November 12, 2015 Reference No. 082715

Mr. Jay Fedczak
Assistant Director of Permitting
Division of Air Quality
WV Department of Environmental Protection
601 57th Street, SE
Charleston, West Virginia 25304

Dear Mr. Jay Fedczak:

Re: General Permit Registration G70-A Modification Application
Snake Run Well Pad
Antero Resources Corporation

GHD Services Inc. (GHD) would like to submit this General Permit Modification application that we prepared on behalf of Antero Resources Corporation for an oil and gas facility identified as Snake Run Well Pad.

A General Permit Registration Modification is requested due to the following planned operational changes:

1. Decrease in production
2. Removal of the flare
3. Change in service of six existing storage tanks

Please refer to Table 11 in Attachment I - Emissions Calculations for the summary of changes in emissions of regulated air pollutants that will result from the above operational changes.

Enclosed are the following documents:

- Original copy of the G70-A General Permit Modification Application
- Two CD copies of the G70-A General Permit Modification Application
- The application fee with check no. 429142 in the amount of $1,500.00

GHD Services Inc.
6320 Rothway Suite 100 Houston Texas 77040 USA
T 713 734 3090 **F** 713 734 3391 **W** www.ghd.com

Please let us know if you have any questions or require additional information.

Sincerely,

GHD

Manuel Bautista

MB/ma/231

Encl.

cc: Barry Schatz, Antero Resources Corporation
Elizabeth McLaughlin, Antero Resources Corporation

General Permit G70-A Modification Application

Decrease in condensate production, removal of flare, and change in service of existing storage tanks

Snake Run Well Pad

Antero Resources Corporation

GHD Services Inc.
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 231 | November 2015

Table of Contents *

G70-A General Permit Modification

* Note: Attachments which have no changes from previous permit application or not applicable were not included in this submittal. The Attachment letter identifiers consistent with the G70-A application were maintained for easier identification/reference.

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

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE

A STATIONARY SOURCE OF AIR POLLUTANTS

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

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

☐ **G10-D –** Coal Preparation and Handling
☐ **G20-B –** Hot Mix Asphalt
☐ **G30-D –** Natural Gas Compressor Stations
☐ **G33-A –** Spark Ignition Internal Combustion Engines
☐ **G35-A –** Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)
☐ **G40-C –** Nonmetallic Minerals Processing
☐ **G50-B –** Concrete Batch
☐ **G60-C –** Class II Emergency Generator
☐ **G65-C –** Class I Emergency Generator
☒ **G70-A –** Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office):
Antero Resources Corporation

2. Federal Employer ID No. **(FEIN):**
80-0162034

3. Applicant's mailing address:
1615 Wynkoop St.
Denver, CO, 80202

4. Applicant's physical address:
4795 Meathouse Fork Rd.
New Milton, WV 26411

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

6. **WV BUSINESS REGISTRATION.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

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

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.):
Natural Gas Production facility

8a. Standard Industrial Classification (SIC) code: 1311

AND

8b. North American Industry System (NAICS) code: 211111

9. DAQ Plant ID No. (for existing facilities only):
017-00104

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
G70-A050

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
Snake Run Wellpad	Mailing: N/A Physical: 4795 Meathouse Fork Rd. New Milton, WV 26411

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☒ **YES** ☐ **NO**

- IF **YES**, please explain: Antero is leasing the mineral rights for this site
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A.
- For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;
- For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

From the nearest city:

At the intersection of Meathouse Fork Rd/ Co Rte 25 and Co Rte 25/2, go to Meathouse Fork Rd/ Co Rte 25 Rd and go for 3.8 miles. Turn left on Snake Run Branch Road for 0.19 miles. Turn right on Snake Run Road and go for 0.15 miles. Entrance to the Facility is on the right.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
New Milton	Doddridge	Northing (KM): 4,339.569 Easting (KM): 530.131 Zone: 17N

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Decrease in condensate production, removal of flare, and 6 change in service of existing storage tanks	Latitude: 39.204868 Longitude: -80.651022

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site:
	Mailing: Physical:

13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐ **YES** ☐ **NO**

- IF **YES**, please explain:
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14B.
- For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;
- For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):

11C. Name of 2nd alternate operating site: _____ _____	12C. Address of 2nd alternate operating site: Mailing:_____ Physical:_____ _____

13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☐ **YES** ☐ **NO**

- IF **YES**, please explain: _____

  _____

- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

_____

_____

_____

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18C. Briefly describe the proposed new operation or change (s) to the facility:		19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

20. Provide the date of anticipated installation or change: Upon issuance of the permit ☐ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: : _____/_____/_____	21. Date of anticipated Start-up if registration is granted: Upon issuance of the permit

22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day_____ Days per week _____ Weeks per year _____ Percentage of operation _____

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ☐ ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ☒ ATTACHMENT B: PROCESS DESCRIPTION
- ☒ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☒ ATTACHMENT D: PROCESS FLOW DIAGRAM
- ☒ ATTACHMENT E: PLOT PLAN
- ☐ ATTACHMENT F: AREA MAP
- ☒ ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ☐ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ☒ ATTACHMENT I: EMISSIONS CALCULATIONS
- ☒ ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ☐ ATTACHMENT K: ELECTRONIC SUBMITTAL
- ☒ ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ☐ ATTACHMENT M: SITING CRITERIA WAIVER
- ☐ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ☒ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☐ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This 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 a 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, Emission Inventory, Certified Emission Statement, 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 Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☐ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

☐ *I hereby certify that* (please print or type) _____

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 Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this 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

Signature _____
(please use blue ink) Responsible Official Date

Name & Title Barry Schatz, Senior Environmental & Regulatory Manager
(please print or type)

Signature Barry Schatz 11-12-2015
(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name Antero Resources Corporation

Phone & Fax 303-357-7276 303-357-7315
Phone Fax

Email bschatz@anteroresources.com

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: January 23, 2015

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 80-0162034

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) Barry Schatz (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.

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

Name of Corporation or business entity

Attachment B
Process Description

Attachment B

Process Description
Snake Run Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

A mixture of condensate, water, and entrained gas from the condensate and gas wells enters the facility through a series gas production unit (GPU) heaters (H001-006) which are 3-phase separators where the gas, condensate, and produced water are separated. The GPUs are fueled by a slip stream of the separated gas. The separated gas from the three phase separators is metered and sent to the sales gas pipeline. The separated water flows to the produced water storage tanks (TANKPW001-002). The separated condensate is then sent to two phase low pressure separators where gas is further separated. The separated gas is sent to the sales gas line. The condensate from the two phase separators flows to the condensate storage tanks (TANKCOND001-004).

The facility has four (4) tanks (TANKCOND001-004) on site to store condensate and two (2) tanks (TANKPW001-002) to store produced water prior to removal from the site. The flashing, working and breathing losses from the tanks are vented to the atmosphere.

Condensate and produced water are transported off site on an as needed basis via tanker truck. Truck loading connections are in place to pump condensate (L001) and produced water (L002) from the storage tanks into tanker trucks. Emissions from the loading operations are vented to the atmosphere.

Emissions from the facility's emission sources were calculated using the extended analysis of the condensate and gas from Yoke No. 1H, one of the wells in Maxwell Horizontal Well Pad. These extended analyses are considered representative of the materials from Snake Run Well Pad, being in the same Marcellus rock formation.

Snake Run Well Pad calculation of potential to emit included all of the emission sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Swisher Well Pad. This is approximately 0.90 miles northwest of the facility.

Attachment C
Description of Fugitive Emissions

Attachment C

Description of Fugitive Emissions
Snake Run Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

Sources of fugitive emissions include loading operations, haul road emissions, equipment leaks, and pneumatic control valves. Fugitive emissions were calculated using AP-42 factors. Routine equipment leaks are assumed to be occurring continuously throughout the year. Loading operations and haul road emissions only occur when tanker trucks are on site. The fugitive emissions summary is also located in Attachment O.

Equipment Leaks

Equipment includes valves, flanges, and connectors installed in various process equipments such as gas production unit heaters, pipelines, and separators. Emissions are assumed to be occurring throughout the year. Detailed calculations are shown on Table 4.

Pneumatic Control Valves

Pneumatic control valves are part of the gas production unit heaters. These are intermittent low bleed valves and their emissions are assumed to be occurring throughout the year. Detailed calculations are shown on Table 5.

Loading Operations

Loading emissions occur when condensate and produced water are transferred out of the well site via tanker trucks. Fugitive emissions were estimated using AP-42 loading loss formula, L= 12.46*SPM/T, and Bryan & Engineering (BR&E) software known as Promax. Detailed calculations are shown in Table 8.

Haul Road Emissions

Haul road emissions are emitted when tanker trucks or service vehicles enter the facility. The facility is flat and unpaved. Detailed calculations are shown on Table 10.

