/h | 941.916 | 4172.33 | 0.0436034 | 5117.33 | 2079.46 |
| Mass Flow | lb/h | 49305.5 | 87210.7 | 0.815755 * | 136648 | 37496.1 |
| Vapor Volumetric Flow | ft^3/h | 1391.78 | 17109.4 | 624.556 | 18509.7 | 602.256 |
| Liquid Volumetric Flow | gpm | 173.521 | 2133.12 | 77.8667 | 2307.7 | 75.0865 |
| Std Vapor Volumetric Flow | MMSCFD | 8.57861 | 38 | 0.000397123 | 46.6067 * | 18.9389 |
| Std Liquid Volumetric Flow | sgpm | 180.683 | 510.865 | 0.00184135 | 692.224 | 74.9875 |
| Compressibility | | 0.266284 | 0.738998 | 0.999618 | 0.651841 | 0.00074879 |
| Specific Gravity | | 0.568009 | 0.721697 | 0.645956 | | 0.998243 |
| API Gravity | | 115.998 | | | | 10.0488 |
| Enthalpy | Btu/h | -5.47421E+07 | -1.46863E+08 | -4432.3 | -2.01633E+08 | -2.55787E+08 |
| Mass Enthalpy | Btu/lb | -1110.26 | -1684 | -5433.37 | -1475.57 | -6821.69 |
| Mass Cp | Btu/(lb*°F) | 0.584069 | 0.716296 | 0.438257 | 0.668489 | 0.981666 |
| Ideal Gas CpCv Ratio | | 1.10653 | 1.25109 | 1.31975 | 1.20082 | 1.32553 |
| Dynamic Viscosity | cP | 0.15335 | 0.0132278 | 0.0102252 | | 0.995377 |
| Kinematic Viscosity | cSt | 0.270234 | 0.162006 | 488.723 | | 0.998071 |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Stream Properties

| Property | Units | Condensate to Pipeline | Gas to Dehy and Sales | Loading | Measured Well Stream | Produced Water |
|---|---|---|---|---|---|---|
| Thermal Conductivity | Btu/(h*ft*°F) | 0.0622247 | 0.0219858 | 0.012066 | | 0.346665 |
| Surface Tension | lbf/ft | 0.000383926 ? | | | | 0.00502747 ? |
| Net Ideal Gas Heating Value | Btu/ft^3 | 2702.62 | 1142.15 | 61.4115 | 1430.37 | 0.961696 |
| Net Liquid Heating Value | Btu/lb | 19455.3 | 20672.4 | 291.793 | 20237.4 | -1038.53 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 2926.89 | 1259.08 | 114.305 | 1567.12 | 51.3333 |
| Gross Liquid Heating Value | Btu/lb | 21081.5 | 22795.7 | 1364.73 | 22181.2 | 21.5612 |

**Warnings**

ProMax: ProMax!Project!Flowsheets!Flowsheet1!PStreams!Condensate to Pipeline
Warning: The temperature of 65 °F is below hydrate formation.
ProMax: ProMax!Project!Flowsheets!Flowsheet1!PStreams!Gas to Dehy and Sales
Warning: The temperature of 65 °F is below hydrate formation.

**Remarks**


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Connections

| | Produced Water Flow | PW Tank Vent Gas | Stable Liquid | Tank Vent Gas | W/B |
|---|---|---|---|---|---|
| From Block | -- | Produced Water Tank | Blowdown Process Vessel | Blowdown Process Vessel | -- |
| To Block | MIX-100 | -- | Produced Water Tank | -- | -- |

## Stream Composition

| Mole Fraction | Produced Water Flow % | PW Tank Vent Gas % | Stable Liquid % | Tank Vent Gas % | W/B % |
|---|---|---|---|---|---|
| Nitrogen | 0 * | | 2.92247E-06 | 0.235651 | 0.0051672 * |
| Carbon Dioxide | 0 * | | 0.000754365 | 1.44808 | 2.02934 * |
| Methane | 0 * | | 0.00153343 | 59.5932 | 3.66737 * |
| Ethane | 0 * | | 0.000778108 | 18.2476 | 1.38768 * |
| Propane | 0 * | | 0.000358094 | 8.19565 | 0.138981 * |
| Isobutane | 0 * | | 7.48303E-05 | 1.18952 | 0.010329 * |
| n-Butane | 0 * | | 0.000316648 | 3.58262 | 0.0297338 * |
| Neopentane | 0 * | | 2.03642E-06 | 0.0208986 | 0.000133516 * |
| Isopentane | 0 * | | 0.000183485 | 0.991457 | 0.00622408 * |
| n-Pentane | 0 * | | 0.000340582 | 1.4768 | 0.00846492 * |
| 2-2-Dimethylbutane | 0 * | | 9.49654E-06 | 0.0252695 | 0.000145507 * |
| 2-Methylpentane | 0 * | | 0.000186507 | 0.337475 | 0.00182999 * |
| 3-Methylpentane | 0 * | | 0.000133689 | 0.211625 | 0.00117439 * |
| n-Hexane | 0 * | | 0.000487305 | 0.610087 | 0.00336464 * |
| Methylcyclopentane | 0 * | | 4.59976E-05 | 0.0560577 | 0.000289517 * |
| Benzene | 0 * | | 3.79389E-05 | 0.00822198 | 0.000159951 * |
| Cyclohexane | 0 * | | 9.92271E-05 | 0.0800258 | 0.000433879 * |
| 2-Methylhexane | 0 * | | 0.000250727 | 0.142223 | 0.000200498 * |
| 3-Methylhexane | 0 * | | 0.000286643 | 0.145374 | 0.000768953 * |
| 2,2,4-Trimethylpentane | 0 * | | 0 | 0 | 0 * |
| n-Heptane | 0 * | | 0.000944223 | 0.359945 | 0.00183907 * |
| Methylcyclohexane | 0 * | | 0.000363711 | 0.135931 | 0.000725286 * |
| Toluene | 0 * | | 0.000116129 | 0.0189093 | 0.00013852 * |
| n-Octane | 0 * | | 0.00217492 | 0.245174 | 0.00122811 * |
| Ethylbenzene | 0 * | | 0.000108305 | 0.00791016 | 4.25085E-05 * |
| p-Xylene | 0 * | | 0.000110469 | 0.00830531 | 3.87981E-05 * |
| o-Xylene | 0 * | | 0.000227267 | 0.0126535 | 5.84195E-05 * |
| n-Nonane | 0 * | | 0.00161498 | 0.054832 | 0.000264742 * |
| n-Decane | 0 * | | 0.00149069 | 0.0158942 | 7.16148E-05 * |
| Water | 100 * | | 99.9827 | 2.4817 | 92.7035 * |
| Cyclopentane | 0 * | | 1.57948E-06 | 0.00342389 | 2.3786E-05 * |
| 2-3-Dimethylbutane | 0 * | | 2.92936E-05 | 0.0561847 | 0.000323146 * |
| Undecanes Plus | 0 * | | 0.00427829 | 0.0013389 | 4.27137E-06 * |

| Molar Flow | Produced Water Flow lbmol/h | PW Tank Vent Gas lbmol/h | Stable Liquid lbmol/h | Tank Vent Gas lbmol/h | W/B lbmol/h |
|---|---|---|---|---|---|
| Nitrogen | 0 * | 0 | 6.07716E-05 | 0.0112546 | 4.75371E-07 * |
| Carbon Dioxide | 0 * | 0 | 0.0156867 | 0.0691594 | 0.000186695 * |
| Methane | 0 * | 0 | 0.0318871 | 2.84614 | 0.00033739 * |
| Ethane | 0 * | 0 | 0.0161804 | 0.871495 | 0.000127663 * |
| Propane | 0 * | 0 | 0.00744642 | 0.39142 | 1.27859E-05 * |
| Isobutane | 0 * | 0 | 0.00155606 | 0.0568107 | 9.50251E-07 * |
| n-Butane | 0 * | 0 | 0.00658456 | 0.171104 | 2.73544E-06 * |
| Neopentane | 0 * | 0 | 4.23464E-05 | 0.000998103 | 1.22832E-08 * |
| Isopentane | 0 * | 0 | 0.00381549 | 0.0473514 | 5.72602E-07 * |
| n-Pentane | 0 * | 0 | 0.00708226 | 0.0705311 | 7.78755E-07 * |
| 2-2-Dimethylbutane | 0 * | 0 | 0.000197477 | 0.00120686 | 1.33863E-08 * |
| 2-Methylpentane | 0 * | 0 | 0.00387834 | 0.0161176 | 1.68355E-07 * |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Molar Flow | Produced Water Flow lbmol/h | PW Tank Vent Gas lbmol/h | Stable Liquid lbmol/h | Tank Vent Gas lbmol/h | W/B lbmol/h |
|---|---|---|---|---|---|
| 3-Methylpentane | 0 * | 0 | 0.00278 | 0.0101071 | 1.08042E-07 * |
| n-Hexane | 0 * | 0 | 0.0101333 | 0.0291374 | 3.0954E-07 * |
| Methylcyclopentane | 0 * | 0 | 0.000956501 | 0.00267728 | 2.6635E-08 * |
| Benzene | 0 * | 0 | 0.000788923 | 0.000392677 | 1.47152E-08 * |
| Cyclohexane | 0 * | 0 | 0.00206339 | 0.00382199 | 3.9916E-08 * |
| 2-Methylhexane | 0 * | 0 | 0.00521375 | 0.00679248 | 1.84454E-08 * |
| 3-Methylhexane | 0 * | 0 | 0.00596062 | 0.00694299 | 7.07421E-08 * |
| 2,2,4-Trimethylpentane | 0 * | 0 | 0 | 0 | 0 * |
| n-Heptane | 0 * | 0 | 0.0196347 | 0.0171908 | 1.6919E-07 * |
| Methylcyclohexane | 0 * | 0 | 0.00756322 | 0.00649198 | 6.67248E-08 * |
| Toluene | 0 * | 0 | 0.00241485 | 0.000903098 | 1.27436E-08 * |
| n-Octane | 0 * | 0 | 0.0452265 | 0.0117094 | 1.12983E-07 * |
| Ethylbenzene | 0 * | 0 | 0.00225216 | 0.000377785 | 3.91069E-09 * |
| p-Xylene | 0 * | 0 | 0.00229716 | 0.000396657 | 3.56934E-09 * |
| o-Xylene | 0 * | 0 | 0.00472592 | 0.000604323 | 5.37447E-09 * |
| n-Nonane | 0 * | 0 | 0.0335828 | 0.00261874 | 2.43557E-08 * |
| n-Decane | 0 * | 0 | 0.0309983 | 0.000759098 | 6.58842E-09 * |
| Water | 2081.15 * | 0 | 2079.1 | 0.118524 | 0.00852853 * |
| Cyclopentane | 0 * | 0 | 3.28446E-05 | 0.000163523 | 2.18826E-09 * |
| 2-3-Dimethylbutane | 0 * | 0 | 0.000609147 | 0.00268335 | 2.97288E-08 * |
| Undecanes Plus | 0 * | 0 | 0.0889653 | 6.39449E-05 | 3.92957E-10 * |

| Mass Fraction | Produced Water Flow % | PW Tank Vent Gas % | Stable Liquid % | Tank Vent Gas % | W/B % |
|---|---|---|---|---|---|
| Nitrogen | 0 * | | 4.54025E-06 | 0.246511 | 0.00773717 * |
| Carbon Dioxide | 0 * | | 0.00184116 | 2.37979 | 4.77379 * |
| Methane | 0 * | | 0.00136427 | 35.7 | 3.14475 * |
| Ethane | 0 * | | 0.00129755 | 20.4892 | 2.23033 * |
| Propane | 0 * | | 0.000875703 | 13.4952 | 0.327576 * |
| Isobutane | 0 * | | 0.000241203 | 2.58175 | 0.0320895 * |
| n-Butane | 0 * | | 0.00102066 | 7.77576 | 0.0923747 * |
| Neopentane | 0 * | | 8.14815E-06 | 0.0563048 | 0.000514899 * |
| Isopentane | 0 * | | 0.000734163 | 2.67118 | 0.024003 * |
| n-Pentane | 0 * | | 0.00136274 | 3.97879 | 0.0326447 * |
| 2-2-Dimethylbutane | 0 * | | 4.5385E-05 | 0.0813167 | 0.000670235 * |
| 2-Methylpentane | 0 * | | 0.000891338 | 1.08599 | 0.00842932 * |
| 3-Methylpentane | 0 * | | 0.000638912 | 0.681004 | 0.00540951 * |
| n-Hexane | 0 * | | 0.00232888 | 1.96325 | 0.0154982 * |
| Methylcyclopentane | 0 * | | 0.000214685 | 0.176173 | 0.00130238 * |
| Benzene | 0 * | | 0.000164348 | 0.0239825 | 0.00066783 * |
| Cyclohexane | 0 * | | 0.000463124 | 0.251497 | 0.00195179 * |
| 2-Methylhexane | 0 * | | 0.00139329 | 0.532165 | 0.00107386 * |
| 3-Methylhexane | 0 * | | 0.00159287 | 0.543956 | 0.00411848 * |
| 2,2,4-Trimethylpentane | 0 * | | 0 | 0 | 0 * |
| n-Heptane | 0 * | | 0.00524704 | 1.34683 | 0.00984997 * |
| Methylcyclohexane | 0 * | | 0.00198048 | 0.498389 | 0.00380645 * |
| Toluene | 0 * | | 0.000593396 | 0.0650604 | 0.000682206 * |
| n-Octane | 0 * | | 0.0137779 | 1.0458 | 0.00749846 * |
| Ethylbenzene | 0 * | | 0.000637668 | 0.0313593 | 0.000241223 * |
| p-Xylene | 0 * | | 0.000650409 | 0.0329259 | 0.000220167 * |
| o-Xylene | 0 * | | 0.00133808 | 0.050164 | 0.000331513 * |
| n-Nonane | 0 * | | 0.011487 | 0.262609 | 0.00181493 * |
| n-Decane | 0 * | | 0.0117625 | 0.0844477 | 0.000544644 * |
| Water | 100 * | | 99.8917 | 1.66951 | 89.2685 * |
| Cyclopentane | 0 * | | 6.14327E-06 | 0.00896689 | 8.91671E-05 * |
| 2-3-Dimethylbutane | 0 * | | 0.000139997 | 0.180801 | 0.00148848 * |
| Undecanes Plus | 0 * | | 0.0442253 | 0.00931931 | 4.25564E-05 * |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Mass Flow | Produced Water Flow lb/h | PW Tank Vent Gas lb/h | Stable Liquid lb/h | Tank Vent Gas lb/h | W/B lb/h |
|---|---|---|---|---|---|
| Nitrogen | 0 * | 0 | 0.00170242 | 0.315279 | 1.33168E-05 * |
| Carbon Dioxide | 0 * | 0 | 0.690363 | 3.04367 | 0.00821637 * |
| Methane | 0 * | 0 | 0.511548 | 45.659 | 0.00541257 * |
| Ethane | 0 * | 0 | 0.48653 | 26.205 | 0.00383871 * |
| Propane | 0 * | 0 | 0.328355 | 17.2599 | 0.000563804 * |
| Isobutane | 0 * | 0 | 0.0904419 | 3.30196 | 5.52307E-05 * |
| n-Butane | 0 * | 0 | 0.382709 | 9.94493 | 0.00015899 * |
| Neopentane | 0 * | 0 | 0.00305524 | 0.0720119 | 8.86215E-07 * |
| Isopentane | 0 * | 0 | 0.275283 | 3.41635 | 4.13126E-05 * |
| n-Pentane | 0 * | 0 | 0.510976 | 5.08873 | 5.61863E-05 * |
| 2-2-Dimethylbutane | 0 * | 0 | 0.0170176 | 0.104001 | 1.15357E-06 * |
| 2-Methylpentane | 0 * | 0 | 0.334217 | 1.38894 | 1.45081E-05 * |
| 3-Methylpentane | 0 * | 0 | 0.239567 | 0.87098 | 9.31054E-06 * |
| n-Hexane | 0 * | 0 | 0.873241 | 2.51093 | 2.66747E-05 * |
| Methylcyclopentane | 0 * | 0 | 0.0804987 | 0.225319 | 2.24159E-06 * |
| Benzene | 0 * | 0 | 0.0616242 | 0.0306727 | 1.14943E-06 * |
| Cyclohexane | 0 * | 0 | 0.173653 | 0.321656 | 3.35931E-06 * |
| 2-Methylhexane | 0 * | 0 | 0.522428 | 0.68062 | 1.84826E-06 * |
| 3-Methylhexane | 0 * | 0 | 0.597266 | 0.695701 | 7.0885E-06 * |
| 2,2,4-Trimethylpentane | 0 * | 0 | 0 | 0 | 0 * |
| n-Heptane | 0 * | 0 | 1.96744 | 1.72255 | 1.69532E-05 * |
| Methylcyclohexane | 0 * | 0 | 0.742603 | 0.637422 | 6.55145E-06 * |
| Toluene | 0 * | 0 | 0.2225 | 0.08321 | 1.17417E-06 * |
| n-Octane | 0 * | 0 | 5.16616 | 1.33754 | 1.29059E-05 * |
| Ethylbenzene | 0 * | 0 | 0.239101 | 0.0401075 | 4.15179E-07 * |
| p-Xylene | 0 * | 0 | 0.243878 | 0.0421111 | 3.78939E-07 * |
| o-Xylene | 0 * | 0 | 0.501728 | 0.064158 | 5.70581E-07 * |
| n-Nonane | 0 * | 0 | 4.30716 | 0.335867 | 3.12375E-06 * |
| n-Decane | 0 * | 0 | 4.41049 | 0.108006 | 9.37411E-07 * |
| Water | 37492.5 * | 0 | 37455.5 | 2.13525 | 0.153644 * |
| Cyclopentane | 0 * | 0 | 0.00230349 | 0.0114683 | 1.53469E-07 * |
| 2-3-Dimethylbutane | 0 * | 0 | 0.0524935 | 0.231238 | 2.56189E-06 * |
| Undecanes Plus | 0 * | 0 | 16.5828 | 0.0119191 | 7.32456E-08 * |

## Stream Properties

| Property | Units | Produced Water Flow | PW Tank Vent Gas | Stable Liquid | Tank Vent Gas | W/B |
|---|---|---|---|---|---|---|
| Temperature | °F | 65 * | 70 | 70 * | 70 | 70.3624 * |
| Pressure | psia | 1014.7 * | 14.6959 | 14.6959 * | 14.6959 | 0.396963 |
| Mole Fraction Vapor | % | 0 | 0 | 0 | 100 | 100 * |
| Mole Fraction Light Liquid | % | 100 | | 0.013837 | 0 | 0 |
| Mole Fraction Heavy Liquid | % | 0 | | 99.9862 | 0 | 0 |
| Molecular Weight | lb/lbmol | 18.0153 | | 18.0317 | 26.7793 | 18.7085 |
| Mass Density | lb/ft^3 | 62.381 | | 62.2595 | 0.0696642 | 0.00130614 |
| Molar Flow | lbmol/h | 2081.15 | 0 | 2079.46 | 4.77594 | 0.00919979 |
| Mass Flow | lb/h | 37492.5 | 0 | 37496.1 | 127.897 | 0.172114 * |
| Vapor Volumetric Flow | ft^3/h | 601.024 | | 602.256 | 1835.9 | 131.774 |
| Liquid Volumetric Flow | gpm | 74.9329 | | 75.0865 | 228.891 | 16.4289 |
| Std Vapor Volumetric Flow | MMSCFD | 18.9543 | 0 | 18.9389 | 0.0434974 | 8.37882E-05 |
| Std Liquid Volumetric Flow | sgpm | 74.9501 * | 0 | 74.9875 | 0.638132 | 0.000388503 |
| Compressibility | | 0.0520445 | | 0.00074879 | 0.993845 | 0.999618 |
| Specific Gravity | | 1.00019 | | 0.998243 | 0.924621 | 0.645956 |
| API Gravity | | 9.87799 | | 10.0488 | | |
| Enthalpy | Btu/h | -2.5608E+08 | 0 | -2.55787E+08 | -194070 | -935.161 |
| Mass Enthalpy | Btu/lb | -6830.18 | | -6821.69 | -1517.4 | -5433.37 |
| Mass Cp | Btu/(lb*°F) | 0.980925 | | 0.981666 | 0.443105 | 0.438257 |
| Ideal Gas CpCv Ratio | | 1.32608 | | 1.32553 | 1.20212 | 1.31975 |
| Dynamic Viscosity | cP | 1.07584 | | 0.995377 | 0.00995014 | 0.0102252 |
| Kinematic Viscosity | cSt | 1.07665 | | 0.998071 | 8.91658 | 488.723 |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Stream Properties

| Property | Units | Produced Water Flow | PW Tank Vent Gas | Stable Liquid | Tank Vent Gas | W/B |
|---|---|---|---|---|---|---|
| Thermal Conductivity | Btu/(h*ft*°F) | 0.344737 | | 0.346665 | 0.0151381 | 0.012066 |
| Surface Tension | lbf/ft | 0.00506977 | | 0.00502747 ? | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 0 | | 0.961696 | 1384.31 | 61.4115 |
| Net Liquid Heating Value | Btu/lb | -1059.76 | | -1038.53 | 19506.7 | 291.793 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 50.31 | | 51.3333 | 1518.48 | 114.305 |
| Gross Liquid Heating Value | Btu/lb | 0 | | 21.5612 | 21408.5 | 1364.73 |

**Remarks**


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Connections

| | Water Phase | 1 | | | |
|---|---|---|---|---|---|
| From Block | VSSL-100 | MIX-100 | | | |
| To Block | Blowdown Process Vessel | VSSL-100 | | | |

