G70-D General Permit Application

Goff 5-55 Natural Gas Production Site

Clarksburg, West Virginia

Prepared By:

Environmental Resources Management, Inc.
Hurricane, West Virginia

August 2017

ARSENAL RESOURCES

People Powered. Asset Strong.

August 11, 2017

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

RE: G70-D General Permit Registration Application
Arsenal Resources
Goff 5-55 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 Goff 5-55 natural gas production site located in Harrison 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 contact me for payment of the application fee by credit card.

If you have any questions concerning this permit application, please contact me at (724) 940-1112 or by email at myingling@arsenalresources.com.

Sincerely,

Meghan M.B. Yingling
Environmental Compliance Manager
Arsenal Resources

Enclosures

Cc: Bill Veigel, Sr. Director of Production, Arsenal Resources
Stacey Lucas, V.P. HSE, Arsenal Resources
Grant Morgan, ERM

6031 Wallace Road Ext. Suite 300
Wexford, PA 15090
P: 724-940-1100
F: 800-428-0981
www.arsenalresources.com

1.0 INTRODUCTION NARRATIVE

Arsenal Resources, LLC submits this G70-D Class II General Permit application to the West Virginia Department of Environmental Protection's Division of Air Quality (WVDAQ) for the Goff 5-55 Wellpad (Goff) site located in Harrison County, West Virginia. This application addresses the operational activities associated with the production of natural gas and produced water at the Goff pad.

Arsenal submits this permit application for the authority to construct the following equipment:

- Four (4) Natural Gas Wells;
- Four (4) Gas Production Units/Heaters each rated at 1.00 MMBtu/hr input;
- One (1) 210 bbl Blowdown Tank;
- Four (4) 400 bbl Produced Fluids Tank;
- One (1) Produced Fluids Loadout; and
- One (1) Thermoelectric Generator.

Statement of aggregation

The Goff 5-55 wellpad is located in Harrison County, WV and operated by Arsenal. 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. Arsenal operates Goff with the same industrial grouping as nearby facilities, and some of these facilities are under common control. However, the Goff site is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

The Goff wellpad operates under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding sites operated by Arsenal that share the same two digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the Goff wellpad does share the same SIC codes as the surrounding wells and 5-55 wellpad.

Arsenal is the sole operator of the Goff Wellpad. Arsenal is also the sole operator of other production sites and compressor stations in the area. Therefore, Arsenal 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 additional consideration that the EPA put forth in the Source Determination Guidance is that the facilities must be within ¼ mile to be considered as for an adjacently determination. Goff 5-55 wellpad does fall within the ¼ mile distance; however, the Goff 5-55 wellpad will operate independently of the Goff 8, 16, and 17 wellpad and will not share equipment. Since the two facilities do not share equipment, they would not meet the common sense notion of a plant and therefore, does meet the definition of contiguous or adjacent properties.

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

Below are the GPS coordinates for the Goff wellpad and nearby, Arsenal owned assets to show the ¼ mile radius is valid.

Goff 5-55 wellpad: 39.25854, -80.38052
Goff 8, 16, and 17 wellpad: 39.25889, -80.37556

2.0 REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the Goff pad 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 Goff 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 gas production units 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 Goff well pad are subject to this requirement. Based on the nature of the process at the well pad, the presence of objectionable odors is unlikely.

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

The Goff Wellpad does not have a combustion device and is therefore not subject to this rule.

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

The line heaters are indirect heat exchangers that combust natural gas but are exempt 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 Arsenal's production of natural gas at the Goff pad.

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 Goff pad will not exceed emission thresholds established by this permitting program. Arsenal 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 nonattainment 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.

Harrison County, WV is in attainment for all pollutants with a National Ambient Air Quality Standard (NAAQS). Therefore, this regulation would not apply to the Goff site.

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 Goff wellpad 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 Goff Wellpad will commence construction after September 18, 2015 and therefore, does not have any affected facilities subject to Subpart OOOO.

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

The Goff facility commenced construction after September 18, 2015 and, therefore, will qualify as an affected facility under OOOOa. The Goff site will qualify as a collection of Fugitive Components Affected Facility. As a Fugitive Component Affected Facility, in order to comply,

LDAR monitoring at the Goff site must be performed within 60 days of startup of production and then semi-annually thereafter. The Goff site will also qualify as a gas well affected facility for all production wells.

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

- Storage vessels: Emissions from each storage vessel were determined to be below 6 tons per year (tpy) of VOC. Therefore, the produced water tanks are not affected storage vessels.
- Pneumatic devices: All pneumatic devices installed at the Goff facility 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 Goff facility does not operate any engines and, therefore, will not be subject to 40 CFR 60 Subpart JJJJ.

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

National Emissions Standards for Hazardous Air Pollutants

The following NESHAP included in the G70-D permit are not applicable to the Goff facility:

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

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

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	1.42	80
NOx	1.68	50
PM	11.16	20
PM-10	3.09	20
SO_2	0.01	20
VOC	2.94	80
Total HAPs	0.20	20

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): **Arsenal Resources, LLC**

Federal Employer ID No. (FEIN): **27-5343422**

Applicant's Mailing Address: **65 Professional Place Suite 200**

City: **Bridgeport**	State: **WV**	ZIP Code: **26330**

Facility Name: **Goff 5-55 Natural Gas Production Site**

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

City: **Clarksburg**	Zip Code: **26301**	County: **Harrison**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **39.25854**
Longitude: **-80.38052**

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

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: Phone: Fax:
Email: Date:

If applicable:
Authorized Representative Signature:_____
Name and Title: **Meghan M.B. Yingling, Environmental Compliance Manager** Phone: **724-940-1112** Fax:
Email: **myingling@arsenalresources.com** Date:

If applicable:
Environmental Contact
Name and Title: **Meghan M.B. Yingling, Environmental Compliance Manager** Phone: **724-940-1112** Fax:
Email: **myingling@arsenalresources.com** Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: **Construction of four (4) new wells and associated well equipment at the site.**	
Directions to the facility: **Slight left onto US-19 S/Milford St. Turn left at Shadow Hills Dr. Pad is on the left.**	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☐ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☒ I wish to pay by credit card. Contact for payment (incl. name and email address): **Stacey Lucas slucas@aresenalresources.com** ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☐ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☒ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Pneumatic Pump Data Sheet – Attachment R	
☐ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
☒ Facility-wide Emission Summary Sheet(s) – Attachment U	
☒ Class I Legal Advertisement – Attachment V	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

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

Attachment A

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

WEST VIRGINIA
STATE TAX DEPARTMENT

BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
ARSENAL RESOURCES LLC
6031 WALLACE ROAD EXT 300
WEXFORD, PA 15090-3430

BUSINESS REGISTRATION ACCOUNT NUMBER: **2247-4512**

This certificate is issued on: **03/8/2017**

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

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

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

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

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

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

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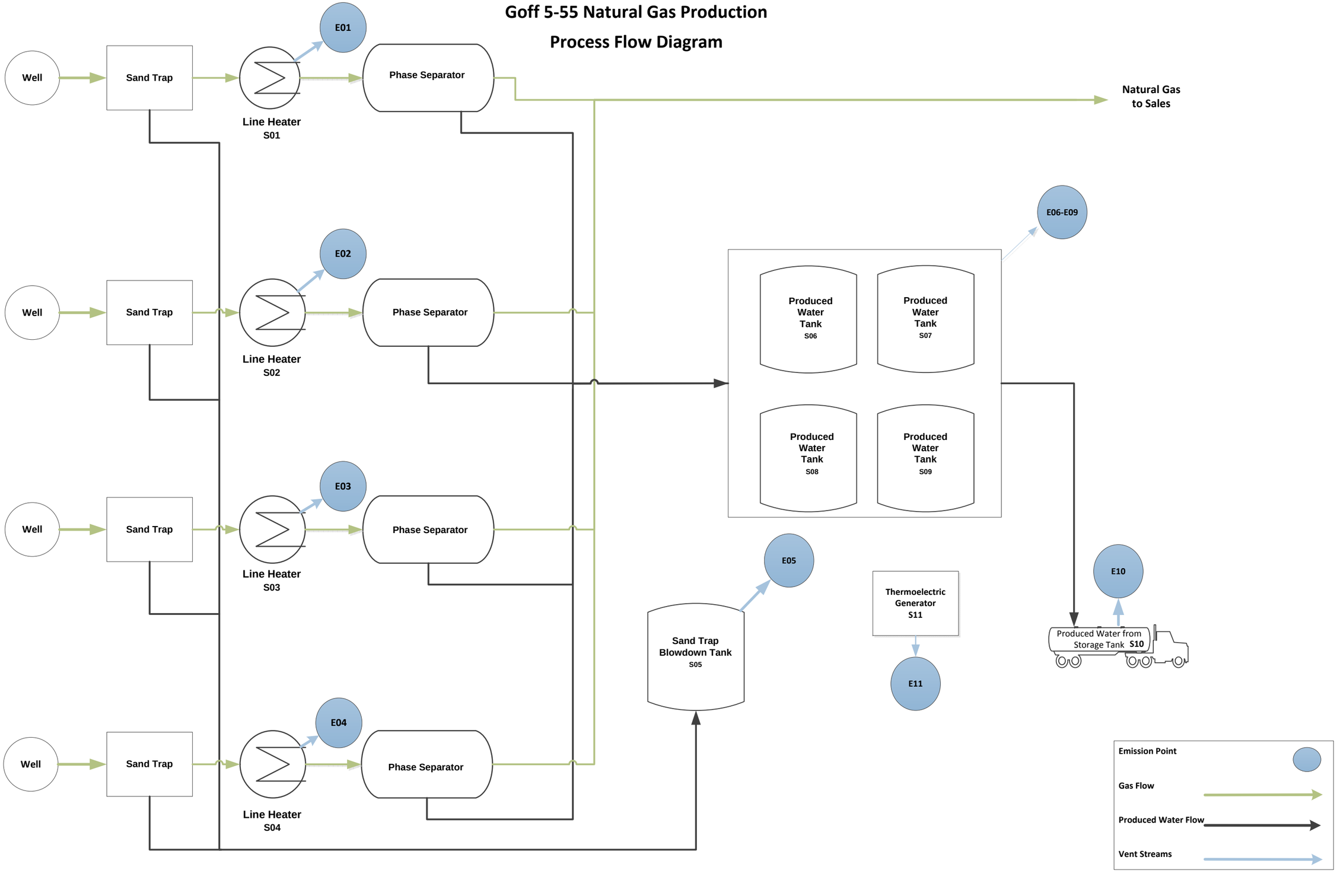
Attachment D

Attachment D

Goff 5-55 Natural Gas Production

Process Flow Diagram



Attachment E

Attachment E – Process Description

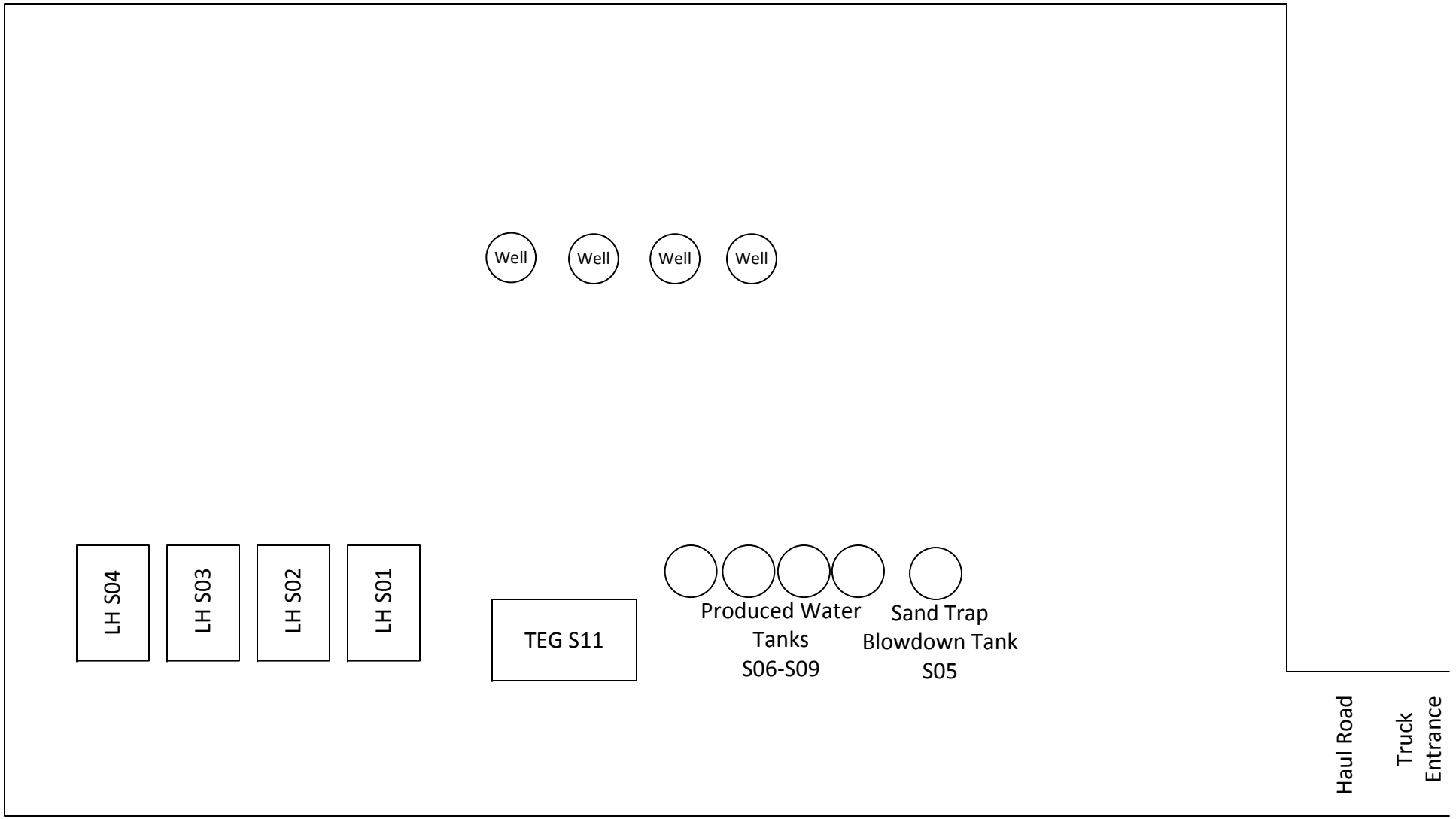
This permit application is being filed for Arsenal Resources, LLC and addresses operational activities associated with the Goff 5-55 natural gas production site. Natural gas flows from the four (4) wellheads that will be drilled and completed at the Goff pad. The raw gas is first routed through the sand traps to remove any sediment. Fluids from these sand traps are manually blown down to the sand trap blowdown tank (S05), as needed. From the sand traps, raw gas is routed through line heaters (S01-S04) to assist with the phase separation process in the downstream separators. In the separator, produced water is removed from the raw gas before being dumped to produced water tank (S06-S09). The separated gas is then sent off site via a sales pipeline. The produced water is pumped into a tank truck (S10) on an as needed basis and are disposed of off-site.