Attachment C/O: G70-A Emissions Summary Sheet

Fugitive Emissions Data Summary Sheet

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	n/a					
Unpaved Haul Roads	PM, PM10, PM2.5	1.1556	0.0640	0.5778	0.0320	MB
Loading/Unloading Operations	VOCs	4.9184	0.0225	4.9184	0.0225	MB
	CO2 Equivalent CO2 (124389), CH4	3.8275	0.0583	3.8275	0.0583	
Equipment Leaks (Components)	Toluene (108883)	Does not apply	0.0308	Does not apply	0.0308	MB
	Ethyl benzene (100414)		0.0630		0.0630	
	Hexane (110543)		0.4871		0.4871	
	o,m,p-xylenes (95476,108383,106423)		0.1586		0.1586	
	CO2 Equivalent CO2 (124389)), CH4		212.1180		212.1180	
Equipment Leaks (PCVs)	CO2 Equivalent CO2 (124389)), CH4	4.0647	17.8035	4.0647	17.8035	MB
	VOCs	0.0515	0.2257	0.0515	0.2257	

1 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

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

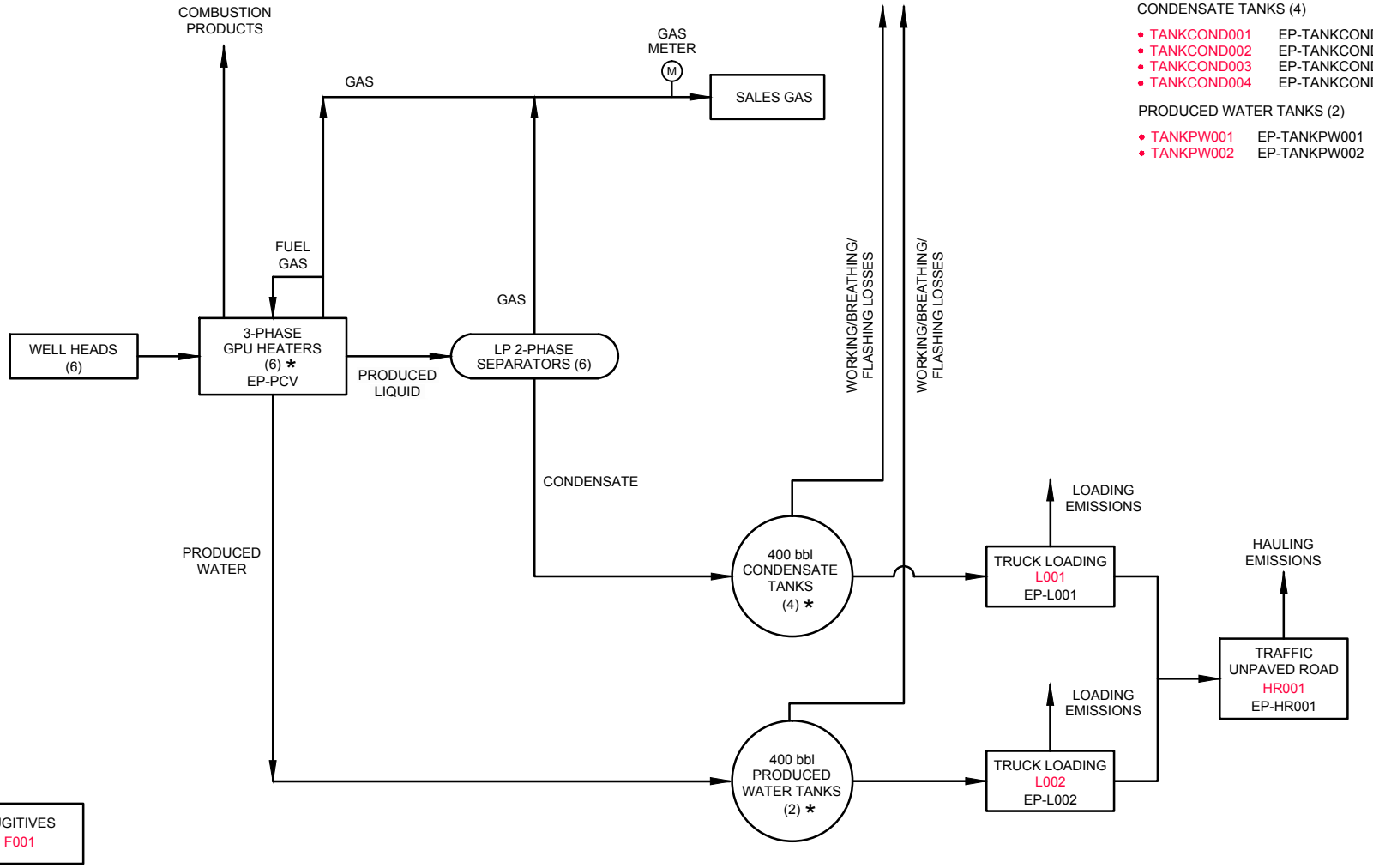
3 Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

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

Attachment C: Leak Source Data Sheet

Source Category	Pollutant	Number of Source Components (1)	Number of Components Monitored by Frequency (2)	Average Time to Repair (days) (3)	Estimated Annual Emission Rate (lb/yr) (4)
Pumps (5)	light liquid VOC [6,7]				
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves (10)	Gas VOC	300		First attempt within 5 days of detection and final repair within 15 days	4,968.45
	Light Liquid VOC	312		First attempt within 5 days of detection and final repair within 15 days	14,691.45
	Heavy Liquid VOC	--			--
	Non-VOC	--			--
Safety Relief Valves (11)	Gas VOC	See Valves		First attempt within 5 days of detection and final repair within 15 days	see Valves
	Non VOC	See Valves		First attempt within 5 days of detection and final repair within 15 days	see Valves
Open-ended Lines (12)	VOC				
	Non-VOC				
Sampling Connections (13)	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	VOC	78		First attempt within 5 days of detection and final repair within 15 days	111.96
	Non-VOC			First attempt within 5 days of detection and final repair within 15 days	474.30
Other	VOC	354		First attempt within 5 days of detection and final repair within 15 days	260.57
	Non-VOC				1,103.89

Attachment D
Process Flow Diagram

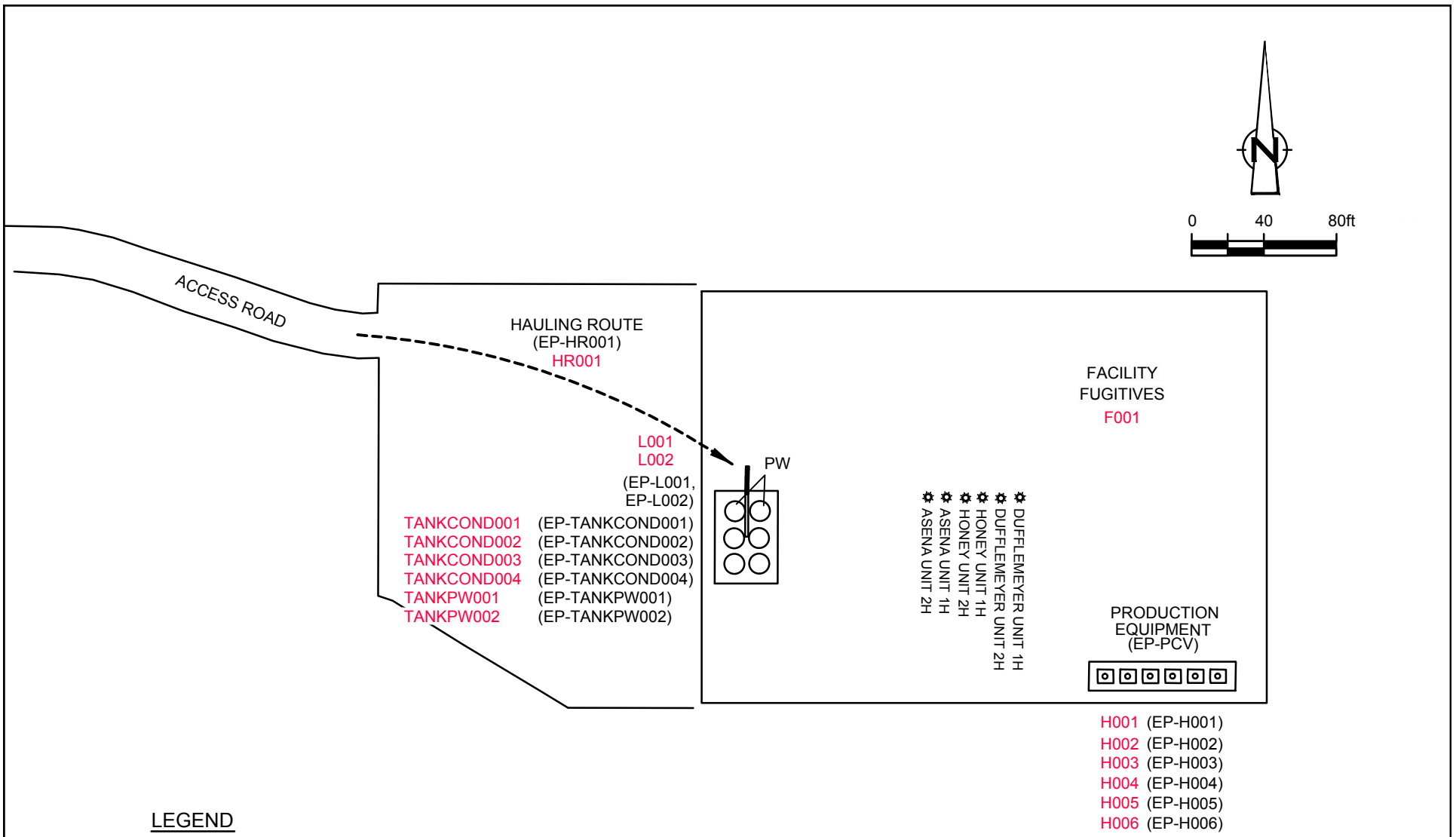


Attachment D

PROCESS FLOW DIAGRAM - ANTERO RESOURCES SNAKE RUN WELL PAD

Doddridge County, West Virginia

Attachment E
Plot Plan



Attachment E

PLOT PLAN
SNAKE RUN WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(231)GN-WA002 OCT 28/2015

Attachment G
G70-A Section Applicability Form/ Emission Unit Data Sheets

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-A 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.

