G35-D General Permit Application

Cather Natural Gas Compressor Station

Clarksburg, West Virginia

Prepared By:

Environmental Resources Management, Inc.
Hurricane, West Virginia

September 2017

ARSENAL MIDSTREAM

People Powered. Asset Strong.

September 18, 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: G35-D General Permit Registration Application
Arsenal Midstream
Cather Natural Gas Compression Station

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) complete PDFs included on CD-ROM of a G35-D General Permit Registration Application for the authority to construct the Cather/M&R natural gas compression 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 Midstream

Enclosures

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

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 Midstream, LLC submits this G35-D Class II General Permit application to the West Virginia Department of Environmental Protection's Divison of Air Quality (WVDAQ) for the Cather Compressor Station (Cather) located in Harrison County, West Virginia. This application addresses the operational activities associated with the compression of natural gas and produced water at the Cather Station.

Arsenal wishes to submit this G35-D General Permit application to permit the following equipment currently at the Cather Station:

- One (1) CAT G3608 TALE Compressor Engine;
- One (1) CAT G3606 TALE Compressor Engine;
- One (1) Kohler 80REZGD Emergency Generator;
- Two (2) Exterran 67 mmscf/day Dehydration Units;
- Two (2) 50 bbl Produced Water Tanks;
- One (1) 100 bbl Regen Condensate Tank;
- Four (4) 520 gal Oil Storage tanks;
- One (1) 520 gal Glycol Storage tank; and
- One (1) Produced Fluid Loadout.

This update is being made to correct issues with emission factors and fuel usage rates currently permitted under Permit No. G35-D107E. The original name permitted for this station was Goff West Compressor Station, which was an aggregation of this station and another compressor station. These stations will no longer share a permit, based on EPA Source Determination Guidance, and the name for this station will change to Cather Compressor Station. The other station will have a separate G35-D permit application submitted to become Goff Compressor Station.

Statement of aggregation

The Cather Compressor Station 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 Cather with the same industrial grouping as nearby facilities, and some of these facilities are under common control. However, the Cather Station is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

The Cather Station 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 Cather Station does share the same SIC codes as the surrounding wells and compressor stations.

Arsenal is the sole operator of the Cather Station. 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 Cather Compressor Station shares equipment with the surrounding wells and compressor stations. Specifically, the Goff Compressor Station and Cather Compressor Station can be operated such that gas flows from one station to the other, with each station acting as a stage of compression. It is important to note that bypass valves are installed and operated at each facility to allow for each station to operate independently of one another, as required by field and market conditions. Based upon the above, the Cather compressor station does share equipment with nearby facilities.

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 adjacent facilities. Cather Compressor station does not fall within the ¼ mile rule and therefore, does not meet the definition of contiguous or adjacent properties.

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

Cather Compressor Station: 39.27944, -80.41333 (0.50 miles from Goff Compressor Station and 0.96 miles from Goff 3 & 4)
Goff Compressor Station: 39.27737, -80.40417
Goff 3 & 4 Wellpad: 39.269845, -80.40031

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.

2.0 REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the Cather Station and makes an applicability determination for each regulation based on activities conducted at the station and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP G35-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 Cather 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 Dehydrator Reboilers 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 Cather Station are subject to this requirement. Based on the nature of the process at the compressor station, the presence of objectionable odors is unlikely.

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

The Cather Compressor Station does not have a refuse 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 Dehydrators Reboilers 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 G35-D permit application is being submitted for the operational activities associated with Arsenal's compression of natural gas.

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 G35-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 Cather Station will not exceed emission thresholds established by this permitting program. Arsenal will monitor future construction and modification activities at the station 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 G35-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 Cather Station.

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

No hazardous waste will be burned at this compressor station; 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 Cather Station 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 G35-D permit.

Equipment types that have been installed at the Cather Station that do not meet the affected facility definitions as specified by EPA include:

- Pneumatic devices: All pneumatic devices installed at the Cather Station are either low-continuous bleed or intermittent bleed and do not qualify as affected sources.

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

The Cather Station does have equipment that is an affected facility under OOOOa. The Cather Station will qualify as a collection of fugitive components affected facility. As a fugitive component affected facility, in order to comply, LDAR monitoring at the Cather Station must be conducted quarterly.

The Cather Station is a reciprocating compressor engine affected facility under OOOOa. As a reciprocating engine affected facility, Arsenal must replace the compressor rod packing on or before the compressor operating for 26,000 hours or prior to three (3) years from the date of the most recent rod packing replacement, whichever is earlier.

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

- Storage vessels: Emissions from each produced water tank was determined to be below 6 tons per year (tpy) of VOC. Therefore, Produced Water Tanks TK-1 and TK-2 are not affected storage vessels.
- Pneumatic devices: All pneumatic devices installed at the Cather Station 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 Cather Station has two (2) compressor engines that were constructed after 6/12/2006, making them subject to JJJJ. One (1) of these engines is a non-emergency, spark-ignition (SI) CAT G3608 TALE reciprocating internal combustion engine (RICE) with a horsepower rating of 2,370 bhp. The other engine is a non-emergency, SI CAT G3606 TALE RICE with a horsepower rating of 1,775 bhp. These units are subject to the following emissions standards:

- NOx – 1.0 g/bhp-hr;
- CO – 2.0 g/bhp-hr; and
- VOCs – 0.7 g/bhp-hr.

The Cather Station also has one (1) 107 hp Kohler 80REZGD Emergency Generator. This unit is JJJJ certified for the following standards and has an EPA Certificate of Conformity:

- NOx – 2.0 g/bhp-hr;
- CO – 4.0 g/bhp-hr;
- VOC – 1.0 g/bhp-hr.

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

National Emissions Standards for Hazardous Air Pollutants

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

The CAT G3608 TALE and CAT G3606 TALE compressor engines comply with Subpart ZZZZ because they are subject to NSPS Subpart JJJJ regulations.

The Kohler 80REZGD Emergency Generator complies with Subpart ZZZZ because it is a NSPS Subpart JJJJ certified engine with an EPA Certificate of Conformity.

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

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475
Fax (304) 926-0479
www.dep.wv.gov

G35-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 COMPRESSOR AND/OR DEHYDRATION FACILITIES

☐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 Midstream, LLC**

Federal Employer ID No. (FEIN): **47-1919654**

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

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

Facility Name: **Cather Compressor Station**

Operating Site Physical Address: **50 E. Davisson Run Rd. Clarksburg, Harrison County, WV**
If none available, list road, city or town and zip of facility.

City: **Clarksburg** | Zip Code: **26302** | County: **Harrison**

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: **39.27944**
Longitude: **-80.41333**

SIC Code: **1311**

NAICS Code: **211111**

DAQ Facility ID No. (For existing facilities)
033-00187

CERTIFICATION OF INFORMATION

This G35-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 G35-D Registration Application will be returned to the applicant. Furthermore, if the G35-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 G35-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: 9/18/17

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: Addition of New emergency generator.
Directions to the facility: From I-79 South; (1.) At exit 119, take ramp right for US-50 West toward Clarksburg, Travel 7.0 miles (2.) Turn left onto WV-98/Old US 50 / Sun Valley Rd. travel 0.4 miles (3.) turn left to stay on WV-98 and ravel 0.3 miles (4.) arrive at the Compressor Station on the right. Cather station is ~0.5 miles down the lease road on the right.

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): **Meghan Yingling myingling@arsenalresources.com** ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO and/or OOOOa ☐$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 in its entirety)** – 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
☒ G35-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ 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 K	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment L	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment M	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment N	
☒ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment O	
☒ Pneumatic Controllers Data Sheet – Attachment P	
☒ Centrifugal Compressor Data Sheet – Attachment Q	
☒ Reciprocating Compressor Data Sheet – Attachment R	
☒ Blowdown and Pigging Operations Data Sheet – Attachment S	
☐ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment T	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment U	
☒ Facility-wide Emission Summary Sheet(s) – Attachment V	
☒ Class I Legal Advertisement – Attachment W	
☒ 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 MIDSTREAM LLC
65 PROFESSIONAL PL 200
BRIDGEPORT, WV 26330-1889

BUSINESS REGISTRATION ACCOUNT NUMBER: **2306-9776**

This certificate is issued on: **05/17/2017**

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.

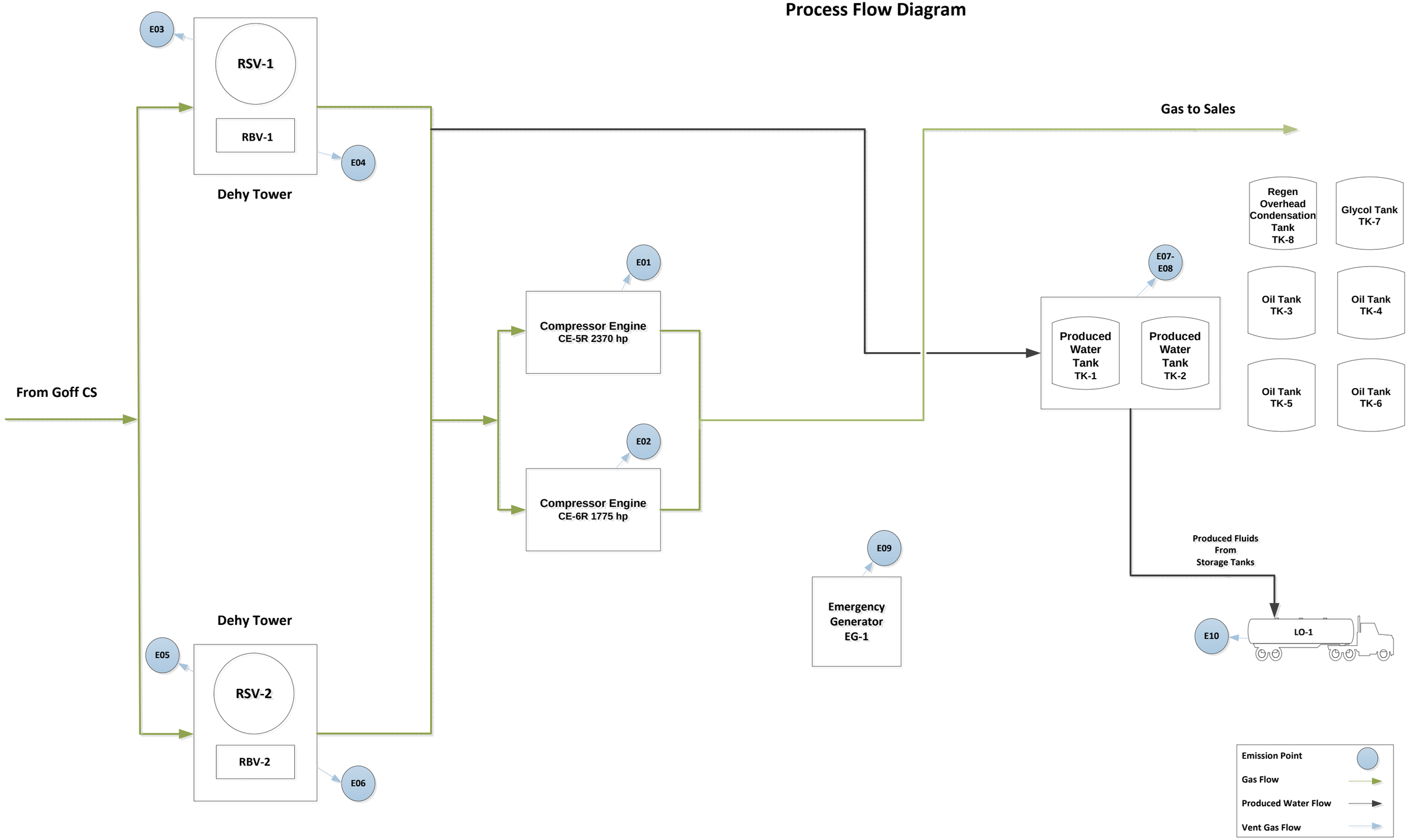
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

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.