Power to the site is provided by a thermoelectric generator (S11).

Arsenal also operates a number of fugitive emission sources that are quantified within this permit application.

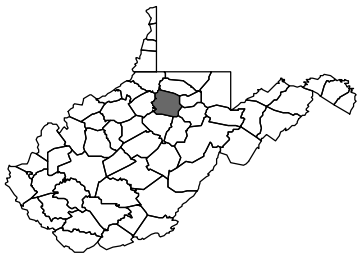
Attachment F

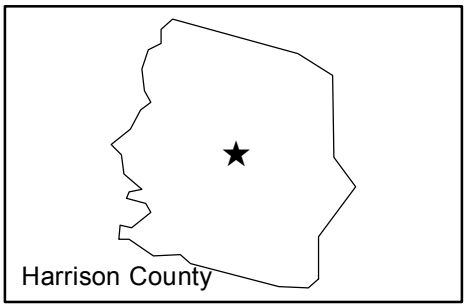
ATTACHMENT F – PLOT PLAN



Goff 5-55 Natural Gas Production Site
LAT: 39.25854 LON: -80.38052

Attachment G





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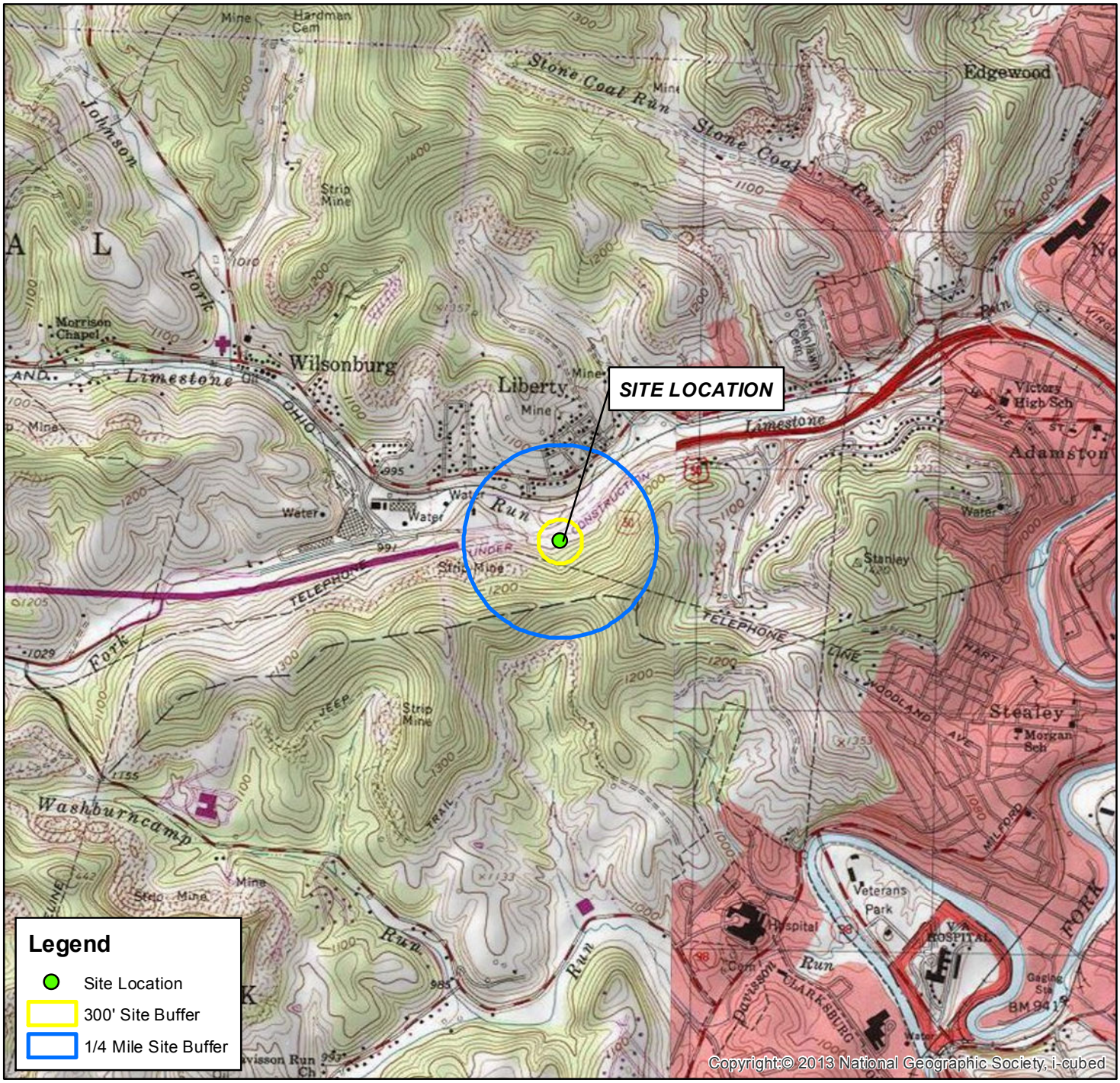
LAT. 39.285840 LON. -80.380522
HARRISON COUNTY
WEST VIRGINIA



USGS 1:24K 7.5' Quadrangle:
Wolf Summit, WV

SITE LOCATION MAP

ERM	**Arsenal Resources** Arsenal GOFF 5-55 Wellpad Clarksburg Harrison County, West Virginia	GIS Review: GM CHK'D: GM 0405216
Drawn By: SRV-7/17/17	**Environmental Resources Management**	ATTACHMENT G

J:\Projects\SiteLocationMaps\Arsenal Resources_MXD\AttachmentG-SiteLocationMap_Goff5-55_20170717.mxd - 7/17/2017|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]
S01	E01	Line Heater	2017	2017	1.0 MMBtu/hr	New	N/A	N/A
S02	E02	Line Heater	2017	2017	1.0 MMBtu/hr	New	N/A	N/A
S03	E03	Line Heater	2017	2017	1.0 MMBtu/hr	New	N/A	N/A
S04	E04	Line Heater	2017	2017	1.0 MMBtu/hr	New	N/A	N/A
S05	E05	Sand Trap Blowdown Tank	2017	2017	210 bbl	New	N/A	N/A
S06	E06	Produced Water Tank	2017	2017	400 bbl	New	N/A	N/A
S07	E07	Produced Water Tank	2017	2017	400 bbl	New	N/A	N/A
S08	E08	Produced Water Tank	2017	2017	400 bbl	New	N/A	N/A
S09	E09	Produced Water Tank	2017	2017	400 bbl	New	N/A	N/A
S10	E10	Produced Water Loadout	2017	2017	416,000 bbl/yr	New	N/A	N/A
S11	E11	Thermoelectric Generator	2017	2017	0.0007 MMBTU/hr	New	N/A	N/A

[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:

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	**152**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**<0.01**	**<0.01**	**0.72, 17.93**
Safety Relief Valves	☒ Yes ☐ No	**4**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**<0.01**	**<0.01**	**0.03, 0.70**
Open Ended Lines	☒ Yes ☐ No	**10**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**<0.01**	**<0.01**	**0.11, 2.67**
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	**661**	**EPA**	☒ Gas ☐ Liquid ☐ Both	**<0.01**	**<0.01**	**0.35, 8.66**
Compressors	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Other[1]	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			

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

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):
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?
4703305887	TBD	TBD	Green Completion	OOOOa
4703305886	TBD	TBD	Green Completion	OOOOa
4703305885	TBD	TBD	Green Completion	OOOOa
4703305888	TBD	TBD	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 **Goff 5-55 Tank Battery**	2. Tank Name **Produced Water Tank**
3. Emission Unit ID number **S01-S04**	4. Emission Point ID number **E01-E04**
5. Date Installed , Modified or Relocated *(for existing tanks)* **NA** Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☐ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **400 bbl**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.) **20**
10A. Maximum Liquid Height (ft.) **12**	10B. Average Liquid Height (ft.) **10**
11A. Maximum Vapor Space Height (ft.) **11**	11B. Average Vapor Space Height (ft.)
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **400 bbl**	
13A. Maximum annual throughput (gal/yr) **17,472,000**	13B. Maximum daily throughput (gal/day) **47,868.5**
14. Number of tank turnovers per year **1040**	15. Maximum tank fill rate (gal/min) **33.24**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☒ Does Not Apply ☐ Rupture Disc (psig)

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

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

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

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

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**			
21A. Shell Color: **Olive Vine**	21B. Roof Color: **Olive Vine**	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 psig Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): **0.06**	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☐ Yes ☒ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based:			
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			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig): **0.0**	37A. Minimum (psig): **0.0**	37B. Maximum (psig): **0.0**	
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. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

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 **Blowdown Storage Vessel**	2. Tank Name **Sand Trap Blowdown**
3. Emission Unit ID number **S05**	4. Emission Point ID number **E05**
5. Date Installed , Modified or Relocated *(for existing tanks)* **NA** Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☐ Yes ☐ No Was the tank manufactured after September 18, 2015? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☐ Yes ☒ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **210 bbl**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.) **12**
10A. Maximum Liquid Height (ft.) **12**	10B. Average Liquid Height (ft.) **6**
11A. Maximum Vapor Space Height (ft.) **11**	11B. Average Vapor Space Height (ft.)
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **210 bbl**	
13A. Maximum annual throughput (gal/yr) **2,293,200**	13B. Maximum daily throughput (gal/day) **6,283**
14. Number of tank turnovers per year **260**	15. Maximum tank fill rate (gal/min) **4.36**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof ☒ vertical ☐ horizontal ☐ flat roof ☒ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☒ Does Not Apply ☐ Rupture Disc (psig)

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

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

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

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

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

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**			
21A. Shell Color: **Olive Vine**	21B. Roof Color: **Olive Vine**	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 psig Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft): **0.06**	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☒ Yes ☐ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based:			
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			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig): **0.0**	37A. Minimum (psig): **0.0**	37B. Maximum (psig): **0.0**	
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. 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]
S01	S01	Line Heater	2017	New	1.00	1040
S02	S02	Line Heater	2017	New	1.00	1040
S03	S03	Line Heater	2017	New	1.00	1040
S04	S04	Line Heater	2017	New	1.00	1040
S11	S11	TEG	2017	New	0.0007	1040

[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
(Not Applicable)

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#: **S10**	Emission Point ID#: **E10**	Year Installed/Modified: **2017**
Emission Unit Description: **Tanker Truck load out for Produced water tanks**		
Loading Area Data		
Number of Pumps: **2**	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 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? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

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

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	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)	47.87		
Max. Annual Throughput (1000 gal/yr)	17,472		
Loading Method[1]	SP		
Max. Fill Rate (gal/min)	33.24		
Average Fill Time (min/loading)	NA		
Max. Bulk Liquid Temperature (°F)	60		
True Vapor Pressure[2]	NA		

Cargo Vessel Condition[3]		U		
Control Equipment or Method[4]		None		
Max. Collection Efficiency (%)		NA		
Max. Control Efficiency (%)		NA		
Max.VOC Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	<0.01		
Max.HAP Emission Rate	Loading (lb/hr)	<0.01		
	Annual (ton/yr)	<0.01		
Estimation Method[5]		EPA		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

O Other (describe)

4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)

CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)

ECD Enclosed Combustion Device F Flare

TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance

TM Test Measurement based upon test data submittal O Other (describe)

Attachment P

(Not Applicable)

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

Attachment S
(Not Applicable)

Attachment T

Attachment T - Emission Calculations
Line Heaters S01 - S04

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	0.02
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	0.08	0.35
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	0.10	0.42
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	0.02
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	0.03
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	1.00	1,040	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1.00	1,040	8,760	116.98	512.36
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	1.00	1,040	8,760	<0.01	<0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	1.00	1,040	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							117.10	512.89

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 4 line heaters are diplayed in the Total Site Emissions Table.

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

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

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

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

Example Equations:

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

Subpart C

Max. Hourly Emission Rate **(lb/hr)** = Emission Factor **(kg CO_2/MMBtu)** x Boiler Rating **(MMBtu/hr)** x 2.20462 **(lb/kg)**

Attachment T - Emission Calculations
Sand Trap Blowdown Tank S05

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	0.06	0.27
Total 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	0.07	0.31
CH_4	1.70	7.44
Total CO_2e	42.53	186.29

Notes:

-Blowdown operations are conducted on the Goff 5-55 pad daily to allow for the removal of fluids from the sand traps. Based on available operational information, blowdowns are assummed to occur for one hour per day.