Section 5	Natural Gas Well Affected Facility	☑
Section 6	Storage Vessels*	☑
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	☑
Section 8	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)	☐
Section 9	*Reserved*	☐
Section 10	Natural gas-fired Compressor Engine(s) (RICE) **	☐
Section 11	Tank Truck Loading Facility ***	☑
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	☐
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	☐
Section 14	Control Devices not subject to NSPS, Subpart OOOO	☐
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	☐
Section 16	Glycol Dehydration Units	☐
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	☐
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	☐
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	☐

***** *Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.*

****** *Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.*

******* *Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.*

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

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

Please provide the API number(s) for each NG well at this facility:	
47-017-06428-00	
47-017-06429-00	
47-017-06418-00	
47-017-06419-00	
47-017-06420-00	
47-017-06421-00	

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

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

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

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

Attachment G: Emission Units Data Sheet
(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
H001, H002, H003, H004, H005, H006	EP-H001, EP-H002, EP-H003, EP-H004, EP-H005, EP-H006	Gas Production Unit Heaters	2014	1.0 MMBtu/hr (each)	New	N/A
F001	F001	Fugitives	2014	N/A	New	N/A
TANKCOND001-004	EP-TANKCOND001, EP-TANKCOND002, EP-TANKCOND003, EP-TANKCOND004,	Condensate Tank F/W/B	2014	400 bbl each	New	N/A
TANKPW001-002	EP-TANKPW001, EP-TANKPW002	PW Tank F/W/B	2014	400 bbl each	New	N/A
L001	EP-L001	Loading (Condensate)	2014	200 bbl capacity (each)	New	N/A
L002	EP-L002	Loading (Water)	2014	200 bbl capacity (each)	New	N/A
HR001	EP-HR001	Haul Truck	2014	40 ton capacity	New	N/A
PCV	EP-PCV	Pneumatic CV	2014	6.6 scf/day/PCV	New	N/A
TANK001-006[5]	FL001	Condensate/ Produced Water Tank F/W/B	2014	400 bbl each	Removal	N/A
FL001	FL001	Flare	2014	6.6 MMBtu/hr	Removal	FL001

1 For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
2 For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
3 New, modification, removal.
4 For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
5 Change in Emission Unit ID for the six existing tanks, from TANK001-006 to TANKCOND001-004 and TANKPW001-002

Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name CONDTANK	2. Tank Name TANKCOND001-004
3. Emission Unit ID number TANKCOND001-004	4. Emission Point ID number EP-TANKCOND001, EP-TANKCOND002, EP-TANKCOND003, EP-TANKCOND004,
5. Date Installed or Modified *(for existing tanks)* 2014	6. Type of change: New
7A. Description of Tank Modification *(if applicable) NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 400bbls	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 18	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 18	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons)* . This is also known as "working volume." 400bbls	
13A. Maximum annual throughput (gal/yr) 91,980	13B. Maximum daily throughput (gal/day) 252
14. Number of tank turnovers per year 2	15. Maximum tank fill rate (gal/min) 168
16. Tank fill method: Splash Fill	
17. Is the tank system a variable vapor space system? 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): X Fixed Roof X vertical horizontal X 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 Underground Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 34 – 39 in section VII

Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

Does Not Apply Rupture Disc (psig)

Carbon Adsorption[1] Inert Gas Blanket of _____

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

Conservation Vent (psig

Other[1] (describe) Vacuum Setting Pressure Setting Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
	Please see Tables 6 and 7								

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.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: Steel		
20A. Shell Color: Green	20B. Roof Color: Green	20C. Year Last Painted: 2014
21. Shell Condition (if metal and unlined): No Rust		
22A. Is the tank heated? No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): 0		
24. Is the tank a **Vertical Fixed Roof Tank**? Yes	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):
25. Complete item 25 for **Floating Roof Tanks** Does not apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one):* Metallic (mechanical) shoe seal Liquid mounted resilient seal		
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:		
26D. Deck seam length (ft.):	26E. Area of deck (ft2):	26F. For column supported	26G. For column supported

Attachment G: Storage Vessel Emission Unit Data Sheet (Condensate)

Provide the following information for each new or modified bulk liquid storage tank.

SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: West Union, WV			
28. Daily Avg. Ambient Temperature (°F): 51.7		29. Annual Avg. Maximum Temperature (°F): 63.8	
30. Annual Avg. Minimum Temperature (°F): 39.5		31. Avg. Wind Speed (mph): 5.9	
32. Annual Avg. Solar Insulation Factor (BTU/ft2-day): 1030.235999		33. Atmospheric Pressure (psia): 14.8	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 51.7	34A. Minimum (°F): 39.5	34B. Maximum (°F): 63.8	
35. Avg. operating pressure range of tank (psig): 0	35A. Minimum (psig): 0	35B. Maximum (psig): 0	
36A. Minimum liquid surface temperature (°F): 39.5		36B. Corresponding vapor pressure (psia):	0.6860
37A. Avg. liquid surface temperature (°F): 51.7		37B. Corresponding vapor pressure (psia):	0.9202
38A. Maximum liquid surface temperature (°F): 63.8		38B. Corresponding vapor pressure (psia):	1.2147
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Condensate		
39B. CAS number:	mix of HC		
39C. Liquid density (lb/gal):	6.05		
39D. Liquid molecular weight (lb/lb-mole):	113.2		
39E. Vapor molecular weight (lb/lb-mole):	39.51		
39F. Maximum true vapor pressure (psia):	1.4589		
39G. Max Reid vapor pressure (psi):	2.51000		
39H. Months Storage per year. From: To:	year round		

Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name PWTANK	2. Tank Name TANKPW001-002
3. Emission Unit ID number TANKPW001-002	4. Emission Point ID number EP-TANKPW001, EP-TANKPW002
5. Date Installed or Modified *(for existing tanks)* 2014	6. Type of change: New
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.* No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 400bbls	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 18	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 18	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons)* . This is also known as "working volume." 400bbls	
13A. Maximum annual throughput (gal/yr) 919,800	13B. Maximum daily throughput (gal/day) 2,520
14. Number of tank turnovers per year 28	15. Maximum tank fill rate (gal/min) 168
16. Tank fill method Splash Fill	
17. Is the tank system a variable vapor space system? 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): X Fixed Roof X vertical horizontal X 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 Underground Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

Refer to enclosed TANKS Summary Sheets

X Refer to the responses to items 34 – 39 in section VII

Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

Does Not Apply — Rupture Disc (psig)

Carbon Adsorption[1] — Inert Gas Blanket of _____

X Vent to Vapor Combustion Device1 (vapor combustors, flares, thermal oxidizers) Condenser[1]

Conservation Vent (psig

Other[1] (describe) — Vacuum Setting — Pressure Setting Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
	Please see Tables 6 and 7								

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.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: Steel		
20A. Shell Color: Green	20B. Roof Color: Green	20C. Year Last Painted: 2014
21. Shell Condition (if metal and unlined): No Rust		
22A. Is the tank heated? No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?
23. Operating Pressure Range (psig): 0		
24. Is the tank a **Vertical Fixed Roof Tank**? Yes	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):
25. Complete item 25 for **Floating Roof Tanks** Does not apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one):* Metallic (mechanical) shoe seal Liquid mounted resilient seal		
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:		
26D. Deck seam length (ft.):	26E. Area of deck (ft2):	26F. For column supported	26G. For column supported

Attachment G: Storage Vessel Emission Unit Data Sheet (Produced Water)

Provide the following information for each new or modified bulk liquid storage tank.

SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: West Union, WV			
28. Daily Avg. Ambient Temperature (°F): 51.7		29. Annual Avg. Maximum Temperature (°F): 63.8	
30. Annual Avg. Minimum Temperature (°F): 39.5		31. Avg. Wind Speed (mph): 5.9	
32. Annual Avg. Solar Insulation Factor (BTU/ft2-day): 1030.235999		33. Atmospheric Pressure (psia): 14.8	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 51.7	34A. Minimum (°F): 39.5	34B. Maximum (°F): 63.8	
35. Avg. operating pressure range of tank (psig): 0	35A. Minimum (psig): 0	35B. Maximum (psig): 0	
36A. Minimum liquid surface temperature (°F): 39.5		36B. Corresponding vapor pressure (psia):	0.1836
37A. Avg. liquid surface temperature (°F): 51.7		37B. Corresponding vapor pressure (psia):	0.2594
38A. Maximum liquid surface temperature (°F): 63.8		38B. Corresponding vapor pressure (psia):	0.3598
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	Produced Water		
39B. CAS number:	mix of HC and water		
39C. Liquid density (lb/gal):	8.33		
39D. Liquid molecular weight (lb/lb-mole):	18.0156		
39E. Vapor molecular weight (lb/lb-mole):	18.3345		
39F. Maximum true vapor pressure (psia):	0.4464		
39G. Max Reid vapor pressure (psi):	1.02274		
39H. Months Storage per year. From: To:	year round		

Attachment G: Natural Gas Fired Fuel Burning Units
Emission Data Sheet

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
H001	EP-H001	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
H002	EP-H002	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
H003	EP-H003	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
H004	EP-H004	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
H005	EP-H005	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
H006	EP-H006	Gas Production Unit Heater	2014	New	--	1.00	1,247.06
FL001	FL001	Flare	2014	Removal	FL001	6.6 MMBtu/hr	1,247.06

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

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

3 New, modification, removal.

4 Complete appropriate air pollution control device sheet for any control device.

5 Enter design heat input capacity in mmBtu/hr.

6 Enter the fuel heating value in Btu/standard cubic foot.

Attachment G: Tank Truck Loading
Emissions Unit Data Sheet

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad.

This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID: L001, L002	2. Emission Point ID: EP-L001, EP-L002	3. Year Installed/ Modified: 2014

4. Emission Unit Description: CONDENSATE AND PRODUCED WATER

5. Loading Area Data

5A. Number of pumps: 2	5B. Number of liquids loaded: 2	5C. Maximum number of tank trucks loading at one time: 2

6. Describe cleaning location, compounds and procedure for tank trucks: For hire tank trucks are used and are cleaned at the operator's dispatch terminal. These trucks are in dedicated service and cleaned only prior to repair or leak tests. Cleaning materials include water, steam, detergent, and solvents which are applied using hand held pressurized spray nozzles.

7. Are tank trucks pressure tested for leaks at this or any other location?

X Yes No

If YES, describe: Tank trucks are pressure tested for leaks at the location of the leak testing company. Trucks are tested using EPA Method 27-internal vapor valve test and issued certification that DOT requirements are met.