atL006 v.4
L0904785088

Attachment D

Attachment D
Cather Natural Gas Compression Station
Process Flow Diagram



Attachment E

Attachment E – Process Description

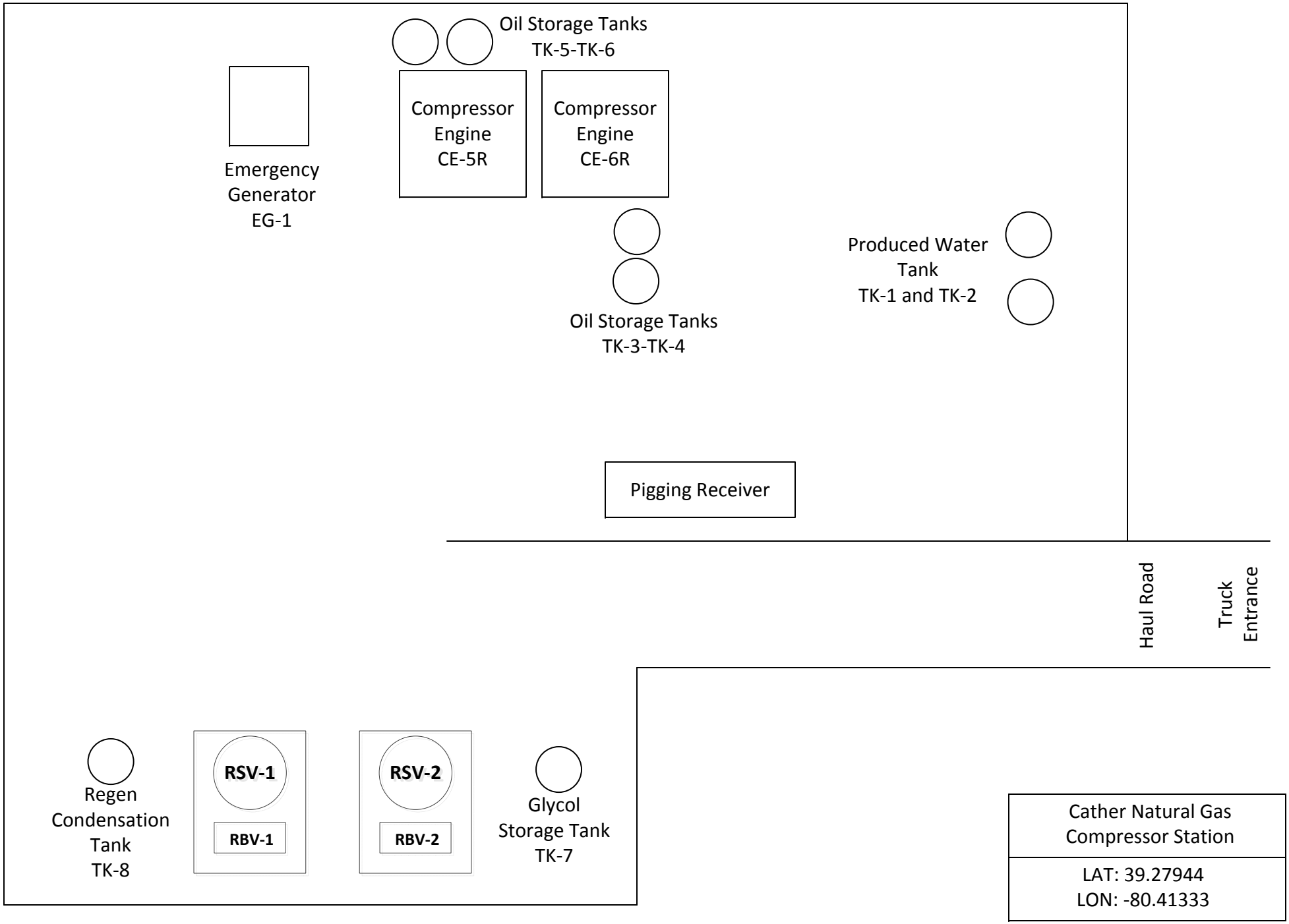
Pipeline quality natural gas enters the site and is routed through two (2) 67 MMSCF/D Tri-Ethylene Glycol (TEG) Dehydration units (RSV-1 and RSV-2) to dry gas below 7.0 lbs/MMSCF/D of water content. From the dehydration units, the gas flows to one (1) 2,370 hp CAT G3608 TALE Compressor Engine (CE-5R) and one (1) 1,775 hp CAT G3606 TALE Compressor Engine (CE-6R). From the compressors, the gas enters the sales line.

Fluids are removed from Produced Water Tanks (TK-1 and TK-2) via Produced Fluids Loadout (LO-1) to tanker trucks on an as needed basis.

Emergency Generator EG-1 will provide backup power to the site on an as needed basis.

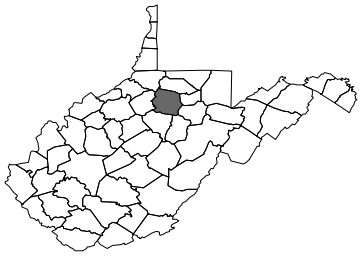
Attachment F

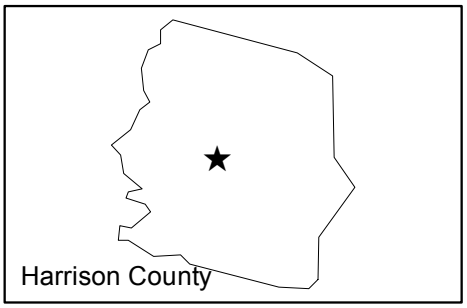
ATTACHMENT F – PLOT PLAN



Cather Natural Gas Compressor Station
LAT: 39.27944 LON: -80.41333

Attachment G





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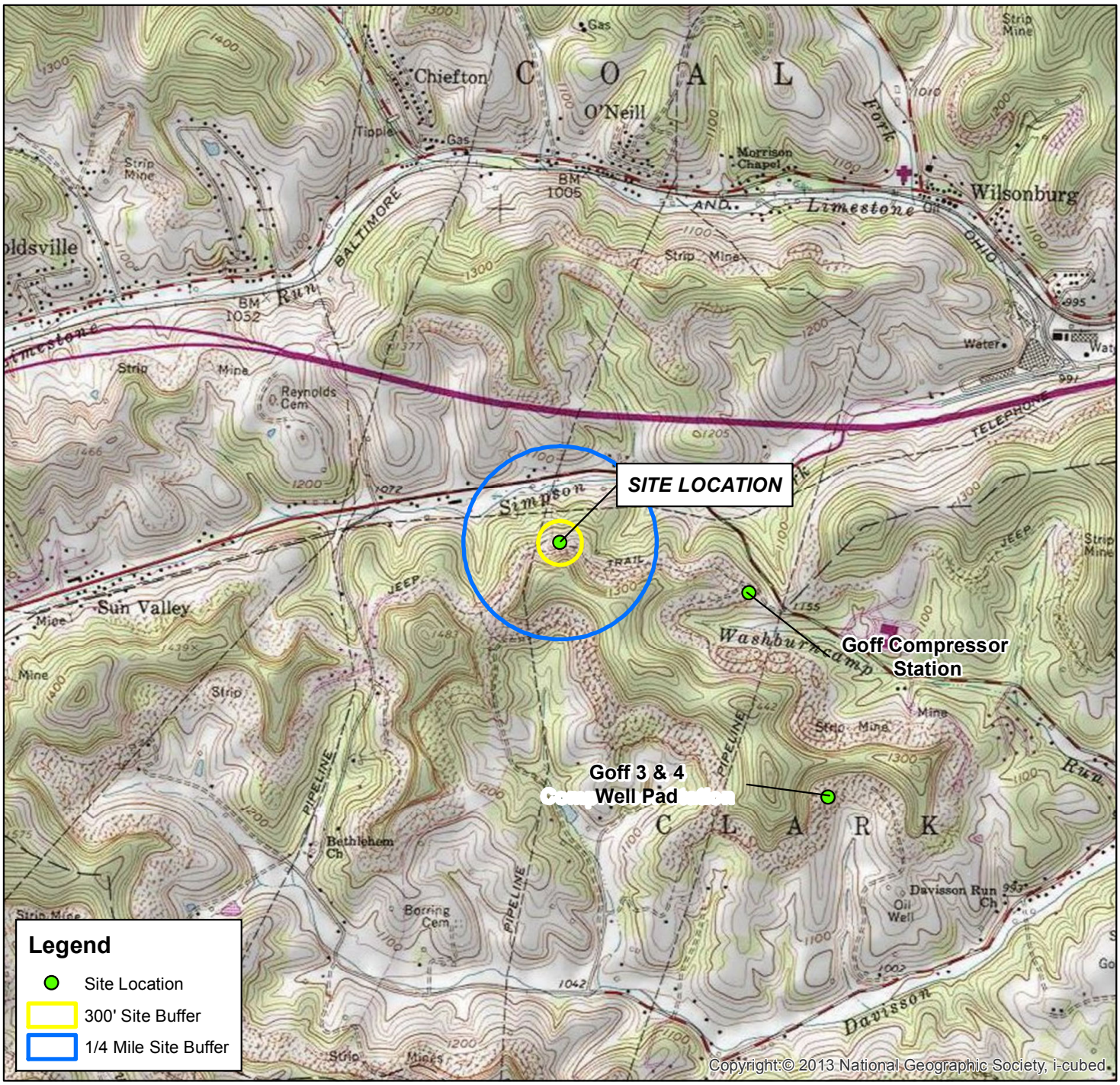
LAT. 39.27917 LON. -80.41333
HARRISON COUNTY
WEST VIRGINIA



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

SITE LOCATION MAP

ERM	**Arsenal Resources** Cather Compressor Station Clarksburg Harrison County, West Virginia	GIS Review: GM CHK'D: GM 0419542
Drawn By: SRV-9/8/17	**Environmental Resources Management**	ATTACHMENT G

J:\Projects\SiteLocationMaps\Arsenal Resources_MXD\AttachmentG-SiteLocationMap_Cather_20170908.mxd - 9/8/2017\SRV

Attachment H

ATTACHMENT H – G35-D SECTION APPLICABILITY FORM

General Permit G35-D Registration
Section Applicability Form

General Permit G35-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, centrifugal compressors, reciprocating compressors, reciprocating internal combustion engines (RICEs), tank truck 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 G35-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 G35-D APPLICABLE SECTIONS	
☒ Section 5.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐ Section 6.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐ Section 7.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
☒ Section 8.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐ Section 9.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐ Section 10.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO/OOOOa)[2]
☒ Section 11.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO/OOOOa)[2]
☒ Section 12.0	Reciprocating Internal Combustion Engines, Generator Engines. Microturbine Generators
☒ Section 13.0	Tanker Truck Loading[3]
☒ Section 14.0	Glycol Dehydration Units[4]
☒ Section 15.0	Blowdown and Pigging Operations
☒ Section 16.0	Fugitive Emission Components (NSPS, Subpart OOOOa)

1 *Applicants that are subject to Section 5 may also be subject to Section 6 if the applicant is subject to the NSPS, Subpart OOOO/OOOOa control requirements or the applicable control device requirements of Section 7.*

2 *Applicants that are subject to Section 10 and 11 may also be subject to the applicable RICE requirements of Section 12.*

3 *Applicants that are subject to Section 13 may also be subject to control device and emission reduction device requirements of Section 7.*

4 *Applicants that are subject to Section 14 may also be subject to the requirements of Section 8 (reboilers). Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 7.*

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 K 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]
CE-5R	E01	CAT G3608 TALE Compressor Engine	After 11/17/2015	4/11/2011	2,370 hp/1,000 rpm	Existing	Oxidation Catalyst	N/A
CE-6R	E02	CAT G3606 TALE Compressor Engine	After 11/17/2015	12/12/2014	1,775 hp/1,000 rpm	Existing	Oxidation Catalyst	N/A
RSV-1	E03	TEG Dehydration Still Vent	2012	2012	67 mmscf/day	Existing	N/A	N/A
RBV-1	E04	TEG Dehydration Reboiler	2012	2012	1.0 mmBtu/hr	Existing	N/A	N/A
RSV-2	E05	TEG Dehydration Still Vent	2013	2013	67 mmscf/day	Existing	N/A	N/A
RBV-2	E06	TEG Dehydration Reboiler	2013	2013	1.0 mmscf/day	Existing	N/A	N/A
TK-1	E07	Produced Water Tank	2015	2015	50 bbl	Existing	N/A	N/A
TK-2	E08	Produced Water Tank	2015	2015	50 bbl	Existing	N/A	N/A
EG-1	E09	Kohler 80REZGD Emergency Generator	2015	2015	107 bhp	Existing	N/A	N/A
LO-1	E10	Produced Fluids Loadout	2016	2016	200 bbl	Existing	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

Is the facility subject to quarterly LDAR monitoring under 40CFR60 Subpart OOOOa? ☒ Yes ☐ No. If no, why?