## Stream Composition

| Mole Fraction | Water Phase % | 1 % | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.000542902 | 0.298574 | | | |
| Carbon Dioxide | 0.00407086 | 0.105923 | | | |
| Methane | 0.138085 | 47.5557 | | | |
| Ethane | 0.04259 | 11.9885 | | | |
| Propane | 0.0191373 | 5.10917 | | | |
| Isobutane | 0.00280039 | 0.626295 | | | |
| n-Butane | 0.00852536 | 1.71893 | | | |
| Neopentane | 4.992E-05 | 0.00995247 | | | |
| Isopentane | 0.00245495 | 0.431511 | | | |
| n-Pentane | 0.00372383 | 0.629849 | | | |
| 2-2-Dimethylbutane | 6.73789E-05 | 0.0106634 | | | |
| 2-Methylpentane | 0.000959391 | 0.146443 | | | |
| 3-Methylpentane | 0.000618312 | 0.0931267 | | | |
| n-Hexane | 0.00188418 | 0.280091 | | | |
| Methylcyclopentane | 0.000174346 | 0.0255921 | | | |
| Benzene | 5.66923E-05 | 0.00426534 | | | |
| Cyclohexane | 0.000282376 | 0.0405208 | | | |
| 2-Methylhexane | 0.00057605 | 0.0824633 | | | |
| 3-Methylhexane | 0.000619106 | 0.0881505 | | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | | |
| n-Heptane | 0.00176686 | 0.249523 | | | |
| Methylcyclohexane | 0.000674358 | 0.0945485 | | | |
| Toluene | 0.000159193 | 0.0184832 | | | |
| n-Octane | 0.00273174 | 0.37535 | | | |
| Ethylbenzene | 0.000126183 | 0.0163505 | | | |
| p-Xylene | 0.000129248 | 0.0170614 | | | |
| o-Xylene | 0.000255741 | 0.032701 | | | |
| n-Nonane | 0.00173692 | 0.235305 | | | |
| n-Decane | 0.0015237 | 0.205447 | | | |
| Water | 99.7592 | 28.9109 | | | |
| Cyclopentane | 9.42157E-06 | 0.00142178 | | | |
| 2-3-Dimethylbutane | 0.000157971 | 0.0241703 | | | |
| Undecanes Plus | 0.00427156 | 0.572978 | | | |

| Molar Flow | Water Phase lbmol/h | 1 lbmol/h | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.0113153 | 21.4928 | | | |
| Carbon Dioxide | 0.0848461 | 7.62483 | | | |
| Methane | 2.87802 | 3423.29 | | | |
| Ethane | 0.887675 | 862.987 | | | |
| Propane | 0.398866 | 367.783 | | | |
| Isobutane | 0.0583668 | 45.0837 | | | |
| n-Butane | 0.177688 | 123.737 | | | |
| Neopentane | 0.00104045 | 0.716427 | | | |
| Isopentane | 0.0511669 | 31.0622 | | | |
| n-Pentane | 0.0776134 | 45.3396 | | | |
| 2-2-Dimethylbutane | 0.00140433 | 0.7676 | | | |
| 2-Methylpentane | 0.019996 | 10.5417 | | | |
| 3-Methylpentane | 0.0128871 | 6.70371 | | | |
| n-Hexane | 0.0392707 | 20.1623 | | | |
| Methylcyclopentane | 0.00363378 | 1.84224 | | | |
| Benzene | 0.0011816 | 0.30704 | | | |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Molar Flow | Water Phase lbmol/h | 1 lbmol/h | | | |
|---|---|---|---|---|---|
| Cyclohexane | 0.00588537 | 2.91688 | | | |
| 2-Methylhexane | 0.0120062 | 5.93611 | | | |
| 3-Methylhexane | 0.0129036 | 6.34549 | | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | | |
| n-Heptane | 0.0368255 | 17.9618 | | | |
| Methylcyclohexane | 0.0140552 | 6.80605 | | | |
| Toluene | 0.00331795 | 1.33051 | | | |
| n-Octane | 0.0569359 | 27.0195 | | | |
| Ethylbenzene | 0.00262995 | 1.17699 | | | |
| p-Xylene | 0.00269382 | 1.22816 | | | |
| o-Xylene | 0.00533025 | 2.35397 | | | |
| n-Nonane | 0.0362015 | 16.9384 | | | |
| n-Decane | 0.0317574 | 14.7891 | | | |
| Water | 2079.22 | 2081.15 | | | |
| Cyclopentane | 0.000196368 | 0.102347 | | | |
| 2-3-Dimethylbutane | 0.00329249 | 1.73989 | | | |
| Undecanes Plus | 0.0890292 | 41.2457 | | | |

| Mass Fraction | Water Phase % | 1 % | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.000842497 | 0.345748 | | | |
| Carbon Dioxide | 0.0099246 | 0.192698 | | | |
| Methane | 0.122716 | 31.5367 | | | |
| Ethane | 0.0709428 | 14.9013 | | | |
| Propane | 0.0467474 | 9.31296 | | | |
| Isobutane | 0.00901659 | 1.50474 | | | |
| n-Butane | 0.0274496 | 4.12993 | | | |
| Neopentane | 0.000199519 | 0.0296826 | | | |
| Isopentane | 0.0098119 | 1.28695 | | | |
| n-Pentane | 0.0148833 | 1.87848 | | | |
| 2-2-Dimethylbutane | 0.000321653 | 0.0379856 | | | |
| 2-Methylpentane | 0.00457994 | 0.521669 | | | |
| 3-Methylpentane | 0.0029517 | 0.331741 | | | |
| n-Hexane | 0.0089947 | 0.997755 | | | |
| Methylcyclopentane | 0.000812825 | 0.0890329 | | | |
| Benzene | 0.000245314 | 0.0137725 | | | |
| Cyclohexane | 0.00131647 | 0.140969 | | | |
| 2-Methylhexane | 0.00319755 | 0.341569 | | | |
| 3-Methylhexane | 0.00343655 | 0.365126 | | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | | |
| n-Heptane | 0.00980752 | 1.03354 | | | |
| Methylcyclohexane | 0.00366794 | 0.383748 | | | |
| Toluene | 0.000812541 | 0.0703978 | | | |
| n-Octane | 0.017286 | 1.77237 | | | |
| Ethylbenzene | 0.000742101 | 0.0717553 | | | |
| p-Xylene | 0.000760125 | 0.0748751 | | | |
| o-Xylene | 0.00150405 | 0.143511 | | | |
| n-Nonane | 0.0123406 | 1.24752 | | | |
| n-Decane | 0.0120096 | 1.20835 | | | |
| Water | 99.5578 | 21.53 | | | |
| Cyclopentane | 3.66038E-05 | 0.00412189 | | | |
| 2-3-Dimethylbutane | 0.000754124 | 0.0861007 | | | |
| Undecanes Plus | 0.0441066 | 4.41485 | | | |

| Mass Flow | Water Phase lb/h | 1 lb/h | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.316981 | 602.087 | | | |
| Carbon Dioxide | 3.73404 | 335.565 | | | |
| Methane | 46.1706 | 54918 | | | |
| Ethane | 26.6915 | 25949.2 | | | |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

| Mass Flow | Water Phase lb/h | 1 lb/h | | | |
|---|---|---|---|---|---|
| Propane | 17.5882 | 16217.6 | | | |
| Isobutane | 3.3924 | 2620.36 | | | |
| n-Butane | 10.3276 | 7191.88 | | | |
| Neopentane | 0.0750672 | 51.6893 | | | |
| Isopentane | 3.69163 | 2241.1 | | | |
| n-Pentane | 5.59971 | 3271.2 | | | |
| 2-2-Dimethylbutane | 0.121019 | 66.1482 | | | |
| 2-Methylpentane | 1.72316 | 908.436 | | | |
| 3-Methylpentane | 1.11055 | 577.694 | | | |
| n-Hexane | 3.38417 | 1737.49 | | | |
| Methylcyclopentane | 0.305817 | 155.042 | | | |
| Benzene | 0.092297 | 23.9835 | | | |
| Cyclohexane | 0.49531 | 245.483 | | | |
| 2-Methylhexane | 1.20305 | 594.81 | | | |
| 3-Methylhexane | 1.29297 | 635.831 | | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | | |
| n-Heptane | 3.68998 | 1799.81 | | | |
| Methylcyclohexane | 1.38003 | 668.26 | | | |
| Toluene | 0.30571 | 122.591 | | | |
| n-Octane | 6.5037 | 3086.4 | | | |
| Ethylbenzene | 0.279208 | 124.955 | | | |
| p-Xylene | 0.285989 | 130.388 | | | |
| o-Xylene | 0.565885 | 249.91 | | | |
| n-Nonane | 4.64303 | 2172.43 | | | |
| n-Decane | 4.5185 | 2104.22 | | | |
| Water | 37457.6 | 37492.5 | | | |
| Cyclopentane | 0.0137718 | 7.17787 | | | |
| 2-3-Dimethylbutane | 0.283732 | 149.936 | | | |
| Undecanes Plus | 16.5947 | 7688.04 | | | |

## Stream Properties

| Property | Units | Water Phase | 1 | | | |
|---|---|---|---|---|---|---|
| Temperature | °F | 65 | 64.8438 | | | |
| Pressure | psia | 1014.7 | 1014.7 | | | |
| Mole Fraction Vapor | % | 0 | 57.9381 | | | |
| Mole Fraction Light Liquid | % | 0.0978096 | 13.1363 | | | |
| Mole Fraction Heavy Liquid | % | 99.9022 | 28.9257 | | | |
| Molecular Weight | lb/lbmol | 18.0517 | 24.1912 | | | |
| Mass Density | lb/ft^3 | 62.1416 | 9.12097 | | | |
| Molar Flow | lbmol/h | 2084.23 | 7198.48 | | | |
| Mass Flow | lb/h | 37624 | 174140 | | | |
| Vapor Volumetric Flow | ft^3/h | 605.456 | 19092.3 | | | |
| Liquid Volumetric Flow | gpm | 75.4854 | 2380.34 | | | |
| Std Vapor Volumetric Flow | MMSCFD | 18.9824 | 65.561 | | | |
| Std Liquid Volumetric Flow | sgpm | 75.6256 | 767.174 | | | |
| Compressibility | | 0.0523507 | 0.478115 | | | |
| Specific Gravity | | 0.996354 | | | | |
| API Gravity | | 10.4188 | | | | |
| Enthalpy | Btu/h | -2.56084E+08 | -4.57713E+08 | | | |
| Mass Enthalpy | Btu/lb | -6806.41 | -2628.42 | | | |
| Mass Cp | Btu/(lb*°F) | 0.980875 | 0.736117 | | | |
| Ideal Gas CpCv Ratio | | 1.32533 | 1.22594 | | | |
| Dynamic Viscosity | cP | 1.05813 | | | | |
| Kinematic Viscosity | cSt | 1.06301 | | | | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.341249 | | | | |
| Surface Tension | lbf/ft | 0.00503401 ? | | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 4.13158 | 1016.84 | | | |
| Net Liquid Heating Value | Btu/lb | -968.69 | 15652.1 | | | |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 54.6952 | 1128.6 | | | |
| Gross Liquid Heating Value | Btu/lb | 94.2625 | 17405.6 | | | |

* User Specified Values
? Extrapolated or Approximate Values

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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

**Warnings**

ProMax: ProMax!Project!Flowsheets!Flowsheet1!PStreams!Water Phase
Warning: The temperature of 65 °F is below hydrate formation.
ProMax: ProMax!Project!Flowsheets!Flowsheet1!PStreams!1
Warning: The temperature of 64.8438 °F is below hydrate formation.

**Remarks**


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# Energy Stream Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Energy Streams

| Energy Stream | Energy Rate | | Power | | From Block | To Block |
|---|---|---|---|---|---|---|
| Q-1 | 103165 | Btu/h | 40.5455 | hp | -- | Blowdown Process Vessel |
| Q-2 | 24109.1 | Btu/h | 9.47524 | hp | -- | VSSL-100 |
| Q-3 | -5.08449E-08 | Btu/h | -1.99828E-11 | hp | -- | Produced Water Tank |

**Remarks**

* User Specified Values
? Extrapolated or Approximate Values

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# Blocks
# Blowdown Process Vessel
**Separator Report**

| | | | |
|---|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank | |
| Location: | Taylor Pad B | Modified: 4:19 PM, 6/29/2017 | |
| Flowsheet: | Flowsheet1 | Status: Solved 10:46 AM, 11/14/2017 | |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| Water Phase | Inlet | VSSL-100 | Tank Vent Gas | Vapor Outlet | |
| Stable Liquid | Heavy Liquid Outlet | Produced Water Tank | Q-1 | Energy | |

## Block Parameters

| | | | | | |
|---|---|---|---|---|---|
| Pressure Drop | 1000 | psi | Main Liquid Phase | Light Liquid | |
| Mole Fraction Vapor | 0.229146 | % | Heat Duty | 103165 | Btu/h |
| Mole Fraction Light Liquid | 0.0138053 | % | Heat Release Curve Type | Plug Flow | |
| Mole Fraction Heavy Liquid | 99.757 | % | Heat Release Curve Increments | 10 | |

**Warnings**

ProMax:ProMax!Project!Flowsheets!Flowsheet1!Blocks!Blowdown Process Vessel!Increment 0
Warning: The temperature of 65 °F is below hydrate formation.

**Remarks**


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# Blocks
# MIX-100
**Mixer/Splitter Report**

| | | | |
|---|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank | |
| Location: | Taylor Pad B | Modified: 10:16 AM, 11/1/2017 | |
| Flowsheet: | Flowsheet1 | Status: Solved 10:46 AM, 11/14/2017 | |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| Measured Well Stream | Inlet | | Produced Water Flow | Inlet | |
| 1 | Outlet | VSSL-100 | | | |

## Block Parameters

| | | | |
|---|---|---|---|
| Pressure Drop | 0 psi | Fraction to PStream 1 | 100 % |

**Remarks**


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# Blocks
# Produced Water Tank
**Separator Report**

| | | | |
|---|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank | |
| Location: | Taylor Pad B | Modified: 10:48 AM, 11/14/2017 | |
| Flowsheet: | Flowsheet1 | Status: Solved 10:49 AM, 11/14/2017 | |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| Stable Liquid | Inlet | Blowdown Process Vessel | PW Tank Vent Gas | Vapor Outlet | |
| Produced Water | Light Liquid Outlet | | Q-3 | Energy | |

## Block Parameters

| | | | | | |
|---|---|---|---|---|---|
| Pressure Drop | 0 | psi | Main Liquid Phase | Light Liquid | |
| Mole Fraction Vapor | 0 | % | Heat Duty | -5.08449E-08 | Btu/h |
| Mole Fraction Light Liquid | 0.013837 | % | Heat Release Curve Type | Plug Flow | |
| Mole Fraction Heavy Liquid | 99.9862 | % | Heat Release Curve Increments | 10 | |

**Remarks**


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# Blocks
# VSSL-100
**Separator Report**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | Modified: 10:16 AM, 11/1/2017 |
| Flowsheet: | Flowsheet1 | Status: Solved 10:46 AM, 11/14/2017 |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| 1 | Inlet | MIX-100 | Gas to Dehy and Sales | Vapor Outlet | |
| Condensate to Pipeline | Light Liquid Outlet | | Water Phase | Heavy Liquid Outlet | Blowdown Process Vessel |
| Q-2 | Energy | | | | |

## Block Parameters

| | | | | | |
|---|---|---|---|---|---|
| Pressure Drop | 0 | psi | Main Liquid Phase | Light Liquid | |
| Mole Fraction Vapor | 57.9613 | % | Heat Duty | 24109.1 | Btu/h |
| Mole Fraction Light Liquid | 13.1132 | % | Heat Release Curve Type | Plug Flow | |
| Mole Fraction Heavy Liquid | 28.9255 | % | Heat Release Curve Increments | 10 | |

## Entrainments

### Entrainment Entrainment 1

| | | | | | |
|---|---|---|---|---|---|
| From Phase (Numerator) | Light Liquid | | * Numerator Value | 0.5 | gal |
| * To Phase (Denominator) | Heavy Liquid | | * Denominator Value | 100 | gal |
| * Numerator Basis | Volume | | Entrainment Value | 0.5 | % |
| Denominator Basis | per Volume | | * Active | True | |

**Remarks**


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# Flowsheet Environment
# Environment1

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| Flowsheet: | Flowsheet1 | |

## Environment Settings

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

## Components

| Component Name | Henry's Law Component | Phase Initiator | Component Name | Henry's Law Component | Phase Initiator |
|---|---|---|---|---|---|
| Nitrogen | False | False | 2-Methylhexane | False | False |
| Carbon Dioxide | False | False | 3-Methylhexane | False | False |
| Methane | False | False | 2,2,4-Trimethylpentane | False | False |
| Ethane | False | False | n-Heptane | False | False |
| Propane | False | False | Methylcyclohexane | False | False |
| Isobutane | False | False | Toluene | False | False |
| n-Butane | False | False | n-Octane | False | False |
| Neopentane | False | False | Ethylbenzene | False | False |
| Isopentane | False | False | p-Xylene | False | False |
| n-Pentane | False | False | o-Xylene | False | False |
| 2-2-Dimethylbutane | False | False | n-Nonane | False | False |
| 2-Methylpentane | False | False | n-Decane | False | False |
| 3-Methylpentane | False | False | Water | False | True |
| n-Hexane | False | False | Cyclopentane | False | False |
| Methylcyclopentane | False | False | 2-3-Dimethylbutane | False | False |
| Benzene | False | False | Undecanes Plus | False | False |
| Cyclohexane | False | False | | | |

## Physical Property Method Sets

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

**Remarks**


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# Environments Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Project-Wide Constants

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

## Environment [Environment1]

### Environment Settings

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

### Components

| Component Name | Henry's Law Component | Phase Initiator | Component Name | Henry's Law Component | Phase Initiator |
|---|---|---|---|---|---|
| Nitrogen | False | False | 2-Methylhexane | False | False |
| Carbon Dioxide | False | False | 3-Methylhexane | False | False |
| Methane | False | False | 2,2,4-Trimethylpentane | False | False |
| Ethane | False | False | n-Heptane | False | False |
| Propane | False | False | Methylcyclohexane | False | False |
| Isobutane | False | False | Toluene | False | False |
| n-Butane | False | False | n-Octane | False | False |
| Neopentane | False | False | Ethylbenzene | False | False |
| Isopentane | False | False | p-Xylene | False | False |
| n-Pentane | False | False | o-Xylene | False | False |
| 2-2-Dimethylbutane | False | False | n-Nonane | False | False |
| 2-Methylpentane | False | False | n-Decane | False | False |
| 3-Methylpentane | False | False | Water | False | True |
| n-Hexane | False | False | Cyclopentane | False | False |
| Methylcyclopentane | False | False | 2-3-Dimethylbutane | False | False |
| Benzene | False | False | Undecanes Plus | False | False |
| Cyclohexane | False | False | | | |

### Physical Property Method Sets

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

**Remarks**


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# Single Oil Report
# Undecanes Plus

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| | | |

## Properties

| | | | | | |
|---|---|---|---|---|---|
| | Volume Average Boiling Point | 463.899 °F | Low Temperature Viscosity | 1.65182 | cP |
| * | Molecular Weight | 186.396 lb/lbmol | Temperature of High T Viscosity | 210 | °F |
| * | Specific Gravity | 0.8206 | High Temperature Viscosity | 0.694579 | cP |
| | API Gravity | 40.9348 | Watson K | 11.8675 | |
| | Critical Temperature | 789.17 °F | ASTM D86 10-90% Slope | 0 | °F/% |
| | Critical Pressure | 288.107 psia | ASTM D93 Flash Point | 201.891 | °F |
| | Critical Volume | 11.4161 ft^3/lbmol | Pour Point | -11.5239 | °F |
| | Acentric Factor | 0.58965 | Paraffinic Fraction | 44.6638 | % |
| | Carbon to Hydrogen Ratio | 6.31479 | Naphthenic Fraction | 29.7178 | % |
| | Refractive Index | 1.45703 | Aromatic Fraction | 25.6184 | % |
| | Temperature of Low T Viscosity | 100 °F | Ideal Gas Heat Capacity | 64.718 | Btu/(lbmol*°F) |

**Remarks**


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# Calculator Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## PL flow

### Source Code

Residual Error (for CV1) = SLflow - 2571

### Calculated Variable [CV1]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water Flow!Phases!Total!Properties!Std Liquid Volumetric Flow |
| Value | 2569.72 |
| Unit | |

### Measured Variable [SLflow]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Stable Liquid!Phases!Total!Properties!Std Liquid Volumetric Flow |
| Value | 2571 |
| Unit | |

### Solver Properties

Status: Solved

| | | | | |
|---|---|---|---|---|
| Error | -3.00133E-11 | | Algorithm | Default |
| Calculated Value | 74.9501 | sgpm | Iterations | 2 |
| Lower Bound | | sgpm | Max Iterations | 20 |
| Upper Bound | | sgpm | Weighting | 1 |
| Step Size | | sgpm | Solver Active | Active |
| Is Minimizer | False | | * Skip Dependency Check | True |

**Remarks**

## SG flow

### Source Code

Residual Error (for CV1) = SGflow - 38

### Calculated Variable [CV1]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Well Stream!Phases!Total!Properties!Std Vapor Volumetric Flow |
| Value | 46.6067 |
| Unit | |

### Measured Variable [SGflow]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Gas to Dehy and Sales!Phases!Total!Properties!Std Vapor Volumetric Flow |
| Value | 38 |
| Unit | |

### Solver Properties

Status: Solved

| | | | | |
|---|---|---|---|---|
| Error | 1.98952E-13 | | Algorithm | Default |
| Calculated Value | 46.6067 | MMSCFD | Iterations | 2 |
| Lower Bound | | MMSCFD | Max Iterations | 20 |
| Upper Bound | | MMSCFD | Weighting | 1 |
| Step Size | | MMSCFD | Solver Active | Active |
| Is Minimizer | False | | * Skip Dependency Check | True |

**Remarks**



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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Palleta Tank Farm

### User Value [ShellLength]

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

### User Value [ShellDiam]

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

### User Value [BreatherVP]

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

### User Value [BreatherVacP]

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

### User Value [DomeRadius]

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

### User Value [OpPress]

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

### User Value [AvgPercentLiq]

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

### User Value [MaxPercentLiq]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 90 % | Upper Bound | | % |
| | Lower Bound | % | * Enforce Bounds | False | |

### User Value [AnnNetTP]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 2570.84 bbl/day | Upper Bound | | bbl/day |
| | Lower Bound | bbl/day | * Enforce Bounds | False | |

### User Value [OREff]

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

### User Value [MaxAvgT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 59.9 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [MinAvgT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 40.7 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [BulkLiqT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 54.64 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [AvgP]

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


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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## User Value [Therml]

| | | | | |
|---|---|---|---|---|
| * Parameter | 1069 | Btu/ft^2/day | Upper Bound | Btu/ft^2/day |
| Lower Bound | | Btu/ft^2/day | * Enforce Bounds | False |

## User Value [AvgWindSpeed]

| | | | | |
|---|---|---|---|---|
| * Parameter | 9.1 | mi/h | Upper Bound | mi/h |
| Lower Bound | | mi/h | * Enforce Bounds | False |

## User Value [MaxHourlyLoadingRate]

| | | | | |
|---|---|---|---|---|
| * Parameter | 107.118 | bbl/hr | Upper Bound | bbl/hr |
| Lower Bound | | bbl/hr | * Enforce Bounds | False |

## User Value [EntrainedOilFrac]

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

## User Value [TurnoverRate]

| | | | | |
|---|---|---|---|---|
| * Parameter | 323.463 | | Upper Bound | |
| Lower Bound | | | * Enforce Bounds | False |

## User Value [LLossSatFactor]

| | | | | |
|---|---|---|---|---|
| * Parameter | 1.45 | | Upper Bound | |
| Lower Bound | | | * Enforce Bounds | False |