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

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	1	1	1	1
days/week	1	1	1	1

9. Bulk Liquid Data *(add pages as necessary)*

Liquid Name		Condensate	Produced Water	
Max. daily throughput (1000 gal/day)		0.252	2.52	
Max. annual throughput (1000 gal/yr)		91.98	919.80	
Loading Method [1]		BF	BF	
Max. Fill Rate (gal/min)		168	168	
Average Fill Time (min/loading)		50	50	
Max. Bulk Liquid Temperature (^{o}F)		72.1	72.1	
True Vapor Pressure [2]		1.46	0.45	
Cargo Vessel Condition [3]		U	U	
Control Equipment or Method [4]		None	None	
Minimum collection efficiency (%)		0	0	
Minimum control efficiency (%)		0	0	
Maximum Emission Rate	Loading (lb/hr)	8.17	1.16	
	Annual (ton/yr)	0.04	0.05	
Estimation Method [5]		Promax	Promax	

Notes:

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 as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system) ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration

5 EPA = EPA Emission Factor as stated in AP-42

10. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

MONITORING	RECORDKEEPING
1) Visual inspection to ensure that loading connections from storage tanks to trucks are leak-free.	1) Maintain records of condensate transferred from storage tanks. 2) Maintain records of produced water transferred from storage tanks.
REPORTING N/A	TESTING N/A

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

Attachment I
Emission Calculations

Table 1

Facility Information
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Oil and Gas Site General Information

Administrative Information	
Company Name	Antero Resources Corporation
Facility/Well Name	Snake Run Well Pad
Nearest City/Town	New Milton
API Number/SIC Code	1311
Latitude/Longitude	39.204868, -80.651022
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	6
Max Produced Water Site Throughput (bbl/day):	60
Are there any sour gas streams at this site?	No
Is this site currently operational/producing?	Yes

Equipment/Processes at Site	
Equipment/Process Types	**How many for this site?**
Fugitives	6
Gas Production Unit Heaters	6
Condensate Tanks	4
Produced Water Tanks	2
Loading Jobs	2

Table 2

Uncontrolled/Controlled Emissions Summary
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Emission Source	VOC		NO_x		CO_{2e}		CO		SO_2		$PM_{2.5}$		PM_{10}		Lead		Total HAPs		Benzene		Xylenes		Formaldehyde	
	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)	(lbs/hr)	(ton/yr)
UNCONTROLLED (Fugitives, Storage Tanks, Gas Production Unit Heaters, Line Heaters)																								
Fugitive Emissions (Component Count, PCV and Hauling)[1]	2.3383	10.2419			52.493	229.92							0.5200	0.0288			0.1757	0.7697	0.0008	0.0034	3.62E-02	1.59E-01		
Flashing, Working and Breathing (F/W/B) Losses[2]	2.93	12.8			8.3	36.3											0.027	0.118	0.0005	0.0022	0.0024	0.0105		
Gas Production Unit Heater Emissions[3]	0.0265	0.1159	0.4811	2.1074	577.36	2,528.83	0.4042	1.7702	0.0029	0.0126	0.0366	0.1602	0.0366	0.1602	2.41E-06	1.05E-05	9.06E-03	3.97E-02	1.01E-05	4.43E-05			0.0004	0.0016
TOTALS:	**5.2982**	**23.2060**	**0.4811**	**2.1074**	**638.1402**	**2795.0539**	**0.4042**	**1.7702**	**0.0029**	**0.0126**	**0.0366**	**0.1602**	**0.5566**	**0.1889**	**2.41E-06**	**1.05E-05**	**0.2118**	**0.9276**	**0.0013**	**0.0056**	**0.0386**	**0.1690**	**0.0004**	**0.0016**
UNCONTROLLED (Truck Loading Emissions)																								
Truck Loading Emissions[4]	4.918	0.022			3.827	0.058											0.0109	0.0000	1.15E-04	5.49E-07	0.0019	8.63E-06		
CONTROLLED EMISSIONS																								
Controlled Fugitive Emissions from Hauling													0.2600	0.0144										
TOTALS:	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.2600**	**0.0144**	**0.00E+00**	**0.00E+00**	**0.0000**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**
POTENTIAL TO EMIT[5]	**5.2982**	**23.2285**	**0.4811**	**2.1074**	**638.1402**	**2795.1122**	**0.4042**	**1.7702**	**0.0029**	**0.0126**	**0.0366**	**0.1602**	**0.2966**	**0.1746**	**2.41E-06**	**1.05E-05**	**0.2118**	**0.9277**	**0.0013**	**0.0056**	**0.0386**	**0.1690**	**0.0004**	**0.0016**

Enter any notes here:	1 - See Tables 4 and 5 for fugitive emission calculations; Table 10 for PM emissions from hauling. 2 - See Tables 6 and 7 for tanks emission calculations 3 - See Table 9 for gas production unit heater calculations 4 - The maximum emission was calculated based on tank truck capacity of 200 barrels and actual fill rate of 50 minutes per tank truck. At a production rate of 6 barrels per day, VOC emissions would be 4.9184 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.0051 pound per hour. 5 - The hourly potential to emit is the sum of emissions from gas production unit heaters, storage tanks, and fugitives. Does not include emissions from loading (see footnote 4). The total TPY PTE is the sum of all emissions. PM 10 TPY is the sum of uncontrolled hauling and other PM10 sources.

Table 3

Permits Summary
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Pollutant		Emissions			Threshold Exceeded?	
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	5.2982		6		
	tons/yr	23.2285		10	**Yes**	
NO_X	lbs/hr	0.4811		6		
	tons/yr	2.1074		10		
CO	lbs/hr	0.4042		6		
	tons/yr	1.7702		10		
SO_2	lbs/hr	0.0029		6		
	tons/yr	0.0126		10		
$PM_{2.5}$	lbs/hr	0.0366		6		
	tons/yr	0.1602		10		
PM_{10}	lbs/hr	0.5566	0.2966	6		
	tons/yr	0.1889	0.1746	10		
Lead	lbs/hr	2.41E-06		6		
	tons/yr	1.05E-05		10		
Total HAPs	lbs/hr	0.2118		2		
	tons/yr	0.9277		5		
Total TAPs	lbs/hr	0.0016		1.14		
n-Hexane	lbs/hr	0.1392				
	tons/yr	0.6098				
Toluene	lbs/hr	0.0085				
	tons/yr	0.0371				
Ethylbenzene	lbs/hr	0.0155				
	tons/yr	0.0681				
Xylenes	lbs/hr	0.0386				
	tons/yr	0.1690				
Benzene	lbs/hr	0.0013				
	tons/yr	0.0056				

Enter any notes here:	1. Please see Attachment C/O- Fugitive Emissions Data Summary Sheet and Attachment O – Emission Points Data Summary Sheet for sitewide sources and breakdown of emission quantities.

Table 4

Fugitive Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

VOC Type:	Condensate VOC
Emission Type:	Steady State (continuous)

Gas Weight Fraction From Analysis:	VOC frac	0.191
	n-Hexane	0.023
	Methane	0.603

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
300	Valves	Gas VOC	0.004500	0.26	4,968.45
		Non VOC	0.004500	1.09	21,048.75
354	Connectors	VOC	0.000200	0.01	260.57
		Non-VOC	0.000200	0.06	1,103.89
78	Flanges	VOC	0.000390	0.01	111.96
		Non-VOC	0.000390	0.02	474.30
			Total VOCs:	0.28	5,340.98
			Total THC:	1.45	27,967.91

Light Liquid Weight Fraction From Analysis:	VOC frac	0.977
	Benzene frac	0.000
	Toluene	0.004
	Ethylbenzene	0.008
	Xylenes	0.021
	n-hexane	0.023
	Methane	0.008

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
312	Valves	Light Liquid VOC	0.002500	0.76	14,691.45
		Light Liquid Non-VOC		0.02	340.71
			Total VOC:	0.76	14,691.45
			Total THC:	0.78	15,032.16

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	20,032.43	2.29	10.02
Ethylbenzene		0.01	0.06
Toluene		0.01	0.03
Xylenes		0.04	0.16
n-Hexane		0.11	0.49
TAPs (Benzene)		7.71E-04	0.00
HAPs		0.17	0.74
CO_{2e}	424,236.08	48.43	212.12

Enter Notes Here:	Fugitive emissions based on an estimated component count Global Warming Potentials from EPA site Reference to Emission factors used: 1. Emission factors are for oil and gas production facilities (not refineries) come from the EPA's "Protocol for Equipment Leak Emission Estimates" November 1995, EPA 4531, R-95-017, Table 2-4. 2. Percent of speciated VOCs used in fugitive calculations are based on the total hydrocarbons, not of the total sample.

Table 5

Pneumatic Control Valve Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Number of PCVs	18
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	118.8

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions (lbs/day)	(lbs/hr)	(tons/year)
Nitrogen	0.4946	14.01	0.5875848	1.55E-03	0.02	9.04E-04	0.00
Carbon Dioxide	0.1467	44.01	0.1742796	4.59E-04	0.02	8.42E-04	3.69E-03
Methane	77.6927	16.04	92.2989276	0.24	3.90	0.16	0.71
Ethane	14.1987	30.07	16.8680556	0.04	1.34	0.06	0.24
Propane	4.4938	44.1	5.3386344	0.01	0.62	0.03	0.11
Isobutane	0.5666	58.12	0.6731208	1.77E-03	0.10	0.00	0.02
n-Butane	1.1838	58.12	1.4063544	3.71E-03	0.22	0.01	0.04
Isopentane	0.3749	72.15	0.4453812	1.17E-03	0.08	3.53E-03	0.02
n-Pentane	0.2914	72.15	0.3461832	9.12E-04	0.07	2.74E-03	0.01
n-Hexane	0.5451	86.18	0.6475788	1.71E-03	0.15	0.01	0.03

	lb/hr	tpy
VOC Emissions	0.0515	0.2257
n-Hexane Emissions	0.0061	0.0268
HAPs Emissions	0.0061	0.0268
CO_{2e} emissions	4.0647	17.8035

Enter any notes here:	1. PCV bleed rate obtained from the user manual for PCV http://issuu.com/rmcprocesscontrols/docs/mizer-pilot-operation--parts---installation-manual 2. Emissions per hour= Mol % x no. of PCV x bleed rate x MW / 379.48 / 24