-Emission rates for the Sand Trap Blowdown Tank were calculated using ProMax software. ProMax output sheets for the Goff 5-55 Pad 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

Attachment T - Emission Calculations
Produced Water Tanks S06 - S09

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	0.59	2.57
Total HAPs	0.03	0.12
Hexane	0.02	0.08
Benzene	<0.01	<0.01
Toluene	<0.01	0.03
Ethylbenzene	<0.01	<0.01
Xylene	<0.01	<0.01
CO_2	0.54	2.35
CH_4	12.99	56.88
Total CO_2e	325.20	1,424.38

Notes:

-Emission rates for Produced Water Tanks S06 - S09 were calculated using ProMax software. ProMax output sheets for the Goff 5-55 Pad are attached.

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

-For emission calculation purposes, the total throughput for tanks S06 - S09 is modeled as being received through a single tank. The throughput value represents the total throughput for all four (4) 400-barrel tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the well pad. Actual throughput for each tank will vary based on operations.

-Arsenal Resources will operate the Goff 5-55 Site in Harrison county where the produced hydrocarbon condensate is expected to be minimal. A representative analysis was used in order to find a conservative estimate of emissions from condensate. In order to comply with the permit, Arsenal will collect and analyze a pressurized tank liquid sample within 30 days of production start up.

Attachment T - Emission Calculations
Liquids Unloading (S10)

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	<0.01	<0.01
Total 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	0.02	0.08
CH_4	0.02	0.10
Total CO_2e	0.57	2.48

Notes:

-Emission rates for Liquids Unloading was calculated using ProMax software. ProMax output sheets for the Goff 5-55 Pad are attached.

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

Attachment T - Emission Calculations
TEG (S11)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Boiler Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
Hexane	1.8	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
Formaldehyde	0.075	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
Benzene	0.0021	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
Toluene	0.0034	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
Pb	0.0005	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
CO	84	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
NOx	100	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
$PM_{Filterable}$	1.9	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
$PM_{Condensable}$	5.7	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
PM_{Total}	7.6	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
SO_2	0.6	lb/10^6 scf	AP-42 Chapter 1.4	0.0007	1,040	8,760	<0.01	<0.01
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	0.0007	1,040	8,760	0.08	0.36
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	0.0007	1,040	8,760	<0.01	<0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	0.0007	1,040	8,760	<0.01	<0.01
Total HAPs							<0.01	<0.01
Total CO_2e							0.08	0.36

Notes:

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

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

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

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

Example Equations:

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

Subpart C

Max. Hourly Emission Rate **(lb/hr)** = Emission Factor **(kg CO_2/MMBtu)** x Boiler Rating **(MMBtu/hr)** x 2.20462 **(lb/kg)**

Attachment T - Emission Calculations
Fugitive Leaks

Default Average Component Counts for Major Onshore Natural Gas Production Equipment				
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

- Table W-1B to 40CFR98 Subpart W

Well Specific Equipment Counts	
Facility Equipment Type	**Count on Site**
Wellheads	4
Separators	4
Meters/Piping	4
Compressors	0
In-line Heaters	4
Dehydrators	0

Gas Composition														
	Propane	**Butane**	**Pentanes**	**Heptane**	**Octanes**	**Nonanes**	**Decanes**	**Hexane**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**CO_2**	**CH_4**
Mole %	0.20	0.02	0.002	<0.01	<0.001	<0.001	<0.001	0.0046	<0.001	<0.001	<0.001	<0.001	0.11	96.12
MW	44	58	72	100	114	128	142	86.00	78.00	92.00	106.00	106.00	44.00	16.00

Fugitive Emissions													
Facility Equipment Type	**Total Count**	**Emission Rate (scf/hr/component)[2]**	**Hours of Operation**	**VOCs (lbs/hr)**	**VOCs (tons/yr)**	**HAPs (lbs/hr)**	**HAPs (tons/yr)**	**CO_2 (lbs/hr)**	**CO_2 (tons/yr)**	**CH_4 (lbs/hr)**	**CH_4 (tons/yr)**	**Total CO_2e (lbs/hr)**	**Total CO_2e (tons/yr)**
Valves	152	0.027	8760	0.00	0.00	<0.001	<0.001	<0.001	0.004	0.16	0.72	4.09	17.93
Connectors	661	0.003	8760	<0.001	0.00	<0.001	<0.001	<0.001	0.002	0.08	0.35	1.98	8.66
Open-ended Lines	10	0.06	8760	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.02	0.11	0.61	2.67
Pressure Relief Valves	4	0.04	8760	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	0.03	0.16	0.70
			Total Emissions:	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.27**	**1.20**	**6.84**	**29.96**

- Table W-1A to 40CFR98 Subpart W

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

Attachment T - Emission Calculations
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	1.17	1	4,333	NA	NA	5.01	10.86	1.28	2.77	0.13	0.28
2	Employee Vehicles	4	3	10	1.17	1	200	NA	NA	1.78	0.18	0.45	0.05	0.05	0.005
									Totals:	**6.79**	**11.04**	**1.73**	**2.81**	**0.17**	**0.28**

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

Attachment T - Emission Calculations

Goff 5-55 Site Emission Levels

	VOCs		HAPs		CO		NO_x		PM - Total		PM - 10/2.5		PM - CON		SO_2		CO_2		CH_4		N_2O		CO_2e	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (E01)	<0.01	0.02	<0.01	<0.01	0.0808	0.35	0.10	0.42	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	116.98	512.36	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E02)	<0.01	0.02	<0.01	<0.01	0.0808	0.35	0.10	0.42	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	116.98	512.36	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E03)	<0.01	0.02	<0.01	<0.01	0.0808	0.35	0.10	0.42	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	116.98	512.36	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E04)	<0.01	0.02	<0.01	<0.01	0.0808	0.35	0.10	0.42	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	116.98	512.36	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Blowdown Tank (E05)	0.06	0.27	<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	0.07	0.31	1.70	7.44	<0.01	<0.01	42.53	186.29
Water Tank (E06-E09)	0.59	2.57	0.03	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.54	2.35	12.99	56.88	<0.01	<0.01	325.20	1424.38
Tank Truck Loading Activities (E10)	<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	<0.01	<0.01	0.02	0.08	0.02	0.10	<0.01	<0.01	0.57	2.48
TEG (E11)	<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	<0.01	<0.01	0.08	0.36	<0.01	<0.01	<0.01	<0.01	0.08	0.36
Haul Roads	--	--	--	--	--	--	--	--	6.79	11.04	1.90	3.09	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	<0.01	<0.01	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	0.27	1.20	--	--	6.84	29.96
Totals	**0.67**	**2.94**	**0.05**	**0.20**	**0.32**	**1.42**	**0.38**	**1.68**	**6.80**	**11.16**	**1.74**	**3.09**	**0.02**	**0.10**	**<0.01**	**0.01**	**468.62**	**2052.55**	**14.99**	**65.65**	**<0.01**	**<0.01**	**843.61**	**3695.02**

Attachment T - Emission Calculations
Goff Site Emission Levels - HAP Speciation

	Total HAPs		**Formaldehyde**		**Hexane**		**Benzene**		**Toluene**		**Ethylbenzene**		**Xylene**	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (E01)	<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 (E02)	<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 (E03)	<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 (E04)	<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 Tank (E05)	<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
Water Tanks (E06-E09)	0.03	0.12	<0.01	<0.01	0.02	0.08	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01
Tank Truck Loading Activities (E10)	<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
TEG (E11)	<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	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Totals	**0.05**	**0.20**	**<0.01**	**<0.01**	**0.03**	**0.14**	**0.00**	**0.00**	**0.01**	**0.03**	**<0.01**	**0.00**	**<0.01**	**0.00**

Certificate of Analysis

Number: 2030-14100210-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Gary Vermillion
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Oct. 27, 2014

Field:
Station N
Station Number:
Sample Point:
Analyzed: 10/23/2014 14:04:51 by GR

Sampled By: GR-SPL
Sample Of: Condensate Spot
Sample Date: 10/08/2014 15:00
Sample Conditions: 630 psig
Method: GPA-2186M/GPA-2103

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	28.013	NIL	0.807	NIL
Methane	10.674	16.043	1.735	0.300	4.055
Carbon Dioxide	0.065	44.010	0.029	0.817	0.025
Ethane	5.377	30.069	1.638	0.356	3.224
Propane	3.736	44.096	1.669	0.507	2.308
Iso-Butane	1.359	58.122	0.800	0.563	0.997
n-Butane	2.754	58.122	1.622	0.584	1.947
Iso-Pentane	2.508	72.149	1.833	0.625	2.056
n-Pentane	2.250	72.149	1.645	0.631	1.829
i-Hexanes	4.742	85.172	4.092	0.667	4.303
n-Hexane	2.718	86.175	2.373	0.664	2.506
2,2,4-Trimethylpentane	0.018	114.231	0.021	0.697	0.021
Benzene	0.109	78.114	0.086	0.885	0.068
Heptanes	13.220	98.287	13.166	0.700	13.187
Toluene	1.097	92.141	1.024	0.872	0.823
Octanes	15.626	110.146	17.442	0.732	16.710
Ethylbenzene	0.200	106.167	0.215	0.872	0.173
Xylenes	0.368	106.167	0.396	0.885	0.314
Nonanes	11.599	124.568	14.638	0.744	13.792
Decanes Plus	21.580	162.726	35.576	0.788	31.662
	100.000		100.000		100.000

Physical Properties	Total	C10+
Specific Gravity at 60°F	0.7012	0.7879
API Gravity at 60°F	70.284	48.091
Molecular Weight	98.699	162.726
Pounds per Gallon (in Vacuum)	5.846	6.569
Pounds per Gallon (in Air)	5.840	6.562
Cu. Ft. Vapor per Gallon @ 14.73 psia	22.427	15.283

Patti L. Perro

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

Number: 2030-14100210-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Gary Vermillion
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Oct. 27, 2014

Field:
Station Name:
Station Number:
Sample Point:
Analyzed: 10/23/2014 14:04:51 by GR

Sampled By: GR-SPL
Sample Of: Condensate Spot
Sample Date: 10/08/2014 15:00
Sample Conditions: 630 psig
Method: GPA-2186M/GPA-2103

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	28.013	NIL	0.807	NIL
Carbon Dioxide	0.065	44.010	0.029	0.817	0.025
Methane	10.674	16.043	1.735	0.300	4.055
Ethane	5.377	30.069	1.638	0.356	3.224
Propane	3.736	44.096	1.669	0.507	2.308
Iso-butane	1.359	58.122	0.800	0.563	0.997
n-Butane	2.754	58.122	1.622	0.584	1.947
Iso-pentane	2.508	72.149	1.833	0.625	2.056
n-Pentane	2.250	72.149	1.645	0.631	1.829
Hexanes	7.460	85.537	6.465	0.666	6.809
Heptanes Plus	63.817	127.692	82.564	0.754	76.750
	100.000		100.000		100.000

Physical Properties	Total	C7+
Specific Gravity at 60°F	0.7012	0.7543
API Gravity at 60°F	70.284	56.084
Molecular Weight	98.699	127.692
Pounds per Gallon (in Vacuum)	5.846	6.289
Pounds per Gallon (in Air)	5.840	6.282
Cu. Ft. Vapor per Gallon @ 14.73 psia	22.427	18.647

Patti L. Pitre

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

Number: 2030-14100210-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Gary Vermillion
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Oct. 27, 2014

Field:
Station Name:
Station Number:
Sample Point:

Sampled By: GR-SPL
Sample Of: Condensate Spot
Sample Date: 10/08/2014 15:00
Sample Conditions: 630 psig

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color Visual	Proprietary	Straw			CM	10/23/2014
API Gravity @ 60° F	ASTM D-5002	60.59	°		CM	10/23/2014
Specific Gravity @ 60/60° F	ASTM D-5002	0.7366			CM	10/23/2014
Density @ 60° F	ASTM D-5002	0.7359	g/ml		CM	10/23/2014
Shrinkage Factor	Proprietary	0.9173			CM	10/23/2014
Flash Factor	Proprietary	198.5929	Cu. Ft./S.T. Bbl		CM	10/23/2014

Patti L. Peters

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

C6+ Gas Analysis Report

Gas Analytical
Stonewood, West Virginia
8444 Water Street
Stonewood, WV 26301-8006

Report Date: Jan 17, 2017 10:05a

Client:	MOUNTAINEER KEYSTONE	Date Sampled:	Jan 13, 2017
Client Code:	5764	Analysis Date:	Jan 16, 2017 12:00a
Site:	PALETTA 8	Collected By:	JM
Field:	190-WEST VIRGINIA	Date Effective:	Feb 1, 2017 12:00a
Meter:	5203	Sample Pressure (PSI):	45.0
Source Laboratory	Stonewood, WV	Sample Temp (°F):	60
Lab File No:	**516613903**	Field H2O (lb/MMSCFD):	
Cylinder No:	5857		
Analysis Status:	good		
Sample Type:	Spot		
Measurement Analyst:	Ashley Free		

Component	Mol %	GPM @Contract PSIA
H2S		
Methane	96.1193	0.0000
Ethane	3.2990	0.8839
Propane	0.1964	0.0542
I-Butane	0.0072	0.0024
N-Butane	0.0133	0.0042
I-Pentane	0.0015	0.0005
N-Pentane	0.0007	0.0003
Nitrogen	0.2453	0.0000
Oxygen		
Carbon Dioxide	0.1127	0.0000
Helium	0.0000	
Hexanes+	0.0046	0.0020
TOTAL	100.0000	0.9475

Analytical Results at Base Conditions (Real)		
BTU/SCF (Dry):	1,037.3348	BTU/ft³
BTU/SCF (Saturated):	1,019.5843	BTU/ft³
PSIA:	14.696	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99787	
Z Factor (Saturated):	0.99752	

Analytical Results at Contract Conditions (Real)		
BTU/SCF (Dry):	1,039.7399	BTU/ft³
BTU/SCF (Saturated):	1,021.9901	BTU/ft³
PSIA:	14.730	PSI
Temperature (°F):	60.0	°F
Z Factor (Dry):	0.99787	
Z Factor (Saturated):	0.99752	

Calculated Specific Gravities			
Ideal Gravity:	0.5743	Real Gravity:	0.5753
Molecular Wt:	16.6346	lb/lbmol	

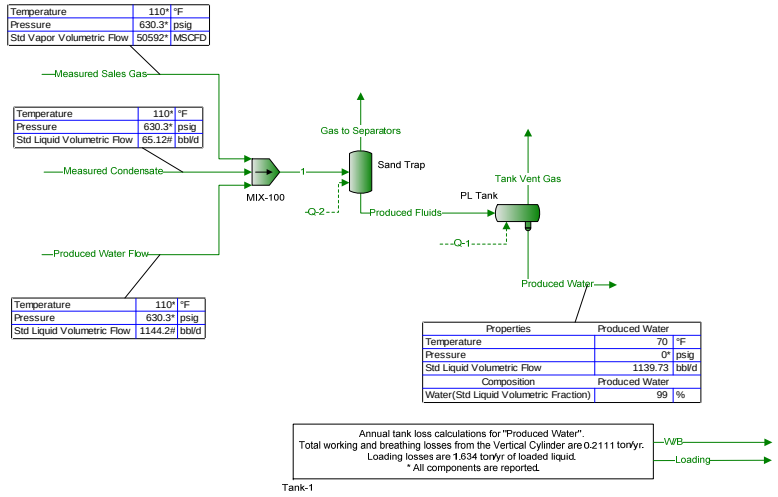
Methods, standards, and uncertainties based on GPA 2261-13.
Analytical Calculations performed in accordance with GPA 2172-09.