## User Value [AtmPressure]

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

## User Value [TVP]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.278904 | psia | Upper Bound | psia |
| Lower Bound | | psia | * Enforce Bounds | False |

## User Value [AvgLiqSurfaceT]

| | | | | |
|---|---|---|---|---|
| * Parameter | 60.2465 | °F | Upper Bound | °F |
| Lower Bound | | °F | * Enforce Bounds | False |

## User Value [MaxLiqSurfaceT]

| | | | | |
|---|---|---|---|---|
| * Parameter | 70.3624 | °F | Upper Bound | °F |
| Lower Bound | | °F | * Enforce Bounds | False |

## User Value [TotalLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.172114 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [WorkingLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.0181242 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [StandingLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.00339006 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [RimSealLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0 | ton/yr | Upper Bound | ton/yr |


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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## User Value [RimSealLosses]

| | | | |
|---|---|---|---|
| Lower Bound | ton/yr | * Enforce Bounds | False |

## User Value [WithdrawalLoss]

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

## User Value [LoadingLosses]

| | | | |
|---|---|---|---|
| * Parameter | 0.815755 lb/h | Upper Bound | lb/h |
| Lower Bound | lb/h | * Enforce Bounds | False |

## User Value [MaxHourlyLoadingLoss]

| | | | |
|---|---|---|---|
| * Parameter | 0.815755 lb/hr | Upper Bound | lb/hr |
| Lower Bound | lb/hr | * Enforce Bounds | False |

## User Value [PStar]

| | | | |
|---|---|---|---|
| Parameter | | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |

## User Value [DeckFittingLosses]

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

## User Value [DeckSeamLosses]

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

## User Value [FlashingLosses]

| | | | |
|---|---|---|---|
| * Parameter | 0 lb/h | Upper Bound | lb/h |
| Lower Bound | lb/h | * Enforce Bounds | False |

## User Value [TotalResidual]

| | | | |
|---|---|---|---|
| * Parameter | 164232 ton/yr | Upper Bound | ton/yr |
| Lower Bound | ton/yr | * Enforce Bounds | False |

## User Value [GasMoleWeight]

| | | | |
|---|---|---|---|
| * Parameter | 0.0187085 kg/mol | Upper Bound | kg/mol |
| Lower Bound | kg/mol | * Enforce Bounds | False |

## User Value [VapReportableFrac]

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

## User Value [LiqReportableFrac]

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

## User Value [FlashReportableFrac]

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

## User Value [BlockReady]

| | | | |
|---|---|---|---|
| * Parameter | 1 | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |



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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

**Remarks**
This User Value Set was programmatically generated. GUID={3843DD0A-6AE9-40D0-99C6-A976AAF7621C}

## Tank Losses

### User Value [BlockReady]

| | | | |
|---|---|---|---|
| * Parameter | 1 | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={3843DD0A-6AE9-40D0-99C6-A976AAF7621C}

## Sum Component Flow/Frac

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.0043342 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={925DEC8C-C0EC-472A-A9CD-1FF5DC1AF139}

## Sum Component Flow/Frac.52

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.0205424 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={BDF4AF0A-AFC7-4483-9E2C-9812C5730341}

## Sum Component Flow/Frac.53

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 221.358 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={4D7786AF-B02E-4564-9E48-7DCDC380F443}

## Sum Component Flow/Frac.55

### User Value [CompSum]

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

**Remarks**
This User Value Set was programmatically generated. GUID={ABD34E80-30AB-401A-B739-62707180E523}


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Component Recoveries - Project Inlets

Status: Solved

### Recovery Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Measured Well Stream lbmol/h | Flowsheet1:Produced Water Flow lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 21.4928 | 0 | 21.4928 | |
| Carbon Dioxide | 7.62483 | 0 | 7.62483 | |
| Methane | 3423.29 | 0 | 3423.29 | |
| Ethane | 862.987 | 0 | 862.987 | |
| Propane | 367.783 | 0 | 367.783 | |
| Isobutane | 45.0837 | 0 | 45.0837 | |
| n-Butane | 123.737 | 0 | 123.737 | |
| Neopentane | 0.716427 | 0 | 0.716427 | |
| Isopentane | 31.0622 | 0 | 31.0622 | |
| n-Pentane | 45.3396 | 0 | 45.3396 | |
| 2-2-Dimethylbutane | 0.7676 | 0 | 0.7676 | |
| 2-Methylpentane | 10.5417 | 0 | 10.5417 | |
| 3-Methylpentane | 6.70371 | 0 | 6.70371 | |
| n-Hexane | 20.1623 | 0 | 20.1623 | |
| Methylcyclopentane | 1.84224 | 0 | 1.84224 | |
| Benzene | 0.30704 | 0 | 0.30704 | |
| Cyclohexane | 2.91688 | 0 | 2.91688 | |
| 2-Methylhexane | 5.93611 | 0 | 5.93611 | |
| 3-Methylhexane | 6.34549 | 0 | 6.34549 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 17.9618 | 0 | 17.9618 | |
| Methylcyclohexane | 6.80605 | 0 | 6.80605 | |
| Toluene | 1.33051 | 0 | 1.33051 | |
| n-Octane | 27.0195 | 0 | 27.0195 | |
| Ethylbenzene | 1.17699 | 0 | 1.17699 | |
| p-Xylene | 1.22816 | 0 | 1.22816 | |
| o-Xylene | 2.35397 | 0 | 2.35397 | |
| n-Nonane | 16.9384 | 0 | 16.9384 | |
| n-Decane | 14.7891 | 0 | 14.7891 | |
| Water | 0 | 2081.15 | 2081.15 | |
| Cyclopentane | 0.102347 | 0 | 0.102347 | |
| 2-3-Dimethylbutane | 1.73989 | 0 | 1.73989 | |
| Undecanes Plus | 41.2457 | 0 | 41.2457 | |
| Total | 5117.33 | 2081.15 | 7198.48 | |

**Remarks**

## Component Recoveries - Project Outlets

Status: Solved

### Recovery Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |


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# Recoveries Report

| | |
|---|---|
| Client Name: | Chevron Appalachia, LLC |
| Location: | Taylor Pad B |
| Job: Produced Water Tank | |

## Parameters

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

## Tabulated Data

| Index | Flowsheet1:Condensate to Pipeline lbmol/h | Flowsheet1:Gas to Dehy and Sales lbmol/h | Flowsheet1:Produced Water lbmol/h | Flowsheet1:PW Tank Vent Gas lbmol/h |
|---|---|---|---|---|
| Nitrogen | 0.710626 | 20.7709 | 6.07716E-05 | |
| Carbon Dioxide | 1.05506 | 6.48493 | 0.0156867 | |
| Methane | 254.965 | 3165.45 | 0.0318871 | |
| Ethane | 192.091 | 670.008 | 0.0161804 | |
| Propane | 150.386 | 216.998 | 0.00744642 | |
| Isobutane | 25.3464 | 19.6789 | 0.00155606 | |
| n-Butane | 77.7295 | 45.8299 | 0.00658456 | |
| Neopentane | 0.471271 | 0.244115 | 4.23464E-05 | |
| Isopentane | 23.2893 | 7.72177 | 0.00381549 | |
| n-Pentane | 35.7009 | 9.56111 | 0.00708226 | |
| 2-2-Dimethylbutane | 0.646943 | 0.119253 | 0.000197477 | |
| 2-Methylpentane | 9.21468 | 1.30703 | 0.00387834 | |
| 3-Methylpentane | 5.91832 | 0.772504 | 0.00278 | |
| n-Hexane | 18.1292 | 1.99383 | 0.0101333 | |
| Methylcyclopentane | 1.66387 | 0.174737 | 0.000956501 | |
| Benzene | 0.276841 | 0.0290178 | 0.000788923 | |
| Cyclohexane | 2.67603 | 0.234968 | 0.00206339 | |
| 2-Methylhexane | 5.5438 | 0.380304 | 0.00521375 | |
| 3-Methylhexane | 5.95769 | 0.374899 | 0.00596062 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 17.0113 | 0.913766 | 0.0196347 | |
| Methylcyclohexane | 6.47528 | 0.316717 | 0.00756322 | |
| Toluene | 1.27126 | 0.0559267 | 0.00241485 | |
| n-Octane | 26.3062 | 0.656379 | 0.0452265 | |
| Ethylbenzene | 1.15058 | 0.023772 | 0.00225216 | |
| p-Xylene | 1.20113 | 0.0243334 | 0.00229716 | |
| o-Xylene | 2.30873 | 0.0399177 | 0.00472592 | |
| n-Nonane | 16.7266 | 0.175597 | 0.0335828 | |
| n-Decane | 14.6733 | 0.0839986 | 0.0309983 | |
| Water | 0.286461 | 1.64596 | 2079.1 | |
| Cyclopentane | 0.0858117 | 0.0163386 | 3.28446E-05 | |
| 2-3-Dimethylbutane | 1.5121 | 0.224504 | 0.000609147 | |
| Undecanes Plus | 41.1343 | 0.0224125 | 0.0889653 | |
| Total | 941.916 | 4172.33 | 2079.46 | |

| Index | Flowsheet1:Tank Vent Gas lbmol/h | Summary Table lbmol/h | | |
|---|---|---|---|---|
| Nitrogen | 0.0112546 | 21.4928 | | |
| Carbon Dioxide | 0.0691594 | 7.62483 | | |
| Methane | 2.84614 | 3423.29 | | |
| Ethane | 0.871495 | 862.987 | | |
| Propane | 0.39142 | 367.783 | | |
| Isobutane | 0.0568107 | 45.0837 | | |
| n-Butane | 0.171104 | 123.737 | | |
| Neopentane | 0.000998103 | 0.716427 | | |
| Isopentane | 0.0473514 | 31.0622 | | |
| n-Pentane | 0.0705311 | 45.3396 | | |
| 2-2-Dimethylbutane | 0.00120686 | 0.7676 | | |
| 2-Methylpentane | 0.0161176 | 10.5417 | | |
| 3-Methylpentane | 0.0101071 | 6.70371 | | |
| n-Hexane | 0.0291374 | 20.1623 | | |
| Methylcyclopentane | 0.00267728 | 1.84224 | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

| Index | Flowsheet1:Tank Vent Gas lbmol/h | Summary Table lbmol/h | | |
|---|---|---|---|---|
| Benzene | 0.000392677 | 0.30704 | | |
| Cyclohexane | 0.00382199 | 2.91688 | | |
| 2-Methylhexane | 0.00679248 | 5.93611 | | |
| 3-Methylhexane | 0.00694299 | 6.34549 | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | |
| n-Heptane | 0.0171908 | 17.9618 | | |
| Methylcyclohexane | 0.00649198 | 6.80605 | | |
| Toluene | 0.000903098 | 1.33051 | | |
| n-Octane | 0.0117094 | 27.0195 | | |
| Ethylbenzene | 0.000377785 | 1.17699 | | |
| p-Xylene | 0.000396657 | 1.22816 | | |
| o-Xylene | 0.000604323 | 2.35397 | | |
| n-Nonane | 0.00261874 | 16.9384 | | |
| n-Decane | 0.000759098 | 14.7891 | | |
| Water | 0.118524 | 2081.15 | | |
| Cyclopentane | 0.000163523 | 0.102347 | | |
| 2-3-Dimethylbutane | 0.00268335 | 1.73989 | | |
| Undecanes Plus | 6.39449E-05 | 41.2457 | | |
| Total | 4.77594 | 7198.48 | | |

**Remarks**

## Component Recoveries - Project Losses

Status: Solved

### Reference Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |

### Recovery Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Nitrogen | 7.04915E-15 | | | |
| Carbon Dioxide | -3.52458E-15 | | | |
| Methane | 1.35344E-12 | | | |
| Ethane | -1.12786E-13 | | | |
| Propane | 2.81966E-13 | | | |
| Isobutane | 3.52458E-14 | | | |
| n-Butane | 5.63932E-14 | | | |
| Neopentane | 3.30429E-16 | | | |
| Isopentane | 3.52458E-15 | | | |
| n-Pentane | 7.04915E-15 | | | |
| 2-2-Dimethylbutane | 0 | | | |
| 2-Methylpentane | 0 | | | |
| 3-Methylpentane | -8.81144E-16 | | | |
| n-Hexane | -7.04915E-15 | | | |
| Methylcyclopentane | 0 | | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| | | |

## Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Benzene | -5.50715E-17 | | | |
| Cyclohexane | -1.32172E-15 | | | |
| 2-Methylhexane | -3.52458E-15 | | | |
| 3-Methylhexane | -6.16801E-15 | | | |
| 2,2,4-Trimethylpentane | 0 | | | |
| n-Heptane | -2.11475E-14 | | | |
| Methylcyclohexane | -6.16801E-15 | | | |
| Toluene | -1.32172E-15 | | | |
| n-Octane | -5.99178E-14 | | | |
| Ethylbenzene | -2.42315E-15 | | | |
| p-Xylene | -2.64343E-15 | | | |
| o-Xylene | -4.84629E-15 | | | |
| n-Nonane | -5.63932E-14 | | | |
| n-Decane | -4.40572E-14 | | | |
| Water | 9.02292E-13 | | | |
| Cyclopentane | 2.75358E-17 | | | |
| 2-3-Dimethylbutane | -2.20286E-16 | | | |
| Undecanes Plus | -1.12786E-13 | | | |
| Total | 3.60917E-12 | | | |

**Remarks**

## Component Recoveries - Project Recoveries

Status: Solved

### Reference Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Recovery Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Condensate to Pipeline % | Flowsheet1:Gas to Dehy and Sales % | Flowsheet1:Produced Water % | Flowsheet1:PW Tank Vent Gas % |
|---|---|---|---|---|
| Nitrogen | 3.30635 | 96.641 | 0.000282753 | |
| Carbon Dioxide | 13.8371 | 85.0501 | 0.205732 | |
| Methane | 7.44794 | 92.468 | 0.000931475 | |
| Ethane | 22.2589 | 77.6382 | 0.00187493 | |
| Propane | 40.89 | 59.0015 | 0.00202468 | |
| Isobutane | 56.2208 | 43.6497 | 0.0034515 | |
| n-Butane | 62.8183 | 37.0381 | 0.00532141 | |
| Neopentane | 65.7808 | 34.074 | 0.00591078 | |
| Isopentane | 74.9762 | 24.859 | 0.0122834 | |
| n-Pentane | 78.741 | 21.0878 | 0.0156205 | |
| 2-2-Dimethylbutane | 84.2812 | 15.5359 | 0.0257265 | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Tabulated Data

| Index | Flowsheet1:Condensate to Pipeline % | Flowsheet1:Gas to Dehy and Sales % | Flowsheet1:Produced Water % | Flowsheet1:PW Tank Vent Gas % |
|---|---|---|---|---|
| 2-Methylpentane | 87.4116 | 12.3987 | 0.0367904 | |
| 3-Methylpentane | 88.2842 | 11.5235 | 0.0414696 | |
| n-Hexane | 89.9163 | 9.88888 | 0.0502587 | |
| Methylcyclopentane | 90.3177 | 9.48505 | 0.0519205 | |
| Benzene | 90.1643 | 9.45082 | 0.256945 | |
| Cyclohexane | 91.7428 | 8.05546 | 0.0707395 | |
| 2-Methylhexane | 93.3911 | 6.40663 | 0.0878312 | |
| 3-Methylhexane | 93.8885 | 5.90811 | 0.0939348 | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 94.7077 | 5.08726 | 0.109313 | |
| Methylcyclohexane | 95.14 | 4.65346 | 0.111125 | |
| Toluene | 95.5472 | 4.20341 | 0.181498 | |
| n-Octane | 97.36 | 2.42928 | 0.167385 | |
| Ethylbenzene | 97.7568 | 2.01973 | 0.19135 | |
| p-Xylene | 97.7994 | 1.98129 | 0.187041 | |
| o-Xylene | 98.0778 | 1.69576 | 0.200764 | |
| n-Nonane | 98.7496 | 1.03668 | 0.198264 | |
| n-Decane | 99.2173 | 0.567977 | 0.209602 | |
| Water | 0.0137646 | 0.0790891 | 99.9015 | |
| Cyclopentane | 83.8441 | 15.964 | 0.0320915 | |
| 2-3-Dimethylbutane | 86.9075 | 12.9033 | 0.0350106 | |
| Undecanes Plus | 99.7298 | 0.054339 | 0.215696 | |
| Total | 13.0849 | 57.9613 | 28.8874 | |

| Index | Flowsheet1:Tank Vent Gas % | Summary Table % | | |
|---|---|---|---|---|
| Nitrogen | 0.0523644 | 100 | | |
| Carbon Dioxide | 0.907029 | 100 | | |
| Methane | 0.0831403 | 100 | | |
| Ethane | 0.100986 | 100 | | |
| Propane | 0.106427 | 100 | | |
| Isobutane | 0.126012 | 100 | | |
| n-Butane | 0.13828 | 100 | | |
| Neopentane | 0.139317 | 100 | | |
| Isopentane | 0.152441 | 100 | | |
| n-Pentane | 0.155562 | 100 | | |
| 2-2-Dimethylbutane | 0.157225 | 100 | | |
| 2-Methylpentane | 0.152894 | 100 | | |
| 3-Methylpentane | 0.150768 | 100 | | |
| n-Hexane | 0.144514 | 100 | | |
| Methylcyclopentane | 0.145328 | 100 | | |
| Benzene | 0.127891 | 100 | | |
| Cyclohexane | 0.13103 | 100 | | |
| 2-Methylhexane | 0.114427 | 100 | | |
| 3-Methylhexane | 0.109416 | 100 | | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 0.0957072 | 100 | | |
| Methylcyclohexane | 0.0953854 | 100 | | |
| Toluene | 0.0678762 | 100 | | |
| n-Octane | 0.0433367 | 100 | | |
| Ethylbenzene | 0.0320976 | 100 | | |
| p-Xylene | 0.0322968 | 100 | | |
| o-Xylene | 0.0256725 | 100 | | |
| n-Nonane | 0.0154604 | 100 | | |
| n-Decane | 0.00513282 | 100 | | |
| Water | 0.00569515 | 100 | | |
| Cyclopentane | 0.159774 | 100 | | |
| 2-3-Dimethylbutane | 0.154225 | 100 | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

| Index | Flowsheet1:Tank Vent Gas % | Summary Table % | | |
|---|---|---|---|---|
| Undecanes Plus | 0.000155034 | 100 | | |
| Total | 0.0663465 | 100 | | |

**Remarks**

## Component Recoveries - Flowsheet1 Inlets

Status: Solved

### Recovery Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Measured Well Stream lbmol/h | Flowsheet1:Produced Water Flow lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 21.4928 | 0 | 21.4928 | |
| Carbon Dioxide | 7.62483 | 0 | 7.62483 | |
| Methane | 3423.29 | 0 | 3423.29 | |
| Ethane | 862.987 | 0 | 862.987 | |
| Propane | 367.783 | 0 | 367.783 | |
| Isobutane | 45.0837 | 0 | 45.0837 | |
| n-Butane | 123.737 | 0 | 123.737 | |
| Neopentane | 0.716427 | 0 | 0.716427 | |
| Isopentane | 31.0622 | 0 | 31.0622 | |
| n-Pentane | 45.3396 | 0 | 45.3396 | |
| 2-2-Dimethylbutane | 0.7676 | 0 | 0.7676 | |
| 2-Methylpentane | 10.5417 | 0 | 10.5417 | |
| 3-Methylpentane | 6.70371 | 0 | 6.70371 | |
| n-Hexane | 20.1623 | 0 | 20.1623 | |
| Methylcyclopentane | 1.84224 | 0 | 1.84224 | |
| Benzene | 0.30704 | 0 | 0.30704 | |
| Cyclohexane | 2.91688 | 0 | 2.91688 | |
| 2-Methylhexane | 5.93611 | 0 | 5.93611 | |
| 3-Methylhexane | 6.34549 | 0 | 6.34549 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 17.9618 | 0 | 17.9618 | |
| Methylcyclohexane | 6.80605 | 0 | 6.80605 | |
| Toluene | 1.33051 | 0 | 1.33051 | |
| n-Octane | 27.0195 | 0 | 27.0195 | |
| Ethylbenzene | 1.17699 | 0 | 1.17699 | |
| p-Xylene | 1.22816 | 0 | 1.22816 | |
| o-Xylene | 2.35397 | 0 | 2.35397 | |
| n-Nonane | 16.9384 | 0 | 16.9384 | |
| n-Decane | 14.7891 | 0 | 14.7891 | |
| Water | 0 | 2081.15 | 2081.15 | |
| Cyclopentane | 0.102347 | 0 | 0.102347 | |
| 2-3-Dimethylbutane | 1.73989 | 0 | 1.73989 | |
| Undecanes Plus | 41.2457 | 0 | 41.2457 | |
| Total | 5117.33 | 2081.15 | 7198.48 | |

**Remarks**


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# Recoveries Report

| | |
|---|---|
| Client Name: | Chevron Appalachia, LLC |
| Location: | Taylor Pad B |
| Job: Produced Water Tank | |