Table 6

Uncontrolled Flashing Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

# Hours Operational	8760

	Condensate Tank Flashing Losses			Produced Water Tank Flashing Losses		
	Vapor Mass Fraction	Flashing Losses		Vapor Mass Fraction	Flashing Losses	
	wt%	lbs/hr	tpy	wt%	lbs/hr	tpy
Water	0.1960	0.0024	0.0103	2.7447	0.0090	3.95E-02
Nitrogen	0.0099	0.0001	0.0005	0.3898	0.0013	0.0056
Carbon Dioxide	0.2390	0.0029	0.0126	2.1656	0.0071	0.0311
Methane	6.4179	0.0772	0.3381	62.0337	0.2036	0.8918
Ethane	31.1347	0.3744	1.6400	21.5517	0.0707	0.3098
Propane	30.9191	0.3718	1.6286	8.0612	0.0265	0.1159
Isobutane	6.6685	0.0802	0.3513	0.4356	0.0014	0.0063
n-Butane	11.3796	0.1369	0.5994	1.4412	0.0047	0.0207
Isopentane	3.8879	0.0468	0.2048	0.3082	0.0010	0.0044
n-Pentane	2.9885	0.0359	0.1574	0.2262	0.0007	0.0033
2-Methylpentane	1.0597	0.0127	0.0558	0.0369	0.0001	0.0005
3-Methylpentane	0.6688	0.0080	0.0352	0.0617	0.0002	0.0009
n-Hexane	1.5078	0.0181	0.0794	0.0415	0.0001	0.0006
Methylcyclopentane	0.1103	0.0013	0.0058	0.0291	0.0001	0.0004
Benzene	0.0263	0.0003	0.0014	0.0402	0.0001	0.0006
2-Methylhexane	0.4341	0.0052	0.0229	0.0133	0.0000	0.0002
3-Methylhexane	0.3454	0.0042	0.0182	0.0111	0.0000	0.0002
Heptane	0.5588	0.0067	0.0294	0.0187	0.0001	0.0003
Methylcyclohexane	0.3363	0.0040	0.0177	0.0588	0.0002	0.0008
Toluene	0.0689	0.0008	0.0036	0.0998	0.0003	0.0014
Octane	0.5893	0.0071	0.0310	0.0117	0.0000	0.0002
Ethylbenzene	0.0478	0.0006	0.0025	0.0685	0.0002	0.0010
m & p-Xylene	0.0334	0.0004	0.0018	0.0475	0.0002	0.0007
o-Xylene	0.0598	0.0007	0.0032	0.0875	0.0003	0.0013
Nonane	0.1979	0.0024	0.0104	0.0061	0.0000	0.0001
C10+	0.1143	0.0014	0.0060	0.0096	0.0000	0.0001
Total VOCs	62.002	0.75	3.3	11.114	0.0365	0.1598
Total CO_{2e}		1.93	8.5		5.10	22.3
Total TAPs (Benzene)		0.0003	0.0014		0.0001	0.0006
Toluene		0.0008	0.0036		0.0003	0.0014
Ethylbenzene		0.0006	0.0025		0.0002	0.0010
Xylenes		0.0011	0.0049		0.0004	0.0019
n-Hexane		0.018	0.079		0.0001	0.0006
Total HAPs		0.021	0.092		0.0013	0.0055
Total	100.00	1.20	5.3	100.00	0.328	1.44

Enter any notes here:	Vapor mass fractions and Flashing losses from Promax output

Table 7

Uncontrolled Working and Breathing Losses
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Condensate Tank Information	
Number of Tanks	4
Maximum Working Losses (lbs/hr)	0.1174
Maximum Breathing Losses (lbs/hr)	3.4559

	Condensate Tank W/B Losses						
	Vapor Mass Fraction	Working Losses		Breathing Losses		Max W/B Losses	
	wt%	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Water	1.13E-04	1.33E-07	5.82E-07	3.91E-06	1.71E-05	4.04E-06	1.77E-05
Nitrogen	4.09E-04	4.80E-07	2.10E-06	1.41E-05	6.19E-05	1.46E-05	6.40E-05
Carbon Dioxide	0.2941	0.0003	0.0015	0.0102	0.0445	0.0105	0.0460
Methane	1.3754	0.0016	0.0071	0.0475	0.2082	0.0491	0.2153
Ethane	38.1271	0.0448	0.1961	1.3176	5.7712	1.3624	5.9674
Propane	32.7511	0.0385	0.1685	1.1318	4.9575	1.1703	5.1260
Isobutane	6.5958	0.0077	0.0339	0.2279	0.9984	0.2357	1.0323
n-Butane	11.0919	0.0130	0.0571	0.3833	1.6790	0.3964	1.7360
Isopentane	3.6022	0.0042	0.0185	0.1245	0.5453	0.1287	0.5638
n-Pentane	2.7326	0.0032	0.0141	0.0944	0.4136	0.0976	0.4277
2-Methylpentane	0.9404	0.0011	0.0048	0.0325	0.1424	0.0336	0.1472
3-Methylpentane	0.5932	0.0007	0.0031	0.0205	0.0898	0.0212	0.0928
n-Hexane	0.0909	0.0001	0.0005	0.0031	0.0138	0.0032	0.0142
Methylcyclopentane	0.0925	0.0001	0.0005	0.0032	0.0140	0.0033	0.0145
Benzene	0.0014	0.0000	0.0000	0.0000	0.0002	0.0001	0.0002
2-Methylhexane	0.0247	0.0000	0.0001	0.0009	0.0037	0.0009	0.0039
3-Methylhexane	0.2967	0.0003	0.0015	0.0103	0.0449	0.0106	0.0464
Heptane	0.4420	0.0005	0.0023	0.0153	0.0669	0.0158	0.0692
Methylcyclohexane	0.2707	0.0003	0.0014	0.0094	0.0410	0.0097	0.0424
Toluene	0.0078	0.0000	0.0000	0.0003	0.0012	0.0003	0.0012
Octane	0.4390	0.0005	0.0023	0.0152	0.0665	0.0157	0.0687
Ethylbenzene	0.0100	0.0000	0.0001	0.0003	0.0015	0.0004	0.0016
m & p-Xylene	0.0090	0.0000	0.0000	0.0003	0.0014	0.0003	0.0014
o-Xylene	0.0140	0.0000	0.0001	0.0005	0.0021	0.0005	0.0022
Nonane	0.1322	0.0002	0.0007	0.0046	0.0200	0.0047	0.0207
C10+	0.0645	0.0001	0.0003	0.0022	0.0098	0.0023	0.0101
Total VOCs	60.203	0.0707	0.310	2.0805	9.1128	2.1513	9.422
Total CO_{2e}		0.0407	0.1784	1.1984	5.2492	1.2392	5.428
Total TAPs (Benzene)		0.0000	0.0000	0.0000	0.0002	0.0001	0.0002
Toluene		0.0000	0.0000	0.0003	0.0012	0.0003	0.0012
Ethylbenzene		0.0000	0.0001	0.0003	0.0015	0.0004	0.0016
Xylenes		0.0000	0.0001	0.0008	0.0035	0.0008	0.0036
n-Hexane		0.0001	0.0005	0.0031	0.0138	0.0032	0.0142
Total HAPs		0.0002	0.0007	0.0046	0.0202	0.0048	0.0208
Total	100.00	0.1174	0.5144	3.4559	15.1368	3.5733	15.651

Table 7

Uncontrolled Working and Breathing Losses
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0149
Maximum Breathing Losses (lbs/hr)	0.0082

	Produced Water Tank W/B Losses						
	Vapor Mass Fraction	Working Losses		Breathing Losses		Max W/B Losses	
	wt%	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Water	92.6976	0.0138	0.0605	0.0076	0.0334	0.0214	0.0939
Nitrogen	0.0075	1.12E-06	4.90E-06	6.17E-07	2.70E-06	1.74E-06	7.60E-06
Carbon Dioxide	2.8098	0.0004	0.0018	0.0002	0.0010	0.0006	0.0028
Methane	3.3193	0.0005	0.0022	0.0003	0.0012	0.0008	0.0034
Ethane	1.0643	0.0002	0.0007	0.0001	0.0004	0.0002	0.0011
Propane	0.0970	0.0000	0.0001	7.97E-06	3.49E-05	2.24E-05	9.83E-05
Isobutane	0.0007	9.79E-08	4.29E-07	5.40E-08	2.36E-07	1.52E-07	6.65E-07
n-Butane	0.0033	4.87E-07	2.13E-06	2.69E-07	1.18E-06	7.56E-07	3.31E-06
Isopentane	0.0002	2.61E-08	1.14E-07	1.44E-08	6.31E-08	4.05E-08	1.77E-07
n-Pentane	0.0001	1.40E-08	6.13E-08	7.71E-09	3.38E-08	2.17E-08	9.50E-08
2-Methylpentane	2.92E-06	4.35E-10	1.90E-09	2.40E-10	1.05E-09	6.75E-10	2.96E-09
3-Methylpentane	1.18E-05	1.76E-09	7.73E-09	9.73E-10	4.26E-09	2.74E-09	1.20E-08
n-Hexane	1.27E-07	1.90E-11	8.31E-11	1.05E-11	4.58E-11	2.94E-11	1.29E-10
Methylcyclopentane	1.20E-05	1.79E-09	7.85E-09	9.88E-10	4.33E-09	2.78E-09	1.22E-08
Benzene	0.0001	7.60E-09	3.33E-08	4.19E-09	1.84E-08	1.18E-08	5.16E-08
2-Methylhexane	1.73E-08	2.58E-12	1.13E-11	1.42E-12	6.22E-12	4.00E-12	1.75E-11
3-Methylhexane	2.15E-07	3.20E-11	1.40E-10	1.77E-11	7.74E-11	4.97E-11	2.18E-10
Heptane	2.68E-07	3.99E-11	1.75E-10	2.20E-11	9.63E-11	6.19E-11	2.71E-10
Methylcyclohexane	5.18E-06	7.73E-10	3.38E-09	4.26E-10	1.87E-09	1.20E-09	5.25E-09
Toluene	0.0001	9.08E-09	3.98E-08	5.01E-09	2.19E-08	1.41E-08	6.17E-08
Octane	3.27E-08	4.87E-12	2.13E-11	2.68E-12	1.18E-11	7.55E-12	3.31E-11
Ethylbenzene	2.35E-05	3.51E-09	1.54E-08	1.93E-09	8.47E-09	5.44E-09	2.38E-08
m & p-Xylene	1.82E-05	2.71E-09	1.19E-08	1.50E-09	6.55E-09	4.21E-09	1.84E-08
o-Xylene	3.51E-05	5.23E-09	2.29E-08	2.88E-09	1.26E-08	8.11E-09	3.55E-08
Nonane	8.02E-09	1.20E-12	5.24E-12	6.59E-13	2.89E-12	1.85E-12	8.12E-12
C10+	2.49E-09	3.72E-13	1.63E-12	2.05E-13	8.97E-13	5.76E-13	2.52E-12
Total VOCs	0.1015	0.0000	0.0001	8.34E-06	0.0000	0.0000	0.0001
Total CO_{2e}		0.0128	0.0560	0.0071	0.0309	0.0198	0.0869
Total TAPs (Benzene)		7.60E-09	3.33E-08	4.19E-09	1.84E-08	1.18E-08	5.16E-08
Toluene		9.08E-09	3.98E-08	5.01E-09	2.19E-08	1.41E-08	6.17E-08
Ethylbenzene		3.51E-09	1.54E-08	1.93E-09	8.47E-09	5.44E-09	2.38E-08
Xylenes		7.94E-09	3.48E-08	4.38E-09	1.92E-08	1.23E-08	5.39E-08
n-Hexane		1.90E-11	8.31E-11	1.05E-11	4.58E-11	2.94E-11	1.29E-10
Total HAPs		2.81E-08	1.23E-07	1.55E-08	6.80E-08	4.37E-08	1.91E-07
Total	100.00	0.0149	0.0653	0.0082	0.0360	0.0231	0.1013