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	136	EPA	☒ Gas ☐ Liquid ☐ Both	0.01	<0.01	0.64 (16.00)
Safety Relief Valves	☐ Yes ☒ No	6	EPA	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	0.04 (1.05)
Open Ended Lines	☐ Yes ☒ No	8	EPA	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	0.09 (2.13)
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	583	EPA	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	0.30 (7.62)
Compressors	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Other[1] (Pigging)	☐ Yes ☒ No	1	EPA	☒ Gas ☐ Liquid ☐ Both	<0.01	<0.01	<0.01 (<0.01)

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.
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 loading, etc.) N/A

Attachment K

ATTACHMENT K – 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

1. Bulk Storage Area Name: **Cather Compressor Station**	2. Tank Name: **Produced Water Tank**
3. Emission Unit ID number **TK-1, TK-2**	4. Emission Point ID number **E07 and E08**
5. Date Installed , Modified or Relocated *(for existing tanks)* **2016** Was the tank manufactured after August 23, 2011? ☒ 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. **50 bbl**	
9A. Tank Internal Diameter (ft.) **8**	9B. Tank Internal Height (ft.) **10**
10A. Maximum Liquid Height (ft.) **8.5**	10B. Average Liquid Height (ft.) **5**
11A. Maximum Vapor Space Height (ft.) **1.5**	11B. Average Vapor Space Height (ft.) **5**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume". **50 bbl**	
13A. Maximum annual throughput (gal/yr) **218,400**	13B. Maximum daily throughput (gal/day) **598.36**
14. Number of tank turnovers per year **52**	15. Maximum tank fill rate (gal/min) **0.42**
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**	
Produced Water	**See Attachment V**								

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

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

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)			
21A. Shell Color: **Tan**	21B. Roof Color: **Tan**	21C. Year Last Painted: **2015**	
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): **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): **4**	24B. If yes, for cone roof, provide slop (ft/ft):	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☒ No			
28. Closed Vent System with Enclosed Combustor? ☐ Yes ☒ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based:			
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):	37A. Minimum (psig):	37B. Maximum (psig):	
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):		
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):		
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-			

mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
Oil Storage TK3-TK6	Existing	Oil	520 gal each
Glycol Storage TK7	Existing	Glycol	520 gal
Regen Overhead Condensation Tank TK8	Existing	Dehydrator Regenerator Condensate	100 bbl

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:
   - EXIST Existing Equipment
   - NEW Installation of New Equipment
   - REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

Attachment L
(Not Applicable)

Attachment M

ATTACHMENT M – INTERNAL COMBUSTION ENGINE DATA SHEET

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

Emission Unit ID#[1]	CE-5R	CE-6R	EG-1
Engine Manufacturer/Model	CAT G3608 TALE	CAT G3606 TALE	Kohler 80REZGD
Manufacturers Rated bhp/rpm	2370/1000	1775/1000	107/1800
Source Status[2]	ES	ES	NS
Date Installed/ Modified/Removed/Relocated[3]	2015	2015	2017
Engine Manufactured /Reconstruction Date[4]	4/11/2011	12/12/2014	06/09/2017
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☒40CFR60 Subpart JJJJ ☒JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SLB	4SLB	4SLB
APCD Type[7]	OxCat	OxCat	OxCat
Fuel Type[8]	RG	RG	RG
H_2S (gr/100 scf)	0.025	0.025	0.025
Operating bhp/rpm	2370/1000	1775/1000	107/1800
BSFC (BTU/bhp-hr)	6,677	6,697	
Hourly Fuel Throughput	17,940 ft^3/hr gal/hr	13,440 ft^3/hr gal/hr	1,187 ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	157.1 $MMft^3$/yr gal/yr	117.7 $MMft^3$/yr gal/yr	0.59 $MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☒ No ☐	Yes ☒ No ☐

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
Vendor Guarantee	NO_x	2.61	11.44	1.96	8.57	0.47	0.12
Vendor Guarantee	CO	1.00	4.39	0.75	3.29	0.07	0.02
Vendor Guarantee	VOC	1.65	7.21	1.23	5.40	0.05	0.01
AP-42	SO_2	0.01	0.05	<0.01	0.03	<0.01	<0.01
AP-42	PM_{10}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vendor Guarantee	Formaldehyde	0.68	2.98	0.51	2.23	0.05	0.01
AP-42	Total HAPs	0.70	3.06	0.52	2.29	0.05	0.01
AP-42	GHG (CO_2e)	3,000.31	13,141.35	1,986.84	8,702.36	99.24	434.68

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

2 Enter the Source Status using the following codes:

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

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

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

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

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

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

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

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

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

8 Enter the Fuel Type using the following codes:

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

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

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other	(please list)

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

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

Engine Air Pollution Control Device
(Emission Unit ID# CE-5R, use extra pages as necessary)

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

☐ NSCR ☐ SCR ☒ Oxidation Catalyst

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

Manufacturer: **EMIT**	Model #: **ELX-6200-2022F-6CE0-362**
Design Operating Temperature: °F	Design gas volume: scfm
Service life of catalyst:	Provide manufacturer data? ☐Yes ☐ No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

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

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

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

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

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

Engine Air Pollution Control Device
(Emission Unit ID# CE-6R, use extra pages as necessary)

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

☐ NSCR ☐ SCR ☒ Oxidation Catalyst

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

Manufacturer: **DCL**	Model #: **DC64L2**
Design Operating Temperature: °F	Design gas volume: scfm
Service life of catalyst:	Provide manufacturer data? ☐Yes ☐ No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

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

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

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

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

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

Attachment N

ATTACHMENT N – TANKER TRUCK 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. Use extra pages if necessary.

Truck Loadout Collection Efficiencies

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

- For tanker trucks passing the MACT level annual leak test – 99.2%
- For tanker trucks passing the NSPS level annual leak test – 98.7%
- For tanker trucks 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 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 and will be noted on the issued G35-D Registration.

Emission Unit ID#: **LO-1**	Emission Point ID#: **E10**	Year Installed/Modified: **N/A**
Emission Unit Description: **Produced Water Tank Truck Loading TK-1 and TK-2**		
Loading Area Data		
Number of Pumps: **NA**	Number of Liquids Loaded: 1	Max number of trucks loading at one (1) time: **1**
Are tanker trucks 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. **NA**		
Are any of the following truck loadout systems utilized? ☐ Closed System to tanker truck passing a MACT level annual leak test? ☐ Closed System to tanker truck passing a NSPS level annual leak test? ☐ Closed System to tanker truck 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)	0.60		
Max. Annual Throughput (1000 gal/yr)	218.4		
Loading Method[1]	SP		
Max. Fill Rate (gal/min)	0.42		
Average Fill Time (min/loading)	NA		
Max. Bulk Liquid Temperature (°F)	70		

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]		O - ProMax		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

O Other (describe)

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

CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)

ECD Enclosed Combustion Device F Flare

TO Thermal Oxidization or Incineration

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

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

Attachment O
(Not Applicable)

Attachment P

ATTACHMENT P – 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 Q

ATTACHMENT Q – CENTRIFUGAL COMPRESSOR DATA SHEET

Are there any centrifugal compressors at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list:

Emission Unit ID#	Compressor Description

Are there any centrifugal compressors at this facility that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list:

Emission Unit ID#	Compressor Description

Attachment R

ATTACHMENT R – RECIPROCATING COMPRESSOR DATA SHEET

Are there any reciprocating compressors at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list:

Emission Unit ID#	Compressor Description

Are there any reciprocating compressors at this facility that commenced construction, modification or reconstruction after September 18, 2015?

☒ Yes ☐ No

Please list:

Emission Unit ID#	Compressor Description
CE-5R	CAT G3608 TALE Compressor Engine
CE-6R	CAT G3606 TALE Compressor Engine

Attachment S

ATTACHMENT S – BLOWDOWN AND PIGGING OPERATIONS DATA SHEET

Will there be any blowdown and pigging operations that occur at this facility?

☒ Yes ☐ No

Please list:

Type of Event	# of Events (event/yr)	Amount Vented per event (scf/event)	MW of vented gas (lb/lb-mol)	Total Emissions (ton/yr)	VOC weight fraction	VOC emissions (ton/yr)
Compressor Blowdown	100	3,776	16.45	290.23	<0.01	0.50
Compressor Startup						
Plant Shutdown						
Low Pressure Pig Venting						
High Pressure Pig Venting	20	437.34	16.45	0.3462	<0.01	<0.01

Type of Event	# of Events (event/yr)	Amount Vented per event (scf/event)	MW of vented gas (lb/lb-mol)	Total Emissions (ton/yr)	HAP weight fraction	HAP emissions (ton/yr)
Compressor Blowdown	100	3,776	16.45	290.23	<0.01	<0.01
Compressor Startup						
Plant Shutdown						
Low Pressure Pig Venting						
High Pressure Pig Venting	20	437.34	16.45	0.3462	<0.01	<0.01

Attachment T
(Not Applicable)

Attachment U

Attachment U
CAT G3608TALE Compressor Engine (CE-5R)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Engine Rating (kW)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Catalyst Reduction (%)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOCs	0.63	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	50%	8,760.00	1.65	7.21
Formaldehyde	0.26	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	50%	8,760.00	0.68	2.98
Benzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	0.03
Toluene	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	0.03
Ethylbenzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	<0.01
Xylene	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	0.01
CO	2.74	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	93%	8,760.00	1.00	4.39
NO_x	0.50	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	2.61	11.44
$PM_{Filterable}$	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	<0.01
$PM_{Condensable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	0.18	0.78
PM_{Total}	0.01	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	0.18	0.79
SO_2	0.00	lb/MMBtu	AP-42 Chapter 3.2	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	0.01	0.05
CO_2	440.00	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	2,298.98	10,069.54
CH_4	5.36	g/bhp-hr	Vendor Guarantee	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	28.01	122.67
N_2O	0.00	kg N_2O / MMBtu	40 CFR Subpart C	2,370.00	1,767.31	7,589.00	1,038	0%	8,760.00	<0.01	0.02
Total HAPs										0.70	3.06
Total CO_2e										3,000.31	13,141.35

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one CAT G3608TALE NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-2 - Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- Vendor Guarantee Emissions Specification Sheet is attached.

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x Fuel Consumption Rating **(Btu/bhp-hr)** x Engine Rating **(bhp)** x (1 **MMBtu**/10^6 **Btu**)

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

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(kg/MMBtu)** x Engine Rating **(bhp)** x (2.205 **lb**/**kg**) x Fuel Consumption Rating **(Btu/bhp-hr)** x (1 **MMBtu**/10^6 **Btu**)

Attachment U
CAT G3606TALE Compressor Engine (CE-6R)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Engine Rating (kW)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Catalyst Reduction (%)	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOCs	0.63	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	50%	8,760.00	1.23	5.40
Formaldehyde	0.26	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	50%	8,760.00	0.51	2.23
Benzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	0.03
Toluene	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	0.02
Ethylbenzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	<0.01
Xylene	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	0.01
CO	2.74	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	93%	8,760.00	0.75	3.29
NO_x	0.50	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	1.96	8.57
$PM_{Filterable}$	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	<0.01
$PM_{Condensable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	0.13	0.59
PM_{Total}	0.01	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	0.13	0.59
SO_2	0.00	lb/MMBtu	AP-42 Chapter 3.2	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	0.03
CO_2	441.00	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	1,725.72	7,558.67
CH_4	2.66	g/bhp-hr	Vendor Guarantee	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	10.41	45.59
N_2O	0.00	kg N_2O / MMBtu	40 CFR Subpart C	1,775.00	1,323.62	7,611.00	1,038	0%	8,760.00	<0.01	0.01
Total HAPs										0.52	2.29
Total CO_2e										1,986.84	8,702.36

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one CAT G3606TALE NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-2 - Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298
- Vendor Guarantee Emissions Specification Sheet is attached.