Source	Date	Notes

Flowsheet1
Plant Schematic

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Arsenal - Goff Well Pad
Produced Liquids Tank



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

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
From Block	Sand Trap	--	--	--	Sand Trap
To Block	--	--	MIX-100	MIX-100	PL Tank

Stream Composition

Mole Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.269422	0.00306876	0 *	0.2703 *	0.000133623
Methane	95.6699	5.96949	10.674 *	95.9763 *	0.0910095
Carbon Dioxide	0.158436	1.86648	0.065 *	0.1592 *	0.00204516
Ethane	3.35003	0.576628	5.377 *	3.3552 *	0.00537675
Propane	0.210158	0.0266299	3.736 *	0.2065 *	0.000582286
Isobutane	0.0101678	0.00159982	1.359 *	0.0086 *	5.03213E-05
n-Butane	0.0180817	0.00349945	2.754 *	0.0149 *	0.000123135
Isopentane	0.00494238	0.00106202	2.508 *	0.002 *	6.18244E-05
n-Pentane	0.00393994	0.000910337	2.25 *	0.0013 *	6.35359E-05
i-Hexane	0.00556446	0.00136787	4.742 *	0 *	0.000182784
n-Hexane	0.00318402	0.000780622	2.718 *	0 *	0.000137632
2,2,4-Trimethylpentane	2.08823E-05	4.28082E-06	0.018 *	0 *	2.1527E-06
Benzene	0.000126698	4.34568E-05	0.109 *	0 *	1.15482E-05
Heptane	0.0153121	0.0031465	13.22 *	0 *	0.00173159
Toluene	0.00125584	0.000264547	1.097 *	0 *	0.000233562
Octane	0.0176415	0.0026481	15.626 *	0 *	0.00483082
Ethylbenzene	0.000221114	3.46184E-05	0.2 *	0 *	9.03323E-05
o-Xylene	0.000400569	5.1505E-05	0.368 *	0 *	0.000204433
Nonane	0.0123305	0.001332	11.599 *	0 *	0.00823912
Decane	0	0	0 *	0 *	0
Water	0.229931	91.5401	0 *	0 *	99.8104
Oxygen	0.00338873	0.000208327	0 *	0.0034 *	3.06028E-06
Decanes Plus	0.0132181	0.000636492	21.58 *	0 *	0.0745075
Hexanes+	0.00229256	4.09583E-05	0 *	0.0023 *	9.23768E-07

Molar Flow	Gas to Separators lbmol/h	Loading lbmol/h	Measured Condensate lbmol/h	Measured Sales Gas lbmol/h	Produced Fluids lbmol/h
Nitrogen	15.0137	6.19823E-07	0 *	15.0149 *	0.0012234
Methane	5331.27	0.00120571	0.701748 *	5331.4 *	0.833248
Carbon Dioxide	8.82897	0.000376988	0.00427334 *	8.84342 *	0.0187247
Ethane	186.683	0.000116466	0.353504 *	186.378 *	0.0492275
Propane	11.7112	5.37866E-06	0.245619 *	11.4709 *	0.00533119
Isobutane	0.566607	3.23129E-07	0.0893457 *	0.477722 *	0.000460723
n-Butane	1.00761	7.06813E-07	0.181058 *	0.827682 *	0.00112738
Isopentane	0.275417	2.14505E-07	0.164885 *	0.111098 *	0.000566041
n-Pentane	0.219556	1.83868E-07	0.147923 *	0.0722139 *	0.000581711
i-Hexane	0.310083	2.7628E-07	0.311757 *	0 *	0.0016735
n-Hexane	0.177431	1.57669E-07	0.178691 *	0 *	0.0012601
2,2,4-Trimethylpentane	0.00116368	8.64632E-10	0.00118339 *	0 *	1.97093E-05
Benzene	0.00706033	8.77733E-09	0.00716607 *	0 *	0.000105731
Heptane	0.853278	6.35525E-07	0.869132 *	0 *	0.0158538
Toluene	0.0699825	5.34327E-08	0.0721209 *	0 *	0.00213841
Octane	0.983082	5.34859E-07	1.02731 *	0 *	0.0442292
Ethylbenzene	0.0123217	6.99217E-09	0.0131487 *	0 *	0.000827048
o-Xylene	0.022322	1.04029E-08	0.0241937 *	0 *	0.00187172
Nonane	0.687127	2.69035E-07	0.762561 *	0 *	0.0754343
Decane	0	0	0 *	0 *	0
Water	12.8131	0.0184891	0 *	0 *	913.826
Oxygen	0.188839	4.20775E-08	0 *	0.188867 *	2.80188E-05
Decanes Plus	0.736587	1.28558E-07	1.41875 *	0 *	0.682163
Hexanes+	0.127755	8.2727E-09	0 *	0.127763 *	8.45768E-06

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Mass Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.450834	0.00465391	0 *	0.454498 *	0.000206368
Methane	91.6779	5.18439	1.71125 *	92.4177 *	0.0804922
Carbon Dioxide	0.416504	4.44691	0.0285875 *	0.420542 *	0.00496214
Ethane	6.01709	0.938652	1.61576 *	6.05561 *	0.00891325
Propane	0.553553	0.0635702	1.64634 *	0.546557 *	0.00141556
Isobutane	0.035301	0.00503386	0.789365 *	0.0300027 *	0.000161246
n-Butane	0.0627767	0.0110111	1.59964 *	0.0519815 *	0.000394566
Isopentane	0.0213002	0.0041481	1.80831 *	0.00866122 *	0.000245915
n-Pentane	0.01698	0.00355566	1.62229 *	0.00562979 *	0.000252723
i-Hexane	0.0286434	0.00638141	4.08377 *	0 *	0.000868395
n-Hexane	0.0163899	0.00364177	2.34072 *	0 *	0.000653879
2,2,4-Trimethylpentane	0.000142485	2.64722E-05	0.0205477 *	0 *	1.35567E-05
Benzene	0.00059116	0.000183765	0.0850863 *	0 *	4.9731E-05
Heptane	0.0916495	0.0170684	13.238 *	0 *	0.00956569
Toluene	0.00691183	0.00131957	1.0101 *	0 *	0.00118642
Octane	0.120373	0.0163756	17.8377 *	0 *	0.0304223
Ethylbenzene	0.00140222	0.000198965	0.212191 *	0 *	0.000528714
o-Xylene	0.00254025	0.000296019	0.390432 *	0 *	0.00119655
Nonane	0.0944658	0.00924841	14.8666 *	0 *	0.0582575
Decane	0	0	0 *	0 *	0
Water	0.247433	89.2773	0 *	0 *	99.1318
Oxygen	0.00647722	0.000360884	0 *	0.00653029 *	5.39873E-06
Decanes Plus	0.128482	0.00560711	35.0933 *	0 *	0.668426
Hexanes+	0.00228174	3.69452E-05	0 *	0.00230025 *	8.48568E-07

Mass Flow	Gas to Separators lb/h	Loading lb/h	Measured Condensate lb/h	Measured Sales Gas lb/h	Produced Fluids lb/h
Nitrogen	420.585	1.73634E-05	0 *	420.619 *	0.0342716
Methane	85526.6	0.0193425	11.2578 *	85528.8 *	13.3674
Carbon Dioxide	388.558	0.0165911	0.188068 *	389.194 *	0.824064
Ethane	5613.37	0.00350204	10.6295 *	5604.22 *	1.48022
Propane	516.412	0.000237175	10.8307 *	505.816 *	0.235082
Isobutane	32.9325	1.87809E-05	5.19297 *	27.7663 *	0.0267782
n-Butane	58.5647	4.10815E-05	10.5235 *	48.1067 *	0.0655256
Isopentane	19.871	1.54762E-05	11.8963 *	8.0156 *	0.0408392
n-Pentane	15.8407	1.32659E-05	10.6725 *	5.21014 *	0.0419698
i-Hexane	26.7215	2.38085E-05	26.8657 *	0 *	0.144215
n-Hexane	15.2902	1.35872E-05	15.3988 *	0 *	0.10859
2,2,4-Trimethylpentane	0.132925	9.87657E-08	0.135177 *	0 *	0.00225137
Benzene	0.551496	6.85613E-07	0.559755 *	0 *	0.00825883
Heptane	85.5001	6.36808E-05	87.0887 *	0 *	1.58858
Toluene	6.44807	4.9232E-06	6.6451 *	0 *	0.197029
Octane	112.296	6.10961E-05	117.348 *	0 *	5.05223
Ethylbenzene	1.30813	7.42324E-07	1.39594 *	0 *	0.0878036
o-Xylene	2.36981	1.10442E-06	2.56852 *	0 *	0.198711
Nonane	88.1276	3.45051E-05	97.8024 *	0 *	9.67483
Decane	0	0	0 *	0 *	0
Water	230.831	0.333087	0 *	0 *	16462.8
Oxygen	6.04262	1.34643E-06	0 *	6.04352 *	0.000896568
Decanes Plus	119.862	2.09197E-05	230.867 *	0 *	111.006
Hexanes+	2.12865	1.3784E-07	0 *	2.12879 *	0.000140922

Stream Properties

Property	Units	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
Temperature	°F	110 *	72.1381	110 *	110 *	110
Pressure	psia	645	0.426963	645 *	645 *	645

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
Mole Fraction Vapor	%	100	100	0	100	0
Mole Fraction Light Liquid	%	0	0	100	0	0.109849
Mole Fraction Heavy Liquid	%	0	0	0	0	99.8902
Molecular Weight	lb/lbmol	16.741	18.4719	100.065	16.6602	18.1386
Mass Density	lb/ft^3	1.90656	0.00138247	42.9219	1.89571	61.6316
Molar Flow	lbmol/h	5572.56	0.0201978	6.57437	5554.91	915.562
Mass Flow	lb/h	93290.4	0.373092	657.867	92545.9	16607
Vapor Volumetric Flow	ft^3/h	48931.2	269.874	15.3271	48818.5	269.456
Liquid Volumetric Flow	gpm	6100.51	33.6466	1.91091	6086.46	33.5945
Std Vapor Volumetric Flow	MMSCFD	50.7528	0.000183954	0.0598768	50.592 *	8.33859
Std Liquid Volumetric Flow	sgpm	607.877	0.000856968	1.8994 *	605.946	33.3406
Compressibility		0.926411	0.999603	0.245968	0.927214	0.0310508
Specific Gravity		0.578022	0.637784	0.688192	0.575231	0.988177
API Gravity				66.8378		10.404
Enthalpy	Btu/h	-1.81846E+08	-2030.22	-579483	-1.80122E+08	-1.11866E+08
Mass Enthalpy	Btu/lb	-1949.25	-5441.6	-880.85	-1946.3	-6736.04
Mass Cp	Btu/(lb*°F)	0.598591	0.441532	0.526269	0.599232	0.976601
Ideal Gas CpCv Ratio		1.28751	1.32199	1.05157	1.28868	1.32141
Dynamic Viscosity	cP	0.0124682	0.0103191	0.354499	0.0124635	0.631979
Kinematic Viscosity	cSt	0.408255	465.978	0.515603	0.410437	0.640144
Thermal Conductivity	Btu/(h*ft*°F)	0.0226955	0.0124403	0.0663816	0.0227179	0.359659
Surface Tension	lbf/ft			0.00099228		0.00469602
Net Ideal Gas Heating Value	Btu/ft^3	934.47	65.0293	5056.69	932.757	7.90549
Net Liquid Heating Value	Btu/lb	21168.7	384.863	19022.3	21235.8	-886.381
Gross Ideal Gas Heating Value	Btu/ft^3	1036.71	118.073	5439.14	1034.85	58.7049
Gross Liquid Heating Value	Btu/lb	23486.3	1474.59	20472.7	23561.3	176.41

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

	Produced Water	Produced Water Flow	Tank Vent Gas	W/B	1
From Block	PL Tank	--	PL Tank	--	MIX-100
To Block	--	MIX-100	--	--	Sand Trap