Enter any notes here:	Vapor mass fractions, working losses and breathing losses from Promax output

Table 8

Loading Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	2.51	1.0227
Annual Average Temp (F)	72.1	72.1
S (saturation factor)	0.6	0.6
P (true vapor pressure)	1.46	0.45
M (MW of vapor)	39.51	18.33
Collection Efficiency (%)	0	0
Loading Loss (lb/10^3 gal)*	0.81	0.12
Maximum Throughput (gallons/hr)	10,080	10,080
Average Throughput (gallons/yr)	91,980	919,800
Loading Emissions (lbs/hr)	8.17	1.16
Loading Emissions (tpy)	0.04	0.05

	Condensate Tank Loading Losses			Produced Water Tank Loading Losses		
	Vapor Mass Fraction	Loading Losses		Vapor Mass Fraction	Loading Losses	
	wt%	lbs/hr	tpy	wt%	lbs/hr	tpy
Water	1.13E-04	9.24E-06	4.22E-08	92.6976	1.08E+00	4.91E-02
Nitrogen	0.0004	3.34E-05	1.52E-07	0.0075	8.71E-05	3.97E-06
Carbon Dioxide	0.2941	0.02	0.00	2.8098	3.26E-02	1.49E-03
Methane	1.3754	0.11	0.00	3.3193	3.85E-02	1.76E-03
Ethane	38.1271	3.11	0.01	1.0643	1.23E-02	5.63E-04
Propane	32.7511	2.68	0.01	0.0970	1.13E-03	5.13E-05
Isobutane	6.5958	0.54	0.00	0.0007	7.62E-06	3.47E-07
n-Butane	11.0919	0.91	0.00	0.0033	3.79E-05	1.73E-06
Isopentane	3.6022	0.29	0.00	0.0002	2.03E-06	9.27E-08
n-Pentane	2.7326	0.22	0.00	0.0001	1.09E-06	4.96E-08
2-Methylpentane	0.9404	0.08	0.00	2.92E-06	3.38E-08	1.54E-09
3-Methylpentane	0.5932	0.05	0.00	1.18E-05	1.37E-07	6.26E-09
n-Hexane	0.0909	0.01	0.00	1.27E-07	1.48E-09	6.74E-11
Methylcyclopentane	0.0925	0.01	0.00	1.20E-05	1.39E-07	6.36E-09
Benzene	0.0014	1.15E-04	5.22E-07	0.0001	5.91E-07	2.70E-08
2-Methylhexane	0.0247	0.00	0.00	1.73E-08	2.00E-10	9.15E-12
3-Methylhexane	0.2967	0.02	0.00	2.15E-07	2.49E-09	1.14E-10
Heptane	0.4420	0.04	0.00	2.68E-07	3.10E-09	1.42E-10
Methylcyclohexane	0.2707	0.02	0.00	5.18E-06	6.01E-08	2.74E-09
Toluene	0.0078	6.37E-04	2.91E-06	6.09E-05	7.07E-07	3.22E-08
Octane	0.4390	0.04	0.00	3.27E-08	3.79E-10	1.73E-11
Ethylbenzene	0.0100	8.18E-04	3.73E-06	2.35E-05	2.73E-07	1.25E-08
m & p-Xylene	0.0090	7.38E-04	3.37E-06	1.82E-05	2.11E-07	9.63E-09
o-Xylene	0.0140	1.15E-03	5.23E-06	3.51E-05	4.07E-07	1.86E-08
Nonane	0.1322	0.01	0.00	8.02E-09	9.30E-11	4.24E-12
C10+	0.0645	0.01	2.40E-05	2.49E-09	2.89E-11	1.32E-12
Total VOCs	60.2029	4.917	0.022	0.1015	1.18E-03	5.37E-05
Total CO_{2e}		2.832	0.0129		0.9951	0.0454
Total TAPs (Benzene)		0.0001	0.0000		5.91E-07	2.70E-08
Toluene		0.0006	0.0000		7.07E-07	3.22E-08
Ethylbenzene		0.0008	0.0000		2.73E-07	1.25E-08
Xylenes		0.0019	0.0000		6.18E-07	2.82E-08
n-Hexane		0.0074	0.0000		1.48E-09	6.74E-11
Total HAPs		0.0109	0.0000		2.19E-06	9.99E-08
Total	100.0000	8.1677	0.0373	100.0000	1.1598	0.0529

Enter any notes here

Vapor mass fractions and loading losses from Promax output
Using equation L_L = 12.46 SPM/T from AP-42, Chapter 5, Section 5.2-4
MW was obtained by Promax; RVP was taken from laboratory reports
Annual Average Temp (F) obtained from Charleston, WV (preset in Promax)
S (saturation factor) is based on submerged loading, dedicated service as it was most representative
True vapor pressure (TVP) equation from AP-42, Chapter 7, Figure 7.1-13b
Loading emissions are vented to the atmosphere.

Table 9

Gas Production Unit Heater Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Gas Production Unit Heater Emissions

Number of Units	6
GPU Heater Rating (MMBtu/hr)	1.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	0.481	2.107
CO	84	0.404	1.770
CO_2	120,000	577.358	2528.828
Lead	0.0005	2.41E-06	1.05E-05
N_2O	2.2	0.011	0.046
PM (Total)	7.6	0.037	0.160
SO_2	0.6	0.003	0.013
TOC	11	0.053	0.232
Methane	2.3	0.011	0.048
VOC	5.5	0.026	0.116
HAPS			
2-Methylnaphthalene	2.40E-05	1.15E-07	5.06E-07
Benzene	2.10E-03	1.01E-05	4.43E-05
Dichlorobenzene	1.20E-03	5.77E-06	2.53E-05
Fluoranthene	3.00E-06	1.44E-08	6.32E-08
Fluorene	2.80E-06	1.35E-08	5.90E-08
Formaldehyde	7.50E-02	3.61E-04	1.58E-03
Hexane	1.80E+00	8.66E-03	3.79E-02
Naphthalene	6.10E-04	2.93E-06	1.29E-05
Phenanathrene	1.70E-05	8.18E-08	3.58E-07
Toluene	3.40E-03	1.64E-05	7.17E-05

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.026	0.116
TOTAL Uncontrolled HAPs	0.009	0.040
TOTAL Uncontrolled TAPs (Benzene)	1.01E-05	4.43E-05
TOTAL Uncontrolled TAPs (Formaldehyde)	3.61E-04	0.002
TOTAL CO_{2e} Emissions	580.79	2,543.86

Enter any notes here:
All Emission Factors based off AP-42 Sec 1.4 Natural Gas Combustion

Table 10

Haul Road Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

	PM	PM10
Particle Size Multiplier (k)	0.8	0.36
Silt Content of Road Surface Material (s) (%)	5.1	5.1
Days per Year with Precipitation > 0.01 in (p)	150	150
Control Efficiency for Watering [1] (%)	50	50

Tanker Truck Trip Calculation	
Condensate Production (bbl/day)	6
PW Production (bbl/day)	60
Truck Capacity (bbl)	200

Pick Up Truck Trip Calculation	
No of Trips Per day	2
Trips Per Year	730

	# of Wheels	Mean Vehicle Weight (W) (tons)	Mean Vehicle Speed (S) (mph)	Miles Per Trip (miles)	Maximum Trips per Hour	Maximum Trips per Year	Vehicle Miles Travelled (miles/hr)	Vehicle Miles Travelled (miles/year)	PM (lbs/VMT)	PM10 (lbs/VMT)
Tanker Trucks Condensate	10	40	10	0.1400	1	11	0.1400	1.5400	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.1400	1	110	0.1400	15.4000	3.8175	1.7179
Pick Up Truck	4	3	10	0.2500	1	730	0.2500	182.5000	0.3467	0.1560

	Uncontrolled Emissions						Controlled Emissions					
	PM			PM10			PM			PM10		
	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)	(lbs/hr)	(lbs/year)	(tpy)
Tanker Trucks Condensate	0.5345	5.8790	0.0029	0.2405	2.6455	0.0013	0.2672	2.9395	0.0015	0.1203	1.3228	0.0007
Tanker Trucks PW	0.5345	58.7900	0.0294	0.2405	26.4555	0.0132	0.2672	29.3950	0.0147	0.1203	13.2277	0.0066
Pick Up Truck	0.0867	63.2690	0.0316	0.0390	28.4711	0.0142	0.0433	31.6345	0.0158	0.0195	14.2355	0.0071
Total Emissions	1.1556	127.9380	0.0640	0.5200	57.5721	0.0288	0.5778	63.9690	0.0320	0.2600	28.7860	0.0144

Enter any notes here:	1 EPA, AP-42, Volume I, Section 13.2.2 Unpaved Roads (11/06); assume 2:1 moisture ratio Section 13.2.2 Unpaved Roads (11/06) Source: Attachment L, Fugitive Emissions from Unpaved Haul Roads, Rev 03/2007, West Virginia Department of Environmental Protection

Table 11

Change in Regulated Air Pollutants Emissions
Snake Run Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

	Potential Emissions		Initial Permit Application Emissions		Change in Emissions	
Pollutant	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**
PM	0.6144	0.1921	0.3489	0.2597	2.65E-01	-0.0676
PM10	0.2966	0.1746	0.1780	0.2016	0.1185	-0.0270
VOC (uncontrolled)	5.2982	23.2285	9.4897	41.8057	-4.1915	-18.5772
CO	0.4042	1.7702	0.4233	1.8538	-0.0191	-0.0837
NOx	0.4811	2.1074	0.5039	2.2070	-0.0227	-9.96E-02
SO2	0.0029	0.0126	0.0029	0.0127	-7.56E-06	-3.31E-05
Pb	2.41E-06	1.05E-05	2.52E-06	1.10E-05	-1.14E-07	-4.98E-07
HAPs	0.2118	0.9277	0.1953	0.8559	0.0165	0.0717
TAPs	0.0016	0.0072	0.0013	0.0055	3.81E-04	0.0017
Notes: 1.) Change in emissions due to the decrease in production, removal of flare, and change in service of existing storage tanks.						