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x Fuel Consumption Rating **(Btu/bhp-hr)** x Engine Rating **(bhp)** x (1 **MMBtu**/10^6 **Btu**)

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

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(kg/MMBtu)** x Engine Rating **(bhp)** x (2.205 **lb**/**kg**) x Fuel Consumption Rating **(Btu/bhp-hr)** x (1 **MMBtu**/10^6 **Btu**)

Attachment U
Dehydrator Reboilers (RBV-1 and RBV-2)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis/Source	Heater Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating hours	Max Hourly Emissions (lb/hr)	Max Annual Emissions (tpy)
VOCs	5.5	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	0.02
Hexane	1.8	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
Formaldehyde	0.075	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
Benzene	0.0021	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
Toluene	0.0034	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
CO	84	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	0.08	0.35
NO_x	100	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	0.10	0.42
$PM_{Filterable}$	1.9	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
$PM_{Condensable}$	5.7	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	0.02
PM_{Total}	7.6	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	0.03
SO_2	0.6	$lb/10^6$ scf	AP-42 Chapter 1.4	1.0	1038	8760	<0.01	<0.01
CO_2	53.06	kg CO_2/MMBtu	40 CFR Subpart C	1.0	1038	8760	116.98	512.36
CH_4	0.001	kg CO_2/MMBtu	40 CFR Subpart C	1.0	1038	8760	<0.01	<0.01
N_2O	0.0001	kg CO_2/MMBtu	40 CFR Subpart C	1.0	1038	8760	<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 Reboiler

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

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

Max Annual Emissions based upon Max hourly Emissions @ 8760 hr/yr

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

Max hourly Emission Rate **(lb/hr)** = Emission Factor **(kg/MMBtu) x** Heater Boiler Rating **(MMBtu/hr) x** 2.20462 **(lb/kg)**

Attachment U
Regenerator Overhead Vent (RSV-1 and RSV-2)

Pollutant	Max Hourly Uncontrolled Emissions (lb/hr)	Max Annual Uncontrolled Emissions (tons/yr)
VOCs	0.60	2.62
HAPs	0.36	1.58
Benzene	0.03	0.13
Toluene	0.06	0.26
Ethylbenzene	0.10	0.45
Xylenes	0.15	0.66
n-Hexane	0.02	0.08
CH_4	2.59	11.34
CO_2e	64.72	283.45

Note:

- Emission rates from GRI-GLYCalc 4.0. Input sheets and aggregate GRI-GLYCalc 4.0 reports 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 U
Emergency Generator (EG-1)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Engine Rating (kW)	Fuel Consumption (Btu/bhp-hr)	Catalyst Effect	Annual Operating Hours	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
VOC's	1.00	g/bhp-hr	Vendor Guarantee	107.30	80.01	8,399.00	0.80	500.00	0.05	0.01
Formaldehyde	0.05	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.90	500.00	0.05	0.01
Benzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
Toluene	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
Ethylbenzene	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
Xylene	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
CO	4.00	g/bhp-hr	Vendor Guarantee	107.30	80.01	8,399.00	0.93	500.00	0.07	0.02
NO_x	2.00	g/bhp-hr	Vendor Guarantee	107.30	80.01	8,399.00	0.00	500.00	0.47	0.12
$PM_{Filterable}$	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
$PM_{Condensable}$	0.01	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
PM_{Total}	0.01	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
SO_2	0.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
CO_2	110.00	lb/MMBtu	AP-42 Chapter 3.2	107.30	80.01	8,399.00	0.00	500.00	99.13	24.78
CH_4	0.00	kg CH_4 / MMBtu	40 CFR Subpart C	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
N_2O	0.00	kg N_2O / MMBtu	40 CFR Subpart C	107.30	80.01	8,399.00	0.00	500.00	<0.01	<0.01
Total HAPs									0.05	0.01
Total CO_2e									99.24	24.81

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-2 - Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.
- CO_2 equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x Fuel Consumption Rating **(Btu/bhp-hr)** x Engine Rating **(bhp)** x (1 **MMBtu**/10^6 **Btu**)

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

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(kg/MMBtu)** x Engine Rating **(bhp)** x (2.205 **lb**/**kg**) x Fuel Consumption Rating **(Btu/bhp-hr)** x (1 **MMBtu/**10^6 **Btu**)

Attachment U
Tank Emissions

Pollutant	Max. Hourly Emissions using ProMax (lb/hr)	Max. Annual Emissions using ProMax (tons/yr)
VOCs	<0.01	0.03
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	0.01	0.04
CH_4	0.18	0.77
Total CO_2e	4.43	19.41

Notes:

-Emission rates for Produced Fluid Tanks TK-1 and TK-2 were calculated using ProMax software. ProMax output sheets for the Cather 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 TK-1 and TK-2 is modeled as being received through a single tank. The throughput value represents the total throughput for both tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the compressor station. Actual throughput for each tank will vary based on operations.

Attachment U - Emissions Calculations
Pigging Operations

Type (Launch or Receiving)	Latitude Decimal Degrees	Longitude Decimal Degrees	Chamber Length (Ft.)	Chamber Diam. (Ft .)	Volume of Chamber (ft3)	PSIG of Chamber	Volume of Pressurized Gas (ft3)
Receiving	39.27944	-80.41333	11	1	8.64	625	375.96

Temp. of Chamber (R°)	Molecular Weight of gas mixture (lb/lb-mole)	Compressibility Factor	Pressurized Density (lb/ft3)	Atmospheric Density (lb/ft3)	Delta Density (lb/ft3)	Amount Gas Vented (lbs) Per Event
539.67	16.49	0.99793	1.82572249	0.04195423	1.783768264	15.41065151

# of Events	# of Purges Per Event	Total Amount of Gas Vented (lbs)
20	1	308.2130301

Methane/Ethane Weight Fraction	Total VOC Weight Fraction	Total CO2 Weight Fraction	Tons of Total Amount of Gas Vented	Tons of CH4/C2H6	Tons of VOC	Tons of CO2
0.9857	0.0074	0.0047	0.1541	0.0001	0.00	0.00

Example Calc

Volume of Pressurized Gas (ft3)= (Volume of Chamber (ft3) x (PSIG of Chamber 14.7)) / 14.7

Pressurized Density (lb/ft3) = (Moecular Weight (lb/lb-mole) x (PSIG of Chamber + 14.7)) / Compressibility Factor x 10.73 x Temp of Chamber (R))

Atmospheric Density (lb/ft3) = (14.7 x Molecular Weight (lb/lb-mole)) / (10.73 x Temp of Chamber (R) x Compressibility Factor)

Amount of gas vented (lbs) = Delta Density (lb/ft3) x Volume of chamber (ft3)

Total Gas vented (lbs) = Number of events x Number of purges per event x Amount of gas vented (lbs)

Tons of Total Gas Vented = Amount of gas vented (lbs) / 2000

Tons of VOC = Tons of total gas vented x Total VOC weight frac / 2000

Tons of CO2 = Tons of total gas vented x CO2 weight frac / 2000

Attachment U - Emissions Calculations
Blowdowns

Blowdown Volume (scf)	Number of Events	Average length of event (hrs)	Average blowdown rate (scf/hr)	Amount of gas vented (scf)	Pressure of chamber (PSIG)
3,776	100	0.167	22,610.78	377,600.00	625
Temp of Gas (R)	**Molecular weight of mixture (lb/lb-mol)**	**Compressibility Factor**	**Pressurized Density (lb/ft3)**	**Atmospheric Density (lb/ft3)**	**Delta Density (lb/ft3)**
539.67	16.64	0.9979	1.842548139	0.042340875	1.800207264
Amount of Gas vented (lbs)	**VOC weight fraction**	**CO2 Weight fraction**	**Me/Et frac**	**Gas vented (tons)**	**Tons of CH4/C2H6**
679,758.26	0.007432189	0.004680229	0.985680419	339.88	335.01
Tons of VOC	**Tons of CO2**				
2.53	1.57				

Example Calc

Amount of gas vented (scf) = Blowdown volume (scf) x Number of events

Pressurized Density (lb/ft3) = (Moecular Weight (lb/lb-mole) x (PSIG of Chamber + 14.7)) / Compressibility Factor x 10.73 x Temp of Chamber (R))

Atmospheric Density (lb/ft3) = (14.7 x Molecular Weight (lb/lb-mole)) / (10.73 x Temp of Chamber (R) x Compressibility Factor)

Amount of gas vented (lbs) = Delta Density (lb/ft3) x Volume of chamber (ft3)

Total Gas vented (lbs) = Amount of gas vented (scf) x Delta Density (lb/ft3)

Tons of Total Gas Vented = Amount of gas vented (lbs) / 2000

Tons of VOC = Tons of total gas vented x Total VOC weight frac

Tons of CO2 = Tons of total gas vented x CO2 weight frac

Arsenal Midstream, LLC
Cather Compressor Station
Fugitive Emissions From Haul Roads
Attachment U

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)	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	0.75	1	52	NA	NA	3.21	0.08	0.82	0.02	0.08	0.00
2	Employee Vehicles	4	3	0.75	1	200	NA	NA	1.14	0.11	0.29	0.03	0.03	0.003
								Totals:	**4.35**	**0.20**	**1.11**	**0.05**	**0.11**	**0.01**

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

Arsenal Midstream, LLC
Cather Compressor Station
Fugitive Emissions From Equipment Leaks
Attachment U

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	0
Separators	0
Meters/Piping	1
Compressors	2
In-line Heaters	2
Dehydrators	2

Gas Composition														
	Propane	**Butane**	**Pentanes**	**Heptane**	**Octanes**	**Nonanes**	**Decanes**	**Hexane**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**CO_2**	**CH_4**
Mole %	0.22	0.03	0.007	<0.01	<0.001	<0.001	<0.001	0.0046	<0.001	<0.001	<0.001	<0.001	0.18	95.88
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	136	0.027	8760	0.00	0.01	<0.001	<0.001	<0.001	0.003	0.15	0.64	3.65	16.00
Connectors	583	0.003	8760	<0.001	0.00	<0.001	<0.001	<0.001	0.002	0.07	0.30	1.74	7.62
Open-ended Lines	8	0.06	8760	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.02	0.09	0.49	2.13
Pressure Relief Valves	6	0.04	8760	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	0.04	0.24	1.05
			Total Emissions:	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.24**	**1.07**	**6.12**	**26.80**

- 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 VOCs

Attachment U - Emission Calculations
Cather Compressor Station - 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**
Compressor Engine (CE-5R)	1.65	7.21	0.70	3.06	1.00	4.39	2.61	11.44	0.18	0.79	<0.01	<0.01	0.18	0.78	0.01	0.05	2298.98	10069.54	28.01	122.67	<0.01	0.02	3000.31	13141.35
Compressor Engine (CE-6R)	1.23	5.40	0.52	2.29	0.75	3.29	1.96	8.57	0.13	0.59	<0.01	<0.01	0.13	0.59	<0.01	0.03	1725.72	7558.67	10.41	45.59	<0.01	0.01	1986.84	8702.36
Reboiler (RBV-1)	<0.01	0.02	<0.01	<0.01	0.08	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
Reboiler (RBV-2)	<0.01	0.02	<0.01	<0.01	0.08	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
Dehydrator Regenerator Overhead Vent (RSV-1)	0.60	2.62	0.36	1.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.59	11.34	--	--	64.72	283.45
Dehydrator Regenerator Overhead Vent (RSV-2)	0.60	2.62	0.36	1.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.59	11.34	--	--	64.72	283.45
Produced Water Tank (TK-1, TK-2)	<0.01	0.03	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	0.01	0.04	0.18	0.77	--	--	4.43	19.41
Emergency Generator (EG-1)	0.05	0.01	0.05	0.01	0.07	0.02	0.47	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	99.13	24.78	<0.01	<0.01	<0.01	<0.01	99.24	24.81
Blowdown	0.58	2.53	<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	0.36	1.57	<0.01	<0.01	<0.01	<0.01	0.36	1.57
Fugitives - Pigging Operations	<0.01	<0.01	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	<0.01	<0.01	--	--	<0.01	<0.01
Fugitives - Haul Roads	--	--	--	--	--	--	--	--	4.35	0.20	1.22	0.06	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives - Equipment Leaks	<0.01	<0.01	<0.01	<0.01	--	--	--	--	--	--	--	--	--	--	--	--	<0.01	<0.01	0.24	1.07	--	--	6.12	26.80
Totals	**4.71**	**20.45**	**1.99**	**8.53**	**1.98**	**8.40**	**5.23**	**20.97**	**4.69**	**1.64**	**1.23**	**0.08**	**0.33**	**1.42**	**0.02**	**0.09**	**4358.16**	**18679.34**	**44.02**	**192.80**	**0.01**	**0.03**	**5460.93**	**23532.22**

Attachment U

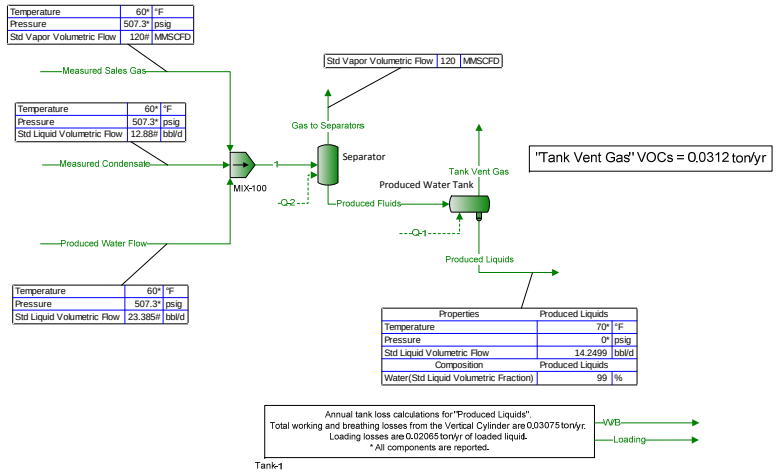
Cather Compressor Station - Site HAP Emission Levels