Stream Composition

Mole Fraction	Produced Water %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	1.81668E-06	0 *	0.134013	0.00306876	0.231422
Methane	0.00261258	0 *	89.8784	5.96949	82.1825
Carbon Dioxide	0.000717077	0 *	1.35102	1.86648	0.136367
Ethane	0.000334527	0 *	5.12692	0.576628	2.87806
Propane	7.07973E-05	0 *	0.520117	0.0266299	0.180584
Isobutane	1.19338E-05	0 *	0.0390416	0.00159982	0.00874009
n-Butane	3.83279E-05	0 *	0.0862641	0.00349945	0.0155475
Isopentane	3.21212E-05	0 *	0.0302323	0.00106202	0.00425367
n-Pentane	3.75386E-05	0 *	0.0264698	0.000910337	0.00339292
i-Hexane	0.000142532	0 *	0.0410681	0.00136787	0.00480504
n-Hexane	0.000115458	0 *	0.02266	0.000780622	0.00275413
2,2,4-Trimethylpentane	2.02813E-06	0 *	0.00012868	4.28082E-06	1.82393E-05
Benzene	1.05092E-05	0 *	0.00106689	4.34568E-05	0.000110449
Heptane	0.00164367	0 *	0.0910327	0.0031465	0.0133957
Toluene	0.000225394	0 *	0.00852978	0.000264547	0.00111158
Octane	0.00475408	0 *	0.0827758	0.0026481	0.0158337
Ethylbenzene	8.93278E-05	0 *	0.00111062	3.46184E-05	0.000202659
o-Xylene	0.000202716	0 *	0.00194856	5.1505E-05	0.000372892
Nonane	0.00820489	0 *	0.0430104	0.001332	0.0117532
Decane	0	0 *	0	0	0
Water	99.9062	100 *	2.48395	91.5401	14.2821
Oxygen	8.3148E-08	0 *	0.00302703	0.000208327	0.00291096
Decanes Plus	0.074555	0 *	0.0263245	0.000636492	0.0218669
Hexanes+	1.07106E-08	0 *	0.000928344	4.09583E-05	0.00196918

Molar Flow	Produced Water lbmol/h	Produced Water Flow lbmol/h	Tank Vent Gas lbmol/h	W/B lbmol/h	1 lbmol/h
Nitrogen	1.66165E-05	0 *	0.00120678	8.00561E-08	15.0149
Methane	0.0238963	0 *	0.809352	0.000155729	5332.1
Carbon Dioxide	0.00655883	0 *	0.0121659	4.86916E-05	8.84769
Ethane	0.00305979	0 *	0.0461677	1.50428E-05	186.732
Propane	0.000647556	0 *	0.00468363	6.94706E-07	11.7165
Isobutane	0.000109154	0 *	0.000351568	4.17352E-08	0.567068
n-Butane	0.000350571	0 *	0.000776805	9.12917E-08	1.00874
Isopentane	0.0002938	0 *	0.000272241	2.77053E-08	0.275983
n-Pentane	0.000343352	0 *	0.00023836	2.37484E-08	0.220137
i-Hexane	0.00130368	0 *	0.000369817	3.56842E-08	0.311757
n-Hexane	0.00105605	0 *	0.000204053	2.03644E-08	0.178691
2,2,4-Trimethylpentane	1.85506E-05	0 *	1.15876E-06	1.11676E-10	0.00118339
Benzene	9.61236E-05	0 *	9.60727E-06	1.13368E-09	0.00716607
Heptane	0.015034	0 *	0.000819747	8.20841E-08	0.869132
Toluene	0.0020616	0 *	7.68105E-05	6.90135E-09	0.0721209
Octane	0.0434838	0 *	0.000745394	6.90822E-08	1.02731
Ethylbenzene	0.000817047	0 *	1.00011E-05	9.03106E-10	0.0131487
o-Xylene	0.00185417	0 *	1.75467E-05	1.34363E-09	0.0241937
Nonane	0.075047	0 *	0.000387307	3.47484E-08	0.762561
Decane	0	0 *	0	0	0
Water	913.804	926.639 *	0.0223679	0.00238805	926.639
Oxygen	7.60523E-07	0 *	2.72583E-05	5.43472E-09	0.188867
Decanes Plus	0.681926	0 *	0.000237051	1.66045E-08	1.41875
Hexanes+	9.7966E-08	0 *	8.35971E-06	1.0685E-09	0.127763

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Mass Fraction	Produced Water %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	2.80564E-06	0 *	0.211682	0.00465391	0.382738
Methane	0.00231061	0 *	81.3012	5.18439	77.8362
Carbon Dioxide	0.0017398	0 *	3.35257	4.44691	0.354315
Ethane	0.000554545	0 *	8.69254	0.938652	5.10917
Propane	0.000172107	0 *	1.2932	0.0635702	0.470117
Isobutane	3.82391E-05	0 *	0.12795	0.00503386	0.0299909
n-Butane	0.000122813	0 *	0.282711	0.0110111	0.0533499
Isopentane	0.000127764	0 *	0.12299	0.0041481	0.0181186
n-Pentane	0.000149312	0 *	0.107684	0.00355566	0.0144522
i-Hexane	0.000677145	0 *	0.199553	0.00638141	0.0244462
n-Hexane	0.000548521	0 *	0.110107	0.00364177	0.014012
2,2,4-Trimethylpentane	1.2772E-05	0 *	0.000828812	2.64722E-05	0.000123002
Benzene	4.52557E-05	0 *	0.004699	0.000183765	0.000509343
Heptane	0.00907981	0 *	0.514333	0.0170684	0.0792455
Toluene	0.00114491	0 *	0.0443149	0.00131957	0.00604664
Octane	0.0299384	0 *	0.533149	0.0163756	0.10678
Ethylbenzene	0.000522823	0 *	0.00664844	0.000198965	0.00127022
o-Xylene	0.00118647	0 *	0.0116645	0.000296019	0.0023372
Nonane	0.0580142	0 *	0.311042	0.00924841	0.0889943
Decane	0	0 *	0	0	0
Water	99.2248	100 *	2.52322	89.2773	15.1902
Oxygen	1.4668E-07	0 *	0.00546161	0.000360884	0.00549924
Decanes Plus	0.668837	0 *	0.241539	0.00560711	0.210075
Hexanes+	9.83849E-09	0 *	0.000872182	3.69452E-05	0.00193707

Mass Flow	Produced Water lb/h	Produced Water Flow lb/h	Tank Vent Gas lb/h	W/B lb/h	1 lb/h
Nitrogen	0.000465485	0 *	0.0338061	2.24264E-06	420.619
Methane	0.383355	0 *	12.984	0.00249827	85540
Carbon Dioxide	0.288651	0 *	0.535414	0.00214289	389.383
Ethane	0.0920048	0 *	1.38822	0.000452321	5614.85
Propane	0.0285544	0 *	0.206528	3.06335E-05	516.647
Isobutane	0.00634428	0 *	0.0204339	2.42574E-06	32.9592
n-Butane	0.0203759	0 *	0.0451496	5.30608E-06	58.6302
Isopentane	0.0211973	0 *	0.0196418	1.99891E-06	19.9119
n-Pentane	0.0247724	0 *	0.0171974	1.71342E-06	15.8826
i-Hexane	0.112345	0 *	0.0318691	3.0751E-06	26.8657
n-Hexane	0.0910055	0 *	0.0175843	1.75491E-06	15.3988
2,2,4-Trimethylpentane	0.002119	0 *	0.000132363	1.27565E-08	0.135177
Benzene	0.00750839	0 *	0.000750442	8.85535E-08	0.559755
Heptane	1.50644	0 *	0.0821403	8.22499E-06	87.0887
Toluene	0.189952	0 *	0.00707719	6.35879E-07	6.6451
Octane	4.96709	0 *	0.0851452	7.89115E-06	117.348
Ethylbenzene	0.0867418	0 *	0.00106177	9.58783E-08	1.39594
o-Xylene	0.196848	0 *	0.00186284	1.42647E-07	2.56852
Nonane	9.62516	0 *	0.0496741	4.45666E-06	97.8024
Decane	0	0 *	0	0	0
Water	16462.4	16693.7 *	0.402964	0.0430213	16693.7
Oxygen	2.43358E-05	0 *	0.000872232	1.73904E-07	6.04352
Decanes Plus	110.967	0 *	0.0385744	2.70198E-06	230.867
Hexanes+	1.63231E-06	0 *	0.000139289	1.78033E-08	2.12879

Stream Properties

Property	Units	Produced Water	Produced Water Flow	Tank Vent Gas	W/B	1
Temperature	°F	70.0002	110 *	70.0002	72.1381	106.299
Pressure	psia	14.6959 *	645 *	14.6959	0.426963	645

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Produced Water	Produced Water Flow	Tank Vent Gas	W/B	1
Mole Fraction Vapor	%	0	0	100	100	85.8664
Mole Fraction Light Liquid	%	0.090655	100	0	0	0.0177426
Mole Fraction Heavy Liquid	%	99.9093	0	0	0	14.1159
Molecular Weight	lb/lbmol	18.139	18.0153	17.7349	18.4719	16.9382
Mass Density	lb/ft^3	62.1411	61.8554	0.0459752	0.00138247	2.25346
Molar Flow	lbmol/h	914.662	926.639	0.900497	0.00260874	6488.13
Mass Flow	lb/h	16591.1	16693.7	15.9702	0.0481884	109897
Vapor Volumetric Flow	ft^3/h	266.99	269.882	347.366	34.8568	48768.4
Liquid Volumetric Flow	gpm	33.2871	33.6476	43.308	4.34578	6080.21
Std Vapor Volumetric Flow	MMSCFD	8.33039	8.43947	0.00820138	2.37594E-05	59.0914
Std Liquid Volumetric Flow	sgpm	33.242	33.3718 *	0.0985982	0.000110686	641.217
Compressibility		0.000754681	0.0307281	0.997318	0.999603	0.798221
Specific Gravity		0.996345	0.991766	0.612338	0.637784	
API Gravity		10.3146	9.92256			
Enthalpy	Btu/h	-1.12508E+08	-1.13302E+08	-32614.1	-262.222	-2.94004E+08
Mass Enthalpy	Btu/lb	-6781.23	-6787.13	-2042.18	-5441.6	-2675.25
Mass Cp	Btu/(lb*°F)	0.978194	0.979727	0.501144	0.441532	0.655688
Ideal Gas CpCv Ratio		1.32352	1.32394	1.2889	1.32199	1.29273
Dynamic Viscosity	cP	0.997421	0.63601	0.0110075	0.0103191	
Kinematic Viscosity	cSt	1.00203	0.641896	14.9467	465.978	
Thermal Conductivity	Btu/(h*ft*°F)	0.344293	0.363956	0.0183123	0.0124403	
Surface Tension	lbf/ft	0.00500015 ?	0.00473609			
Net Ideal Gas Heating Value	Btu/ft^3	6.99176	0	936.003	65.0293	803.719
Net Liquid Heating Value	Btu/lb	-906.467	-1059.76	19979.7	384.863	17835.8
Gross Ideal Gas Heating Value	Btu/ft^3	57.7405	50.3101	1038.28	118.073	898.702
Gross Liquid Heating Value	Btu/lb	155.241	0	22168.3	1474.59	19963.8

Remarks

Energy Stream Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	-674895 * Btu/h	-265.244 * hp	--	PL Tank
Q-2	292188 Btu/h	114.834 hp	--	Sand Trap

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank	
Location:		Modified: 11:59 AM, 6/20/2017	
Flowsheet:	Flowsheet1	Status: Solved 11:41 AM, 8/1/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water Flow	Inlet		Measured Condensate	Inlet	
Measured Sales Gas	Inlet		1	Outlet	Sand Trap

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 1	100 %

Remarks

Blocks
PL Tank
Separator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank	
Location:		Modified: 12:02 PM, 7/26/2017	
Flowsheet:	Flowsheet1	Status: Solved 11:41 AM, 8/1/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Fluids	Inlet	Sand Trap	Tank Vent Gas	Vapor Outlet	
Produced Water	Heavy Liquid Outlet		Q-1	Energy	

Block Parameters

Pressure Drop	630.304	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.0983545	%	Heat Duty	-674895	Btu/h
Mole Fraction Light Liquid	0.0905659	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	99.8111	%	Heat Release Curve Increments	10	

Remarks

Blocks
Sand Trap
Separator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank	
Location:		Modified: 12:21 PM, 6/20/2017	
Flowsheet:	Flowsheet1	Status: Solved 11:41 AM, 8/1/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
1	Inlet	MIX-100	Gas to Separators	Vapor Outlet	
Produced Fluids	Light Liquid Outlet	PL Tank	Q-2	Energy	

Block Parameters

* Pressure Drop	0	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	85.8886	%	Heat Duty	292188	Btu/h
Mole Fraction Light Liquid	0.0155011	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	14.0959	%	Heat Release Curve Increments	10	

Remarks

Flowsheet Environment
Environment1

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		
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	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False	Hexanes+	False	False

Physical Property Method Sets

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

Remarks

Environments Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

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	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False	Hexanes+	False	False

Physical Property Method Sets

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

Remarks

Single Oil Report
Decanes Plus

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

Properties

	Volume Average Boiling Point	399.878 °F	Low Temperature Viscosity	1.05288	cP
*	Molecular Weight	162.726 lb/lbmol	Temperature of High T Viscosity	210	°F
*	Specific Gravity	0.788	High Temperature Viscosity	0.503332	cP
	API Gravity	48.0685	Watson K	12.066	
	Critical Temperature	720.653 °F	ASTM D86 10-90% Slope	0	°F/%
	Critical Pressure	307.278 psia	ASTM D93 Flash Point	157.716	°F
	Critical Volume	10.2876 ft^3/lbmol	? Pour Point	-12.6777	°F
	Acentric Factor	0.527304	Paraffinic Fraction	51.9393	%
	Carbon to Hydrogen Ratio	6.00643	Naphthenic Fraction	27.7089	%
	Refractive Index	1.43922	Aromatic Fraction	20.3518	%
	Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	57.9027	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus!Properties!Pour Point

Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Single Oil Report
Hexanes+

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

Properties

Volume Average Boiling Point	-173.182	°F	Low Temperature Viscosity	3.0532E+30	cP
* Molecular Weight	16.662	lb/lbmol	Temperature of High T Viscosity	210	°F
* Specific Gravity	0.5763		High Temperature Viscosity	1370.85	cP
API Gravity	114.032		Watson K	11.439	
Critical Temperature	-2.89417	°F	ASTM D86 10-90% Slope	0	°F/%
Critical Pressure	1116.36	psia	? ASTM D93 Flash Point	-237.696	°F
Critical Volume	1.64547	ft^3/lbmol	? Pour Point	2.40106E+29	°F
Acentric Factor	0.333018		? Paraffinic Fraction	100	%
? Carbon to Hydrogen Ratio	8.6229		? Naphthenic Fraction	0	%
? Refractive Index	1.31682		? Aromatic Fraction	0	%
Temperature of Low T Viscosity	100	°F	? Ideal Gas Heat Capacity	5.55252	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Hexanes+!Properties!Carbon to Hydrogen Ratio
Warning: Carbon to Hydrogen Ratio calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 80 °F and 650 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Refractive Index
Warning: Refractive Index calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 80 °F and 1500 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!ASTM D93 Flash Point
Warning: ASTM D93 Flash Point calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 150 °F and 850 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Pour Point
Warning: Pour Point calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 340.33 °F and 1040.33 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Paraffinic Fraction
Warning: Paraffinic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Naphthenic Fraction
Warning: Naphthenic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Aromatic Fraction
Warning: Aromatic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Ideal Gas Heat Capacity
Warning: Ideal Gas Heat Capacity calculation: The value of 0.5763 for Specific Gravity should be between 0.662763 and 1.07605.
ProMax:ProMax!Project!Oils!Hexanes+
Warning: The value of 0.5763 for Specific Gravity should be between 0.662763 and 1.07605.