## Component Recoveries - Flowsheet1 Outlets

Status: Solved

### Recovery Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Condensate to Pipeline lbmol/h | Flowsheet1:Gas to Dehy and Sales lbmol/h | Flowsheet1:Produced Water lbmol/h | Flowsheet1:PW Tank Vent Gas lbmol/h |
|---|---|---|---|---|
| Nitrogen | 0.710626 | 20.7709 | 6.07716E-05 | |
| Carbon Dioxide | 1.05506 | 6.48493 | 0.0156867 | |
| Methane | 254.965 | 3165.45 | 0.0318871 | |
| Ethane | 192.091 | 670.008 | 0.0161804 | |
| Propane | 150.386 | 216.998 | 0.00744642 | |
| Isobutane | 25.3464 | 19.6789 | 0.00155606 | |
| n-Butane | 77.7295 | 45.8299 | 0.00658456 | |
| Neopentane | 0.471271 | 0.244115 | 4.23464E-05 | |
| Isopentane | 23.2893 | 7.72177 | 0.00381549 | |
| n-Pentane | 35.7009 | 9.56111 | 0.00708226 | |
| 2-2-Dimethylbutane | 0.646943 | 0.119253 | 0.000197477 | |
| 2-Methylpentane | 9.21468 | 1.30703 | 0.00387834 | |
| 3-Methylpentane | 5.91832 | 0.772504 | 0.00278 | |
| n-Hexane | 18.1292 | 1.99383 | 0.0101333 | |
| Methylcyclopentane | 1.66387 | 0.174737 | 0.000956501 | |
| Benzene | 0.276841 | 0.0290178 | 0.000788923 | |
| Cyclohexane | 2.67603 | 0.234968 | 0.00206339 | |
| 2-Methylhexane | 5.5438 | 0.380304 | 0.00521375 | |
| 3-Methylhexane | 5.95769 | 0.374899 | 0.00596062 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 17.0113 | 0.913766 | 0.0196347 | |
| Methylcyclohexane | 6.47528 | 0.316717 | 0.00756322 | |
| Toluene | 1.27126 | 0.0559267 | 0.00241485 | |
| n-Octane | 26.3062 | 0.656379 | 0.0452265 | |
| Ethylbenzene | 1.15058 | 0.023772 | 0.00225216 | |
| p-Xylene | 1.20113 | 0.0243334 | 0.00229716 | |
| o-Xylene | 2.30873 | 0.0399177 | 0.00472592 | |
| n-Nonane | 16.7266 | 0.175597 | 0.0335828 | |
| n-Decane | 14.6733 | 0.0839986 | 0.0309983 | |
| Water | 0.286461 | 1.64596 | 2079.1 | |
| Cyclopentane | 0.0858117 | 0.0163386 | 3.28446E-05 | |
| 2-3-Dimethylbutane | 1.5121 | 0.224504 | 0.000609147 | |
| Undecanes Plus | 41.1343 | 0.0224125 | 0.0889653 | |
| Total | 941.916 | 4172.33 | 2079.46 | |

| Index | Flowsheet1:Tank Vent Gas lbmol/h | Summary Table lbmol/h | | |
|---|---|---|---|---|
| Nitrogen | 0.0112546 | 21.4928 | | |
| Carbon Dioxide | 0.0691594 | 7.62483 | | |
| Methane | 2.84614 | 3423.29 | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

| Index | Flowsheet1:Tank Vent Gas lbmol/h | Summary Table lbmol/h | | |
|---|---|---|---|---|
| Ethane | 0.871495 | 862.987 | | |
| Propane | 0.39142 | 367.783 | | |
| Isobutane | 0.0568107 | 45.0837 | | |
| n-Butane | 0.171104 | 123.737 | | |
| Neopentane | 0.000998103 | 0.716427 | | |
| Isopentane | 0.0473514 | 31.0622 | | |
| n-Pentane | 0.0705311 | 45.3396 | | |
| 2-2-Dimethylbutane | 0.00120686 | 0.7676 | | |
| 2-Methylpentane | 0.0161176 | 10.5417 | | |
| 3-Methylpentane | 0.0101071 | 6.70371 | | |
| n-Hexane | 0.0291374 | 20.1623 | | |
| Methylcyclopentane | 0.00267728 | 1.84224 | | |
| Benzene | 0.000392677 | 0.30704 | | |
| Cyclohexane | 0.00382199 | 2.91688 | | |
| 2-Methylhexane | 0.00679248 | 5.93611 | | |
| 3-Methylhexane | 0.00694299 | 6.34549 | | |
| 2,2,4-Trimethylpentane | 0 | 0 | | |
| n-Heptane | 0.0171908 | 17.9618 | | |
| Methylcyclohexane | 0.00649198 | 6.80605 | | |
| Toluene | 0.000903098 | 1.33051 | | |
| n-Octane | 0.0117094 | 27.0195 | | |
| Ethylbenzene | 0.000377785 | 1.17699 | | |
| p-Xylene | 0.000396657 | 1.22816 | | |
| o-Xylene | 0.000604323 | 2.35397 | | |
| n-Nonane | 0.00261874 | 16.9384 | | |
| n-Decane | 0.000759098 | 14.7891 | | |
| Water | 0.118524 | 2081.15 | | |
| Cyclopentane | 0.000163523 | 0.102347 | | |
| 2-3-Dimethylbutane | 0.00268335 | 1.73989 | | |
| Undecanes Plus | 6.39449E-05 | 41.2457 | | |
| Total | 4.77594 | 7198.48 | | |

**Remarks**

## Component Recoveries - Flowsheet1 Losses

Status: Solved

### Reference Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |

### Recovery Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Nitrogen | 7.04915E-15 | | | |
| Carbon Dioxide | -3.52458E-15 | | | |
| Methane | 1.35344E-12 | | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Ethane | -1.12786E-13 | | | |
| Propane | 2.81966E-13 | | | |
| Isobutane | 3.52458E-14 | | | |
| n-Butane | 5.63932E-14 | | | |
| Neopentane | 3.30429E-16 | | | |
| Isopentane | 3.52458E-15 | | | |
| n-Pentane | 7.04915E-15 | | | |
| 2-2-Dimethylbutane | 0 | | | |
| 2-Methylpentane | 0 | | | |
| 3-Methylpentane | -8.81144E-16 | | | |
| n-Hexane | -7.04915E-15 | | | |
| Methylcyclopentane | 0 | | | |
| Benzene | -5.50715E-17 | | | |
| Cyclohexane | -1.32172E-15 | | | |
| 2-Methylhexane | -3.52458E-15 | | | |
| 3-Methylhexane | -6.16801E-15 | | | |
| 2,2,4-Trimethylpentane | 0 | | | |
| n-Heptane | -2.11475E-14 | | | |
| Methylcyclohexane | -6.16801E-15 | | | |
| Toluene | -1.32172E-15 | | | |
| n-Octane | -5.99178E-14 | | | |
| Ethylbenzene | -2.42315E-15 | | | |
| p-Xylene | -2.64343E-15 | | | |
| o-Xylene | -4.84629E-15 | | | |
| n-Nonane | -5.63932E-14 | | | |
| n-Decane | -4.40572E-14 | | | |
| Water | 9.02292E-13 | | | |
| Cyclopentane | 2.75358E-17 | | | |
| 2-3-Dimethylbutane | -2.20286E-16 | | | |
| Undecanes Plus | -1.12786E-13 | | | |
| Total | 3.60917E-12 | | | |

**Remarks**

## Component Recoveries - Flowsheet1 Recoveries

Status: Solved

### Reference Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Recovery Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Condensate to Pipeline | Flowsheet1 | PW Tank Vent Gas |
| Flowsheet1 | Gas to Dehy and Sales | Flowsheet1 | Tank Vent Gas |
| Flowsheet1 | Produced Water | | |

### Parameters

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


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| | | |

## Tabulated Data

| Index | Flowsheet1:Condensate to Pipeline % | Flowsheet1:Gas to Dehy and Sales % | Flowsheet1:Produced Water % | Flowsheet1:PW Tank Vent Gas % |
|---|---|---|---|---|
| Nitrogen | 3.30635 | 96.641 | 0.000282753 | |
| Carbon Dioxide | 13.8371 | 85.0501 | 0.205732 | |
| Methane | 7.44794 | 92.468 | 0.000931475 | |
| Ethane | 22.2589 | 77.6382 | 0.00187493 | |
| Propane | 40.89 | 59.0015 | 0.00202468 | |
| Isobutane | 56.2208 | 43.6497 | 0.0034515 | |
| n-Butane | 62.8183 | 37.0381 | 0.00532141 | |
| Neopentane | 65.7808 | 34.074 | 0.00591078 | |
| Isopentane | 74.9762 | 24.859 | 0.0122834 | |
| n-Pentane | 78.741 | 21.0878 | 0.0156205 | |
| 2-2-Dimethylbutane | 84.2812 | 15.5359 | 0.0257265 | |
| 2-Methylpentane | 87.4116 | 12.3987 | 0.0367904 | |
| 3-Methylpentane | 88.2842 | 11.5235 | 0.0414696 | |
| n-Hexane | 89.9163 | 9.88888 | 0.0502587 | |
| Methylcyclopentane | 90.3177 | 9.48505 | 0.0519205 | |
| Benzene | 90.1643 | 9.45082 | 0.256945 | |
| Cyclohexane | 91.7428 | 8.05546 | 0.0707395 | |
| 2-Methylhexane | 93.3911 | 6.40663 | 0.0878312 | |
| 3-Methylhexane | 93.8885 | 5.90811 | 0.0939348 | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 94.7077 | 5.08726 | 0.109313 | |
| Methylcyclohexane | 95.14 | 4.65346 | 0.111125 | |
| Toluene | 95.5472 | 4.20341 | 0.181498 | |
| n-Octane | 97.36 | 2.42928 | 0.167385 | |
| Ethylbenzene | 97.7568 | 2.01973 | 0.19135 | |
| p-Xylene | 97.7994 | 1.98129 | 0.187041 | |
| o-Xylene | 98.0778 | 1.69576 | 0.200764 | |
| n-Nonane | 98.7496 | 1.03668 | 0.198264 | |
| n-Decane | 99.2173 | 0.567977 | 0.209602 | |
| Water | 0.0137646 | 0.0790891 | 99.9015 | |
| Cyclopentane | 83.8441 | 15.964 | 0.0320915 | |
| 2-3-Dimethylbutane | 86.9075 | 12.9033 | 0.0350106 | |
| Undecanes Plus | 99.7298 | 0.054339 | 0.215696 | |
| Total | 13.0849 | 57.9613 | 28.8874 | |

| Index | Flowsheet1:Tank Vent Gas % | Summary Table % | | |
|---|---|---|---|---|
| Nitrogen | 0.0523644 | 100 | | |
| Carbon Dioxide | 0.907029 | 100 | | |
| Methane | 0.0831403 | 100 | | |
| Ethane | 0.100986 | 100 | | |
| Propane | 0.106427 | 100 | | |
| Isobutane | 0.126012 | 100 | | |
| n-Butane | 0.13828 | 100 | | |
| Neopentane | 0.139317 | 100 | | |
| Isopentane | 0.152441 | 100 | | |
| n-Pentane | 0.155562 | 100 | | |
| 2-2-Dimethylbutane | 0.157225 | 100 | | |
| 2-Methylpentane | 0.152894 | 100 | | |
| 3-Methylpentane | 0.150768 | 100 | | |
| n-Hexane | 0.144514 | 100 | | |
| Methylcyclopentane | 0.145328 | 100 | | |
| Benzene | 0.127891 | 100 | | |
| Cyclohexane | 0.13103 | 100 | | |
| 2-Methylhexane | 0.114427 | 100 | | |
| 3-Methylhexane | 0.109416 | 100 | | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 0.0957072 | 100 | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| | | |

| Index | Flowsheet1:Tank Vent Gas % | Summary Table % | | |
|---|---|---|---|---|
| Methylcyclohexane | 0.0953854 | 100 | | |
| Toluene | 0.0678762 | 100 | | |
| n-Octane | 0.0433367 | 100 | | |
| Ethylbenzene | 0.0320976 | 100 | | |
| p-Xylene | 0.0322968 | 100 | | |
| o-Xylene | 0.0256725 | 100 | | |
| n-Nonane | 0.0154604 | 100 | | |
| n-Decane | 0.00513282 | 100 | | |
| Water | 0.00569515 | 100 | | |
| Cyclopentane | 0.159774 | 100 | | |
| 2-3-Dimethylbutane | 0.154225 | 100 | | |
| Undecanes Plus | 0.000155034 | 100 | | |
| Total | 0.0663465 | 100 | | |

**Remarks**


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# Energy Budgets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |

## Power Budget - Project Power Budget

Status: Solved

### Parameters

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

**Remarks**

## Heat Budget - Project Heat Budget

Status: Solved

### Heat Budget Data Source - All Exchangers in Project

| Flowsheet | Block | Flowsheet | Block |
|---|---|---|---|
| Flowsheet1 | Blowdown Process Vessel | Flowsheet1 | VSSL-100 |
| Flowsheet1 | Produced Water Tank | | |

### Parameters

| | | | |
|---|---|---|---|
| Net Duty | 127274 Btu/h | Total Duty Required | 127274 Btu/h |
| Total Duty Supplied | 0 Btu/h | External Energy Only | True |

### Tabulated Data

| Index | Block Duty Btu/h | Block Highest Temperature °F | Block Lowest Temperature °F | |
|---|---|---|---|---|
| Flowsheet1:Blowdown Process Vessel | 103165 | 70 | 65 | |
| Flowsheet1:Produced Water Tank | 0 | 70 | 70 | |
| Flowsheet1:VSSL-100 | 24109.1 | 65 | 64.8438 | |

**Remarks**

## Power Budget - Flowsheet1 Power Budget

Status: Solved

### Parameters

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

**Remarks**

## Heat Budget - Flowsheet1 Heat Budget

Status: Solved

### Heat Budget Data Source - All Exchangers in Flowsheet

| Flowsheet | Block | Flowsheet | Block |
|---|---|---|---|
| Flowsheet1 | Blowdown Process Vessel | Flowsheet1 | VSSL-100 |
| Flowsheet1 | Produced Water Tank | | |

### Parameters

| | | | |
|---|---|---|---|
| Net Duty | 127274 Btu/h | Total Duty Required | 127274 Btu/h |
| Total Duty Supplied | 0 Btu/h | External Energy Only | True |


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# Energy Budgets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Produced Water Tank |
| Location: | Taylor Pad B | |
| | | |

## Tabulated Data

| Index | Block Duty<br>Btu/h | Block Highest Temperature<br>°F | Block Lowest Temperature<br>°F | |
|---|---|---|---|---|
| Flowsheet1:Blowdown Process Vessel | 103165 | 70 | 65 | |
| Flowsheet1:Produced Water Tank | 0 | 70 | 70 | |
| Flowsheet1:VSSL-100 | 24109.1 | 65 | 64.8438 | |

**Remarks**


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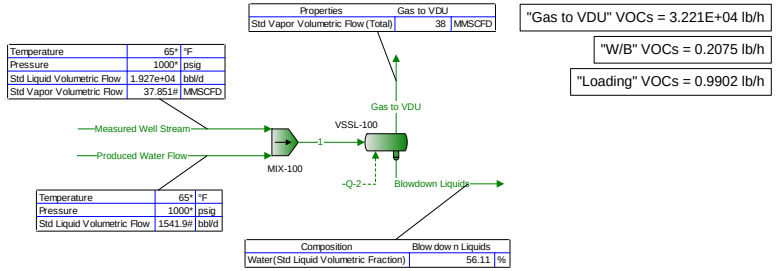
# Flowsheet1
# Plant Schematic

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

Taylor B Pad
Blowdown Process Vessel




**Note**
Working, Breathing and Loading losses include non-VOC components



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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

## Connections

| | Blowdown Liquids | Gas to VDU | Loading | Measured Well Stream | Produced Water Flow |
|---|---|---|---|---|---|
| From Block | VSSL-100 | VSSL-100 | -- | -- | -- |
| To Block | -- | -- | -- | MIX-100 | MIX-100 |

## Stream Composition

| Mole Fraction | Blowdown Liquids % | Gas to VDU % | Loading % | Measured Well Stream % | Produced Water Flow % |
|---|---|---|---|---|---|
| Nitrogen | 4.83456E-05 | 0.41834 | 0.029098 * | 0.42 * | 0 * |
| Carbon Dioxide | 0.000213031 | 0.148353 | 0.229498 * | 0.149 * | 0 * |
| Methane | 0.0235766 | 66.6269 | 21.562 * | 66.896 * | 0 * |
| Ethane | 0.0363749 | 16.7872 | 26.1147 * | 16.864 * | 0 * |
| Propane | 0.0608841 | 7.14085 | 9.58624 * | 7.187 * | 0 * |
| Isobutane | 0.0191743 | 0.871884 | 1.07546 * | 0.881 * | 0 * |
| n-Butane | 0.0769443 | 2.3858 | 2.93685 * | 2.418 * | 0 * |
| Neopentane | 0.000598053 | 0.0137685 | 0.015941 * | 0.014 * | 0 * |
| Isopentane | 0.0502308 | 0.589784 | 0.692893 * | 0.607 * | 0 * |
| n-Pentane | 0.0972614 | 0.853799 | 0.983087 * | 0.886 * | 0 * |
| 2-2-Dimethylbutane | 0.00263454 | 0.014163 | 0.0164175 * | 0.015 * | 0 * |
| 2-Methylpentane | 0.0520154 | 0.189828 | 0.20758 * | 0.206 * | 0 * |
| 3-Methylpentane | 0.0366961 | 0.119647 | 0.131113 * | 0.131 * | 0 * |
| n-Hexane | 0.140952 | 0.350821 | 0.395842 * | 0.394 * | 0 * |
| Methylcyclopentane | 0.0127624 | 0.0320891 | 0.0326727 * | 0.036 * | 0 * |
| Benzene | 0.00248969 | 0.00524108 | 0.00426938 * | 0.006 * | 0 * |
| Cyclohexane | 0.0285855 | 0.048333 | 0.0508398 * | 0.057 * | 0 * |
| 2-Methylhexane | 0.0813546 | 0.0915149 | 0.0264617 * | 0.116 * | 0 * |
| 3-Methylhexane | 0.0949538 | 0.0954665 | 0.103609 * | 0.124 * | 0 * |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 * |
| n-Heptane | 0.333786 | 0.251031 | 0.264436 * | 0.351 * | 0 * |
| Methylcyclohexane | 0.127174 | 0.0949141 | 0.103153 * | 0.133 * | 0 * |
| Toluene | 0.0300143 | 0.0170325 | 0.0145624 * | 0.026 * | 0 * |
| n-Octane | 1.0178 | 0.225294 | 0.23377 * | 0.528 * | 0 * |
| Ethylbenzene | 0.0492544 | 0.00836109 | 0.00786332 * | 0.023 * | 0 * |
| p-Xylene | 0.0520901 | 0.00851956 | 0.00744146 * | 0.024 * | 0 * |
| o-Xylene | 0.106979 | 0.0142202 | 0.0111855 * | 0.046 * | 0 * |
| n-Nonane | 0.910904 | 0.0606396 | 0.0607387 * | 0.331 * | 0 * |
| n-Decane | 0.910411 | 0.0189497 | 0.0177905 * | 0.289 * | 0 * |
| Water | 92.923 | 2.48229 | 35.0454 * | 0 * | 100 * |
| Cyclopentane | 0.000348582 | 0.0018892 | 0.00213499 * | 0.002 * | 0 * |
| 2-3-Dimethylbutane | 0.00798671 | 0.0315076 | 0.0358338 * | 0.034 * | 0 * |
| Undecanes Plus | 2.71247 | 0.00163154 | 0.00110153 * | 0.806 * | 0 * |

| Molar Flow | Blowdown Liquids lbmol/h | Gas to VDU lbmol/h | Loading lbmol/h | Measured Well Stream lbmol/h | Produced Water Flow lbmol/h |
|---|---|---|---|---|---|
| Nitrogen | 0.000595824 | 17.4545 | 3.05108E-05 * | 17.4551 * | 0 * |
| Carbon Dioxide | 0.00262545 | 6.18979 | 0.000240641 * | 6.19241 * | 0 * |
| Methane | 0.290564 | 2779.89 | 0.0226089 * | 2780.19 * | 0 * |
| Ethane | 0.448293 | 700.416 | 0.0273827 * | 700.865 * | 0 * |
| Propane | 0.750352 | 297.94 | 0.0100517 * | 298.69 * | 0 * |
| Isobutane | 0.236309 | 36.3779 | 0.00112768 * | 36.6142 * | 0 * |
| n-Butane | 0.948281 | 99.5434 | 0.00307944 * | 100.492 * | 0 * |
| Neopentane | 0.00737056 | 0.574467 | 1.6715E-05 * | 0.581837 * | 0 * |
| Isopentane | 0.619057 | 24.6078 | 0.000726536 * | 25.2268 * | 0 * |
| n-Pentane | 1.19867 | 35.6233 | 0.00103082 * | 36.822 * | 0 * |
| 2-2-Dimethylbutane | 0.0324688 | 0.590928 | 1.72146E-05 * | 0.623397 * | 0 * |
| 2-Methylpentane | 0.641051 | 7.92027 | 0.000217659 * | 8.56132 * | 0 * |
| 3-Methylpentane | 0.452253 | 4.99208 | 0.000137479 * | 5.44434 * | 0 * |
| n-Hexane | 1.73713 | 14.6374 | 0.000415061 * | 16.3746 * | 0 * |
| Methylcyclopentane | 0.157288 | 1.33887 | 3.4259E-05 * | 1.49615 * | 0 * |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

| Molar Flow | Blowdown Liquids lbmol/h | Gas to VDU lbmol/h | Loading lbmol/h | Measured Well Stream lbmol/h | Produced Water Flow lbmol/h |
|---|---|---|---|---|---|
| Benzene | 0.0306836 | 0.218675 | 4.47668E-06 * | 0.249359 * | 0 * |
| Cyclohexane | 0.352294 | 2.01662 | 5.33082E-05 * | 2.36891 * | 0 * |
| 2-Methylhexane | 1.00263 | 3.8183 | 2.77465E-05 * | 4.82094 * | 0 * |
| 3-Methylhexane | 1.17024 | 3.98318 | 0.00010864 * | 5.15342 * | 0 * |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 * |
| n-Heptane | 4.11367 | 10.4738 | 0.000277276 * | 14.5875 * | 0 * |
| Methylcyclohexane | 1.56732 | 3.96013 | 0.000108161 * | 5.52746 * | 0 * |
| Toluene | 0.369903 | 0.710652 | 1.52694E-05 * | 1.08056 * | 0 * |
| n-Octane | 12.5436 | 9.4 | 0.00024512 * | 21.9436 * | 0 * |
| Ethylbenzene | 0.607023 | 0.348852 | 8.24511E-06 * | 0.955876 * | 0 * |
| p-Xylene | 0.641971 | 0.355464 | 7.80277E-06 * | 0.997436 * | 0 * |
| o-Xylene | 1.31844 | 0.593313 | 1.17286E-05 * | 1.91175 * | 0 * |
| n-Nonane | 11.2262 | 2.53008 | 6.36878E-05 * | 13.7563 * | 0 * |
| n-Decane | 11.2201 | 0.790646 | 1.86543E-05 * | 12.0108 * | 0 * |
| Water | 1145.21 | 103.569 | 0.036747 * | 0 * | 1248.78 * |
| Cyclopentane | 0.00429601 | 0.0788236 | 2.23865E-06 * | 0.0831196 * | 0 * |
| 2-3-Dimethylbutane | 0.0984302 | 1.3146 | 3.75736E-05 * | 1.41303 * | 0 * |
| Undecanes Plus | 33.4291 | 0.0680732 | 1.15502E-06 * | 33.4972 * | 0 * |