	Total HAPs		Formaldehyde		n-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**
Compressor Engine (CE-5R)	0.70	3.06	0.68	2.98	<0.01	<0.01	<0.01	0.03	<0.01	0.03	<0.01	<0.01	<0.01	0.01
Compressor Engine (CE-6R)	0.52	2.29	0.51	2.23	<0.01	<0.01	<0.01	0.03	<0.01	0.02	<0.01	<0.01	<0.01	0.01
Reboiler (RBV-1)	<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
Reboiler (RBV-2)	<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
Dehydrator Regenerator Overhead Vent (RSV-1)	0.36	1.58	<0.01	<0.01	0.02	0.08	0.03	0.13	0.06	0.26	0.10	0.45	0.15	0.66
Dehydrator Regenerator Overhead Vent (RSV-2)	0.36	1.58	<0.01	<0.01	0.02	0.08	0.03	0.13	0.06	0.26	0.10	0.45	0.15	0.66
Produced Water Tank (TK-1, TK-2)	<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
Thermoelectric Generator	0.05	0.01	0.05	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Blowdown	<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
Fugitives - Pigging Operations	<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
Fugitives - Haul Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives - Equipment 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	**1.99**	**8.52**	**1.24**	**5.23**	**0.04**	**0.17**	**0.08**	**0.33**	**0.13**	**0.58**	**0.21**	**0.91**	**0.30**	**1.34**

Flowsheet1
Plant Schematic

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Arsenal – Cather Compressor Station
Produced Water Tank



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

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
From Block	Separator	--	--	--	Separator
To Block	--	--	MIX-100	MIX-100	Produced Water Tank

Stream Composition

Mole Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.25373	0.00257284	0 *	0.2539 *	0.000135784
Methane	95.831	5.50737	10.674 *	95.894 *	0.0986793
Carbon Dioxide	0.157599	2.42896	0.065 *	0.1577 *	0.00285563
Ethane	3.44532	0.656132	5.377 *	3.4471 *	0.0070673
Propane	0.218522	0.0346825	3.736 *	0.2183 *	0.00086768
Isobutane	0.0118262	0.00286207	1.359 *	0.0117 *	9.98425E-05
n-Butane	0.01756	0.00550929	2.754 *	0.0173 *	0.000210602
Isopentane	0.000247453	0.000105329	2.508 *	0 *	6.49927E-06
n-Pentane	0.000221996	0.000104698	2.25 *	0 *	7.67781E-06
i-Hexane	0.000467851	0.000269596	4.742 *	0 *	3.69001E-05
n-Hexane	0.000268153	0.000169868	2.718 *	0 *	3.04649E-05
2,2,4-Trimethylpentane	1.77557E-06	1.01736E-06	0.018 *	0 *	5.16907E-07
Benzene	1.07528E-05	8.36521E-06	0.109 *	0 *	2.26371E-06
Heptane	0.00130398	0.000860103	13.22 *	0 *	0.000475764
Toluene	0.000108194	5.77527E-05	1.097 *	0 *	5.15922E-05
Octane	0.00154048	0.000818965	15.626 *	0 *	0.00150032
Ethylbenzene	1.9712E-05	9.44778E-06	0.2 *	0 *	2.4809E-05
o-Xylene	3.62585E-05	1.4782E-05	0.368 *	0 *	5.89776E-05
Nonane	0.0011416	0.000527935	11.599 *	0 *	0.00327414
Decane	0	0	0 *	0 *	0
Water	0.0570232	91.3583	0 *	0 *	99.8022
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0.0020576	0.000703116	21.58 *	0 *	0.0824619
Hexanes+	0	0	0 *	0 *	0

Molar Flow	Gas to Separators lbmol/h	Loading lbmol/h	Measured Condensate lbmol/h	Measured Sales Gas lbmol/h	Produced Fluids lbmol/h
Nitrogen	33.431	6.51032E-09	0 *	33.431 *	1.55447E-05
Methane	12626.5	1.39358E-05	0.138765 *	12626.4 *	0.011297
Carbon Dioxide	20.7649	6.14623E-06	0.00084502 *	20.7644 *	0.000326917
Ethane	453.949	1.66027E-06	0.0699026 *	453.88 *	0.000809077
Propane	28.792	8.77604E-08	0.0485691 *	28.7436 *	9.93336E-05
Isobutane	1.55819	7.24216E-09	0.0176674 *	1.54054 *	1.14301E-05
n-Butane	2.31367	1.39407E-08	0.0358028 *	2.27789 *	2.41101E-05
Isopentane	0.0326039	2.66523E-10	0.0326048 *	0 *	7.44048E-07
n-Pentane	0.0292497	2.64927E-10	0.0292507 *	0 *	8.78969E-07
i-Hexane	0.061643	6.82185E-10	0.0616474 *	0 *	4.22439E-06
n-Hexane	0.0353312	4.29833E-10	0.0353348 *	0 *	3.48768E-06
2,2,4-Trimethylpentane	0.000233946	2.57433E-12	0.000234005 *	0 *	5.91764E-08
Benzene	0.00141677	2.11673E-11	0.00141703 *	0 *	2.59153E-07
Heptane	0.171809	2.1764E-09	0.171864 *	0 *	5.44663E-05
Toluene	0.0142554	1.46137E-10	0.0142613 *	0 *	5.90637E-06
Octane	0.20297	2.07231E-09	0.203143 *	0 *	0.00017176
Ethylbenzene	0.00259721	2.39066E-11	0.00260006 *	0 *	2.84017E-06
o-Xylene	0.00477734	3.74045E-11	0.00478411 *	0 *	6.75186E-06
Nonane	0.150415	1.33589E-09	0.150791 *	0 *	0.00037483
Decane	0	0	0 *	0 *	0
Water	7.51326	0.000231173	0 *	0 *	11.4255
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0.271105	1.77916E-09	0.280547 *	0 *	0.00944039

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water 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	0	0 *	0 *	0

Mass Fraction	Gas to Separators %	Loading %	Measured Condensate %	Measured Sales Gas %	Produced Fluids %
Nitrogen	0.426059	0.00386802	0 *	0.426571 *	0.000209686
Methane	92.1527	4.74159	1.71125 *	92.2624 *	0.0872678
Carbon Dioxide	0.415748	5.73688	0.0285875 *	0.416237 *	0.00692796
Ethane	6.20985	1.05881	1.61576 *	6.21636 *	0.0117147
Propane	0.577593	0.0820757	1.64634 *	0.577313 *	0.00210917
Isobutane	0.041202	0.00892752	0.789365 *	0.0407841 *	0.0003199
n-Butane	0.0611784	0.0171849	1.59964 *	0.0603046 *	0.000674778
Isopentane	0.00107017	0.000407835	1.80831 *	0 *	2.58494E-05
n-Pentane	0.000960075	0.000405393	1.62229 *	0 *	3.05368E-05
i-Hexane	0.00241669	0.00124683	4.08377 *	0 *	0.000175294
n-Hexane	0.00138515	0.000785604	2.34072 *	0 *	0.000144724
2,2,4-Trimethylpentane	1.21575E-05	6.23676E-06	0.0205477 *	0 *	3.25495E-06
Benzene	5.03467E-05	3.50674E-05	0.0850863 *	0 *	9.74752E-06
Heptane	0.00783207	0.00462526	13.238 *	0 *	0.002628
Toluene	0.00059755	0.000285576	1.0101 *	0 *	0.000262049
Octane	0.0105478	0.00502052	17.8377 *	0 *	0.0094475
Ethylbenzene	0.000125442	5.38295E-05	0.212191 *	0 *	0.000145193
o-Xylene	0.00023074	8.42219E-05	0.390432 *	0 *	0.000345164
Nonane	0.00877649	0.00363383	14.8666 *	0 *	0.0231488
Decane	0	0	0 *	0 *	0
Water	0.0615778	88.3279	0 *	0 *	99.1147
Oxygen	0	0	0 *	0 *	0
Decanes Plus	0.0200701	0.00614035	35.0933 *	0 *	0.73972
Hexanes+	0	0	0 *	0 *	0

Mass Flow	Gas to Separators lb/h	Loading lb/h	Measured Condensate lb/h	Measured Sales Gas lb/h	Produced Fluids lb/h
Nitrogen	936.516	1.82376E-07	0 *	936.516 *	0.000435461
Methane	202560	0.000223565	2.22614 *	202558 *	0.181231
Carbon Dioxide	913.852	0.000270492	0.0371889 *	913.829 *	0.0143875
Ethane	13649.8	4.99229E-05	2.10191 *	13647.7 *	0.0243282
Propane	1269.6	3.86985E-06	2.14169 *	1267.46 *	0.00438017
Isobutane	90.5657	4.20931E-07	1.02687 *	89.5395 *	0.000664345
n-Butane	134.476	8.10263E-07	2.08094 *	132.396 *	0.00140133
Isopentane	2.35233	1.92293E-08	2.35239 *	0 *	5.36822E-05
n-Pentane	2.11033	1.91142E-08	2.1104 *	0 *	6.34166E-05
i-Hexane	5.31211	5.87876E-08	5.31249 *	0 *	0.000364039
n-Hexane	3.04468	3.70411E-08	3.04499 *	0 *	0.000300552
2,2,4-Trimethylpentane	0.0267233	2.94062E-10	0.0267301 *	0 *	6.75964E-06
Benzene	0.110666	1.65342E-09	0.110687 *	0 *	2.02429E-05
Heptane	17.2156	2.1808E-07	17.2211 *	0 *	0.00545763
Toluene	1.31347	1.34649E-08	1.31402 *	0 *	0.000544204
Octane	23.185	2.36717E-07	23.2047 *	0 *	0.0196199
Ethylbenzene	0.275733	2.53805E-09	0.276035 *	0 *	0.000301527
o-Xylene	0.507187	3.97104E-09	0.507905 *	0 *	0.000716811
Nonane	19.2915	1.71334E-07	19.3397 *	0 *	0.0480738
Decane	0	0	0 *	0 *	0
Water	135.353	0.00416464	0 *	0 *	205.834
Oxygen	0	0	0 *	0 *	0
Decanes Plus	44.1159	2.89516E-07	45.6522 *	0 *	1.5362
Hexanes+	0	0	0 *	0 *	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Gas to Separators	Loading	Measured Condensate	Measured Sales Gas	Produced Fluids
Temperature	°F	60 *	72.1381	60 *	60 *	60
Pressure	psia	522	0.429042	522 *	522 *	522
Mole Fraction Vapor	%	100	100	0	100	0
Mole Fraction Light Liquid	%	0	0	100	0	0.107728
Mole Fraction Heavy Liquid	%	0	0	0	0	99.8923
Molecular Weight	lb/lbmol	16.6828	18.6333	100.065	16.6739	18.1402
Mass Density	lb/ft^3	1.68479	0.00140133	44.4326	1.68371	62.1844
Molar Flow	lbmol/h	13175.8	0.00025304	1.30003	13167	11.4482
Mass Flow	lb/h	219809	0.00471498	130.088	219545	207.673
Vapor Volumetric Flow	ft^3/h	130467	3.36463	2.92776	130394	3.33963
Liquid Volumetric Flow	gpm	16266	0.419487	0.36502	16256.9	0.416369
Std Vapor Volumetric Flow	MMSCFD	120	2.30459E-06	0.0118402	119.92 *	0.104266
Std Liquid Volumetric Flow	sgpm	1437.93	1.07806E-05	0.375591 *	1437.28	0.41699
Compressibility		0.926834	0.999611	0.210796	0.926934	0.0273049
Specific Gravity		0.576012	0.643359	0.712414	0.575705	0.99704
API Gravity				67.1204		10.4201
Enthalpy	Btu/h	-4.32994E+08	-25.5971	-118093	-4.32109E+08	-1.40843E+06
Mass Enthalpy	Btu/lb	-1969.86	-5428.9	-907.793	-1968.2	-6781.95
Mass Cp	Btu/(lb*°F)	0.583998	0.437951	0.499086	0.584094	0.970591
Ideal Gas CpCv Ratio		1.30077	1.32176	1.05593	1.30088	1.32398
Dynamic Viscosity	cP	0.0114786	0.0103575	0.469083	0.0114771	1.1308
Kinematic Viscosity	cSt	0.425325	461.414	0.659063	0.425543	1.13523
Thermal Conductivity	Btu/(h*ft*°F)	0.0202824	0.0123555	0.07	0.0202851	0.338244
Surface Tension	lbf/ft			0.00120642		0.00506516 ?
Net Ideal Gas Heating Value	Btu/ft^3	933.664	61.9751	5056.69	933.796	8.04316
Net Liquid Heating Value	Btu/lb	21226.7	320.029	19022.3	21241.7	-883.346
Gross Ideal Gas Heating Value	Btu/ft^3	1035.84	114.574	5439.14	1035.97	58.8461
Gross Liquid Heating Value	Btu/lb	23550.8	1391.24	20472.7	23567.1	179.424