Bryan Research & Engineering, Inc.

ProMax® 3.2

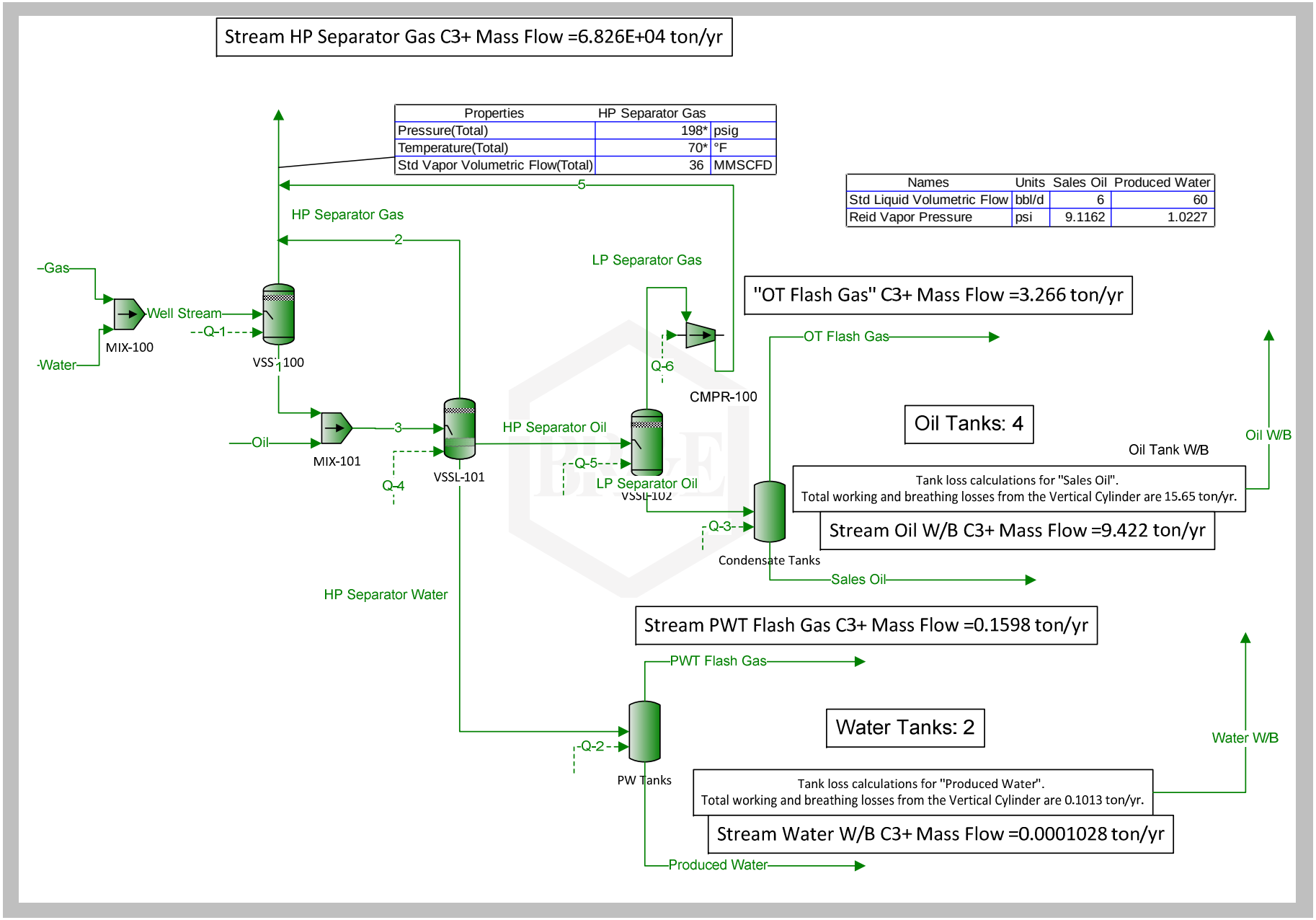
with

TSWEET® & PROSIM®

Simulation Report	
Client Name:	Antero Resources Corporation
Location:	West Virginia
Job:	Snake Run Well Pad

Project Name:	PROMAX SCENARIO 3
File Name:	ProMax@V:\AirQuality\ANTERO RESOURCES\ProMax\Antero WV_Updated 2Ph Separator\PROMAX SCENARIO 3.PMX
ProMax Version:	3.2.13330.0

Report Created:	10/28/2015 17:00


Stream HP Separator Gas C3+ Mass Flow =6.826E+04 ton/yr
Properties | HP Separator Gas
Pressure(Total) | 198* | psig
Temperature(Total) | 70* | °F
Std Vapor Volumetric Flow(Total) | 36 | MMSCFD
Names | Units | Sales Oil | Produced Water
Std Liquid Volumetric Flow | bbl/d | 6 | 60
Reid Vapor Pressure | psi | 9.1162 | 1.0227
"OT Flash Gas" C3+ Mass Flow =3.266 ton/yr
Oil Tanks: 4
Oil Tank W/B
Tank loss calculations for "Sales Oil".
Total working and breathing losses from the Vertical Cylinder are 15.65 ton/yr.
Stream Oil W/B C3+ Mass Flow =9.422 ton/yr
Stream PWT Flash Gas C3+ Mass Flow =0.1598 ton/yr
Water Tanks: 2
Tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.1013 ton/yr.
Stream Water W/B C3+ Mass Flow =0.0001028 ton/yr
Gas
Water
MIX-100
Well Stream
Q-1
VSS-100
HP Separator Gas
2
5
LP Separator Gas
Q-6
CMPR-100
OT Flash Gas
Oil
MIX-101
3
HP Separator Oil
VSSL-101
Q-4
Q-5
LP Separator Oil
VSSL-102
Oil W/B
Q-3
Condensate Tanks
Sales Oil
HP Separator Water
PWT Flash Gas
Q-2
PW Tanks
Water W/B
Produced Water