| Mass Fraction | Blowdown Liquids % | Gas to VDU % | Loading % | Measured Well Stream % | Produced Water Flow % |
|---|---|---|---|---|---|
| Nitrogen | 5.06181E-05 | 0.486531 | 0.0299928 * | 0.440612 * | 0 * |
| Carbon Dioxide | 0.000350407 | 0.271056 | 0.371633 * | 0.245569 * | 0 * |
| Methane | 0.0141363 | 44.3747 | 12.7277 * | 40.1895 * | 0 * |
| Ethane | 0.0408793 | 20.9562 | 28.8931 * | 18.9898 * | 0 * |
| Propane | 0.100342 | 13.0726 | 15.5537 * | 11.8682 * | 0 * |
| Isobutane | 0.0416529 | 2.10386 | 2.29998 * | 1.91761 * | 0 * |
| n-Butane | 0.167148 | 5.75693 | 6.28076 * | 5.26308 * | 0 * |
| Neopentane | 0.00161269 | 0.0412411 | 0.0423188 * | 0.0378267 * | 0 * |
| Isopentane | 0.135451 | 1.7666 | 1.83943 * | 1.64006 * | 0 * |
| n-Pentane | 0.262272 | 2.55741 | 2.60981 * | 2.39389 * | 0 * |
| 2-2-Dimethylbutane | 0.00848537 | 0.0506704 | 0.0520568 * | 0.0484078 * | 0 * |
| 2-Methylpentane | 0.167532 | 0.679141 | 0.658198 * | 0.664801 * | 0 * |
| 3-Methylpentane | 0.118191 | 0.428057 | 0.415734 * | 0.422762 * | 0 * |
| n-Hexane | 0.453981 | 1.25512 | 1.25514 * | 1.27151 * | 0 * |
| Methylcyclopentane | 0.0401439 | 0.112118 | 0.101176 * | 0.113461 * | 0 * |
| Benzene | 0.00726851 | 0.0169963 | 0.0122707 * | 0.0175513 * | 0 * |
| Cyclohexane | 0.0899147 | 0.168874 | 0.157433 * | 0.179647 * | 0 * |
| 2-Methylhexane | 0.304678 | 0.3807 | 0.0975623 * | 0.435287 * | 0 * |
| 3-Methylhexane | 0.355608 | 0.397139 | 0.381999 * | 0.465307 * | 0 * |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 * |
| n-Heptane | 1.25005 | 1.04428 | 0.974958 * | 1.31712 * | 0 * |
| Methylcyclohexane | 0.466692 | 0.386898 | 0.372665 * | 0.489038 * | 0 * |
| Toluene | 0.10336 | 0.065153 | 0.0493699 * | 0.089713 * | 0 * |
| n-Octane | 4.34528 | 1.06841 | 0.982543 * | 2.25865 * | 0 * |
| Ethylbenzene | 0.195438 | 0.0368519 | 0.0307168 * | 0.091443 * | 0 * |
| p-Xylene | 0.20669 | 0.0375503 | 0.0290689 * | 0.0954188 * | 0 * |
| o-Xylene | 0.424486 | 0.062676 | 0.0436944 * | 0.182886 * | 0 * |
| n-Nonane | 4.36646 | 0.322884 | 0.286635 * | 1.58981 * | 0 * |
| n-Decane | 4.84138 | 0.111935 | 0.093138 * | 1.53988 * | 0 * |
| Water | 62.5672 | 1.85656 | 23.2306 * | 0 * | 100 * |
| Cyclopentane | 0.000913712 | 0.00550066 | 0.00550942 * | 0.00525283 * | 0 * |
| 2-3-Dimethylbutane | 0.0257237 | 0.112724 | 0.113622 * | 0.109724 * | 0 * |
| Undecanes Plus | 18.8966 | 0.0126255 | 0.0075548 * | 5.62617 * | 0 * |

| Mass Flow | Blowdown Liquids lb/h | Gas to VDU lb/h | Loading lb/h | Measured Well Stream lb/h | Produced Water Flow lb/h |
|---|---|---|---|---|---|
| Nitrogen | 0.0166911 | 488.961 | 0.000854711 * | 488.977 * | 0 * |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

| Mass Flow | Blowdown Liquids lb/h | Gas to VDU lb/h | Loading lb/h | Measured Well Stream lb/h | Produced Water Flow lb/h |
|---|---|---|---|---|---|
| Carbon Dioxide | 0.115545 | 272.409 | 0.0105905 * | 272.525 * | 0 * |
| Methane | 4.66137 | 44596.4 | 0.362702 * | 44601 * | 0 * |
| Ethane | 13.4797 | 21060.8 | 0.823372 * | 21074.3 * | 0 * |
| Propane | 33.0872 | 13137.9 | 0.443236 * | 13170.9 * | 0 * |
| Isobutane | 13.7348 | 2114.36 | 0.065543 * | 2128.1 * | 0 * |
| n-Butane | 55.1162 | 5785.68 | 0.178984 * | 5840.79 * | 0 * |
| Neopentane | 0.531777 | 41.4471 | 0.00120597 * | 41.9789 * | 0 * |
| Isopentane | 44.6642 | 1775.42 | 0.0524187 * | 1820.08 * | 0 * |
| n-Pentane | 86.4829 | 2570.18 | 0.0743724 * | 2656.66 * | 0 * |
| 2-2-Dimethylbutane | 2.79801 | 50.9235 | 0.00148347 * | 53.7215 * | 0 * |
| 2-Methylpentane | 55.2428 | 682.532 | 0.0187568 * | 737.775 * | 0 * |
| 3-Methylpentane | 38.973 | 430.195 | 0.0118473 * | 469.168 * | 0 * |
| n-Hexane | 149.698 | 1261.39 | 0.0357681 * | 1411.08 * | 0 * |
| Methylcyclopentane | 13.2372 | 112.678 | 0.00288322 * | 125.915 * | 0 * |
| Benzene | 2.39675 | 17.0811 | 0.000349682 * | 19.4779 * | 0 * |
| Cyclohexane | 29.6489 | 169.717 | 0.00448639 * | 199.366 * | 0 * |
| 2-Methylhexane | 100.466 | 382.601 | 0.00278025 * | 483.067 * | 0 * |
| 3-Methylhexane | 117.26 | 399.123 | 0.0108859 * | 516.382 * | 0 * |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 * | 0 * | 0 * |
| n-Heptane | 412.197 | 1049.5 | 0.0277836 * | 1461.7 * | 0 * |
| Methylcyclohexane | 153.889 | 388.83 | 0.0106199 * | 542.719 * | 0 * |
| Toluene | 34.0823 | 65.4783 | 0.0014069 * | 99.5606 * | 0 * |
| n-Octane | 1432.83 | 1073.75 | 0.0279997 * | 2506.58 * | 0 * |
| Ethylbenzene | 64.4446 | 37.0359 | 0.000875342 * | 101.481 * | 0 * |
| p-Xylene | 68.1549 | 37.7379 | 0.000828381 * | 105.893 * | 0 * |
| o-Xylene | 139.972 | 62.989 | 0.00124517 * | 202.961 * | 0 * |
| n-Nonane | 1439.82 | 324.496 | 0.00816828 * | 1764.32 * | 0 * |
| n-Decane | 1596.42 | 112.494 | 0.00265417 * | 1708.91 * | 0 * |
| Water | 20631.2 | 1865.83 | 0.662008 * | 0 * | 22497.1 * |
| Cyclopentane | 0.301292 | 5.52813 | 0.000157003 * | 5.82942 * | 0 * |
| 2-3-Dimethylbutane | 8.48226 | 113.286 | 0.00323792 * | 121.769 * | 0 * |
| Undecanes Plus | 6231.06 | 12.6886 | 0.000215291 * | 6243.75 * | 0 * |

## Stream Properties

| Property | Units | Blowdown Liquids | Gas to VDU | Loading | Measured Well Stream | Produced Water Flow |
|---|---|---|---|---|---|---|
| Temperature | °F | 70 | 70 * | 70.3624 * | 65 * | 65 * |
| Pressure | psia | 14.6959 | 14.6959 * | 1.05036 | 1014.7 * | 1014.7 * |
| Mole Fraction Vapor | % | 0 | 100 | 100 * | 81.5437 | 0 |
| Mole Fraction Light Liquid | % | 7.07821 | 0 | 0 | 18.4563 | 100 |
| Mole Fraction Heavy Liquid | % | 92.9218 | 0 | 0 | 0 | 0 |
| Molecular Weight | lb/lbmol | 26.7558 | 24.0871 | 27.1776 | 26.7029 | 18.0153 |
| Mass Density | lb/ft^3 | 55.8721 | 0.0625939 | 0.00502149 | 7.38344 | 62.381 |
| Molar Flow | lbmol/h | 1232.43 | 4172.33 | 0.104855 | 4155.98 | 1248.78 |
| Mass Flow | lb/h | 32974.5 | 100499 | 2.84972 * | 110977 | 22497.1 |
| Vapor Volumetric Flow | ft^3/h | 590.179 | 1.60558E+06 | 567.505 | 15030.5 | 360.64 |
| Liquid Volumetric Flow | gpm | 73.5807 | 200176 | 70.7538 | 1873.93 | 44.9629 |
| Std Vapor Volumetric Flow | MMSCFD | 11.2245 | 38 | 0.000954983 | 37.8511 * | 11.3734 |
| Std Liquid Volumetric Flow | sgpm | 73.5 | 533.596 | 0.0118901 | 562.123 | 44.9732 * |
| Compressibility | | 0.00123809 | 0.994904 | 0.999426 | 0.651757 | 0.0520445 |
| Specific Gravity | | 0.89583 | 0.831662 | 0.938369 | | 1.00019 |
| API Gravity | | 25.9775 | | | | 9.87799 |
| Enthalpy | Btu/h | -1.50848E+08 | -1.56712E+08 | -6517.51 | -1.6377E+08 | -1.53659E+08 |
| Mass Enthalpy | Btu/lb | -4574.69 | -1559.34 | -2287.07 | -1475.71 | -6830.18 |
| Mass Cp | Btu/(lb*°F) | 0.791878 | 0.458816 | 0.428367 | 0.669028 | 0.980925 |
| Ideal Gas CpCv Ratio | | 1.21585 | 1.22019 | 1.20575 | 1.20082 | 1.32608 |
| Dynamic Viscosity | cP | 0.982509 | 0.0101477 | 0.00999605 | | 1.07584 |
| Kinematic Viscosity | cSt | 1.09779 | 10.1208 | 124.273 | | 1.07665 |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.226279 | 0.01592 | 0.0126775 | | 0.344737 |

* User Specified Values
? Extrapolated or Approximate Values


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

## Stream Properties

| Property | Units | Blowdown Liquids | Gas to VDU | Loading | Measured Well Stream | Produced Water Flow |
|---|---|---|---|---|---|---|
| Surface Tension | lbf/ft | 0.00358721 ? | | | | 0.00506977 |
| Net Ideal Gas Heating Value | Btu/ft^3 | 499.399 | 1277.37 | 1108.44 | 1430.49 | 0 |
| Net Liquid Heating Value | Btu/lb | 6358.54 | 20019 | 15130.1 | 20233.2 | -1059.76 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 581.845 | 1404.29 | 1228.14 | 1567.24 | 50.3101 |
| Gross Liquid Heating Value | Btu/lb | 7527.69 | 22018.3 | 16801.3 | 22176.2 | 0 |

**Remarks**


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

## Connections

| | W/B | 1 | | | |
|---|---|---|---|---|---|
| From Block | -- | MIX-100 | | | |
| To Block | -- | VSSL-100 | | | |

## Stream Composition

| Mole Fraction | W/B % | 1 % | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.029098 * | 0.322958 | | | |
| Carbon Dioxide | 0.229498 * | 0.114573 | | | |
| Methane | 21.562 * | 51.4396 | | | |
| Ethane | 26.1147 * | 12.9676 | | | |
| Propane | 9.58624 * | 5.52643 | | | |
| Isobutane | 1.07546 * | 0.677444 | | | |
| n-Butane | 2.93685 * | 1.85932 | | | |
| Neopentane | 0.015941 * | 0.0107653 | | | |
| Isopentane | 0.692893 * | 0.466752 | | | |
| n-Pentane | 0.983087 * | 0.681289 | | | |
| 2-2-Dimethylbutane | 0.0164175 * | 0.0115342 | | | |
| 2-Methylpentane | 0.20758 * | 0.158403 | | | |
| 3-Methylpentane | 0.131113 * | 0.100732 | | | |
| n-Hexane | 0.395842 * | 0.302966 | | | |
| Methylcyclopentane | 0.0326727 * | 0.0276822 | | | |
| Benzene | 0.00426938 * | 0.00461369 | | | |
| Cyclohexane | 0.0508398 * | 0.0438301 | | | |
| 2-Methylhexane | 0.0264617 * | 0.089198 | | | |
| 3-Methylhexane | 0.103609 * | 0.0953496 | | | |
| 2,2,4-Trimethylpentane | 0 * | 0 | | | |
| n-Heptane | 0.264436 * | 0.269901 | | | |
| Methylcyclohexane | 0.103153 * | 0.10227 | | | |
| Toluene | 0.0145624 * | 0.0199927 | | | |
| n-Octane | 0.23377 * | 0.406005 | | | |
| Ethylbenzene | 0.00786332 * | 0.0176858 | | | |
| p-Xylene | 0.00744146 * | 0.0184548 | | | |
| o-Xylene | 0.0111855 * | 0.0353716 | | | |
| n-Nonane | 0.0607387 * | 0.254522 | | | |
| n-Decane | 0.0177905 * | 0.222226 | | | |
| Water | 35.0454 * | 23.1051 | | | |
| Cyclopentane | 0.00213499 * | 0.0015379 | | | |
| 2-3-Dimethylbutane | 0.0358338 * | 0.0261443 | | | |
| Undecanes Plus | 0.00110153 * | 0.619773 | | | |

| Molar Flow | W/B lbmol/h | 1 lbmol/h | | | |
|---|---|---|---|---|---|
| Nitrogen | 6.39363E-06 * | 17.4551 | | | |
| Carbon Dioxide | 5.04271E-05 * | 6.19241 | | | |
| Methane | 0.00473776 * | 2780.19 | | | |
| Ethane | 0.00573812 * | 700.865 | | | |
| Propane | 0.00210636 * | 298.69 | | | |
| Isobutane | 0.000236308 * | 36.6142 | | | |
| n-Butane | 0.000645306 * | 100.492 | | | |
| Neopentane | 3.50268E-06 * | 0.581837 | | | |
| Isopentane | 0.000152248 * | 25.2268 | | | |
| n-Pentane | 0.000216011 * | 36.822 | | | |
| 2-2-Dimethylbutane | 3.60737E-06 * | 0.623397 | | | |
| 2-Methylpentane | 4.5611E-05 * | 8.56132 | | | |
| 3-Methylpentane | 2.8809E-05 * | 5.44434 | | | |
| n-Hexane | 8.69773E-05 * | 16.3746 | | | |
| Methylcyclopentane | 7.17908E-06 * | 1.49615 | | | |
| Benzene | 9.38101E-07 * | 0.249359 | | | |
| Cyclohexane | 1.11709E-05 * | 2.36891 | | | |
| 2-Methylhexane | 5.81436E-06 * | 4.82094 | | | |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

| Molar Flow | W/B lbmol/h | 1 lbmol/h | | | |
|---|---|---|---|---|---|
| 3-Methylhexane | 2.27658E-05 * | 5.15342 | | | |
| 2,2,4-Trimethylpentane | 0 * | 0 | | | |
| n-Heptane | 5.8104E-05 * | 14.5875 | | | |
| Methylcyclohexane | 2.26655E-05 * | 5.52746 | | | |
| Toluene | 3.19976E-06 * | 1.08056 | | | |
| n-Octane | 5.13656E-05 * | 21.9436 | | | |
| Ethylbenzene | 1.72779E-06 * | 0.955876 | | | |
| p-Xylene | 1.63509E-06 * | 0.997436 | | | |
| o-Xylene | 2.45777E-06 * | 1.91175 | | | |
| n-Nonane | 1.3346E-05 * | 13.7563 | | | |
| n-Decane | 3.90907E-06 * | 12.0108 | | | |
| Water | 0.00770044 * | 1248.78 | | | |
| Cyclopentane | 4.69116E-07 * | 0.0831196 | | | |
| 2-3-Dimethylbutane | 7.87367E-06 * | 1.41303 | | | |
| Undecanes Plus | 2.42037E-07 * | 33.4972 | | | |

| Mass Fraction | W/B % | 1 % | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.0299928 * | 0.366347 | | | |
| Carbon Dioxide | 0.371633 * | 0.204179 | | | |
| Methane | 12.7277 * | 33.4155 | | | |
| Ethane | 28.8931 * | 15.7891 | | | |
| Propane | 15.5537 * | 9.8678 | | | |
| Isobutane | 2.29998 * | 1.59439 | | | |
| n-Butane | 6.28076 * | 4.37598 | | | |
| Neopentane | 0.0423188 * | 0.031451 | | | |
| Isopentane | 1.83943 * | 1.36363 | | | |
| n-Pentane | 2.60981 * | 1.9904 | | | |
| 2-2-Dimethylbutane | 0.0520568 * | 0.0402487 | | | |
| 2-Methylpentane | 0.658198 * | 0.552749 | | | |
| 3-Methylpentane | 0.415734 * | 0.351505 | | | |
| n-Hexane | 1.25514 * | 1.0572 | | | |
| Methylcyclopentane | 0.101176 * | 0.0943372 | | | |
| Benzene | 0.0122707 * | 0.014593 | | | |
| Cyclohexane | 0.157433 * | 0.149367 | | | |
| 2-Methylhexane | 0.0975623 * | 0.361919 | | | |
| 3-Methylhexane | 0.381999 * | 0.386879 | | | |
| 2,2,4-Trimethylpentane | 0 * | 0 | | | |
| n-Heptane | 0.974958 * | 1.09512 | | | |
| Methylcyclohexane | 0.372665 * | 0.406611 | | | |
| Toluene | 0.0493699 * | 0.0745919 | | | |
| n-Octane | 0.982543 * | 1.87796 | | | |
| Ethylbenzene | 0.0307168 * | 0.0760303 | | | |
| p-Xylene | 0.0290689 * | 0.0793359 | | | |
| o-Xylene | 0.0436944 * | 0.152061 | | | |
| n-Nonane | 0.286635 * | 1.32184 | | | |
| n-Decane | 0.093138 * | 1.28034 | | | |
| Water | 23.2306 * | 16.855 | | | |
| Cyclopentane | 0.00550942 * | 0.00436746 | | | |
| 2-3-Dimethylbutane | 0.113622 * | 0.0912303 | | | |
| Undecanes Plus | 0.0075548 * | 4.67788 | | | |

| Mass Flow | W/B lb/h | 1 lb/h | | | |
|---|---|---|---|---|---|
| Nitrogen | 0.000179107 * | 488.977 | | | |
| Carbon Dioxide | 0.00221927 * | 272.525 | | | |
| Methane | 0.0760053 * | 44601 | | | |
| Ethane | 0.17254 * | 21074.3 | | | |
| Propane | 0.0928813 * | 13170.9 | | | |
| Isobutane | 0.0137347 * | 2128.1 | | | |


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Test Tank |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

| Mass Flow | W/B lb/h | | 1 lb/h |
|---|---|---|---|
| n-Butane | 0.0375066 | * | 5840.79 |
| Neopentane | 0.000252714 | * | 41.9789 |
| Isopentane | 0.0109845 | * | 1820.08 |
| n-Pentane | 0.015585 | * | 2656.66 |
| 2-2-Dimethylbutane | 0.000310866 | * | 53.7215 |
| 2-Methylpentane | 0.00393054 | * | 737.775 |
| 3-Methylpentane | 0.00248263 | * | 469.168 |
| n-Hexane | 0.0074953 | * | 1411.08 |
| Methylcyclopentane | 0.000604188 | * | 125.915 |
| Benzene | 7.32768E-05 | * | 19.4779 |
| Cyclohexane | 0.000940137 | * | 199.366 |
| 2-Methylhexane | 0.00058261 | * | 483.067 |
| 3-Methylhexane | 0.00228117 | * | 516.382 |
| 2,2,4-Trimethylpentane | 0 | * | 0 |
| n-Heptane | 0.00582213 | * | 1461.7 |
| Methylcyclohexane | 0.00222543 | * | 542.719 |
| Toluene | 0.00029482 | * | 99.5606 |
| n-Octane | 0.00586742 | * | 2506.58 |
| Ethylbenzene | 0.000183431 | * | 101.481 |
| p-Xylene | 0.00017359 | * | 105.893 |
| o-Xylene | 0.000260929 | * | 202.961 |
| n-Nonane | 0.00171169 | * | 1764.32 |
| n-Decane | 0.000556189 | * | 1708.91 |
| Water | 0.138726 | * | 22497.1 |
| Cyclopentane | 3.29005E-05 | * | 5.82942 |
| 2-3-Dimethylbutane | 0.000678516 | * | 121.769 |
| Undecanes Plus | 4.51148E-05 | * | 6243.75 |

## Stream Properties

| Property | Units | W/B | | 1 |
|---|---|---|---|---|
| Temperature | °F | 70.3624 | * | 64.8134 |
| Pressure | psia | 1.05036 | | 1014.7 |
| Mole Fraction Vapor | % | 100 | * | 62.6662 |
| Mole Fraction Light Liquid | % | 0 | | 14.2244 |
| Mole Fraction Heavy Liquid | % | 0 | | 23.1094 |
| Molecular Weight | lb/lbmol | 27.1776 | | 24.6956 |
| Mass Density | lb/ft^3 | 0.00502149 | | 8.68055 |
| Molar Flow | lbmol/h | 0.0219728 | | 5404.76 |
| Mass Flow | lb/h | 0.597167 | * | 133474 |
| Vapor Volumetric Flow | ft^3/h | 118.922 | | 15376.2 |
| Liquid Volumetric Flow | gpm | 14.8267 | | 1917.03 |
| Std Vapor Volumetric Flow | MMSCFD | 0.000200119 | | 49.2245 |
| Std Liquid Volumetric Flow | sgpm | 0.0024916 | | 607.096 |
| Compressibility | | 0.999426 | | 0.512877 |
| Specific Gravity | | 0.938369 | | |
| API Gravity | | | | |
| Enthalpy | Btu/h | -1365.76 | | -3.17429E+08 |
| Mass Enthalpy | Btu/lb | -2287.07 | | -2378.21 |
| Mass Cp | Btu/(lb*°F) | 0.428367 | | 0.721908 |
| Ideal Gas CpCv Ratio | | 1.20575 | | 1.22042 |
| Dynamic Viscosity | cP | 0.00999605 | | |
| Kinematic Viscosity | cSt | 124.273 | | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.0126775 | | |
| Surface Tension | lbf/ft | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 1108.44 | | 1099.97 |
| Net Liquid Heating Value | Btu/lb | 15130.1 | | 16644.2 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 1228.14 | | 1216.75 |
| Gross Liquid Heating Value | Btu/lb | 16801.3 | | 18438.4 |

**Warnings**


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# Process Streams Report
## All Streams
**Tabulated by Total Phase**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

ProMax: ProMax!Project!Flowsheets!Flowsheet1!PStreams!1
Warning: The temperature of 64.8134 °F is below hydrate formation.