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Connections

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

Stream Composition

Mole Fraction	Produced Liquids %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	1.7332E-06	0 *	0.123357	0.00257284	0.25351
Methane	0.00257368	0 *	88.4404	5.50737	95.7479
Carbon Dioxide	0.000938453	0 *	1.76515	2.42896	0.157464
Ethane	0.00039289	0 *	6.14229	0.656132	3.44234
Propane	9.37482E-05	0 *	0.712277	0.0346825	0.218333
Isobutane	2.15318E-05	0 *	0.0720841	0.00286207	0.011816
n-Butane	6.07297E-05	0 *	0.137975	0.00550929	0.0175449
Isopentane	3.19806E-06	0 *	0.00304102	0.000105329	0.000247244
n-Pentane	4.33204E-06	0 *	0.00308316	0.000104698	0.00022181
i-Hexane	2.81642E-05	0 *	0.0080671	0.000269596	0.000467477
n-Hexane	2.51845E-05	0 *	0.0048843	0.000169868	0.000267946
2,2,4-Trimethylpentane	4.83029E-07	0 *	3.1658E-05	1.01736E-06	1.77448E-06
Benzene	2.02746E-06	0 *	0.000219421	8.36521E-06	1.07455E-05
Heptane	0.000450251	0 *	0.0239276	0.000860103	0.00130326
Toluene	4.93086E-05	0 *	0.00215079	5.77527E-05	0.000108145
Octane	0.00147328	0 *	0.026362	0.000818965	0.00154044
Ethylbenzene	2.44283E-05	0 *	0.000374692	9.44778E-06	1.97164E-05
o-Xylene	5.82982E-05	0 *	0.000683486	1.4782E-05	3.62782E-05
Nonane	0.00325856	0 *	0.0175949	0.000527935	0.00114345
Decane	0	0 *	0	0	0
Water	99.908	100 *	2.49096	91.3583	0.143615
Oxygen	0	0 *	0	0	0
Decanes Plus	0.0825243	0 *	0.0251173	0.000703116	0.0021274
Hexanes+	0	0 *	0	0	0

Molar Flow	Produced Liquids lbmol/h	Produced Water Flow lbmol/h	Tank Vent Gas lbmol/h	W/B lbmol/h	1 lbmol/h
Nitrogen	1.98204E-07	0 *	1.53465E-05	9.69461E-09	33.431
Methane	0.000294319	0 *	0.0110027	2.07521E-05	12626.5
Carbon Dioxide	0.000107319	0 *	0.000219598	9.15243E-06	20.7652
Ethane	4.49299E-05	0 *	0.000764147	2.47234E-06	453.949
Propane	1.07208E-05	0 *	8.86128E-05	1.30685E-07	28.7921
Isobutane	2.46233E-06	0 *	8.96782E-06	1.07844E-08	1.55821
n-Butane	6.94489E-06	0 *	1.71652E-05	2.07593E-08	2.31369
Isopentane	3.65722E-07	0 *	3.78326E-07	3.96884E-10	0.0326047
n-Pentane	4.954E-07	0 *	3.83569E-07	3.94507E-10	0.0292506
i-Hexane	3.22079E-06	0 *	1.00361E-06	1.01585E-09	0.0616472
n-Hexane	2.88003E-06	0 *	6.07645E-07	6.40071E-10	0.0353347
2,2,4-Trimethylpentane	5.52379E-08	0 *	3.9385E-09	3.83347E-12	0.000234005
Benzene	2.31856E-07	0 *	2.72976E-08	3.15206E-11	0.00141703
Heptane	5.14895E-05	0 *	2.97677E-06	3.24091E-09	0.171863
Toluene	5.6388E-06	0 *	2.67575E-07	2.17615E-10	0.0142613
Octane	0.00016848	0 *	3.27963E-06	3.0859E-09	0.203142
Ethylbenzene	2.79356E-06	0 *	4.66145E-08	3.55997E-11	0.00260005
o-Xylene	6.66683E-06	0 *	8.50309E-08	5.56995E-11	0.0047841
Nonane	0.000372641	0 *	2.18894E-06	1.98929E-09	0.15079
Decane	0	0 *	0	0	0
Water	11.4252	18.9388 *	0.000309895	0.000344243	18.9388
Oxygen	0	0 *	0	0	0
Decanes Plus	0.00943727	0 *	3.12479E-06	2.64938E-09	0.280546

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station
Location:	
Flowsheet:	Flowsheet1

Job: Produced Water Tank

Molar Flow	Produced Liquids lbmol/h	Produced Water Flow lbmol/h	Tank Vent Gas lbmol/h	W/B lbmol/h	1 lbmol/h
Hexanes+	0	0 *	0	0	0

Mass Fraction	Produced Liquids %	Produced Water Flow %	Tank Vent Gas %	W/B %	1 %
Nitrogen	2.67649E-06	0 *	0.193402	0.00386802	0.425657
Methane	0.00227602	0 *	79.406	4.74159	92.0658
Carbon Dioxide	0.00227672	0 *	4.34771	5.73688	0.415362
Ethane	0.000651239	0 *	10.3367	1.05881	6.204
Propane	0.000227881	0 *	1.75783	0.0820757	0.57705
Isobutane	6.8988E-05	0 *	0.234484	0.00892752	0.0411634
n-Butane	0.000194578	0 *	0.448823	0.0171849	0.0611213
Isopentane	1.27194E-05	0 *	0.0122795	0.000407835	0.00106919
n-Pentane	1.72294E-05	0 *	0.0124497	0.000405393	0.000959198
i-Hexane	0.000133792	0 *	0.0389074	0.00124683	0.00241458
n-Hexane	0.000119637	0 *	0.0235569	0.000785604	0.00138398
2,2,4-Trimethylpentane	3.04157E-06	0 *	0.000202391	6.23676E-06	1.21491E-05
Benzene	8.73012E-06	0 *	0.000959238	3.50674E-05	5.03083E-05
Heptane	0.00248703	0 *	0.134186	0.00462526	0.00782716
Toluene	0.000250445	0 *	0.011091	0.000285576	0.000597233
Octane	0.00927704	0 *	0.168533	0.00502052	0.0105468
Ethylbenzene	0.000142963	0 *	0.00222632	5.38295E-05	0.000125461
o-Xylene	0.000341182	0 *	0.00406109	8.42219E-05	0.000230848
Nonane	0.0230383	0 *	0.126297	0.00363383	0.00879006
Decane	0	0 *	0	0	0
Water	99.2182	100 *	2.51154	88.3279	0.155074
Oxygen	0	0 *	0	0	0
Decanes Plus	0.740268	0 *	0.22875	0.00614035	0.0207494
Hexanes+	0	0 *	0	0	0

Mass Flow	Produced Liquids lb/h	Produced Water Flow lb/h	Tank Vent Gas lb/h	W/B lb/h	1 lb/h
Nitrogen	5.55238E-06	0 *	0.000429909	2.71579E-07	936.516
Methane	0.00472161	0 *	0.17651	0.000332914	202560
Carbon Dioxide	0.00472306	0 *	0.00966441	0.000402794	913.866
Ethane	0.001351	0 *	0.0229772	7.43409E-05	13649.8
Propane	0.00047274	0 *	0.00390743	5.76265E-06	1269.61
Isobutane	0.000143116	0 *	0.000521229	6.26814E-07	90.5664
n-Butane	0.000403652	0 *	0.000997677	1.20657E-06	134.477
Isopentane	2.63864E-05	0 *	2.72958E-05	2.86347E-08	2.35239
n-Pentane	3.57425E-05	0 *	2.7674E-05	2.84632E-08	2.11039
i-Hexane	0.000277552	0 *	8.64863E-05	8.75414E-08	5.31247
n-Hexane	0.000248188	0 *	5.2364E-05	5.51584E-08	3.04498
2,2,4-Trimethylpentane	6.30975E-06	0 *	4.4989E-07	4.37892E-10	0.02673
Benzene	1.81107E-05	0 *	2.13227E-06	2.46213E-09	0.110687
Heptane	0.00515935	0 *	0.000298278	3.24746E-07	17.2211
Toluene	0.00051955	0 *	2.4654E-05	2.00507E-08	1.31401
Octane	0.0192453	0 *	0.000374627	3.52498E-07	23.2046
Ethylbenzene	0.000296578	0 *	4.94883E-06	3.77944E-09	0.276035
o-Xylene	0.000707784	0 *	9.02731E-06	5.91334E-09	0.507904
Nonane	0.0477931	0 *	0.000280743	2.55136E-07	19.3396
Decane	0	0 *	0	0	0
Water	205.829	341.188 *	0.00558285	0.00620163	341.188
Oxygen	0	0 *	0	0	0
Decanes Plus	1.53569	0 *	0.000508484	4.31122E-07	45.6521
Hexanes+	0	0 *	0	0	0

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Produced Liquids	Produced Water Flow	Tank Vent Gas	W/B	1
Temperature	°F	70 *	60 *	70	72.1381	58.8295
Pressure	psia	14.6959 *	522 *	14.6959	0.429042	522
Mole Fraction Vapor	%	0	0	100	100	99.9108
Mole Fraction Light Liquid	%	0.088633	100	0	0	0.000217836
Mole Fraction Heavy Liquid	%	99.9114	0	0	0	0.0890059
Molecular Weight	lb/lbmol	18.1405	18.0153	17.8677	18.6333	16.6841
Mass Density	lb/ft^3	62.145	62.3966	0.0463004	0.00140133	1.69137
Molar Flow	lbmol/h	11.4357	18.9388	0.0124408	0.000376805	13187.2
Mass Flow	lb/h	207.45	341.188	0.222288	0.00702114	220017
Vapor Volumetric Flow	ft^3/h	3.33817	5.46805	4.80099	5.01033	130082
Liquid Volumetric Flow	gpm	0.416187	0.681731	0.598565	0.624664	16218
Std Vapor Volumetric Flow	MMSCFD	0.104152	0.172487	0.000113306	3.4318E-06	120.104
Std Liquid Volumetric Flow	sgpm	0.415623	0.682059 *	0.00136687	1.60536E-05	1438.34
Compressibility		0.000754697	0.0270246	0.997729	0.999611	0.925384
Specific Gravity		0.996408	1.00044	0.616922	0.643359	
API Gravity		10.3058	9.93743			
Enthalpy	Btu/h	-1.40623E+06	-2.3317E+06	-457.374	-38.1171	-4.34559E+08
Mass Enthalpy	Btu/lb	-6778.63	-6834.08	-2057.58	-5428.9	-1975.12
Mass Cp	Btu/(lb*°F)	0.968638	0.973398	0.497166	0.437951	0.584521
Ideal Gas CpCv Ratio		1.3235	1.32632	1.28911	1.32176	1.30106
Dynamic Viscosity	cP	0.998504	1.14219	0.0110224	0.0103575	
Kinematic Viscosity	cSt	1.00305	1.14276	14.8617	461.414	
Thermal Conductivity	Btu/(h*ft*°F)	0.344284	0.342316	0.0182092	0.0123555	
Surface Tension	lbf/ft	0.0050005 ?	0.00510743			
Net Ideal Gas Heating Value	Btu/ft^3	7.03648	0	933.4	61.9751	932.861
Net Liquid Heating Value	Btu/lb	-905.481	-1059.76	19773.6	320.029	21205.8
Gross Ideal Gas Heating Value	Btu/ft^3	57.7838	50.3101	1035.36	114.574	1034.99
Gross Liquid Heating Value	Btu/lb	156.108	0	21939	1391.24	23528.8

Remarks

Energy Stream Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-1	1738.69 Btu/h	0.683331 hp	--	Produced Water Tank
Q-2	156406 Btu/h	61.4699 hp	--	Separator

Remarks

Blocks
Blowdown Tank
Separator Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank	
Location:		Modified: 12:02 PM, 7/26/2017	
Flowsheet:	Flowsheet1	Status: Solved 3:57 PM, 8/22/2017	

Connections

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

Block Parameters

Pressure Drop	507.304	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.10867	%	Heat Duty	1738.69	Btu/h
Mole Fraction Light Liquid	0.0885367	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	99.8028	%	Heat Release Curve Increments	10	

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank	
Location:		Modified: 11:59 AM, 6/20/2017	
Flowsheet:	Flowsheet1	Status: Solved 3:57 PM, 8/22/2017	

Connections

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

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 1	100 %

Remarks

Blocks
Sand Trap
Separator Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank	
Location:		Modified: 12:21 PM, 6/20/2017	
Flowsheet:	Flowsheet1	Status: Solved 3:57 PM, 8/22/2017	

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	Produced Water Tank	Q-2	Energy	

Block Parameters

* Pressure Drop	0	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	99.9132	%	Heat Duty	156406	Btu/h
Mole Fraction Light Liquid	9.35212E-05	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0.0867191	%	Heat Release Curve Increments	10	

Remarks

Flowsheet Environment
Environment1

Client Name:	Arsenal - Cather Compressor Station	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	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

Environments Report

Client Name:	Arsenal - Cather Compressor Station	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	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

Single Oil Report
Decanes Plus

Client Name:	Arsenal - Cather Compressor Station	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 - Cather Compressor Station	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 - Cather Compressor Station	Job: Produced Water Tank
Location:		

Produced Water

Source Code

Residual Error (for CV1) = Water_flow - 14.25

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water Flow!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	23.3849
Unit	

Measured Variable [Water_flow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Liquids!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	14.2499
Unit	

Solver Properties

Status: Solved

Error	-0.000555989		Iterations	2
Calculated Value	0.682059	sgpm	Max Iterations	20
Lower Bound		sgpm	* Weighting	10
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		* Skip Dependency Check	False

Warnings

ProMax:ProMax!Project!Calculators!Produced Water!Calculated Variables!CV1!PropertySolver
Warning: No calculation path could be found from the CalcVariable to the Measured Variable(s).