Remarks

Calculator Report

Client Name:	Arsenal - Goff 5-55 Well Pad
Location:	

Job: Produced Water Tank

Condensate Produced

Source Code

Residual Error (for CV1) = Water_frac - 99

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	65.1221
Unit	

Measured Variable [Water_frac]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	99
Unit	

Solver Properties

Status: Solved

Error	-6.02164E-07		Algorithm	Default
Calculated Value	1.8994	sgpm	Iterations	11
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

Final Temp

Source Code

Residual Error (for SL_Temp) = PWtemp - 70

Calculated Variable [SL_Temp]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!QStreams!Q-1!Energy Rate
Value	-0.674895
Unit	

Measured Variable [PWtemp]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Temperature
Value	70.0002
Unit	

Solver Properties

Status: Solved

Error	0.000163332		Algorithm	Default
Calculated Value	-674895	Btu/h	Iterations	11
Lower Bound		Btu/h	Max Iterations	20
Upper Bound		Btu/h	Weighting	1
Step Size		Btu/h	Solver Active	Active
Is Minimizer	False		* Skip Dependency Check	True

Remarks

Calculator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

Produced Water

Source Code

Residual Error (for CV1) = Water_flow - 1139.7260274

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water Flow!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1144.18
Unit	

Measured Variable [Water_flow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	1139.73
Unit	

Solver Properties

Status: Solved

Error	0.000259993		Algorithm	Default
Calculated Value	33.3718	sgpm	Iterations	11
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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

Tank-1

User Value [BlockReady]

* Parameter	1		Upper Bound		
Lower Bound			* Enforce Bounds	False	

User Value [ShellLength]

* Parameter	15	ft	Upper Bound		ft
Lower Bound		ft	* Enforce Bounds	False	

User Value [ShellDiam]

* Parameter	10	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	0	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	1139.81	bbl/day	Upper Bound		bbl/day
Lower Bound		bbl/day	* Enforce Bounds	False	

User Value [OREff]

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

User Value [MaxAvgT]

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

User Value [MinAvgT]

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

User Value [BulkLiqT]

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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

User Value [AvgP]

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

User Value [Therml]

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

User Value [AvgWindSpeed]

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

User Value [MaxHourlyLoadingRate]

* Parameter	47.4919	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	2202.79		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	0.291929	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MaxVP]

* Parameter	0.416192	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MinVP]

* Parameter	0.203262	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

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

User Value [MaxLiqSurfaceT]

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

User Value [TotalLosses]

* Parameter	0.211065	ton/yr	Upper Bound	ton/yr

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

User Value [TotalLosses]

Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.202229 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.00883651 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

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

User Value [WithdrawalLoss]

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

User Value [LoadingLosses]

* Parameter	1.63414 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.373092 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 [AllCTotalLosses]

* Parameter	0.211065 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [AllCLoadingLosses]

* Parameter	1.63414 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [AllCMaxHLoadingLoss]

* Parameter	0.373092 lb/hr	Upper Bound	lb/hr
Lower Bound	lb/hr	* Enforce Bounds	False

User Value [AllCFlashingLosses]

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

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Produced Water Tank
Location:		

User Value [FlashingLosses]

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

User Value [TotalResidual]

* Parameter	72668.6	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0184719	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

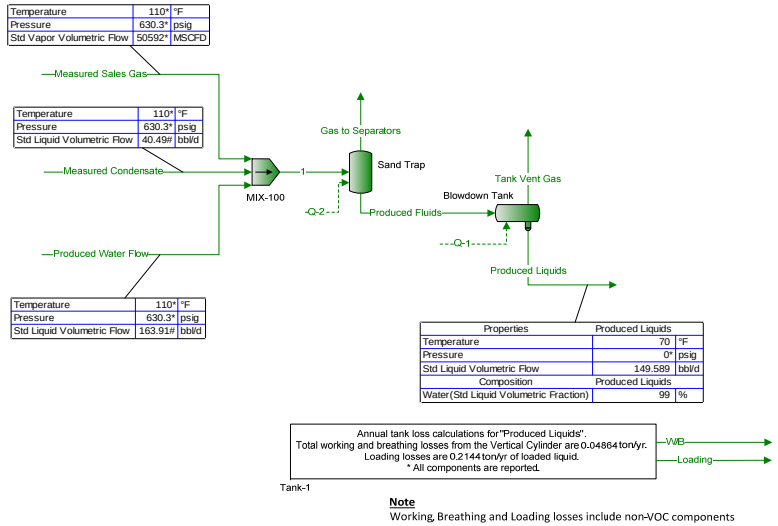
Remarks

This User Value Set was programmatically generated. GUID={8F6700DA-E196-4418-8000-F476C212C378}

Flowsheet1
Plant Schematic

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Arsenal - Goff Well Pad
Blowdown Tank



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

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
From Block	Sand Trap	--	--	--	Sand Trap
To Block	--	--	MIX-100	MIX-100	Blowdown Tank

Stream Composition

Mole Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.269488	0.00307838	0 *	0.2703 *	0.000133411
Methane	95.695	5.96462	10.674 *	95.9763 *	0.0906823
Carbon Dioxide	0.158727	1.87499	0.065 *	0.1592 *	0.00204774
Ethane	3.34899	0.570303	5.377 *	3.3552 *	0.00532544
Propane	0.208611	0.0257804	3.736 *	0.2065 *	0.000568413
Isobutane	0.00957026	0.00147429	1.359 *	0.0086 *	4.66384E-05
n-Butane	0.0168734	0.0032027	2.754 *	0.0149 *	0.000113241
Isopentane	0.00383294	0.000803132	2.508 *	0.002 *	4.70275E-05
n-Pentane	0.00294577	0.000664234	2.25 *	0.0013 *	4.65976E-05
i-Hexane	0.00347644	0.000836582	4.742 *	0 *	0.000112088
n-Hexane	0.00199218	0.000478836	2.718 *	0 *	8.45776E-05
2,2,4-Trimethylpentane	1.31765E-05	2.65649E-06	0.018 *	0 *	1.33655E-06
Benzene	7.98094E-05	2.72148E-05	0.109 *	0 *	7.23163E-06
Heptane	0.00967527	0.00196128	13.22 *	0 *	0.00107963
Toluene	0.000801599	0.000167538	1.097 *	0 *	0.000147917
Octane	0.0113974	0.0016846	15.626 *	0 *	0.00307341
Ethylbenzene	0.000145453	2.26044E-05	0.2 *	0 *	5.89802E-05
o-Xylene	0.000267052	3.41427E-05	0.368 *	0 *	0.000135509
Nonane	0.0083903	0.000892365	11.599 *	0 *	0.00551965
Decane	0	0	0 *	0 *	0
Water	0.229919	91.5481	0 *	0 *	99.812
Oxygen	0.00338976	0.000209337	0 *	0.0034 *	3.05873E-06
Decanes Plus	0.014132	0.000673264	21.58 *	0 *	0.0788065
Hexanes+	0.0022931	4.03675E-05	0 *	0.0023 *	9.13156E-07

Molar Flow	Gas to Separators lbmol/h	Loading lbmol/h	Measured Condensate lbmol/h	Measured Sales Gas lbmol/h	Produced Fluids lbmol/h
Nitrogen	15.0148	8.16008E-08	0 *	15.0149 *	0.000160315
Methane	5331.73	0.000158109	0.436296 *	5331.4 *	0.108969
Carbon Dioxide	8.84362	4.97016E-05	0.00265685 *	8.84342 *	0.00246068
Ethane	186.592	1.51174E-05	0.219783 *	186.378 *	0.00639934
Propane	11.6229	6.8338E-07	0.152708 *	11.4709 *	0.000683037
Isobutane	0.533215	3.908E-08	0.0555487 *	0.477722 *	5.60433E-05
n-Butane	0.940115	8.48962E-08	0.112569 *	0.827682 *	0.000136077
Isopentane	0.213555	2.12892E-08	0.102514 *	0.111098 *	5.65108E-05
n-Pentane	0.164126	1.76073E-08	0.091968 *	0.0722139 *	5.59943E-05
i-Hexane	0.193693	2.21759E-08	0.193828 *	0 *	0.000134691
n-Hexane	0.110996	1.26929E-08	0.111097 *	0 *	0.000101633
2,2,4-Trimethylpentane	0.000734138	7.04173E-11	0.000735744 *	0 *	1.60607E-06
Benzene	0.00444665	7.21402E-10	0.00445534 *	0 *	8.68993E-06
Heptane	0.539066	5.19891E-08	0.540363 *	0 *	0.00129734
Toluene	0.0446618	4.44105E-09	0.0448395 *	0 *	0.000177746
Octane	0.635014	4.46549E-08	0.638708 *	0 *	0.00369319
Ethylbenzene	0.00810406	5.9919E-10	0.00817493 *	0 *	7.08739E-05
o-Xylene	0.014879	9.05044E-10	0.0150419 *	0 *	0.000162835
Nonane	0.467473	2.36546E-08	0.474105 *	0 *	0.00663272
Decane	0	0	0 *	0 *	0
Water	12.8101	0.00242673	0 *	0 *	119.94
Oxygen	0.188863	5.54905E-09	0 *	0.188867 *	3.67554E-06
Decanes Plus	0.787377	1.78467E-08	0.882075 *	0 *	0.0946983

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Molar Flow	Gas to Separators lbmol/h	Loading lbmol/h	Measured Condensate lbmol/h	Measured Sales Gas lbmol/h	Produced Fluids lbmol/h
Hexanes+	0.127762	1.07005E-09	0 *	0.127763 *	1.0973E-06

Mass Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.451465	0.00466904	0 *	0.454498 *	0.000206033
Methane	91.8075	5.18075	1.71125 *	92.4177 *	0.0801996
Carbon Dioxide	0.417749	4.4677	0.0285875 *	0.420542 *	0.00496821
Ethane	6.02215	0.928462	1.61576 *	6.05561 *	0.00882782
Propane	0.550111	0.0615495	1.64634 *	0.546557 *	0.00138178
Isobutane	0.0332647	0.00463942	0.789365 *	0.0300027 *	0.000149439
n-Butane	0.0586492	0.0100785	1.59964 *	0.0519815 *	0.000362848
Isopentane	0.0165378	0.00313729	1.80831 *	0.00866122 *	0.000187051
n-Pentane	0.01271	0.00259471	1.62229 *	0.00562979 *	0.000185341
i-Hexane	0.0179158	0.00390329	4.08377 *	0 *	0.000532499
n-Hexane	0.0102666	0.00223413	2.34072 *	0 *	0.000401807
2,2,4-Trimethylpentane	9.00102E-05	1.64294E-05	0.0205477 *	0 *	8.41662E-06
Benzene	0.000372811	0.000115096	0.0850863 *	0 *	3.11409E-05
Heptane	0.0579772	0.0106403	13.238 *	0 *	0.00596387
Toluene	0.00441688	0.000835783	1.0101 *	0 *	0.000751344
Octane	0.077857	0.0104186	17.8377 *	0 *	0.0193542
Ethylbenzene	0.000923471	0.000129931	0.212191 *	0 *	0.000345196
o-Xylene	0.00169549	0.000196254	0.390432 *	0 *	0.000793101
Nonane	0.0643532	0.00619664	14.8666 *	0 *	0.0390269
Decane	0	0	0 *	0 *	0
Water	0.247705	89.2954	0 *	0 *	99.1294
Oxygen	0.00648665	0.000362676	0 *	0.00653029 *	5.39576E-06
Decanes Plus	0.137524	0.00593173	35.0933 *	0 *	0.706965
Hexanes+	0.0022849	3.64165E-05	0 *	0.00230025 *	8.38786E-07