**Remarks**


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# Energy Stream Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

## Energy Streams

| Energy Stream | Energy Rate | Power | From Block | To Block |
|---|---|---|---|---|
| Q-2 | 9.86798E+06 Btu/h | 3878.26 hp | -- | VSSL-100 |

**Remarks**


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# Blocks
# MIX-100
**Mixer/Splitter Report**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | Modified: 11:16 AM, 11/1/2017 |
| Flowsheet: | Flowsheet1 | Status: Solved 2:53 PM, 11/1/2017 |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| Measured Well Stream | Inlet | | Produced Water Flow | Inlet | |
| 1 | Outlet | VSSL-100 | | | |

## Block Parameters

| | | | |
|---|---|---|---|
| Pressure Drop | 0 psi | Fraction to PStream 1 | 100 % |

**Remarks**


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# Blocks
# VSSL-100
**Separator Report**

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | Modified: 2:48 PM, 11/1/2017 |
| Flowsheet: | Flowsheet1 | Status: Solved 2:53 PM, 11/1/2017 |

## Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| 1 | Inlet | MIX-100 | Gas to VDU | Vapor Outlet | |
| Blowdown Liquids | Heavy Liquid Outlet | | Q-2 | Energy | |

## Block Parameters

| | | | | | |
|---|---|---|---|---|---|
| Pressure Drop | 1000 | psi | Main Liquid Phase | Light Liquid | |
| Mole Fraction Vapor | 77.1974 | % | Heat Duty | 9.86798E+06 | Btu/h |
| Mole Fraction Light Liquid | 1.61402 | % | Heat Release Curve Type | Plug Flow | |
| Mole Fraction Heavy Liquid | 21.1886 | % | Heat Release Curve Increments | 10 | |

## Entrainments

### Entrainment Entrainment 1

| | | | | | |
|---|---|---|---|---|---|
| From Phase (Numerator) | Light Liquid | | * Numerator Value | 0.5 | gal |
| * To Phase (Denominator) | Heavy Liquid | | * Denominator Value | 100 | gal |
| * Numerator Basis | Volume | | Entrainment Value | 0.5 | % |
| Denominator Basis | per Volume | | * Active | False | |

**Remarks**


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# Flowsheet Environment
# Environment1

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| Flowsheet: | Flowsheet1 | |

## Environment Settings

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

## Components

| Component Name | Henry's Law Component | Phase Initiator | Component Name | Henry's Law Component | Phase Initiator |
|---|---|---|---|---|---|
| Nitrogen | False | False | 2-Methylhexane | False | False |
| Carbon Dioxide | False | False | 3-Methylhexane | False | False |
| Methane | False | False | 2,2,4-Trimethylpentane | False | False |
| Ethane | False | False | n-Heptane | False | False |
| Propane | False | False | Methylcyclohexane | False | False |
| Isobutane | False | False | Toluene | False | False |
| n-Butane | False | False | n-Octane | False | False |
| Neopentane | False | False | Ethylbenzene | False | False |
| Isopentane | False | False | p-Xylene | False | False |
| n-Pentane | False | False | o-Xylene | False | False |
| 2-2-Dimethylbutane | False | False | n-Nonane | False | False |
| 2-Methylpentane | False | False | n-Decane | False | False |
| 3-Methylpentane | False | False | Water | False | True |
| n-Hexane | False | False | Cyclopentane | False | False |
| Methylcyclopentane | False | False | 2-3-Dimethylbutane | False | False |
| Benzene | False | False | Undecanes Plus | False | False |
| Cyclohexane | False | False | | | |

## Physical Property Method Sets

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

**Remarks**


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# Environments Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Project-Wide Constants

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

## Environment [Environment1]

### Environment Settings

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

### Components

| Component Name | Henry's Law Component | Phase Initiator | Component Name | Henry's Law Component | Phase Initiator |
|---|---|---|---|---|---|
| Nitrogen | False | False | 2-Methylhexane | False | False |
| Carbon Dioxide | False | False | 3-Methylhexane | False | False |
| Methane | False | False | 2,2,4-Trimethylpentane | False | False |
| Ethane | False | False | n-Heptane | False | False |
| Propane | False | False | Methylcyclohexane | False | False |
| Isobutane | False | False | Toluene | False | False |
| n-Butane | False | False | n-Octane | False | False |
| Neopentane | False | False | Ethylbenzene | False | False |
| Isopentane | False | False | p-Xylene | False | False |
| n-Pentane | False | False | o-Xylene | False | False |
| 2-2-Dimethylbutane | False | False | n-Nonane | False | False |
| 2-Methylpentane | False | False | n-Decane | False | False |
| 3-Methylpentane | False | False | Water | False | True |
| n-Hexane | False | False | Cyclopentane | False | False |
| Methylcyclopentane | False | False | 2-3-Dimethylbutane | False | False |
| Benzene | False | False | Undecanes Plus | False | False |
| Cyclohexane | False | False | | | |

### Physical Property Method Sets

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

**Remarks**


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# Single Oil Report
# Undecanes Plus

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| | | |

## Properties

| | | | | | |
|---|---|---|---|---|---|
| | Volume Average Boiling Point | 463.899 °F | Low Temperature Viscosity | 1.65182 | cP |
| * | Molecular Weight | 186.396 lb/lbmol | Temperature of High T Viscosity | 210 | °F |
| * | Specific Gravity | 0.8206 | High Temperature Viscosity | 0.694579 | cP |
| | API Gravity | 40.9348 | Watson K | 11.8675 | |
| | Critical Temperature | 789.17 °F | ASTM D86 10-90% Slope | 0 | °F/% |
| | Critical Pressure | 288.107 psia | ASTM D93 Flash Point | 201.891 | °F |
| | Critical Volume | 11.4161 ft^3/lbmol | Pour Point | -11.5239 | °F |
| | Acentric Factor | 0.58965 | Paraffinic Fraction | 44.6638 | % |
| | Carbon to Hydrogen Ratio | 6.31479 | Naphthenic Fraction | 29.7178 | % |
| | Refractive Index | 1.45703 | Aromatic Fraction | 25.6184 | % |
| | Temperature of Low T Viscosity | 100 °F | Ideal Gas Heat Capacity | 64.718 | Btu/(lbmol*°F) |

**Remarks**



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# Calculator Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## PL flow

### Source Code

Residual Error (for CV1) = SLflow - 2520

### Calculated Variable [CV1]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water Flow!Phases!Total!Properties!Std Liquid Volumetric Flow |
| Value | 1541.94 |
| Unit | |

### Measured Variable [SLflow]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Blowdown Liquids!Phases!Total!Properties!Std Liquid Volumetric Flow |
| Value | 2520 |
| Unit | |

### Solver Properties

Status: Solved

| | | | | |
|---|---|---|---|---|
| Error | 0.000319871 | | Algorithm | Default |
| Calculated Value | 44.9732 | sgpm | Iterations | 4 |
| Lower Bound | | sgpm | Max Iterations | 20 |
| Upper Bound | | sgpm | Weighting | 1 |
| Step Size | | sgpm | Solver Active | Active |
| Is Minimizer | False | | * Skip Dependency Check | True |

**Remarks**

## SG flow

### Source Code

Residual Error (for CV1) = SGflow - 38

### Calculated Variable [CV1]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Well Stream!Phases!Total!Properties!Std Vapor Volumetric Flow |
| Value | 37.8511 |
| Unit | |

### Measured Variable [SGflow]

| | |
|---|---|
| Source Moniker | ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Gas to VDU!Phases!Total!Properties!Std Vapor Volumetric Flow |
| Value | 38 |
| Unit | |

### Solver Properties

Status: Solved

| | | | | |
|---|---|---|---|---|
| Error | -1.07579E-06 | | Algorithm | Default |
| Calculated Value | 37.8511 | MMSCFD | Iterations | 4 |
| Lower Bound | | MMSCFD | Max Iterations | 20 |
| Upper Bound | | MMSCFD | Weighting | 1 |
| Step Size | | MMSCFD | Solver Active | Active |
| Is Minimizer | False | | * Skip Dependency Check | True |

**Remarks**



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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Palleta Tank Farm

### User Value [ShellLength]

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

### User Value [ShellDiam]

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

### User Value [BreatherVP]

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

### User Value [BreatherVacP]

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

### User Value [DomeRadius]

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

### User Value [OpPress]

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

### User Value [AvgPercentLiq]

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

### User Value [MaxPercentLiq]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 90 % | Upper Bound | | % |
| | Lower Bound | % | * Enforce Bounds | False | |

### User Value [AnnNetTP]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 2514.62 bbl/day | Upper Bound | | bbl/day |
| | Lower Bound | bbl/day | * Enforce Bounds | False | |

### User Value [OREff]

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

### User Value [MaxAvgT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 59.9 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [MinAvgT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 40.7 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [BulkLiqT]

| | | | | | |
|---|---|---|---|---|---|
| * | Parameter | 54.64 °F | Upper Bound | | °F |
| | Lower Bound | °F | * Enforce Bounds | False | |

### User Value [AvgP]

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


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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## User Value [ThermI]

| | | | | |
|---|---|---|---|---|
| * Parameter | 1069 | Btu/ft^2/day | Upper Bound | Btu/ft^2/day |
| Lower Bound | | Btu/ft^2/day | * Enforce Bounds | False |

## User Value [AvgWindSpeed]

| | | | | |
|---|---|---|---|---|
| * Parameter | 9.1 | mi/h | Upper Bound | mi/h |
| Lower Bound | | mi/h | * Enforce Bounds | False |

## User Value [MaxHourlyLoadingRate]

| | | | | |
|---|---|---|---|---|
| * Parameter | 104.776 | bbl/hr | Upper Bound | bbl/hr |
| Lower Bound | | bbl/hr | * Enforce Bounds | False |

## User Value [EntrainedOilFrac]

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

## User Value [TurnoverRate]

| | | | | |
|---|---|---|---|---|
| * Parameter | 316.39 | | Upper Bound | |
| Lower Bound | | | * Enforce Bounds | False |

## User Value [LLossSatFactor]

| | | | | |
|---|---|---|---|---|
| * Parameter | 1.45 | | Upper Bound | |
| Lower Bound | | | * Enforce Bounds | False |

## User Value [AtmPressure]

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

## User Value [TVP]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.68569 | psia | Upper Bound | psia |
| Lower Bound | | psia | * Enforce Bounds | False |

## User Value [AvgLiqSurfaceT]

| | | | | |
|---|---|---|---|---|
| * Parameter | 60.2465 | °F | Upper Bound | °F |
| Lower Bound | | °F | * Enforce Bounds | False |

## User Value [MaxLiqSurfaceT]

| | | | | |
|---|---|---|---|---|
| * Parameter | 70.3624 | °F | Upper Bound | °F |
| Lower Bound | | °F | * Enforce Bounds | False |

## User Value [TotalLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.597167 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [WorkingLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.0638204 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [StandingLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.0108255 | lb/h | Upper Bound | lb/h |
| Lower Bound | | lb/h | * Enforce Bounds | False |

## User Value [RimSealLosses]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0 | ton/yr | Upper Bound | ton/yr |


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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## User Value [RimSealLosses]

| | | | |
|---|---|---|---|
| Lower Bound | ton/yr | * Enforce Bounds | False |

## User Value [WithdrawalLoss]

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

## User Value [LoadingLosses]

| | | | |
|---|---|---|---|
| * Parameter | 2.84972 lb/h | Upper Bound | lb/h |
| Lower Bound | lb/h | * Enforce Bounds | False |

## User Value [MaxHourlyLoadingLoss]

| | | | |
|---|---|---|---|
| * Parameter | 2.84972 lb/hr | Upper Bound | lb/hr |
| Lower Bound | lb/hr | * Enforce Bounds | False |

## User Value [PStar]

| | | | |
|---|---|---|---|
| Parameter | | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |

## User Value [DeckFittingLosses]

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

## User Value [DeckSeamLosses]

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

## User Value [FlashingLosses]

| | | | |
|---|---|---|---|
| * Parameter | 0.650356 lb/h | Upper Bound | lb/h |
| Lower Bound | lb/h | * Enforce Bounds | False |

## User Value [TotalResidual]

| | | | |
|---|---|---|---|
| * Parameter | 144423 ton/yr | Upper Bound | ton/yr |
| Lower Bound | ton/yr | * Enforce Bounds | False |

## User Value [GasMoleWeight]

| | | | |
|---|---|---|---|
| * Parameter | 0.0271776 kg/mol | Upper Bound | kg/mol |
| Lower Bound | kg/mol | * Enforce Bounds | False |

## User Value [VapReportableFrac]

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

## User Value [LiqReportableFrac]

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

## User Value [FlashReportableFrac]

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

## User Value [BlockReady]

| | | | |
|---|---|---|---|
| * Parameter | 1 | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |


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# User Value Sets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| | | |

**Remarks**
This User Value Set was programmatically generated. GUID={3843DD0A-6AE9-40D0-99C6-A976AAF7621C}

## Tank Losses

### User Value [BlockReady]

| | | | |
|---|---|---|---|
| * Parameter | 1 | Upper Bound | |
| Lower Bound | | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={3843DD0A-6AE9-40D0-99C6-A976AAF7621C}

## Sum Component Flow/Frac

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 0.90884 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={925DEC8C-C0EC-472A-A9CD-1FF5DC1AF139}

## Sum Component Flow/Frac.52

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 4.33704 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={BDF4AF0A-AFC7-4483-9E2C-9812C5730341}

## Sum Component Flow/Frac.53

### User Value [CompSum]

| | | | | |
|---|---|---|---|---|
| * Parameter | 141102 | ton/yr | Upper Bound | ton/yr |
| Lower Bound | | ton/yr | * Enforce Bounds | False |

**Remarks**
This User Value Set was programmatically generated. GUID={4D7786AF-B02E-4564-9E48-7DCDC380F443}


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Component Recoveries - Project Inlets

Status: Solved

### Recovery Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Measured Well Stream lbmol/h | Flowsheet1:Produced Water Flow lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 17.4551 | 0 | 17.4551 | |
| Carbon Dioxide | 6.19241 | 0 | 6.19241 | |
| Methane | 2780.19 | 0 | 2780.19 | |
| Ethane | 700.865 | 0 | 700.865 | |
| Propane | 298.69 | 0 | 298.69 | |
| Isobutane | 36.6142 | 0 | 36.6142 | |
| n-Butane | 100.492 | 0 | 100.492 | |
| Neopentane | 0.581837 | 0 | 0.581837 | |
| Isopentane | 25.2268 | 0 | 25.2268 | |
| n-Pentane | 36.822 | 0 | 36.822 | |
| 2-2-Dimethylbutane | 0.623397 | 0 | 0.623397 | |
| 2-Methylpentane | 8.56132 | 0 | 8.56132 | |
| 3-Methylpentane | 5.44434 | 0 | 5.44434 | |
| n-Hexane | 16.3746 | 0 | 16.3746 | |
| Methylcyclopentane | 1.49615 | 0 | 1.49615 | |
| Benzene | 0.249359 | 0 | 0.249359 | |
| Cyclohexane | 2.36891 | 0 | 2.36891 | |
| 2-Methylhexane | 4.82094 | 0 | 4.82094 | |
| 3-Methylhexane | 5.15342 | 0 | 5.15342 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 14.5875 | 0 | 14.5875 | |
| Methylcyclohexane | 5.52746 | 0 | 5.52746 | |
| Toluene | 1.08056 | 0 | 1.08056 | |
| n-Octane | 21.9436 | 0 | 21.9436 | |
| Ethylbenzene | 0.955876 | 0 | 0.955876 | |
| p-Xylene | 0.997436 | 0 | 0.997436 | |
| o-Xylene | 1.91175 | 0 | 1.91175 | |
| n-Nonane | 13.7563 | 0 | 13.7563 | |
| n-Decane | 12.0108 | 0 | 12.0108 | |
| Water | 0 | 1248.78 | 1248.78 | |
| Cyclopentane | 0.0831196 | 0 | 0.0831196 | |
| 2-3-Dimethylbutane | 1.41303 | 0 | 1.41303 | |
| Undecanes Plus | 33.4972 | 0 | 33.4972 | |
| Total | 4155.98 | 1248.78 | 5404.76 | |

**Remarks**

## Component Recoveries - Project Outlets

Status: Solved

### Recovery Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Parameters

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

## Tabulated Data

| Index | Flowsheet1:Blowdown Liquids lbmol/h | Flowsheet1:Gas to VDU lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 0.000595824 | 17.4545 | 17.4551 | |
| Carbon Dioxide | 0.00262545 | 6.18979 | 6.19241 | |
| Methane | 0.290564 | 2779.89 | 2780.19 | |
| Ethane | 0.448293 | 700.416 | 700.865 | |
| Propane | 0.750352 | 297.94 | 298.69 | |
| Isobutane | 0.236309 | 36.3779 | 36.6142 | |
| n-Butane | 0.948281 | 99.5434 | 100.492 | |
| Neopentane | 0.00737056 | 0.574467 | 0.581837 | |
| Isopentane | 0.619057 | 24.6078 | 25.2268 | |
| n-Pentane | 1.19867 | 35.6233 | 36.822 | |
| 2-2-Dimethylbutane | 0.0324688 | 0.590928 | 0.623397 | |
| 2-Methylpentane | 0.641051 | 7.92027 | 8.56132 | |
| 3-Methylpentane | 0.452253 | 4.99208 | 5.44434 | |
| n-Hexane | 1.73713 | 14.6374 | 16.3746 | |
| Methylcyclopentane | 0.157288 | 1.33887 | 1.49615 | |
| Benzene | 0.0306836 | 0.218675 | 0.249359 | |
| Cyclohexane | 0.352294 | 2.01662 | 2.36891 | |
| 2-Methylhexane | 1.00263 | 3.8183 | 4.82094 | |
| 3-Methylhexane | 1.17024 | 3.98318 | 5.15342 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 4.11367 | 10.4738 | 14.5875 | |
| Methylcyclohexane | 1.56732 | 3.96013 | 5.52746 | |
| Toluene | 0.369903 | 0.710652 | 1.08056 | |
| n-Octane | 12.5436 | 9.4 | 21.9436 | |
| Ethylbenzene | 0.607023 | 0.348852 | 0.955876 | |
| p-Xylene | 0.641971 | 0.355464 | 0.997436 | |
| o-Xylene | 1.31844 | 0.593313 | 1.91175 | |
| n-Nonane | 11.2262 | 2.53008 | 13.7563 | |
| n-Decane | 11.2201 | 0.790646 | 12.0108 | |
| Water | 1145.21 | 103.569 | 1248.78 | |
| Cyclopentane | 0.00429601 | 0.0788236 | 0.0831196 | |
| 2-3-Dimethylbutane | 0.0984302 | 1.3146 | 1.41303 | |
| Undecanes Plus | 33.4291 | 0.0680732 | 33.4972 | |
| Total | 1232.43 | 4172.33 | 5404.76 | |

**Remarks**

## Component Recoveries - Project Losses

Status: Solved

### Reference Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |

### Recovery Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Parameters

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

## Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Nitrogen | 7.04915E-15 | | | |
| Carbon Dioxide | 0 | | | |
| Methane | 9.02292E-13 | | | |
| Ethane | 3.38359E-13 | | | |
| Propane | 1.12786E-13 | | | |
| Isobutane | 7.04915E-15 | | | |
| n-Butane | 4.22949E-14 | | | |
| Neopentane | 0 | | | |
| Isopentane | -3.52458E-15 | | | |
| n-Pentane | -1.40983E-14 | | | |
| 2-2-Dimethylbutane | -3.30429E-16 | | | |
| 2-Methylpentane | -8.81144E-15 | | | |
| 3-Methylpentane | -7.04915E-15 | | | |
| n-Hexane | -2.4672E-14 | | | |
| Methylcyclopentane | -2.20286E-15 | | | |
| Benzene | -4.95644E-16 | | | |
| Cyclohexane | -5.28687E-15 | | | |
| 2-Methylhexane | -1.8504E-14 | | | |
| 3-Methylhexane | -1.93852E-14 | | | |
| 2,2,4-Trimethylpentane | 0 | | | |
| n-Heptane | -7.22538E-14 | | | |
| Methylcyclohexane | -2.73155E-14 | | | |
| Toluene | -6.82887E-15 | | | |
| n-Octane | -2.39671E-13 | | | |
| Ethylbenzene | -1.16752E-14 | | | |
| p-Xylene | -1.2336E-14 | | | |
| o-Xylene | -2.53329E-14 | | | |
| n-Nonane | -2.16761E-13 | | | |
| n-Decane | -2.16761E-13 | | | |
| Water | -2.25573E-13 | | | |
| Cyclopentane | -2.75358E-17 | | | |
| 2-3-Dimethylbutane | -1.10143E-15 | | | |
| Undecanes Plus | -6.48522E-13 | | | |
| Total | 0 | | | |

**Remarks**

## Component Recoveries - Project Recoveries

Status: Solved

### Reference Stream Data Source - All Inlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Recovery Stream Data Source - All Outlets in Project

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |

### Parameters

| | | | |
|---|---|---|---|
| * Composition Basis | Molar Flow | * Summation Option | Streams and Summation |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Parameters

| | | | |
|---|---|---|---|
| * Calculate Ratios | True | * Atomic Basis | False |

## Tabulated Data

| Index | Flowsheet1:Blowdown Liquids % | Flowsheet1:Gas to VDU % | Summary Table % | |
|---|---|---|---|---|
| Nitrogen | 0.00341346 | 99.9966 | 100 | |
| Carbon Dioxide | 0.0423979 | 99.9576 | 100 | |
| Methane | 0.0104513 | 99.9895 | 100 | |
| Ethane | 0.0639629 | 99.936 | 100 | |
| Propane | 0.251214 | 99.7488 | 100 | |
| Isobutane | 0.645404 | 99.3546 | 100 | |
| n-Butane | 0.943642 | 99.0564 | 100 | |
| Neopentane | 1.26677 | 98.7332 | 100 | |
| Isopentane | 2.45396 | 97.546 | 100 | |
| n-Pentane | 3.25532 | 96.7447 | 100 | |
| 2-2-Dimethylbutane | 5.20836 | 94.7916 | 100 | |
| 2-Methylpentane | 7.48775 | 92.5122 | 100 | |
| 3-Methylpentane | 8.30685 | 91.6932 | 100 | |
| n-Hexane | 10.6087 | 89.3913 | 100 | |
| Methylcyclopentane | 10.5128 | 89.4872 | 100 | |
| Benzene | 12.305 | 87.695 | 100 | |
| Cyclohexane | 14.8716 | 85.1284 | 100 | |
| 2-Methylhexane | 20.7975 | 79.2025 | 100 | |
| 3-Methylhexane | 22.7079 | 77.2921 | 100 | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 28.2 | 71.8 | 100 | |
| Methylcyclohexane | 28.3553 | 71.6447 | 100 | |
| Toluene | 34.2327 | 65.7673 | 100 | |
| n-Octane | 57.1629 | 42.8371 | 100 | |
| Ethylbenzene | 63.5044 | 36.4956 | 100 | |
| p-Xylene | 64.3622 | 35.6378 | 100 | |
| o-Xylene | 68.965 | 31.035 | 100 | |
| n-Nonane | 81.6078 | 18.3922 | 100 | |
| n-Decane | 93.4172 | 6.5828 | 100 | |
| Water | 91.7063 | 8.29367 | 100 | |
| Cyclopentane | 5.16847 | 94.8315 | 100 | |
| 2-3-Dimethylbutane | 6.96588 | 93.0341 | 100 | |
| Undecanes Plus | 99.7968 | 0.203221 | 100 | |
| Total | 22.8026 | 77.1974 | 100 | |