Remarks

SG Flow

Source Code

Residual Error (for CV1) = SGflow-120

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Sales Gas!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	119920
Unit	

Measured Variable [SGflow]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Gas to Separators!Phases!Total!Properties!Std Vapor Volumetric Flow
Value	120
Unit	

Solver Properties

Status: Solved

Error	5.1825E-07		Iterations	2
Calculated Value	119.92	MMSCFD	Max Iterations	20
Lower Bound		MMSCFD	* Weighting	10
Upper Bound		MMSCFD	Priority	0
Step Size		MMSCFD	* Solver Active	Active
Is Minimizer	False		Group	

Calculator Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		

Solver Properties

Status: Solved

Algorithm	Default	Skip Dependency Check	False

Remarks

Water %

Source Code

Residual Error (for CV1) = water - 99

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Measured Condensate!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	12.8774
Unit	

Measured Variable [water]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Liquids!Phases!Total!Composition!Std Liquid Volumetric Fraction!Water
Value	98.9998
Unit	

Solver Properties

Status: Solved

Error	-0.00022356		Algorithm	Default
Calculated Value	0.375591	sgpm	Iterations	1
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 - Cather Compressor Station	Job: Produced Water Tank
Location:		

Tank-1

User Value [BlockReady]

* Parameter	1		Upper Bound		
Lower Bound			* Enforce Bounds	False	

User Value [ShellLength]

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

User Value [ShellDiam]

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

User Value [BreatherVP]

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

User Value [BreatherVacP]

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

User Value [DomeRadius]

* Parameter	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	14.2509	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 - Cather Compressor Station	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	16.62	gpm	Upper Bound	gpm
Lower Bound		gpm	* Enforce Bounds	False

User Value [EntrainedOilFrac]

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

User Value [TurnoverRate]

* Parameter	14.3444		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	0.292515	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MaxVP]

* Parameter	0.417067	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [MinVP]

* Parameter	0.20359	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	0.0307526	ton/yr	Upper Bound	ton/yr

User Value Sets Report

Client Name:	Arsenal - Cather Compressor Station	Job: Produced Water Tank
Location:		

User Value [TotalLosses]

Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0141757	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0165769	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	0.0206516	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.18853	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	0.0307526	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [AllCLoadingLosses]

* Parameter	0.0206516	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [AllCMaxHLoadingLoss]

* Parameter	0.18853	lb/hr	Upper Bound	lb/hr
Lower Bound		lb/hr	* Enforce Bounds	False

User Value [AllCFlashingLosses]

* Parameter	0.00162562	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 - Cather Compressor Station	Job: Produced Water Tank
Location:		

User Value [FlashingLosses]

* Parameter	0.00162562	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [TotalResidual]

* Parameter	908.6	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0186333	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

User Value [VapReportableFrac]

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

User Value [LiqReportableFrac]

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

User Value [FlashReportableFrac]

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

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

Sum Component Flow/Frac

User Value [CompSum]

* Parameter	0.031201	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={045A8401-919E-4706-9FF7-7DDF1D785673}

Gas Analytical Services

CHARLESTON, WV

304-677-9926

Good

LELAP Certification #

04049

Customer	: 0034 - MK MIDSTREAM	**Date Sampled**	: 12/13/2016
Station ID	: 2601	**Date Analyzed**	: 12/19/2016
Cylinder ID	: 0280	**Effective Date**	: 01/01/2017
Producer	:	**Cyl Pressure**	: 625
Lease	: GOFF WEST	**Temp**	: 60
Area	: 190 - UNKNOWN	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: HT

COMPONENT	MOL%	GPM@14.73(PSIA)
Methane	95.8791	0.000
Ethane	3.4142	0.915
Propane	0.2210	0.061
Iso-Butane	0.0133	0.004
Normal-Butane	0.0198	0.006
Neo-Pentane	0.0006	0.000
Iso-Pentane	0.0038	0.001
Normal-Pentane	0.0022	0.001
Nitrogen	0.2624	0.000
Carbon-Dioxide	0.1770	0.000
Oxygen	0.0020	0.000
BENZENE	0.0000	0.000
ETHYLBENZENE	0.0000	0.000
TOLUENE	0.0000	0.000
M-XYLENE/P-XYLENE	0.0000	0.000
C6's	0.0026	0.001
C8's	0.0004	0.000
C9's	0.0000	0.000
C7's	0.0016	0.001
C10's	0.0000	0.000
C11's	0.0000	0.000
C12's	0.0000	0.000
TOTAL	**100.0000**	**0.990**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9979 **C5+ GPM** : 0.00200

Ideal Gravity: 0.5761 **Real Gravity:** 0.5771 **C5+ Mole %** : 0.0106

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025
Ideal GPM	0.983	0.986	0.989	1.008
Ideal BTU Dry	1,032.69	1,035.94	1,038.33	1,059.13
Ideal BTU Sat	1,014.62	1,017.86	1,020.26	1,041.05
Real GPM	0.985	0.989	0.991	1.011
Real BTU Dry	1,034.91	1,038.16	1,040.57	1,061.46
Real BTU Sat	1,017.14	1,020.40	1,022.81	1,043.70

Comments:

Gas Analysis performed in accordance with GPA 2286 **Sample Count** : 220000003

Analytical Calculations performed in accordance with GPA 2172 **COC** :

Measurement Analyst: _____ **Ashley Free**

CE-5R

USA COMPRESSION

Mk Cathers #2 Quote USA Unit 2368 Caterpillar G3608TALE Engine Emissions

Date of Manufacture	*April 11, 2011*	Engine Serial Number	BEN00694	Date Modified/Reconstructed	Not Any
Driver Rated HP	2370	Rated Speed in RPM	1000	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	8	Compression Ratio	9:1	Combustion Setting	Ultra Lean Burn
Total Displacement, in^3	10350	Fuel Delivery Method	Fuel Injection	Combustion Air Treatment	T.C./Aftercooled

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

Fuel Consumption 6840 *LHV BTU/bhp-hr or* 7589 *HHV BTU/bhp-hr*
Altitude 1200 *ft*
Maximum Air Inlet Temp 90 *F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		2.61	11.44
Carbon Monoxide (CO)	2.74		14.32	62.70
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.63		3.29	14.42
Formaldehyde (CH2O)	0.26		1.36	5.95
Particulate Matter (PM) Filterable+Condensable		9.99E-03	1.80E-01	7.87E-01
Sulfur Dioxide (SO2)		5.88E-04	1.06E-02	4.63E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	440	2299	9133
Methane (CH4)	5.36	28.01	111.26

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) with customer supplied fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For air permitting, it is recommended to use a 20% safety margin for CO, VOC and other organic compounds to allow for variation in operating parameters and fuel gas quality.

[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

Catalytic Converter Emissions

Catalytic Converter Make and Model: *Emit, ELX6200Z-2022F*
Element Type: *Oxidation*
Number of Elements in Housing: *3*
Air/Fuel Ratio Control *Caterpillar ADEM3*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	0	**2.61**	**11.44**
Carbon Monoxide (CO)	93	**1.00**	**4.39**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	50	**1.65**	**7.21**
Formaldehyde (CH2O)	50	**0.68**	**2.98**
Particulate Matter (PM)	0	**1.80E-01**	**7.87E-01**
Sulfur Dioxide (SO2)	0	**1.06E-02**	**4.63E-02**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**2299**	**9133**
Methane (CH4)	0	**28.01**	**111.26**

2585 Heartland Drive
Sheridan, WY 82801
Office: | Direct: +1 (307) 675.5310
kdunham@emittechnologies.com

Prepared For:
Chris Magee
USA COMPRESSION

QUOTE: QUO-16705-Z2F9

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3608
Horsepower:	2370
RPM:	1000
Compression Ratio:	9.2
Exhaust Flow Rate:	16228 CFM
Exhaust Temperature:	858 °F
Reference:	DM8606-06-001
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	0.50	2.61	11.44
CO:	2.74	14.32	62.71
THC:	6.30	32.92	144.18
NMHC	0.94	4.91	21.51
NMNEHC:	0.63	3.29	14.42
HCHO:	0.26	1.36	5.95
O2:	12.00 %		

POST CATALYST EMISSIONS

	% Reduction	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	Unaffected by Oxidation Catalyst			
CO:	>93 %	<0.19	<1.00	<4.39
VOC:	>50 %	<0.32	<1.65	<7.21
HCHO:	>50 %	<0.13	<0.68	<2.98

CONTROL EQUIPMENT

Catalyst Housing

Model:	ELX-6200-2022F-6CE0-362
Manufacturer:	EMIT Technologies, Inc
Element Size:	Rectangle 36" x 15" x 3.5"
Housing Type:	6 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	3/16" Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	20" Flat Face Flange
Outlet Connections:	22" Flat Face Flange
Configuration:	End In / Side Out
Silencer:	Integrated
Silencer Grade:	Hospital Enhanced
Insertion Loss:	35-50 dBA

Catalyst Element

Model:	RT-3615-Z
Catalyst Type:	Oxidation, Standard Precious Group Metals
Substrate Type:	BRAZED
Manufacturer:	EMIT Technologies, Inc
Element Quantity:	3
Element Size:	Rectangle 36" x 15" x 3.5"

CE-5R

CE-6R

USA COMPRESSION

USA Compression Units 2669 Caterpillar G3606TALE Engine Emissions

Date of Manufacture	December 12, 2014	Engine Serial Number	4ZS02061	Date Modified/Reconstructed	Not Any
Driver Rated HP	1775	Rated Speed in RPM	1000	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	6	Compression Ratio	9:1	Combustion Setting	Ultra Lean Burn
Total Displacement, in^3	7762	Fuel Delivery Method	Fuel Injection	Combustion Air Treatment	T.C./Aftercooled

Raw Engine Emissions (Customer Supplied Fuel Gas with little to no H2S)

Fuel Consumption 6860 *LHV BTU/bhp-hr or* 7611 *HHV BTU/bhp-hr*
Altitude 1200 *ft*
Maximum Air Inlet Temp 90 *F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		1.96	8.57
Carbon Monoxide (CO)	2.74		10.72	46.96
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.63		2.47	10.80
Formaldehyde (CH2O)	0.26		1.02	4.46
Particulate Matter (PM) Filterable+Condensable		9.99E-03	1.35E-01	5.91E-01
Sulfur Dioxide (SO2)		5.88E-04	7.94E-03	3.48E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	441	1726	6856
Methane (CH4)	2.66	10.41	41.35

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) Customer supplied fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For air permitting, it is recommended to use a 20% safety margin for CO, VOC and other organic compounds to allow for variation in operating parameters and fuel gas quality.

[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

Catalytic Converter Emissions

Catalytic Converter Make amd Model: *DCL, DC64-L2*
Element Type: *DC-24.23" Round*
Number of Elements in Housing: *2*
Air/Fuel Ratio Control *Caterpillar ADEM A3, Burn Time*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	0	**1.96**	**8.57**
Carbon Monoxide (CO)	93	**0.75**	**3.29**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	50	**1.23**	**5.40**
Formaldehyde (CH2O)	50	**0.51**	**2.23**
Particulate Matter (PM)	0	**1.35E-01**	**5.91E-01**
Sulfur Dioxide (SO2)	0	**7.94E-03**	**3.48E-02**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**1726**	**6856**
Methane (CH4)	0	**10.41**	**41.35**

CE-GR

DCL America Inc.

1610 Woodstead Ct, Suite 245, The Woodlands, Texas 77380 USA
Tel: 877-965-8989 *Fax:* 281-605-5858 info@dcl-inc.com www.dcl-inc.com

GLOBAL LEADER IN EMISSION CONTROL SOLUTIONS

To:	Chris Magee	**Phone:**	
Company:	USA Compression	**Email**	
Date:	September 21, 2015	**No. Pages:**	1

Dear Chris,

We hereby guarantee that our Model DC64L2 specified below with two (2) elements installed as described below, and sized for the following engine:

Engine Data	
Engine Model	Caterpillar G3606
Power	1775HP
Fuel	High Methane NG
Exhaust Flow Rate	12, 211 acfm
Exhaust Temperature	847°F

Catalyst Data	
Catalyst Model	DC64L2
Type	Oxidation- A
# of Elements	2
Cell Density	300 cpsi
Approx Dimensions	See attached drawing
Approx Pressure Drop	4.1" w.c

will perform as follows:

Exhaust Component	Engine Output (g-bhp/hr)	Converter Output % reduction
CO	2.74	93%
VOC	0.63	50%
CH20	0.26	50%

for a period of 1 year or 8000 hours, whichever comes first, subject to all terms and conditions contained in the attached warranty document being respected and met.