Mass Flow	Gas to Separators lb/h	Loading lb/h	Measured Condensate lb/h	Measured Sales Gas lb/h	Produced Fluids lb/h
Nitrogen	420.615	2.28592E-06	0 *	420.619 *	0.00449096
Methane	85534	0.00253645	6.99926 *	85528.8 *	1.74813
Carbon Dioxide	389.203	0.00218734	0.116927 *	389.194 *	0.108293
Ethane	5610.64	0.000454567	6.60867 *	5604.22 *	0.192422
Propane	512.52	3.01341E-05	6.73374 *	505.816 *	0.0301189
Isobutane	30.9916	2.27142E-06	3.22861 *	27.7663 *	0.00325736
n-Butane	54.6415	4.93435E-06	6.54275 *	48.1067 *	0.00790909
Isopentane	15.4078	1.53599E-06	7.39624 *	8.0156 *	0.00407719
n-Pentane	11.8415	1.27035E-06	6.63538 *	5.21014 *	0.00403992
i-Hexane	16.6916	1.91101E-06	16.7032 *	0 *	0.011607
n-Hexane	9.5651	1.09381E-06	9.57385 *	0 *	0.00875828
2,2,4-Trimethylpentane	0.0838595	8.04367E-09	0.084043 *	0 *	0.000183459
Benzene	0.347336	5.63501E-08	0.348015 *	0 *	0.000678786
Heptane	54.0154	5.20941E-06	54.1454 *	0 *	0.129996
Toluene	4.11506	4.09192E-07	4.13144 *	0 *	0.0163772
Octane	72.5367	5.10086E-06	72.9586 *	0 *	0.421867
Ethylbenzene	0.860367	6.3613E-08	0.867892 *	0 *	0.00752433
o-Xylene	1.57963	9.6084E-08	1.59692 *	0 *	0.0172874
Nonane	59.9557	3.03382E-06	60.8064 *	0 *	0.85068
Decane	0	0	0 *	0 *	0
Water	230.778	0.0437182	0 *	0 *	2160.75
Oxygen	6.0434	1.77563E-07	0 *	6.04352 *	0.000117613
Decanes Plus	128.127	2.90412E-06	143.537 *	0 *	15.4099
Hexanes+	2.12877	1.78292E-08	0 *	2.12879 *	1.82832E-05

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
Temperature	°F	110 *	72.1381	110 *	110 *	110
Pressure	psia	645	0.426926	645 *	645 *	645
Mole Fraction Vapor	%	100	100	0	100	0
Mole Fraction Light Liquid	%	0	0	100	0	0.108264
Mole Fraction Heavy Liquid	%	0	0	0	0	99.8917
Molecular Weight	lb/lbmol	16.7218	18.4698	100.065	16.6602	18.1393
Mass Density	lb/ft^3	1.904	0.00138219	42.9219	1.89571	61.6345
Molar Flow	lbmol/h	5571.58	0.00265077	4.08747	5554.91	120.166
Mass Flow	lb/h	93166.7	0.0489591	409.014	92545.9	2179.72
Vapor Volumetric Flow	ft^3/h	48932.2	35.4214	9.52927	48818.5	35.3653
Liquid Volumetric Flow	gpm	6100.64	4.41617	1.18806	6086.46	4.40918
Std Vapor Volumetric Flow	MMSCFD	50.7438	2.41422E-05	0.0372271	50.592 *	1.09442
Std Liquid Volumetric Flow	sgpm	607.532	0.000112422	1.18091 *	605.946	4.37586
Compressibility		0.926593	0.999603	0.245968	0.927214	0.0310506
Specific Gravity		0.577357	0.63771	0.688192	0.575231	0.988223
API Gravity				66.8378		10.3976
Enthalpy	Btu/h	-1.81754E+08	-266.487	-360280	-1.80122E+08	-1.46822E+07
Mass Enthalpy	Btu/lb	-1950.84	-5443.05	-880.85	-1946.3	-6735.83
Mass Cp	Btu/(lb*°F)	0.598688	0.441497	0.526269	0.599232	0.976571
Ideal Gas CpCv Ratio		1.28782	1.32208	1.05157	1.28868	1.32141
Dynamic Viscosity	cP	0.0124693	0.0103198	0.354499	0.0124635	0.63224
Kinematic Viscosity	cSt	0.408842	466.103	0.515603	0.410437	0.64038
Thermal Conductivity	Btu/(h*ft*°F)	0.0227002	0.0124403	0.0663816	0.0227179	0.359663
Surface Tension	lbf/ft			0.00099228		0.00469629
Net Ideal Gas Heating Value	Btu/ft^3	933.505	64.6467	5056.69	932.757	7.92144
Net Liquid Heating Value	Btu/lb	21171.4	377.005	19022.3	21235.8	-886.031
Gross Ideal Gas Heating Value	Btu/ft^3	1035.68	117.661	5439.14	1034.85	58.7196
Gross Liquid Heating Value	Btu/lb	23490.1	1466.26	20472.7	23561.3	176.691

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

	Produced Liquids	Produced Water Flow	Tank Vent Gas	W/B	1
From Block	Blowdown Tank	--	Blowdown Tank	--	MIX-100
To Block	--	MIX-100	--	--	Sand Trap

Stream Composition

Mole Fraction	Produced Liquids %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	1.82224E-06	0 *	0.134509	0.00307838	0.263802
Methane	0.00261025	0 *	90.0278	5.96462	93.6766
Carbon Dioxide	0.000720291	0 *	1.35761	1.87499	0.155419
Ethane	0.000330832	0 *	5.1057	0.570303	3.2784
Propane	6.85338E-05	0 *	0.511033	0.0257804	0.204218
Isobutane	1.09966E-05	0 *	0.0364432	0.00147429	0.0093692
n-Butane	3.5075E-05	0 *	0.0799346	0.0032027	0.0165195
Isopentane	2.42892E-05	0 *	0.0232667	0.000803132	0.00375301
n-Pentane	2.73882E-05	0 *	0.0196628	0.000664234	0.00288456
i-Hexane	8.71651E-05	0 *	0.0255623	0.000836582	0.00340541
n-Hexane	7.08169E-05	0 *	0.0141367	0.000478836	0.0019519
2,2,4-Trimethylpentane	1.25847E-06	0 *	8.10639E-05	2.65649E-06	1.29265E-05
Benzene	6.58088E-06	0 *	0.000671757	2.72148E-05	7.82771E-05
Heptane	0.00102446	0 *	0.0574185	0.00196128	0.0094938
Toluene	0.000142732	0 *	0.00544319	0.000167538	0.000787798
Octane	0.0030241	0 *	0.0534333	0.0016846	0.0112216
Ethylbenzene	5.83228E-05	0 *	0.000730229	2.26044E-05	0.000143628
o-Xylene	0.00013437	0 *	0.00129842	3.41427E-05	0.000264275
Nonane	0.00549641	0 *	0.0292512	0.000892365	0.00832969
Decane	0	0 *	0	0	0
Water	99.9073	100 *	2.48392	91.5481	2.33232
Oxygen	8.35449E-08	0 *	0.00304124	0.000209337	0.00331826
Decanes Plus	0.0788561	0 *	0.028152	0.000673264	0.0154974
Hexanes+	1.05553E-08	0 *	0.000922628	4.03675E-05	0.0022447

Molar Flow	Produced Liquids lbmol/h	Produced Water Flow lbmol/h	Tank Vent Gas lbmol/h	W/B lbmol/h	1 lbmol/h
Nitrogen	2.18756E-06	0 *	0.000158127	1.85095E-08	15.0149
Methane	0.00313355	0 *	0.105835	3.58637E-05	5331.84
Carbon Dioxide	0.000864696	0 *	0.00159598	1.12738E-05	8.84608
Ethane	0.000397157	0 *	0.00600218	3.42908E-06	186.598
Propane	8.22734E-05	0 *	0.000600764	1.55011E-07	11.6236
Isobutane	1.32012E-05	0 *	4.28421E-05	8.8645E-09	0.533271
n-Butane	4.21069E-05	0 *	9.397E-05	1.9257E-08	0.940251
Isopentane	2.91588E-05	0 *	2.73521E-05	4.82902E-09	0.213612
n-Pentane	3.2879E-05	0 *	2.31153E-05	3.99385E-09	0.164182
i-Hexane	0.00010464	0 *	3.00506E-05	5.03014E-09	0.193828
n-Hexane	8.50143E-05	0 *	1.66189E-05	2.87911E-09	0.111097
2,2,4-Trimethylpentane	1.51077E-06	0 *	9.52976E-08	1.59727E-11	0.000735744
Benzene	7.90022E-06	0 *	7.89708E-07	1.63635E-10	0.00445534
Heptane	0.00122984	0 *	6.75003E-05	1.17926E-08	0.540363
Toluene	0.000171347	0 *	6.39894E-06	1.00736E-09	0.0448395
Octane	0.00363037	0 *	6.28154E-05	1.0129E-08	0.638708
Ethylbenzene	7.00154E-05	0 *	8.58447E-07	1.35914E-10	0.00817493
o-Xylene	0.000161309	0 *	1.52641E-06	2.05291E-10	0.0150419
Nonane	0.00659833	0 *	3.43873E-05	5.36555E-09	0.474105
Decane	0	0 *	0	0	0
Water	119.937	132.75 *	0.00292006	0.000550453	132.75
Oxygen	1.00294E-07	0 *	3.57524E-06	1.25869E-09	0.188867
Decanes Plus	0.0946652	0 *	3.30951E-05	4.04815E-09	0.882075

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank	
Location:			
Flowsheet:	Flowsheet1		

Molar Flow	Produced Liquids lbmol/h	Produced Water Flow lbmol/h	Tank Vent Gas lbmol/h	W/B lbmol/h	1 lbmol/h
Hexanes+	1.26714E-08	0 *	1.08463E-06	2.42719E-10	0.127763

Mass Fraction	Produced Liquids %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	2.81409E-06	0 *	0.213736	0.00466904	0.441148
Methane	0.00230845	0 *	81.9232	5.18075	89.7105
Carbon Dioxide	0.00174752	0 *	3.38906	4.4677	0.408313
Ethane	0.000548395	0 *	8.70831	0.928462	5.88468
Propane	0.000166597	0 *	1.27822	0.0615495	0.537566
Isobutane	3.52344E-05	0 *	0.120148	0.00463942	0.0325077
n-Butane	0.000112385	0 *	0.263534	0.0100785	0.0573167
Isopentane	9.66072E-05	0 *	0.0952191	0.00313729	0.016164
n-Pentane	0.000108933	0 *	0.08047	0.00259471	0.0124237
i-Hexane	0.000414088	0 *	0.124952	0.00390329	0.0175184
n-Hexane	0.000336424	0 *	0.0691018	0.00223413	0.0100411
2,2,4-Trimethylpentane	7.92475E-06	0 *	0.000525244	1.64294E-05	8.81448E-05
Benzene	2.83379E-05	0 *	0.00297638	0.000115096	0.000365
Heptane	0.00565895	0 *	0.326353	0.0106403	0.0567881
Toluene	0.000724985	0 *	0.0284481	0.000835783	0.00433309
Octane	0.0190431	0 *	0.346215	0.0104186	0.0765195
Ethylbenzene	0.00034134	0 *	0.00439744	0.000129931	0.000910251
o-Xylene	0.000786414	0 *	0.00781909	0.000196254	0.00167486
Nonane	0.0388616	0 *	0.212803	0.00619664	0.0637742
Decane	0	0 *	0	0	0
Water	99.2213	100 *	2.53827	89.2954	2.50825
Oxygen	1.47374E-07	0 *	0.00552007	0.000362676	0.00633848
Decanes Plus	0.70739	0 *	0.259851	0.00593173	0.150542
Hexanes+	9.69538E-09	0 *	0.000871993	3.64165E-05	0.00223269

Mass Flow	Produced Liquids lb/h	Produced Water Flow lb/h	Tank Vent Gas lb/h	W/B lb/h	1 lb/h
Nitrogen	6.12811E-05	0 *	0.00442967	5.18513E-07	420.619
Methane	0.0502699	0 *	1.69786	0.000575341	85535.8
Carbon Dioxide	0.0380548	0 *	0.0702384	0.000496154	389.311
Ethane	0.0119421	0 *	0.18048	0.000103109	5610.83
Propane	0.0036279	0 *	0.026491	6.83529E-06	512.55
Isobutane	0.000767283	0 *	0.00249008	5.15224E-07	30.9949
n-Butane	0.00244735	0 *	0.00546174	1.11926E-06	54.6494
Isopentane	0.00210377	0 *	0.00197342	3.48408E-07	15.4118
n-Pentane	0.00237218	0 *	0.00166774	2.88152E-07	11.8455
i-Hexane	0.00901739	0 *	0.00258963	4.33474E-07	16.7032
n-Hexane	0.00732614	0 *	0.00143214	2.48108E-07	9.57385
2,2,4-Trimethylpentane	0.000172573	0 *	1.08857E-05	1.82454E-09	0.0840429
Benzene	0.000617101	0 *	6.16855E-05	1.27818E-08	0.348015
Heptane	0.123232	0 *	0.00676366	1.18165E-06	54.1454
Toluene	0.0157876	0 *	0.000589588	9.28167E-08	4.13144
Octane	0.414692	0 *	0.00717531	1.15702E-06	72.9586
Ethylbenzene	0.00743319	0 *	9.11371E-05	1.44293E-08	0.867892
o-Xylene	0.0171254	0 *	0.000162051	2.17947E-08	1.59692
Nonane	0.846269	0 *	0.00441034	6.88159E-07	60.8064
Decane	0	0 *	0	0	0
Water	2160.69	2391.52 *	0.0526057	0.00991657	2391.52
Oxygen	3.20929E-06	0 *	0.000114403	4.02765E-08	6.04352
Decanes Plus	15.4045	0 *	0.00538543	6.58739E-07	143.537
Hexanes+	2.11132E-07	0 *	1.80721E-05	4.04418E-09	2.12879