**Remarks**

## Component Recoveries - Flowsheet1 Inlets

Status: Solved

### Recovery Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Tabulated Data

| Index | Flowsheet1:Measured Well Stream lbmol/h | Flowsheet1:Produced Water Flow lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 17.4551 | 0 | 17.4551 | |
| Carbon Dioxide | 6.19241 | 0 | 6.19241 | |
| Methane | 2780.19 | 0 | 2780.19 | |
| Ethane | 700.865 | 0 | 700.865 | |
| Propane | 298.69 | 0 | 298.69 | |
| Isobutane | 36.6142 | 0 | 36.6142 | |
| n-Butane | 100.492 | 0 | 100.492 | |
| Neopentane | 0.581837 | 0 | 0.581837 | |
| Isopentane | 25.2268 | 0 | 25.2268 | |
| n-Pentane | 36.822 | 0 | 36.822 | |
| 2-2-Dimethylbutane | 0.623397 | 0 | 0.623397 | |
| 2-Methylpentane | 8.56132 | 0 | 8.56132 | |
| 3-Methylpentane | 5.44434 | 0 | 5.44434 | |
| n-Hexane | 16.3746 | 0 | 16.3746 | |
| Methylcyclopentane | 1.49615 | 0 | 1.49615 | |
| Benzene | 0.249359 | 0 | 0.249359 | |
| Cyclohexane | 2.36891 | 0 | 2.36891 | |
| 2-Methylhexane | 4.82094 | 0 | 4.82094 | |
| 3-Methylhexane | 5.15342 | 0 | 5.15342 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 14.5875 | 0 | 14.5875 | |
| Methylcyclohexane | 5.52746 | 0 | 5.52746 | |
| Toluene | 1.08056 | 0 | 1.08056 | |
| n-Octane | 21.9436 | 0 | 21.9436 | |
| Ethylbenzene | 0.955876 | 0 | 0.955876 | |
| p-Xylene | 0.997436 | 0 | 0.997436 | |
| o-Xylene | 1.91175 | 0 | 1.91175 | |
| n-Nonane | 13.7563 | 0 | 13.7563 | |
| n-Decane | 12.0108 | 0 | 12.0108 | |
| Water | 0 | 1248.78 | 1248.78 | |
| Cyclopentane | 0.0831196 | 0 | 0.0831196 | |
| 2-3-Dimethylbutane | 1.41303 | 0 | 1.41303 | |
| Undecanes Plus | 33.4972 | 0 | 33.4972 | |
| Total | 4155.98 | 1248.78 | 5404.76 | |

**Remarks**

## Component Recoveries - Flowsheet1 Outlets

Status: Solved

### Recovery Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |

### Parameters

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

### Tabulated Data

| Index | Flowsheet1:Blowdown Liquids lbmol/h | Flowsheet1:Gas to VDU lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Nitrogen | 0.000595824 | 17.4545 | 17.4551 | |
| Carbon Dioxide | 0.00262545 | 6.18979 | 6.19241 | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Tabulated Data

| Index | Flowsheet1:Blowdown Liquids lbmol/h | Flowsheet1:Gas to VDU lbmol/h | Summary Table lbmol/h | |
|---|---|---|---|---|
| Methane | 0.290564 | 2779.89 | 2780.19 | |
| Ethane | 0.448293 | 700.416 | 700.865 | |
| Propane | 0.750352 | 297.94 | 298.69 | |
| Isobutane | 0.236309 | 36.3779 | 36.6142 | |
| n-Butane | 0.948281 | 99.5434 | 100.492 | |
| Neopentane | 0.00737056 | 0.574467 | 0.581837 | |
| Isopentane | 0.619057 | 24.6078 | 25.2268 | |
| n-Pentane | 1.19867 | 35.6233 | 36.822 | |
| 2-2-Dimethylbutane | 0.0324688 | 0.590928 | 0.623397 | |
| 2-Methylpentane | 0.641051 | 7.92027 | 8.56132 | |
| 3-Methylpentane | 0.452253 | 4.99208 | 5.44434 | |
| n-Hexane | 1.73713 | 14.6374 | 16.3746 | |
| Methylcyclopentane | 0.157288 | 1.33887 | 1.49615 | |
| Benzene | 0.0306836 | 0.218675 | 0.249359 | |
| Cyclohexane | 0.352294 | 2.01662 | 2.36891 | |
| 2-Methylhexane | 1.00263 | 3.8183 | 4.82094 | |
| 3-Methylhexane | 1.17024 | 3.98318 | 5.15342 | |
| 2,2,4-Trimethylpentane | 0 | 0 | 0 | |
| n-Heptane | 4.11367 | 10.4738 | 14.5875 | |
| Methylcyclohexane | 1.56732 | 3.96013 | 5.52746 | |
| Toluene | 0.369903 | 0.710652 | 1.08056 | |
| n-Octane | 12.5436 | 9.4 | 21.9436 | |
| Ethylbenzene | 0.607023 | 0.348852 | 0.955876 | |
| p-Xylene | 0.641971 | 0.355464 | 0.997436 | |
| o-Xylene | 1.31844 | 0.593313 | 1.91175 | |
| n-Nonane | 11.2262 | 2.53008 | 13.7563 | |
| n-Decane | 11.2201 | 0.790646 | 12.0108 | |
| Water | 1145.21 | 103.569 | 1248.78 | |
| Cyclopentane | 0.00429601 | 0.0788236 | 0.0831196 | |
| 2-3-Dimethylbutane | 0.0984302 | 1.3146 | 1.41303 | |
| Undecanes Plus | 33.4291 | 0.0680732 | 33.4972 | |
| Total | 1232.43 | 4172.33 | 5404.76 | |

**Remarks**

## Component Recoveries - Flowsheet1 Losses

Status: Solved

### Reference Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |

### Recovery Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Parameters

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

### Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Nitrogen | 7.04915E-15 | | | |


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Tabulated Data

| Index | Summary Table lbmol/h | | | |
|---|---|---|---|---|
| Carbon Dioxide | 0 | | | |
| Methane | 9.02292E-13 | | | |
| Ethane | 3.38359E-13 | | | |
| Propane | 1.12786E-13 | | | |
| Isobutane | 7.04915E-15 | | | |
| n-Butane | 4.22949E-14 | | | |
| Neopentane | 0 | | | |
| Isopentane | -3.52458E-15 | | | |
| n-Pentane | -1.40983E-14 | | | |
| 2-2-Dimethylbutane | -3.30429E-16 | | | |
| 2-Methylpentane | -8.81144E-15 | | | |
| 3-Methylpentane | -7.04915E-15 | | | |
| n-Hexane | -2.4672E-14 | | | |
| Methylcyclopentane | -2.20286E-15 | | | |
| Benzene | -4.95644E-16 | | | |
| Cyclohexane | -5.28687E-15 | | | |
| 2-Methylhexane | -1.8504E-14 | | | |
| 3-Methylhexane | -1.93852E-14 | | | |
| 2,2,4-Trimethylpentane | 0 | | | |
| n-Heptane | -7.22538E-14 | | | |
| Methylcyclohexane | -2.73155E-14 | | | |
| Toluene | -6.82887E-15 | | | |
| n-Octane | -2.39671E-13 | | | |
| Ethylbenzene | -1.16752E-14 | | | |
| p-Xylene | -1.2336E-14 | | | |
| o-Xylene | -2.53329E-14 | | | |
| n-Nonane | -2.16761E-13 | | | |
| n-Decane | -2.16761E-13 | | | |
| Water | -2.25573E-13 | | | |
| Cyclopentane | -2.75358E-17 | | | |
| 2-3-Dimethylbutane | -1.10143E-15 | | | |
| Undecanes Plus | -6.48522E-13 | | | |
| Total | 0 | | | |

**Remarks**

## Component Recoveries - Flowsheet1 Recoveries

Status: Solved

### Reference Stream Data Source - All Inlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Measured Well Stream | Flowsheet1 | Produced Water Flow |

### Recovery Stream Data Source - All Outlets in Flowsheet

| Flowsheet | PStream | Flowsheet | PStream |
|---|---|---|---|
| Flowsheet1 | Blowdown Liquids | Flowsheet1 | Gas to VDU |

### Parameters

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


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# Recoveries Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| | | |

## Tabulated Data

| Index | Flowsheet1:Blowdown Liquids % | Flowsheet1:Gas to VDU % | Summary Table % | |
|---|---|---|---|---|
| Nitrogen | 0.00341346 | 99.9966 | 100 | |
| Carbon Dioxide | 0.0423979 | 99.9576 | 100 | |
| Methane | 0.0104513 | 99.9895 | 100 | |
| Ethane | 0.0639629 | 99.936 | 100 | |
| Propane | 0.251214 | 99.7488 | 100 | |
| Isobutane | 0.645404 | 99.3546 | 100 | |
| n-Butane | 0.943642 | 99.0564 | 100 | |
| Neopentane | 1.26677 | 98.7332 | 100 | |
| Isopentane | 2.45396 | 97.546 | 100 | |
| n-Pentane | 3.25532 | 96.7447 | 100 | |
| 2-2-Dimethylbutane | 5.20836 | 94.7916 | 100 | |
| 2-Methylpentane | 7.48775 | 92.5122 | 100 | |
| 3-Methylpentane | 8.30685 | 91.6932 | 100 | |
| n-Hexane | 10.6087 | 89.3913 | 100 | |
| Methylcyclopentane | 10.5128 | 89.4872 | 100 | |
| Benzene | 12.305 | 87.695 | 100 | |
| Cyclohexane | 14.8716 | 85.1284 | 100 | |
| 2-Methylhexane | 20.7975 | 79.2025 | 100 | |
| 3-Methylhexane | 22.7079 | 77.2921 | 100 | |
| 2,2,4-Trimethylpentane | | | | |
| n-Heptane | 28.2 | 71.8 | 100 | |
| Methylcyclohexane | 28.3553 | 71.6447 | 100 | |
| Toluene | 34.2327 | 65.7673 | 100 | |
| n-Octane | 57.1629 | 42.8371 | 100 | |
| Ethylbenzene | 63.5044 | 36.4956 | 100 | |
| p-Xylene | 64.3622 | 35.6378 | 100 | |
| o-Xylene | 68.965 | 31.035 | 100 | |
| n-Nonane | 81.6078 | 18.3922 | 100 | |
| n-Decane | 93.4172 | 6.5828 | 100 | |
| Water | 91.7063 | 8.29367 | 100 | |
| Cyclopentane | 5.16847 | 94.8315 | 100 | |
| 2-3-Dimethylbutane | 6.96588 | 93.0341 | 100 | |
| Undecanes Plus | 99.7968 | 0.203221 | 100 | |
| Total | 22.8026 | 77.1974 | 100 | |

**Remarks**


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# Energy Budgets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |

## Power Budget - Project Power Budget

Status: Solved

### Parameters

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

**Remarks**

## Heat Budget - Project Heat Budget

Status: Solved

### Heat Budget Data Source - All Exchangers in Project

| Flowsheet | Block | Flowsheet | Block |
|---|---|---|---|
| Flowsheet1 | VSSL-100 | | |

### Parameters

| | | | | | |
|---|---|---|---|---|---|
| Net Duty | 9.86798E+06 | Btu/h | Total Duty Required | 9.86798E+06 | Btu/h |
| Total Duty Supplied | 0 | Btu/h | External Energy Only | True | |

### Tabulated Data

| Index | Block Duty Btu/h | Block Highest Temperature °F | Block Lowest Temperature °F | |
|---|---|---|---|---|
| Flowsheet1:VSSL-100 | 9.86798E+06 | 70 | 64.8134 | |

**Remarks**

## Power Budget - Flowsheet1 Power Budget

Status: Solved

### Parameters

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

**Remarks**

## Heat Budget - Flowsheet1 Heat Budget

Status: Solved

### Heat Budget Data Source - All Exchangers in Flowsheet

| Flowsheet | Block | Flowsheet | Block |
|---|---|---|---|
| Flowsheet1 | VSSL-100 | | |

### Parameters

| | | | | | |
|---|---|---|---|---|---|
| Net Duty | 9.86798E+06 | Btu/h | Total Duty Required | 9.86798E+06 | Btu/h |
| Total Duty Supplied | 0 | Btu/h | External Energy Only | True | |

### Tabulated Data

| Index | Block Duty Btu/h | Block Highest Temperature °F | Block Lowest Temperature °F | |
|---|---|---|---|---|
| Flowsheet1:VSSL-100 | 9.86798E+06 | 70 | 64.8134 | |

**Remarks**


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# Energy Budgets Report

| | | |
|---|---|---|
| Client Name: | Chevron Appalachia, LLC | Job: Blowdown Process Vessel |
| Location: | Taylor B Pad | |
| | | |


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GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Chevron - Taylor Pad B
File Name: Z:\Pittsburgh\Projects\0334598 Chevron AMBU Chevron AMBU GHG Support 2016.LK\WV permitting\Taylor Pad B - November 2017\Calculations\GRI-GLYCalc\Taylor Pad B - 38 MMscfd Throughput.ddf
Date: November 08, 2017

DESCRIPTION:

Description: 38 MMscf/day Annual Gas Throughput

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 65.00 deg. F
Pressure: 1000.00 psig
Wet Gas Water Content: Saturated

| Component | Conc. (vol %) |
|---|---|
| Carbon Dioxide | 0.1554 |
| Nitrogen | 0.4979 |
| Methane | 75.8791 |
| Ethane | 16.0543 |
| Propane | 5.1917 |
| Isobutane | 0.4717 |
| n-Butane | 1.1001 |
| Isopentane | 0.1851 |
| n-Pentane | 0.2292 |
| Cyclopentane | 0.0004 |
| n-Hexane | 0.0476 |
| Cyclohexane | 0.0057 |
| Other Hexanes | 0.0181 |
| Heptanes | 0.0220 |
| Methylcyclohexane | 0.0076 |
| Benzene | 0.0007 |
| Toluene | 0.0013 |
| Ethylbenzene | 0.0006 |
| Xylenes | 0.0015 |
| C8+ Heavies | 0.0067 |

DRY GAS:

Flow Rate: 38.0 MMSCF/day
Water Content: 4.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Recirculation Ratio: 3.0 gal/lb H2O

PUMP:

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

FLASH TANK:

Flash Control: Vented to atmosphere
Temperature: 65.0 deg. F
Pressure: 30.0 psig

STRIPPING GAS:

Source of Gas: Dry Gas
Gas Flow Rate: 5.500 scfm

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 120.0 deg. F
Pressure: 15.2 psia

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Chevron - Taylor Pad B
File Name: Z:\Pittsburgh\Projects\0334598 Chevron AMBU Chevron AMBU GHG Support 2016.LK\WV permitting\Taylor Pad B - November 2017\Calculations\GRI-GLYCalc\Taylor Pad B - 38 MMscfd Throughput.ddf
Date: November 08, 2017

DESCRIPTION:

Description: 38 MMscf/day Annual Gas Throughput

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 10.6825 | 256.379 | 46.7892 |
| Ethane | 4.3690 | 104.856 | 19.1362 |
| Propane | 2.2285 | 53.483 | 9.7607 |
| Isobutane | 0.2914 | 6.993 | 1.2763 |
| n-Butane | 0.7458 | 17.898 | 3.2665 |
| Isopentane | 0.1635 | 3.925 | 0.7163 |
| n-Pentane | 0.2286 | 5.487 | 1.0013 |
| Cyclopentane | 0.0011 | 0.027 | 0.0050 |
| n-Hexane | 0.0821 | 1.969 | 0.3594 |
| Cyclohexane | 0.0385 | 0.924 | 0.1686 |
| Other Hexanes | 0.0254 | 0.610 | 0.1113 |
| Heptanes | 0.0775 | 1.861 | 0.3396 |
| Methylcyclohexane | 0.0669 | 1.606 | 0.2932 |
| Benzene | 0.0597 | 1.433 | 0.2615 |
| Toluene | 0.1917 | 4.601 | 0.8396 |
| Ethylbenzene | 0.1116 | 2.678 | 0.4887 |
| Xylenes | 0.4403 | 10.567 | 1.9285 |
| C8+ Heavies | 0.0504 | 1.210 | 0.2207 |
| Total Emissions | 19.8545 | 476.507 | 86.9626 |
| Total Hydrocarbon Emissions | 19.8545 | 476.507 | 86.9626 |
| Total VOC Emissions | 4.8030 | 115.272 | 21.0372 |
| Total HAP Emissions | 0.8853 | 21.247 | 3.8777 |
| Total BTEX Emissions | 0.8033 | 19.278 | 3.5183 |

UNCONTROLLED REGENERATOR EMISSIONS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 10.6828 | 256.387 | 46.7906 |
| Ethane | 4.3691 | 104.859 | 19.1368 |
| Propane | 2.2285 | 53.485 | 9.7610 |
| Isobutane | 0.2914 | 6.994 | 1.2763 |
| n-Butane | 0.7458 | 17.899 | 3.2665 |
| Isopentane | 0.1635 | 3.925 | 0.7163 |
| n-Pentane | 0.2286 | 5.487 | 1.0013 |
| Cyclopentane | 0.0011 | 0.027 | 0.0050 |
| n-Hexane | 0.0821 | 1.969 | 0.3594 |

| | | | |
|---|---|---|---|
| Cyclohexane | 0.0385 | 0.924 | 0.1686 |
| Other Hexanes | 0.0254 | 0.610 | 0.1113 |
| Heptanes | 0.0775 | 1.861 | 0.3396 |
| Methylcyclohexane | 0.0669 | 1.606 | 0.2932 |
| Benzene | 0.0598 | 1.436 | 0.2621 |
| Toluene | 0.1921 | 4.610 | 0.8412 |
| Ethylbenzene | 0.1117 | 2.682 | 0.4894 |
| Xylenes | 0.4412 | 10.589 | 1.9324 |
| C8+ Heavies | 0.0504 | 1.210 | 0.2207 |
| Total Emissions | 19.8566 | 476.559 | 86.9720 |
| Total Hydrocarbon Emissions | 19.8566 | 476.559 | 86.9720 |
| Total VOC Emissions | 4.8047 | 115.313 | 21.0446 |
| Total HAP Emissions | 0.8869 | 21.285 | 3.8846 |
| Total BTEX Emissions | 0.8048 | 19.316 | 3.5252 |

FLASH TANK OFF GAS

| Component | lbs/hr | lbs/day | tons/yr |
|---|---|---|---|
| Methane | 20.2262 | 485.429 | 88.5907 |
| Ethane | 9.2664 | 222.395 | 40.5870 |
| Propane | 4.7467 | 113.920 | 20.7904 |
| Isobutane | 0.5991 | 14.378 | 2.6239 |
| n-Butane | 1.5145 | 36.347 | 6.6333 |
| Isopentane | 0.2958 | 7.100 | 1.2958 |
| n-Pentane | 0.3953 | 9.486 | 1.7313 |
| Cyclopentane | 0.0012 | 0.028 | 0.0051 |
| n-Hexane | 0.1007 | 2.417 | 0.4411 |
| Cyclohexane | 0.0197 | 0.474 | 0.0864 |
| Other Hexanes | 0.0365 | 0.877 | 0.1600 |
| Heptanes | 0.0521 | 1.251 | 0.2283 |
| Methylcyclohexane | 0.0233 | 0.559 | 0.1021 |
| Benzene | 0.0030 | 0.073 | 0.0133 |
| Toluene | 0.0053 | 0.128 | 0.0234 |
| Ethylbenzene | 0.0015 | 0.037 | 0.0067 |
| Xylenes | 0.0038 | 0.091 | 0.0166 |
| C8+ Heavies | 0.0066 | 0.158 | 0.0288 |
| Total Emissions | 37.2977 | 895.146 | 163.3641 |
| Total Hydrocarbon Emissions | 37.2977 | 895.146 | 163.3641 |
| Total VOC Emissions | 7.8051 | 187.322 | 34.1863 |
| Total HAP Emissions | 0.1144 | 2.745 | 0.5010 |
| Total BTEX Emissions | 0.0137 | 0.329 | 0.0600 |

EQUIPMENT REPORTS:

CONDENSER

| | |
|---|---|
| Condenser Outlet Temperature: | 120.00 deg. F |
| Condenser Pressure: | 15.20 psia |
| Condenser Duty: | 2.20e-002 MM BTU/hr |
| Produced Water: | 1.88 bbls/day |
| VOC Control Efficiency: | 0.04 % |
| HAP Control Efficiency: | 0.18 % |

BTEX Control Efficiency: 0.20 %
Dissolved Hydrocarbons in Water: 78.09 mg/L

| Component | Emitted | Condensed |
|---|---|---|
| Water | 6.99% | 93.01% |
| Carbon Dioxide | 99.94% | 0.06% |
| Nitrogen | 100.00% | 0.00% |
| Methane | 100.00% | 0.00% |
| Ethane | 100.00% | 0.00% |
| Propane | 100.00% | 0.00% |
| Isobutane | 100.00% | 0.00% |
| n-Butane | 100.00% | 0.00% |
| Isopentane | 100.00% | 0.00% |
| n-Pentane | 100.00% | 0.00% |
| Cyclopentane | 99.99% | 0.01% |
| n-Hexane | 100.00% | 0.00% |
| Cyclohexane | 99.99% | 0.01% |
| Other Hexanes | 100.00% | 0.00% |
| Heptanes | 100.00% | 0.00% |
| Methylcyclohexane | 100.00% | 0.00% |
| Benzene | 99.76% | 0.24% |
| Toluene | 99.80% | 0.20% |
| Ethylbenzene | 99.85% | 0.15% |
| Xylenes | 99.80% | 0.20% |
| C8+ Heavies | 100.00% | 0.00% |

## ABSORBER

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

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 1.50 lbs. H2O/MMSCF

Temperature: 65.0 deg. F
Pressure: 1000.0 psig
Dry Gas Flow Rate: 38.0000 MMSCF/day
Glycol Losses with Dry Gas: 0.2831 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 20.11 lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio: 3.00 gal/lb H2O

| Component | Remaining in Dry Gas | Absorbed in Glycol |
|---|---|---|
| Water | 7.45% | 92.55% |
| Carbon Dioxide | 99.94% | 0.06% |
| Nitrogen | 100.00% | 0.00% |
| Methane | 100.00% | 0.00% |
| Ethane | 99.99% | 0.01% |
| Propane | 99.98% | 0.02% |
| Isobutane | 99.98% | 0.02% |
| n-Butane | 99.97% | 0.03% |
| Isopentane | 99.97% | 0.03% |
| n-Pentane | 99.97% | 0.03% |
| Cyclopentane | 99.86% | 0.14% |
| n-Hexane | 99.95% | 0.05% |
| Cyclohexane | 99.77% | 0.23% |

| | | |
|---|---|---|
| Other Hexanes | 99.96% | 0.04% |
| Heptanes | 99.92% | 0.08% |
| Methylcyclohexane | 99.77% | 0.23% |
| Benzene | 97.21% | 2.79% |
| Toluene | 96.24% | 3.76% |
| Ethylbenzene | 95.58% | 4.42% |
| Xylenes | 93.55% | 6.45% |
| C8+ Heavies | 99.94% | 0.06% |