Best Regards,

On behalf of DCL America Inc.

Lisa Barber

416-788-8021
lbarber@dcl-inc.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2017 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Power Solutions International, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: HPSIB5.70EMT-022

Effective Date: 01/25/2017

Expiration Date: 12/31/2017

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 01/25/2017

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: HPSIB5.70EMT
Mobile/Stationary Certification Type: Stationary
Fuel : LPG/Propane
Natural Gas (CNG/LNG)
Emission Standards :
Part 60 Subpart JJJJ Table 1
VOC (g/Hp-hr) : 1.0
CO (g/Hp-hr) : 4.0
NOx (g/Hp-hr) : 2.0
Stationary Part 1048
CO (g/kW-hr) : 4.4
HC + NOx (g/kW-hr) : 2.7
NMHC + NOx (g/kW-hr) : 2.7
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Arsenal - Cather Compressor Station
File Name: P:\Projects\0419542 Arsenal G35-D Compressor Station.GM\Cather and Goff\Cather.M&R\Calculations\Cather RSV-1 and RSV-2 Dehydration Units.ddf
Date: August 04, 2017

DESCRIPTION:

Description: Dehydrators RSV-1 and RSV-2 with 67.00 MMscf/day throughput at Cather M&R

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 60.00 deg. F
Pressure: 625.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1770
Nitrogen	0.2624
Methane	95.8791
Ethane	3.4142
Propane	0.2210
Isobutane	0.0133
n-Butane	0.0198
Isopentane	0.0038
n-Pentane	0.0022
n-Hexane	0.0026
Heptanes	0.0016
Benzene	0.0001
Toluene	0.0001
Ethylbenzene	0.0001
Xylenes	0.0001
C8+ Heavies	0.0004

DRY GAS:

Flow Rate: 67.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Recirculation Ratio: 3.0 gal/lb H2O

PUMP:

Glycol Pump Type: Electric/Pneumatic

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Arsenal - Cather Compressor Station
File Name: P:\Projects\0419542 Arsenal G35-D Compressor Station.GM\Cather and Goff\Cather.M&R\Calculations\Cather RSV-1 and RSV-2 Dehydration Units.ddf
Date: August 04, 2017

DESCRIPTION:

Description: Dehydrators RSV-1 and RSV-2 with 67.00 MMscf/day throughput at Cather M&R

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.5886	62.125	11.3379
Ethane	0.6565	15.755	2.8753
Propane	0.1259	3.023	0.5517
Isobutane	0.0158	0.378	0.0690
n-Butane	0.0325	0.779	0.1423
Isopentane	0.0085	0.205	0.0373
n-Pentane	0.0067	0.160	0.0292
n-Hexane	0.0177	0.426	0.0777
Heptanes	0.0265	0.636	0.1161
Benzene	0.0306	0.733	0.1338
Toluene	0.0596	1.430	0.2609
Ethylbenzene	0.1028	2.467	0.4503
Xylenes	0.1495	3.589	0.6550
C8+ Heavies	0.0213	0.510	0.0931
Total Emissions	3.8424	92.216	16.8295
Total Hydrocarbon Emissions	3.8424	92.216	16.8295
Total VOC Emissions	0.5973	14.336	2.6163
Total HAP Emissions	0.3602	8.645	1.5777
Total BTEX Emissions	0.3425	8.219	1.5000

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 1.89 lbs. H2O/MMSCF

Temperature: 60.0 deg. F
Pressure: 625.0 psig

Dry Gas Flow Rate: 67.0000 MMSCF/day
Glycol Losses with Dry Gas: 0.0602 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 23.39 lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio: 3.00 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	8.07%	91.93%
Carbon Dioxide	99.95%	0.05%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.98%	0.02%
Isobutane	99.97%	0.03%
n-Butane	99.96%	0.04%
Isopentane	99.96%	0.04%
n-Pentane	99.94%	0.06%
n-Hexane	99.89%	0.11%
Heptanes	99.78%	0.22%
Benzene	94.68%	5.32%
Toluene	91.21%	8.79%
Ethylbenzene	86.84%	13.16%
Xylenes	80.84%	19.16%
C8+ Heavies	99.58%	0.42%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	24.34%	75.66%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.50%	99.50%
n-Pentane	0.50%	99.50%
n-Hexane	0.50%	99.50%
Heptanes	0.50%	99.50%
Benzene	5.00%	95.00%
Toluene	7.91%	92.09%
Ethylbenzene	10.43%	89.57%
Xylenes	12.96%	87.04%
C8+ Heavies	12.10%	87.90%

STREAM REPORTS:

WET GAS STREAM

Temperature: 60.00 deg. F
Pressure: 639.70 psia
Flow Rate: 2.79e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.93e-002	6.53e+001
Carbon Dioxide	1.77e-001	5.73e+002
Nitrogen	2.62e-001	5.41e+002
Methane	9.58e+001	1.13e+005
Ethane	3.41e+000	7.55e+003
Propane	2.21e-001	7.17e+002
Isobutane	1.33e-002	5.69e+001
n-Butane	1.98e-002	8.47e+001
Isopentane	3.80e-003	2.02e+001
n-Pentane	2.20e-003	1.17e+001
n-Hexane	2.60e-003	1.65e+001
Heptanes	1.60e-003	1.18e+001
Benzene	1.00e-004	5.75e-001
Toluene	1.00e-004	6.78e-001
Ethylbenzene	1.00e-004	7.81e-001
Xylenes	1.00e-004	7.81e-001
C8+ Heavies	4.00e-004	5.01e+000
Total Components	100.00	1.23e+005

DRY GAS STREAM

Temperature: 60.00 deg. F
Pressure: 639.70 psia
Flow Rate: 2.79e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.98e-003	5.27e+000
Carbon Dioxide	1.77e-001	5.73e+002
Nitrogen	2.62e-001	5.41e+002
Methane	9.59e+001	1.13e+005
Ethane	3.41e+000	7.55e+003
Propane	2.21e-001	7.17e+002
Isobutane	1.33e-002	5.69e+001
n-Butane	1.98e-002	8.46e+001
Isopentane	3.80e-003	2.02e+001
n-Pentane	2.20e-003	1.17e+001
n-Hexane	2.60e-003	1.65e+001
Heptanes	1.60e-003	1.18e+001
Benzene	9.47e-005	5.44e-001
Toluene	9.12e-005	6.18e-001
Ethylbenzene	8.68e-005	6.78e-001
Xylenes	8.08e-005	6.32e-001
C8+ Heavies	3.98e-004	4.99e+000
Total Components	100.00	1.23e+005

LEAN GLYCOL STREAM

Temperature: 60.00 deg. F

Flow Rate: 2.29e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.27e+003
Water	1.50e+000	1.93e+001
Carbon Dioxide	2.01e-012	2.59e-011
Nitrogen	1.02e-013	1.32e-012
Methane	6.75e-018	8.70e-017
Ethane	2.41e-008	3.10e-007
Propane	3.98e-010	5.13e-009
Isobutane	3.67e-011	4.73e-010
n-Butane	6.25e-011	8.05e-010
Isopentane	3.32e-006	4.28e-005
n-Pentane	2.60e-006	3.35e-005
n-Hexane	6.92e-006	8.92e-005
Heptanes	1.03e-005	1.33e-004
Benzene	1.25e-004	1.61e-003
Toluene	3.97e-004	5.12e-003
Ethylbenzene	9.29e-004	1.20e-002
Xylenes	1.73e-003	2.23e-002
C8+ Heavies	2.27e-004	2.93e-003
Total Components	100.00	1.29e+003

RICH GLYCOL STREAM

Temperature: 60.00 deg. F
Pressure: 639.70 psia
Flow Rate: 2.42e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.38e+001	1.27e+003
Water	5.87e+000	7.94e+001
Carbon Dioxide	1.91e-002	2.59e-001
Nitrogen	9.72e-004	1.31e-002
Methane	1.91e-001	2.59e+000
Ethane	4.86e-002	6.56e-001
Propane	9.32e-003	1.26e-001
Isobutane	1.17e-003	1.58e-002
n-Butane	2.40e-003	3.25e-002
Isopentane	6.33e-004	8.57e-003
n-Pentane	4.96e-004	6.71e-003
n-Hexane	1.32e-003	1.78e-002
Heptanes	1.97e-003	2.66e-002
Benzene	2.38e-003	3.22e-002
Toluene	4.78e-003	6.47e-002
Ethylbenzene	8.49e-003	1.15e-001
Xylenes	1.27e-002	1.72e-001
C8+ Heavies	1.79e-003	2.42e-002
Total Components	100.00	1.35e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F

Pressure: 14.70 psia
Flow Rate: 1.34e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.44e+001	6.01e+001
Carbon Dioxide	1.66e-001	2.59e-001
Nitrogen	1.33e-002	1.31e-002
Methane	4.57e+000	2.59e+000
Ethane	6.18e-001	6.56e-001
Propane	8.09e-002	1.26e-001
Isobutane	7.68e-003	1.58e-002
n-Butane	1.58e-002	3.25e-002
Isopentane	3.34e-003	8.52e-003
n-Pentane	2.62e-003	6.67e-003
n-Hexane	5.83e-003	1.77e-002
Heptanes	7.49e-003	2.65e-002
Benzene	1.11e-002	3.06e-002
Toluene	1.83e-002	5.96e-002
Ethylbenzene	2.74e-002	1.03e-001
Xylenes	3.99e-002	1.50e-001
C8+ Heavies	3.53e-003	2.13e-002
Total Components	100.00	6.42e+001

Attachment V

ATTACHMENT V – 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}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Compressor Engine (CE-5R)	2.61	11.44	1.00	4.39	1.65	7.21	0.01	0.05	<0.01	<0.01	<0.01	<0.01	3,000.31	13,141.35
Compressor Engine (CE-6R)	1.96	8.57	0.75	3.29	1.23	5.40	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	1,986.84	8,702.36
Reboiler (RBV-1)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Reboiler (RBV-2)	0.10	0.42	0.08	0.35	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	117.10	512.89
Dehydrator Regenerator Overhead Vent (RSV-1)	<0.01	<0.01	<0.01	<0.01	0.60	2.62	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	64.72	283.45
Dehydrator Regenerator Overhead Vent (RSV-2)	<0.01	<0.01	<0.01	<0.01	0.60	2.62	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	64.72	283.45
Produced Water (TK-1 and TK-2)	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.43	19.41
Emergency Generator (EG-1)	0.47	0.12	0.07	0.02	0.05	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	99.24	24.81
TOTAL	5.23	20.97	1.98	8.40	4.71	20.45	0.02	0.09	<0.01	<0.01	<0.01	<0.01	5,454.45	23,480.61

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 – 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
Compressor Engine (CE-5R)	0.68	2.98	<0.01	0.03	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.70	3.06
Compressor Engine (CE-6R)	0.51	2.23	<0.01	0.03	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.52	2.29
Reboiler (RBV-1)	<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
Reboiler (RBV-2)	<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
Dehydrator Regenerator Overhead Vent (RSV-1)	<0.01	<0.01	0.03	0.13	0.06	0.26	0.10	0.45	0.15	0.66	0.02	0.08	0.36	1.58
Dehydrator Regenerator Overhead Vent (RSV-2)	<0.01	<0.01	0.03	0.13	0.06	0.26	0.10	0.45	0.15	0.66	0.02	0.08	0.36	1.58
Produced Water (TK-1 and TK-2)	<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
Emergency Generator (EG-1)	0.05	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.01
TOTAL	1.24	5.22	0.08	0.33	0.13	0.58	0.21	0.91	0.30	1.34	0.04	0.17	1.99	8.53

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 W

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Arsenal Resources, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G35-D General Permit for a natural gas compressor station located in Harrison County, West Virginia. The latitude and longitude coordinates are: 39.27944 and -80.41333

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

Particulate Matter (PM) = 1.64 tpy
Sulfur Dioxide (SO_2) = 0.09 tpy
Volatile Organic Compounds (VOC) = 20.45 tpy
Carbon Monoxide (CO) = 8.40 tpy
Nitrogen Oxides (NO_x) = 20.97 tpy
Total Hazardous Air Pollutants (HAPs) = 8.53 tpy
Formaldehyde (HCHO) = 5.22 tpy
Hexane (C_8H_{14}) = 0.17 tpy
Benzene (C_6C_6) = 0.33 tpy
Toluene (C_7H_8) = 0.58 tpy
Ethylbenzene (C_8H_{10}) = 0.91 tpy
Xylene (C_8H_{10}) = 1.34 tpy
Carbon Dioxide Equivalents (CO_2e) = 23,532.22 tpy

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 8th day of September 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 47-1919654

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) 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 Midstream, 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 Midstream, LLC
Name of Corporation or business entity