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Produced Liquids	Produced Water Flow	Tank Vent Gas	W/B	1
Temperature	°F	69.9999	110 *	69.9999	72.1381	105.702
Pressure	psia	14.6959 *	645 *	14.6959	0.426926	645
Mole Fraction Vapor	%	0	0	100	100	97.8602
Mole Fraction Light Liquid	%	0.0895931	100	0	0	0.004788
Mole Fraction Heavy Liquid	%	99.9104	0	0	0	2.13501
Molecular Weight	lb/lbmol	18.1398	18.0153	17.6295	18.4698	16.7517
Mass Density	lb/ft^3	62.1431	61.8554	0.0457006	0.00138219	1.96728
Molar Flow	lbmol/h	120.048	132.75	0.117559	0.000601273	5691.75
Mass Flow	lb/h	2177.65	2391.52	2.0725	0.0111054	95346.4
Vapor Volumetric Flow	ft^3/h	35.0425	38.6631	45.3495	8.03461	48466.2
Liquid Volumetric Flow	gpm	4.36894	4.82034	5.65397	1.00172	6042.54
Std Vapor Volumetric Flow	MMSCFD	1.09335	1.20903	0.00107068	5.47616E-06	51.8383
Std Liquid Volumetric Flow	sgpm	4.36301	4.78083 *	0.0128436	2.55005E-05	611.908
Compressibility		0.000754691	0.0307281	0.997349	0.999603	0.905221
Specific Gravity		0.996378	0.991766	0.6087	0.63771	
API Gravity		10.31	9.92256			
Enthalpy	Btu/h	-1.47666E+07	-1.62316E+07	-4251.97	-60.447	-1.96714E+08
Mass Enthalpy	Btu/lb	-6780.96	-6787.13	-2051.61	-5443.05	-2063.15
Mass Cp	Btu/(lb*°F)	0.978159	0.979727	0.501966	0.441497	0.607305
Ideal Gas CpCv Ratio		1.32351	1.32394	1.29051	1.32208	1.28956
Dynamic Viscosity	cP	0.997997	0.63601	0.0110204	0.0103198	
Kinematic Viscosity	cSt	1.00257	0.641896	15.0541	466.103	
Thermal Conductivity	Btu/(h*ft*°F)	0.344289	0.363956	0.0183397	0.0124403	
Surface Tension	lbf/ft	0.00500034 ?	0.00473609			
Net Ideal Gas Heating Value	Btu/ft^3	7.01788	0	930.612	64.6467	913.964
Net Liquid Heating Value	Btu/lb	-905.894	-1059.76	19984.3	377.005	20667.1
Gross Ideal Gas Heating Value	Btu/ft^3	57.766	50.3101	1032.51	117.661	1015.05
Gross Liquid Heating Value	Btu/lb	155.753	0	22177.6	1466.26	22957.1

Remarks

Energy Stream Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	-88583.7 * Btu/h	-34.8147 * hp	--	Blowdown Tank
Q-2	277902 Btu/h	109.219 hp	--	Sand Trap

Remarks

Blocks
Blowdown Tank
Separator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank	
Location:		Modified: 12:02 PM, 7/26/2017	
Flowsheet:	Flowsheet1	Status: Solved 11:36 AM, 8/1/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Fluids	Inlet	Sand Trap	Tank Vent Gas	Vapor Outlet	
Produced Liquids	Heavy Liquid Outlet		Q-1	Energy	

Block Parameters

Pressure Drop	630.304	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.0978305	%	Heat Duty	-88583.7	Btu/h
Mole Fraction Light Liquid	0.0895055	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	99.8127	%	Heat Release Curve Increments	10	

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank	
Location:		Modified: 11:59 AM, 6/20/2017	
Flowsheet:	Flowsheet1	Status: Solved 11:36 AM, 8/1/2017	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Produced Water Flow	Inlet		Measured Condensate	Inlet	
Measured Sales Gas	Inlet		1	Outlet	Sand Trap

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 1	100 %

Remarks

Blocks
Sand Trap
Separator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		Modified: 12:21 PM, 6/20/2017
Flowsheet:	Flowsheet1	Status: Solved 11:36 AM, 8/1/2017

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
1	Inlet	MIX-100	Gas to Separators	Vapor Outlet	
Produced Fluids	Light Liquid Outlet	Blowdown Tank	Q-2	Energy	

Block Parameters

* Pressure Drop	0	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	97.8888	%	Heat Duty	277902	Btu/h
Mole Fraction Light Liquid	0.0022857	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	2.10894	%	Heat Release Curve Increments	10	

Remarks

Flowsheet Environment
Environment1

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		
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	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False	Hexanes+	False	False

Physical Property Method Sets

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

Remarks

Environments Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

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	Benzene	False	False
Methane	False	False	Heptane	False	False
Carbon Dioxide	False	False	Toluene	False	False
Ethane	False	False	Octane	False	False
Propane	False	False	Ethylbenzene	False	False
Isobutane	False	False	o-Xylene	False	False
n-Butane	False	False	Nonane	False	False
Isopentane	False	False	Decane	False	False
n-Pentane	False	False	Water	False	True
i-Hexane	False	False	Oxygen	False	False
n-Hexane	False	False	Decanes Plus	False	False
2,2,4-Trimethylpentane	False	False	Hexanes+	False	False

Physical Property Method Sets

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

Remarks

Single Oil Report
Decanes Plus

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

Properties

	Volume Average Boiling Point	399.878 °F		Low Temperature Viscosity	1.05288 cP
*	Molecular Weight	162.726 lb/lbmol		Temperature of High T Viscosity	210 °F
*	Specific Gravity	0.788		High Temperature Viscosity	0.503332 cP
	API Gravity	48.0685		Watson K	12.066
	Critical Temperature	720.653 °F		ASTM D86 10-90% Slope	0 °F/%
	Critical Pressure	307.278 psia		ASTM D93 Flash Point	157.716 °F
	Critical Volume	10.2876 ft^3/lbmol	?	Pour Point	-12.6777 °F
	Acentric Factor	0.527304		Paraffinic Fraction	51.9393 %
	Carbon to Hydrogen Ratio	6.00643		Naphthenic Fraction	27.7089 %
	Refractive Index	1.43922		Aromatic Fraction	20.3518 %
	Temperature of Low T Viscosity	100 °F		Ideal Gas Heat Capacity	57.9027 Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Decanes Plus!Properties!Pour Point

Warning: Pour Point calculation: The value of 0.788 for Specific Gravity should be between 0.8 and 1.

Remarks

Single Oil Report
Hexanes+

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

Properties

Volume Average Boiling Point	-173.182	°F	Low Temperature Viscosity	3.0532E+30	cP
* Molecular Weight	16.662	lb/lbmol	Temperature of High T Viscosity	210	°F
* Specific Gravity	0.5763		High Temperature Viscosity	1370.85	cP
API Gravity	114.032		Watson K	11.439	
Critical Temperature	-2.89417	°F	ASTM D86 10-90% Slope	0	°F/%
Critical Pressure	1116.36	psia	? ASTM D93 Flash Point	-237.696	°F
Critical Volume	1.64547	ft^3/lbmol	? Pour Point	2.40106E+29	°F
Acentric Factor	0.333018		? Paraffinic Fraction	100	%
? Carbon to Hydrogen Ratio	8.6229		? Naphthenic Fraction	0	%
? Refractive Index	1.31682		? Aromatic Fraction	0	%
Temperature of Low T Viscosity	100	°F	? Ideal Gas Heat Capacity	5.55252	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!Hexanes+!Properties!Carbon to Hydrogen Ratio
Warning: Carbon to Hydrogen Ratio calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 80 °F and 650 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Refractive Index
Warning: Refractive Index calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 80 °F and 1500 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!ASTM D93 Flash Point
Warning: ASTM D93 Flash Point calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 150 °F and 850 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Pour Point
Warning: Pour Point calculation: The value of -173.182 °F for Volume Average Boiling Point should be between 340.33 °F and 1040.33 °F.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Paraffinic Fraction
Warning: Paraffinic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Naphthenic Fraction
Warning: Naphthenic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Aromatic Fraction
Warning: Aromatic Fraction calculation: The value of 16.662 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!Hexanes+!Properties!Ideal Gas Heat Capacity
Warning: Ideal Gas Heat Capacity calculation: The value of 0.5763 for Specific Gravity should be between 0.662763 and 1.07605.
ProMax:ProMax!Project!Oils!Hexanes+
Warning: The value of 0.5763 for Specific Gravity should be between 0.662763 and 1.07605.

Remarks

Calculator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

Condensate Produced

Source Code

Residual Error (for CV1) = Water_frac - 99

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	40.4882
Unit	

Measured Variable [Water_frac]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Liquids!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	99
Unit	

Solver Properties

Status: Solved

Error	-5.16302E-07		Algorithm	Default
Calculated Value	1.18091	sgpm	Iterations	11
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

Final Temp

Source Code

Residual Error (for SL_Temp) = PWtemp - 70

Calculated Variable [SL_Temp]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!QStreams!Q-1!Energy Rate
Value	-0.0885837
Unit	

Measured Variable [PWtemp]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Liquids!Phases!Total!Properties!Temperature
Value	69.9999
Unit	

Solver Properties

Status: Solved

Error	-6.95352E-05		Algorithm	Default
Calculated Value	-88583.7	Btu/h	Iterations	11
Lower Bound		Btu/h	Max Iterations	20
Upper Bound		Btu/h	Weighting	1
Step Size		Btu/h	Solver Active	Active
Is Minimizer	False		* Skip Dependency Check	True

Remarks

Calculator Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

Produced Water

Source Code

Residual Error (for CV1) = Water_flow - 149.589041096

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water Flow!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	163.914
Unit	

Measured Variable [Water_flow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Liquids!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	149.589
Unit	

Solver Properties

Status: Solved

Error	-6.32153E-06		Algorithm	Default
Calculated Value	4.78083	sgpm	Iterations	11
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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

Tank-1

User Value [BlockReady]

* Parameter	1		Upper Bound		
Lower Bound			* Enforce Bounds	False	

User Value [ShellLength]

* Parameter	15	ft	Upper Bound		ft
Lower Bound		ft	* Enforce Bounds	False	

User Value [ShellDiam]

* Parameter	10	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	0	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	149.6	bbl/day	Upper Bound		bbl/day
Lower Bound		bbl/day	* Enforce Bounds	False	

User Value [OREff]

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

User Value [MaxAvgT]

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

User Value [MinAvgT]

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

User Value [BulkLiqT]

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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

User Value [AvgP]

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

User Value [Therml]

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

User Value [AvgWindSpeed]

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

User Value [MaxHourlyLoadingRate]

* Parameter	6.23333	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	289.117		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	0.291906	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MaxVP]

* Parameter	0.416167	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MinVP]

* Parameter	0.203241	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

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

User Value [MaxLiqSurfaceT]

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

User Value [TotalLosses]

* Parameter	0.0486415	ton/yr	Upper Bound	ton/yr

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

User Value [TotalLosses]

Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0398066 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.00883486 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

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

User Value [WithdrawalLoss]

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

User Value [LoadingLosses]

* Parameter	0.214441 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.0489591 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 [AllCTotalLosses]

* Parameter	0.0486415 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [AllCLoadingLosses]

* Parameter	0.214441 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [AllCMaxHLoadingLoss]

* Parameter	0.0489591 lb/hr	Upper Bound	lb/hr
Lower Bound	lb/hr	* Enforce Bounds	False

User Value [AllCFlashingLosses]

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

User Value [DeckFittingLosses]

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

User Value [DeckSeamLosses]

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

User Value Sets Report

Client Name:	Arsenal - Goff 5-55 Well Pad	Job: Blowdown Tank
Location:		

User Value [FlashingLosses]

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

User Value [TotalResidual]

* Parameter	9538.07	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0184698	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

Remarks

This User Value Set was programmatically generated. GUID={8F6700DA-E196-4418-8000-F476C212C378}

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 (E01)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E02)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E03)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Line Heater (E04)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Blowdown Tank (E05)	<0.01	<0.01	<0.01	<0.01	0.06	0.27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.70	7.44	42.53	186.29
Water Tank (E06-E09)	<0.01	<0.01	<0.01	<0.01	0.59	2.57	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.99	56.88	325.20	1424.38
Tank Truck Loading Activities (E10)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.07	0.42	1.86
TEG (E11)	<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	0.08	0.36
TOTAL	0.38	1.68	0.32	1.42	0.67	2.93	<0.01	0.01	0.01	<0.02	0.01	<0.01	14.72	64.45	836.77	3665.06

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 (E01)	<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 (E02)	<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 (E03)	<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 (E04)	<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 Tank (E05)	<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
Water Tank (E06-E09)	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.02	0.12	0.03	0.12
Tank Truck Loading Activities (E10)	<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
TEG (E11)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TOTAL	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.03	0.14	0.05	0.20

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 Arsenal Resources, 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 Harrison County, West Virginia. The latitude and longitude coordinates are: 39.25854 and -8.38052.

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

Particulate Matter (PM) = 11.16 tpy
Sulfur Dioxide (SO_2) = 0.01 tpy
Volatile Organic Compounds (VOC) = 2.94 tpy
Carbon Monoxide (CO) = 1.42 tpy
Nitrogen Oxides (NO_x) = 1.68 tpy
Total Hazardous Air Pollutants = 0.20 tpy
Formaldehyde (HCHO) = <0.01 tpy
Hexane (C_8H_{14}) = 0.14 tpy
Carbon Dioxide Equivalents (CO_2e) = 3,695.02 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.

Dated this the 11th day of August 2017.

By: Arsenal Resources
Meghan M.B. Yingling
Environmental Compliance Manager
6031 Wallace Road Ext. Suite 300
Wexford, PA 15090

Attachment R
AUTHORITY OF CORPORATION
OR OTHER BUSINESS ENTITY (DOMESTIC OR FOREIGN)

TO: The West Virginia Department of Environmental Protection, Division of Air Quality

DATE: July 6, 2017

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 27-5343422

The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which is used in the conduct of an incorporated business or other business entity.

Further, the corporation or the business entity certifies as follows:

(1) Zachary Allman, Stacey Lucas, William Veigel, Meghan Yingling (is/are) the authorized representative(s) and in that capacity may represent the interest of the corporation or the business entity and may obligate and legally bind the corporation or the business entity.

(2) The corporation or the business entity is authorized to do business in the State of West Virginia.

(3) If the corporation or the business entity changes its authorized representative(s), the corporation or the business entity shall notify the Director of the West Virginia Department of Environmental Protection, Division of Air Quality, immediately upon such change.

Stephen A. Bishop, President and Chief Financial Officer, Arsenal Resources, LLC
President or Other Authorized Officer
(Vice President, Secretary, Treasurer or other official in charge of a principal business function of the corporation or the business entity)

(If not the President, then the corporation or the business entity must submit certified minutes or bylaws stating legal authority of other authorized officer to bind the corporation or the business entity).

Secretary

Arsenal Resources, LLC
Name of Corporation or business entity