FLASH TANK

Flash Control: Vented to atmosphere
Flash Temperature: 65.0 deg. F
Flash Pressure: 30.0 psig

| Component | Left in Glycol | Removed in Flash Gas |
|---|---|---|
| Water | 99.94% | 0.06% |
| Carbon Dioxide | 7.77% | 92.23% |
| Nitrogen | 0.39% | 99.61% |
| Methane | 0.42% | 99.58% |
| Ethane | 1.76% | 98.24% |
| Propane | 4.72% | 95.28% |
| Isobutane | 8.09% | 91.91% |
| n-Butane | 11.10% | 88.90% |
| Isopentane | 13.95% | 86.05% |
| n-Pentane | 17.83% | 82.17% |
| Cyclopentane | 44.13% | 55.87% |
| n-Hexane | 31.72% | 68.28% |
| Cyclohexane | 64.51% | 35.49% |
| Other Hexanes | 24.85% | 75.15% |
| Heptanes | 53.00% | 47.00% |
| Methylcyclohexane | 73.15% | 26.85% |
| Benzene | 95.37% | 4.63% |
| Toluene | 97.49% | 2.51% |
| Ethylbenzene | 98.79% | 1.21% |
| Xylenes | 99.26% | 0.74% |
| C8+ Heavies | 87.15% | 12.85% |

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 5.5000 scfm

| Component | Remaining in Glycol | Distilled Overhead |
|---|---|---|
| Water | 26.76% | 73.24% |
| Carbon Dioxide | 0.00% | 100.00% |
| Nitrogen | 0.00% | 100.00% |
| Methane | 0.00% | 100.00% |
| Ethane | 0.00% | 100.00% |
| Propane | 0.00% | 100.00% |
| Isobutane | 0.00% | 100.00% |
| n-Butane | 0.00% | 100.00% |

| | | |
|---|---|---|
| Isopentane | 1.47% | 98.53% |
| n-Pentane | 1.34% | 98.66% |
| Cyclopentane | 0.90% | 99.10% |
| n-Hexane | 0.91% | 99.09% |
| Cyclohexane | 4.31% | 95.69% |
| Other Hexanes | 2.06% | 97.94% |
| Heptanes | 0.66% | 99.34% |
| Methylcyclohexane | 4.76% | 95.24% |
| Benzene | 5.18% | 94.82% |
| Toluene | 8.04% | 91.96% |
| Ethylbenzene | 10.47% | 89.53% |
| Xylenes | 13.00% | 87.00% |
| C8+ Heavies | 9.16% | 90.84% |

STREAM REPORTS:

WET GAS STREAM

Temperature: 65.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 1.58e+006 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 4.24e-002 | 3.18e+001 |
| Carbon Dioxide | 1.56e-001 | 2.86e+002 |
| Nitrogen | 4.98e-001 | 5.83e+002 |
| Methane | 7.59e+001 | 5.09e+004 |
| Ethane | 1.61e+001 | 2.02e+004 |
| Propane | 5.20e+000 | 9.57e+003 |
| Isobutane | 4.72e-001 | 1.15e+003 |
| n-Butane | 1.10e+000 | 2.67e+003 |
| Isopentane | 1.85e-001 | 5.58e+002 |
| n-Pentane | 2.29e-001 | 6.91e+002 |
| Cyclopentane | 3.92e-004 | 1.15e+000 |
| n-Hexane | 4.76e-002 | 1.71e+002 |
| Cyclohexane | 5.71e-003 | 2.01e+001 |
| Other Hexanes | 1.81e-002 | 6.52e+001 |
| Heptanes | 2.20e-002 | 9.19e+001 |
| Methylcyclohexane | 7.60e-003 | 3.11e+001 |
| Benzene | 6.78e-004 | 2.21e+000 |
| Toluene | 1.35e-003 | 5.18e+000 |
| Ethylbenzene | 5.71e-004 | 2.53e+000 |
| Xylenes | 1.54e-003 | 6.84e+000 |
| C8+ Heavies | 6.68e-003 | 4.75e+001 |
| Total Components | 100.00 | 8.70e+004 |

DRY GAS STREAM

Temperature: 65.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 1.58e+006 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 3.16e-003 | 2.37e+000 |
| Carbon Dioxide | 1.56e-001 | 2.86e+002 |
| Nitrogen | 4.99e-001 | 5.83e+002 |
| Methane | 7.60e+001 | 5.09e+004 |
| Ethane | 1.61e+001 | 2.02e+004 |
| Propane | 5.20e+000 | 9.56e+003 |
| Isobutane | 4.72e-001 | 1.15e+003 |
| n-Butane | 1.10e+000 | 2.67e+003 |
| Isopentane | 1.85e-001 | 5.58e+002 |
| n-Pentane | 2.29e-001 | 6.91e+002 |
| Cyclopentane | 3.92e-004 | 1.15e+000 |
| n-Hexane | 4.76e-002 | 1.71e+002 |
| Cyclohexane | 5.70e-003 | 2.00e+001 |
| Other Hexanes | 1.81e-002 | 6.52e+001 |
| Heptanes | 2.20e-002 | 9.18e+001 |
| Methylcyclohexane | 7.58e-003 | 3.11e+001 |
| Benzene | 6.60e-004 | 2.15e+000 |
| Toluene | 1.30e-003 | 4.98e+000 |
| Ethylbenzene | 5.46e-004 | 2.42e+000 |
| Xylenes | 1.44e-003 | 6.40e+000 |
| C8+ Heavies | 6.68e-003 | 4.74e+001 |
| Total Components | 100.00 | 8.70e+004 |

LEAN GLYCOL STREAM

---

Temperature: 65.00 deg. F
Flow Rate: 1.27e+000 gpm

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 9.85e+001 | 7.07e+002 |
| Water | 1.50e+000 | 1.08e+001 |
| Carbon Dioxide | 2.39e-012 | 1.71e-011 |
| Nitrogen | 3.61e-013 | 2.59e-012 |
| Methane | 8.65e-018 | 6.21e-017 |
| Ethane | 1.39e-007 | 9.95e-007 |
| Propane | 8.56e-009 | 6.14e-008 |
| Isobutane | 9.86e-010 | 7.08e-009 |
| n-Butane | 2.54e-009 | 1.82e-008 |
| Isopentane | 9.84e-005 | 7.06e-004 |
| n-Pentane | 1.60e-004 | 1.15e-003 |
| Cyclopentane | 1.15e-006 | 8.24e-006 |
| n-Hexane | 5.94e-005 | 4.26e-004 |
| Cyclohexane | 2.15e-004 | 1.55e-003 |
| Other Hexanes | 3.47e-005 | 2.49e-004 |
| Heptanes | 5.40e-005 | 3.88e-004 |
| Methylcyclohexane | 4.21e-004 | 3.02e-003 |
| Benzene | 4.52e-004 | 3.25e-003 |
| Toluene | 2.33e-003 | 1.67e-002 |
| Ethylbenzene | 1.81e-003 | 1.30e-002 |
| Xylenes | 9.15e-003 | 6.57e-002 |
| C8+ Heavies | 5.69e-004 | 4.09e-003 |
| Total Components | 100.00 | 7.18e+002 |

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 65.00 deg. F
Pressure: 1014.70 psia
Flow Rate: 1.42e+000 gpm
NOTE: Stream has more than one phase.

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 8.98e+001 | 7.07e+002 |
| Water | 5.11e+000 | 4.03e+001 |
| Carbon Dioxide | 3.50e-002 | 2.75e-001 |
| Nitrogen | 3.02e-002 | 2.37e-001 |
| Methane | 2.58e+000 | 2.03e+001 |
| Ethane | 1.20e+000 | 9.43e+000 |
| Propane | 6.33e-001 | 4.98e+000 |
| Isobutane | 8.28e-002 | 6.52e-001 |
| n-Butane | 2.16e-001 | 1.70e+000 |
| Isopentane | 4.37e-002 | 3.44e-001 |
| n-Pentane | 6.11e-002 | 4.81e-001 |
| Cyclopentane | 2.62e-004 | 2.06e-003 |
| n-Hexane | 1.87e-002 | 1.47e-001 |
| Cyclohexane | 7.06e-003 | 5.56e-002 |
| Other Hexanes | 6.17e-003 | 4.86e-002 |
| Heptanes | 1.41e-002 | 1.11e-001 |
| Methylcyclohexane | 1.10e-002 | 8.68e-002 |
| Benzene | 8.34e-003 | 6.57e-002 |
| Toluene | 2.71e-002 | 2.13e-001 |
| Ethylbenzene | 1.60e-002 | 1.26e-001 |
| Xylenes | 6.47e-002 | 5.09e-001 |
| C8+ Heavies | 6.50e-003 | 5.12e-002 |
| Total Components | 100.00 | 7.87e+002 |

FLASH TANK OFF GAS STREAM

Temperature: 65.00 deg. F
Pressure: 44.70 psia
Flow Rate: 6.61e+002 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 8.15e-002 | 2.55e-002 |
| Carbon Dioxide | 3.31e-001 | 2.54e-001 |
| Nitrogen | 4.85e-001 | 2.36e-001 |
| Methane | 7.24e+001 | 2.02e+001 |
| Ethane | 1.77e+001 | 9.27e+000 |
| Propane | 6.18e+000 | 4.75e+000 |
| Isobutane | 5.92e-001 | 5.99e-001 |
| n-Butane | 1.50e+000 | 1.51e+000 |
| Isopentane | 2.35e-001 | 2.96e-001 |
| n-Pentane | 3.15e-001 | 3.95e-001 |
| Cyclopentane | 9.45e-004 | 1.15e-003 |
| n-Hexane | 6.71e-002 | 1.01e-001 |
| Cyclohexane | 1.35e-002 | 1.97e-002 |
| Other Hexanes | 2.43e-002 | 3.65e-002 |
| Heptanes | 2.99e-002 | 5.21e-002 |

| | | |
|---|---|---|
| Methylcyclohexane | 1.36e-002 | 2.33e-002 |
| Benzene | 2.24e-003 | 3.04e-003 |
| Toluene | 3.33e-003 | 5.34e-003 |
| Ethylbenzene | 8.23e-004 | 1.52e-003 |
| Xylenes | 2.05e-003 | 3.79e-003 |
| C8+ Heavies | 2.22e-003 | 6.58e-003 |
| Total Components | 100.00 | 3.78e+001 |

FLASH TANK GLYCOL STREAM

Temperature: 65.00 deg. F
Flow Rate: 1.34e+000 gpm

| Component | Conc. (wt%) | Loading (lb/hr) |
|---|---|---|
| TEG | 9.44e+001 | 7.07e+002 |
| Water | 5.37e+000 | 4.02e+001 |
| Carbon Dioxide | 2.85e-003 | 2.14e-002 |
| Nitrogen | 1.22e-004 | 9.18e-004 |
| Methane | 1.13e-002 | 8.46e-002 |
| Ethane | 2.21e-002 | 1.66e-001 |
| Propane | 3.14e-002 | 2.35e-001 |
| Isobutane | 7.03e-003 | 5.27e-002 |
| n-Butane | 2.52e-002 | 1.89e-001 |
| Isopentane | 6.40e-003 | 4.80e-002 |
| n-Pentane | 1.14e-002 | 8.58e-002 |
| Cyclopentane | 1.22e-004 | 9.11e-004 |
| n-Hexane | 6.24e-003 | 4.68e-002 |
| Cyclohexane | 4.79e-003 | 3.59e-002 |
| Other Hexanes | 1.61e-003 | 1.21e-002 |
| Heptanes | 7.84e-003 | 5.88e-002 |
| Methylcyclohexane | 8.47e-003 | 6.35e-002 |
| Benzene | 8.36e-003 | 6.26e-002 |
| Toluene | 2.77e-002 | 2.08e-001 |
| Ethylbenzene | 1.66e-002 | 1.24e-001 |
| Xylenes | 6.75e-002 | 5.06e-001 |
| C8+ Heavies | 5.95e-003 | 4.46e-002 |
| Total Components | 100.00 | 7.49e+002 |

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 9.63e+002 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 6.44e+001 | 2.95e+001 |
| Carbon Dioxide | 7.24e-002 | 8.09e-002 |
| Nitrogen | 1.72e-001 | 1.22e-001 |
| Methane | 2.62e+001 | 1.07e+001 |
| Ethane | 5.72e+000 | 4.37e+000 |
| Propane | 1.99e+000 | 2.23e+000 |
| Isobutane | 1.97e-001 | 2.91e-001 |
| n-Butane | 5.05e-001 | 7.46e-001 |
| Isopentane | 8.93e-002 | 1.64e-001 |

| | | |
|---|---|---|
| n-Pentane | 1.25e-001 | 2.29e-001 |
| Cyclopentane | 6.41e-004 | 1.14e-003 |
| n-Hexane | 3.75e-002 | 8.21e-002 |
| Cyclohexane | 1.80e-002 | 3.85e-002 |
| Other Hexanes | 1.16e-002 | 2.54e-002 |
| Heptanes | 3.05e-002 | 7.75e-002 |
| Methylcyclohexane | 2.69e-002 | 6.69e-002 |
| Benzene | 3.02e-002 | 5.98e-002 |
| Toluene | 8.21e-002 | 1.92e-001 |
| Ethylbenzene | 4.15e-002 | 1.12e-001 |
| Xylenes | 1.64e-001 | 4.41e-001 |
| C8+ Heavies | 1.17e-002 | 5.04e-002 |
| Total Components | 100.00 | 4.95e+001 |

CONDENSER VENT GAS STREAM

Temperature: 120.00 deg. F
Pressure: 15.20 psia
Flow Rate: 3.86e+002 scfh

| Component | Conc. (vol%) | Loading (lb/hr) |
|---|---|---|
| Water | 1.12e+001 | 2.06e+000 |
| Carbon Dioxide | 1.81e-001 | 8.09e-002 |
| Nitrogen | 4.29e-001 | 1.22e-001 |
| Methane | 6.55e+001 | 1.07e+001 |
| Ethane | 1.43e+001 | 4.37e+000 |
| Propane | 4.97e+000 | 2.23e+000 |
| Isobutane | 4.93e-001 | 2.91e-001 |
| n-Butane | 1.26e+000 | 7.46e-001 |
| Isopentane | 2.23e-001 | 1.64e-001 |
| n-Pentane | 3.11e-001 | 2.29e-001 |
| Cyclopentane | 1.60e-003 | 1.14e-003 |
| n-Hexane | 9.36e-002 | 8.21e-002 |
| Cyclohexane | 4.50e-002 | 3.85e-002 |
| Other Hexanes | 2.90e-002 | 2.54e-002 |
| Heptanes | 7.61e-002 | 7.75e-002 |
| Methylcyclohexane | 6.70e-002 | 6.69e-002 |
| Benzene | 7.51e-002 | 5.97e-002 |
| Toluene | 2.05e-001 | 1.92e-001 |
| Ethylbenzene | 1.03e-001 | 1.12e-001 |
| Xylenes | 4.08e-001 | 4.40e-001 |
| C8+ Heavies | 2.91e-002 | 5.04e-002 |
| Total Components | 100.00 | 2.21e+001 |

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 5.48e-002 gpm

| Component | Conc. (wt%) | Loading (lb/hr) | (ppm) |
|---|---|---|---|
| Water | 1.00e+002 | 2.74e+001 | 999920. |
| Carbon Dioxide | 1.63e-004 | 4.48e-005 | 2. |
| Nitrogen | 6.70e-006 | 1.84e-006 | 0. |

| | | | |
|---|---|---|---|
| Methane | 1.11e-003 | 3.03e-004 | 11. |
| Ethane | 5.15e-004 | 1.41e-004 | 5. |
| Propane | 2.70e-004 | 7.41e-005 | 3. |
| Isobutane | 1.96e-005 | 5.37e-006 | 0. |
| n-Butane | 6.60e-005 | 1.81e-005 | 1. |
| Isopentane | 1.03e-005 | 2.83e-006 | 0. |
| n-Pentane | 1.55e-005 | 4.24e-006 | 0. |
| Cyclopentane | 5.28e-007 | 1.45e-007 | 0. |
| n-Hexane | 4.65e-006 | 1.27e-006 | 0. |
| Cyclohexane | 1.19e-005 | 3.26e-006 | 0. |
| Other Hexanes | 1.17e-006 | 3.21e-007 | 0. |
| Heptanes | 2.52e-006 | 6.90e-007 | 0. |
| Methylcyclohexane | 9.96e-006 | 2.73e-006 | 0. |
| Benzene | 5.17e-004 | 1.42e-004 | 5. |
| Toluene | 1.37e-003 | 3.75e-004 | 14. |
| Ethylbenzene | 6.00e-004 | 1.65e-004 | 6. |
| Xylenes | 3.29e-003 | 9.01e-004 | 33. |
| C8+ Heavies | 1.09e-006 | 2.98e-007 | 0. |
| Total Components | 100.00 | 2.74e+001 | 1000000. |

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

# Attachment U

## ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

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

| Emission Point ID# | $NO_x$ | | CO | | VOC | | $SO_2$ | | $PM_{10}$ | | $PM_{2.5}$ | | $CH_4$ | | GHG ($CO_2e$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| **Line Heater (E0110)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0210)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0310)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0410)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0510)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0610)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0710)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0810)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0910)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Line Heater (E0012)** | **0.10** | **0.44** | **0.08** | **0.37** | **<0.01** | **0.02** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.01** | **146.37** | **641.11** |
| **Glycol Reboiler (E0086)** | **0.04** | **0.18** | **0.03** | **0.15** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **0.01** | **<0.01** | **0.01** | **<0.01** | **<0.01** | **58.55** | **256.44** |
| **Flash Gas Compressor (E0050)** | **0.94** | **4.10** | **1.64** | **7.18** | **0.58** | **2.54** | **<0.01** | **0.01** | **0.04** | **0.17** | **0.04** | **0.17** | **<0.01** | **0.01** | **99.88** | **437.48** |
| **VDU (E0060)** | **1.25** | **5.49** | **1.05** | **4.61** | **0.66** | **2.96** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.03** | **0.76** | **3.55** | **1,987.44** | **8,832.75** |
| **VDU (E0061)** | **1.25** | **5.49** | **1.05** | **4.61** | **0.66** | **2.96** | **<0.01** | **0.03** | **<0.01** | **0.03** | **<0.01** | **0.03** | **0.76** | **3.55** | **1,987.44** | **8,832.75** |
| **Regenerator Overhead Vent (E0088A)** | **--** | **--** | **--** | **--** | **4.80** | **21.04** | **--** | **--** | **--** | **--** | **--** | **--** | **10.68** | **46.79** | **267.07** | **1,169.73** |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BTEX Eliminator Burner (E0088B)** | **0.08** | **0.35** | **0.07** | **0.30** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **106.64** | **467.04** |
| **Produced Water Loading (E0011)** | **--** | **--** | **--** | **--** | **<0.01** | **0.02** | **--** | **--** | **--** | **--** | **--** | **--** | **0.03** | **0.11** | **0.81** | **2.98** |
| **Blowdown Fluid Loading (E0014)** | **--** | **--** | **--** | **--** | **0.30** | **1.30** | **--** | **--** | **--** | **--** | **--** | **--** | **0.11** | **0.48** | **2.73** | **11.93** |
| **TOTAL** | **4.56** | **19.99** | **4.69** | **20.52** | **7.07** | **31.09** | **0.02** | **0.11** | **0.17** | **0.73** | **0.17** | **0.73** | **12.37** | **54.62** | **5,974.30** | **26,422.28** |

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

## ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

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

| Emission Point ID# | Formaldehyde | | Benzene | | Toluene | | Ethylbenzene | | Xylenes | | Hexane | | Total HAPs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| **Line Heater (E0110)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0210)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0310)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0410)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0510)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0610)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0710)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0810)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0910)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Line Heater (E0012)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Glycol Reboiler (E0086)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Flash Gas Compressor (E0050)** | **0.28** | **1.23** | **<0.01** | **0.03** | **<0.01** | **0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **0.29** | **1.27** |
| **VDU (E0060)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **0.13** | **0.03** | **0.15** |
| **VDU (E0061)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **0.03** | **0.13** | **0.03** | **0.15** |
| **Regenerator Overhead Vent (E0088A)** | **<0.01** | **<0.01** | **0.06** | **0.26** | **0.19** | **0.84** | **0.11** | **0.49** | **0.44** | **1.93** | **0.08** | **0.36** | **0.89** | **3.88** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BTEX Eliminator Burner (E0088B)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Produced Water Loading (E0011)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** |
| **Blowdown Fluid Loading (E0014)** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **<0.01** | **0.01** | **0.05** | **0.01** | **0.05** |
| **TOTAL** | **0.28** | **1.24** | **0.07** | **0.30** | **0.20** | **0.87** | **0.11** | **0.50** | **0.45** | **1.97** | **0.17** | **0.75** | **1.28** | **5.59** |

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

# Attachment V

# AIR QUALITY PERMIT NOTICE

## Notice of Application

Notice is give that Chevron Appalachia, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit for a natural gas production operation located in Marshall County, West Virginia. The latitude and longitude coordinates are: 39.85693 and -80.68801.

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

Particulate Matter (PM) = 5.89 tpy
Sulfur Dioxide ($SO_2$) = 0.11 tpy
Volatile Organic Compounds (VOC) = 32.81 tpy
Carbon Monoxide (CO) = 20.52 tpy
Nitrogen Oxides ($NO_x$) = 19.99 tpy
Total Hazardous Air Pollutants = 5.69 tpy
Formaldehyde (HCHO) = 1.24 tpy
Hexane ($C_8H_{14}$) = 0.82 tpy
Benzene ($C_6H_6$) = 0.30 tpy
Toluene ($C_7H_8$) = 0.87 tpy
Ethylbenzene ($C_8H_{10}$) = 0.50 tpy
Xylene ($C_8H_{10}$) = 1.97 tpy
Carbon Dioxide Equivalents ($CO_2e$) = 26,476.97 tpy

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926 – 0499, extension 1250, during normal business hours.

Dated this the 20th day of December 2017.

By: Chevron Appalachia, LLC
Gary Orr - Appalachia Area Manager
700 Cherrington Parkway
Coraopolis, PA 15108