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		1.39311	0.181013	99.9640	0.0602046	0.414467	0.00993598	0	100	0	99.9969	3.02996	0.000248073	94.3403	99.9642	98.7554	0.0332836
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.487767	0.493764	9.72016E-05	0.0122105	0.0135290	2.02655E-05	0.494658	0	0.013	3.24148E-06	0.276723	0.000576823	0.00491270	8.76093E-05	0.000243745	0.000799925
Carbon Dioxide		0.144673	0.146440	0.000806624	0.0315329	0.206926	0.00406780	0.146717	0	0.014	0.000474492	0.978632	0.263994	1.17057	0.00102141	0.00117834	0.0157758
Methane		76.6193	77.5612	0.0279622	5.29007	15.2424	0.0696712	77.7018	0	5.372	0.00185096	76.9017	3.38692	3.79360	0.0269905	0.0916218	0.945369
Ethane		14.0025	14.1747	0.00523969	5.52355	39.4506	1.16040	14.2004	0	5.517	0.000399853	14.2541	50.0924	0.648949	0.00535239	0.0719987	3.37033
Propane		4.43171	4.48619	0.00134713	4.85594	26.7153	3.03021	4.49433	0	4.82	0.000112689	3.63564	29.3419	0.0403462	0.00181557	0.0600766	4.39720
Isobutane		0.558772	0.565642	5.22177E-05	1.44607	4.37132	1.28185	0.566666	0	1.445	1.60757E-06	0.149053	4.48316	0.000207133	7.37779E-05	0.0175457	1.46016
n-Butane		1.16744	1.18180	0.000179149	3.29288	7.45958	3.15205	1.18394	0	3.282	1.17123E-05	0.493126	7.53916	0.00103134	0.000331747	0.0400133	3.40066
Isopentane		0.369720	0.374266	3.02279E-05	2.10211	2.05313	2.25293	0.374944	0	2.1	1.38287E-06	0.0849522	1.97242	4.45287E-05	6.84458E-05	0.0254606	2.24140
n-Pentane		0.287374	0.290907	2.21804E-05	2.12439	1.57814	2.31981	0.291434	0	2.123	1.00518E-06	0.0623637	1.49623	2.38411E-05	5.17041E-05	0.0257222	2.27700
2-Methylpentane		0	0	2.95290E-06	1.47705	0.468522	1.66660	0	0	1.478	6.52759E-08	0.00850436	0.431123	6.20788E-07	0	0.0178718	1.59745
3-Methylpentane		0	0	5.12885E-06	1.04008	0.295699	1.17646	0	0	1.041	2.96387E-07	0.0142323	0.271957	2.51882E-06	0	0.0125877	1.12562
n-Hexane		0.537569	0.544179	3.31244E-06	2.91112	0.666632	3.30643	0.545164	0	2.91	5.84913E-08	0.00958320	0.0416601	2.70926E-08	3.41264E-05	0.0352211	3.15408
Methylcyclopentane		0	0	2.76589E-06	0.230663	0.0499453	0.262230	0	0	0.231	4.30091E-07	0.00687954	0.0434242	2.61821E-06	0	0.00279323	0.249978
Benzene		0	0	3.53613E-05	0.0610816	0.0128053	0.0694756	0	0	0.064	3.18974E-05	0.0102333	0.000709083	1.19678E-05	0	0.000773882	0.0662049
2-Methylhexane		0	0	9.15282E-07	1.69511	0.165053	1.94408	0	0	1.696	1.71725E-08	0.00264502	0.00974032	3.16269E-09	0	0.0205079	1.84140
3-Methylhexane		0	0	7.60193E-07	1.41925	0.131342	1.62828	0	0	1.42	1.48953E-08	0.00219498	0.116979	3.93360E-08	0	0.0171705	1.54188
Heptane		0	0	1.28868E-06	2.89150	0.212466	3.32197	0	0	2.893	2.53892E-08	0.00372053	0.174256	4.89555E-08	0	0.0349819	3.14250
Methylcyclohexane		0	0	4.53507E-06	1.77378	0.130492	2.03783	0	0	1.775	4.92571E-07	0.0119060	0.108924	9.67792E-07	0	0.0214631	1.92775
Toluene		0	0	6.28268E-05	0.489631	0.0284829	0.563154	0	0	0.495	5.55287E-05	0.0215489	0.00334548	1.21256E-05	0	0.00598549	0.532295
Octane		0	0	7.03511E-07	8.50085	0.196551	9.80226	0	0	8.505	9.20885E-09	0.00204479	0.151838	5.24331E-09	0	0.102842	9.24787
Ethylbenzene		0	0	3.42807E-05	0.874778	0.0171372	1.00896	0	0	0.878	2.99311E-05	0.0128398	0.00372694	4.06394E-06	0	0.0106167	0.951716
m-Xylene		0	0	2.44783E-05	0.731648	0.0119956	0.844070	0	0	0.734	2.14655E-05	0.00889440	0.00336216	3.14287E-06	0	0.00887545	0.796047
o-Xylene		0	0	5.90325E-05	1.47047	0.0214630	1.69664	0	0	1.476	5.34845E-05	0.0163929	0.00522658	6.05620E-06	0	0.0178476	1.59995
Nonane		0	0	3.29216E-07	7.69327	0.0587817	8.88101	0	0	7.697	6.80151E-09	0.000949545	0.0407319	1.14662E-09	0	0.0930713	8.37183
C10+		0	0	4.28701E-07	42.0008	0.0272437	48.5096	0	0	42.021	2.36626E-08	0.00119289	0.0159486	2.85955E-10	0	0.508114	45.7114
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water		55.7431	7.15497	48.5878	0.000358346	0.000130822	5.12027E-05	0	55.7431	0	48.5873	0.000500060	2.24386E-07	0.00118984	48.5881	48.5881	0.000182024
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		19.5172	19.5171	4.72451E-05	7.26784E-05	4.27027E-06	1.04433E-07	19.5172	0	7.73405E-05	1.57500E-06	4.56701E-05	5.21746E-07	6.19599E-08	4.25830E-05	0.000119924	4.37471E-06
Carbon Dioxide		5.78886	5.78837	0.000392062	0.000187688	6.53141E-05	2.09624E-05	5.78886	0	8.32898E-05	0.000230550	0.000161512	0.000238787	1.47634E-05	0.000496460	0.000579750	8.62765E-05
Methane		3065.80	3065.78	0.0135911	0.0314872	0.00481109	0.000359033	3065.80	0	0.0319595	0.000899358	0.0126918	0.00306352	4.78456E-05	0.0131189	0.0450784	0.00517013
Ethane		560.288	560.286	0.00254676	0.0328769	0.0124521	0.00597986	560.288	0	0.0328221	0.000194284	0.00235248	0.0453094	8.18468E-06	0.00260156	0.0354237	0.0184320
Propane		177.328	177.327	0.000654776	0.0289032	0.00843238	0.0156154	177.328	0	0.0286755	5.47544E-05	0.000600022	0.0265403	5.08854E-07	0.000882468	0.0295580	0.0240478
Isobutane		22.3583	22.3583	2.53805E-05	0.00860718	0.00137976	0.00660573	22.3583	0	0.00859670	7.81098E-07	2.45995E-05	0.00405510	2.61240E-09	3.58602E-05	0.00863256	0.00798549
n-Butane		46.7134	46.7132	8.70758E-05	0.0195997	0.00235453	0.0162433	46.7134	0	0.0195255	5.69086E-06	8.13850E-05	0.00681929	1.30075E-08	0.000161247	0.0196868	0.0185979
Isopentane		14.7938	14.7937	1.46923E-05	0.0125120	0.000648049	0.0116099	14.7938	0	0.0124935	6.71921E-07	1.40204E-05	0.00178409	5.61605E-10	3.32685E-05	0.0125267	0.0122580
n-Pentane		11.4988	11.4988	1.07808E-05	0.0126447	0.000498123	0.0119546	11.4988	0	0.0126303	4.88404E-07	1.02924E-05	0.00135336	3.00689E-10	2.51311E-05	0.0126554	0.0124527
2-Methylpentane		0	0	1.43527E-06	0.00879159	0.000147884	0.00858843	0	0	0.00879302	3.17167E-08	1.40355E-06	0.000389958	7.82951E-12	0	0.00879302	0.00873631
3-Methylpentane		0	0	2.49289E-06	0.00619070	9.33340E-05	0.00606258	0	0	0.00619319	1.44011E-07	2.34888E-06	0.000245990	3.17679E-11	0	0.00619319	0.00615591
n-Hexane		21.5099	21.5099	1.61002E-06	0.0173274	0.000210415	0.0170389	21.5099	0	0.0173124	2.84202E-08	1.58160E-06	3.76823E-05	3.41697E-13	1.65873E-05	0.0173290	0.0172493
Methylcyclopentane		0	0	1.34437E-06	0.00137294	1.57647E-05	0.00135134	0	0	0.00137428	2.08976E-07	1.13539E-06	3.92779E-05	3.30214E-11	0	0.00137428	0.00136710
Benzene		0	0	1.71875E-05	0.000363566	4.04185E-06	0.000358026	0	0	0.000380753	1.54986E-05	1.68889E-06	6.41378E-07	1.50940E-10	0	0.000380753	0.000362068
2-Methylhexane		0	0	4.44875E-07	0.0100895	5.20971E-05	0.0100183	0	0	0.0100900	8.34391E-09	4.36531E-07	8.81028E-06	3.98885E-14	0	0.0100900	0.0100704
3-Methylhexane		0	0	3.69494E-07	0.00844760	4.14565E-05	0.00839095	0	0	0.00844797	7.23743E-09	3.62257E-07	0.000105809	4.96114E-13	0	0.00844797	0.00843241
Heptane		0	0	6.26368E-07	0.0172106	6.70625E-05	0.0171189	0	0	0.0172112	1.23363E-08	6.14032E-07	0.000157618	6.17437E-13	0	0.0172112	0.0171860
Methylcyclohexane		0	0	2.20428E-06	0.0105578	4.11883E-05	0.0105015	0	0	0.0105600	2.39334E-07	1.96495E-06	9.85235E-05	1.22060E-11	0	0.0105600	0.0105427
Toluene		0	0	3.05371E-05	0.00291435	8.99030E-06	0.00290208	0	0	0.00294489	2.69807E-05	3.55640E-06	3.02604E-06	1.52930E-10	0	0.00294489	0.00291107
Octane		0	0	3.41944E-07	0.0505982	6.20390E-05	0.0505136	0	0	0.0505986	4.47446E-09	3.37469E-07	0.000137340	6.61296E-14	0	0.0505986	0.0505756
Ethylbenzene		0	0	1.66622E-05	0.00520680	5.40917E-06	0.00519943	0	0	0.00522346	1.45432E-05	2.11907E-06	3.37108E-06	5.12552E-11	0	0.00522346	0.00520484
m-Xylene		0	0	1.18978E-05	0.00435487	3.78628E-06	0.00434971	0	0	0.00436677	1.04298E-05	1.46792E-06	3.04113E-06	3.96385E-11	0	0.00436677	0.00435350
o-Xylene		0	0	2.86929E-05	0.00875243	6.77457E-06	0.00874321	0	0	0.00878113	2.59875E-05	2.70546E-06	4.72753E-06	7.63820E-11	0	0.00878113	0.00874998
Nonane		0	0	1.60017E-07	0.0457914	1.85538E-05	0.0457661	0	0	0.0457915	3.30477E-09	1.56712E-07	3.68427E-05	1.44614E-14	0	0.0457915	0.0457847
C10+		0	0	2.08371E-07	0.249994	8.59918E-06	0.249982	0	0	0.249994	1.14974E-08	1.96874E-07	1.44258E-05	3.60653E-15	0	0.249994	0.249991
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		1.20381	0.156156	99.9587	0.00954972	0.195976	0.00141555	0	100	0	99.9951	2.74472	0.000113126	92.6976	99.9580	92.7958	0.00494105
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.655405	0.662357	0.000151138	0.00301175	0.00994724	4.48948E-06	0.663391	0	0.00320553	5.04035E-06	0.389792	0.000409026	0.00750613	0.000136222	0.000356145	0.000184656
Carbon Dioxide		0.305398	0.308612	0.00197040	0.0122188	0.239020	0.00141572	0.309119	0	0.00542333	0.00115911	2.16564	0.294092	2.80979	0.00249504	0.00270486	0.00572120
Methane		58.9578	59.5830	0.0248988	0.747227	6.41795	0.00883886	59.6762	0	0.758575	0.00164823	62.0337	1.37536	3.31935	0.0240333	0.0766648	0.124974
Ethane		20.1957	20.4098	0.00874502	1.46237	31.1347	0.275931	20.4417	0	1.46021	0.000667377	21.5517	38.1271	1.06429	0.00893304	0.112920	0.835104
Propane		9.37344	9.47284	0.00329717	1.88533	30.9191	1.05667	9.48766	0	1.87083	0.000275822	8.06116	32.7511	0.0970350	0.00444366	0.138174	1.59779
Isobutane		1.55779	1.57431	0.000168460	0.740031	6.66847	0.589187	1.57677	0	0.739267	5.18636E-06	0.435614	6.59582	0.000656631	0.000238013	0.0531911	0.699346
n-Butane		3.25470	3.28921	0.000577953	1.68515	11.3796	1.44880	3.29435	0	1.67908	3.77864E-05	1.44119	11.0919	0.00326944	0.00107024	0.121303	1.62875
Isopentane		1.27948	1.29305	0.000121052	1.33538	3.88793	1.28543	1.29507	0	1.33364	5.53812E-06	0.308194	3.60223	0.000175226	0.000274099	0.0958129	1.33259
n-Pentane		0.994508	1.00506	8.88247E-05	1.34953	2.98846	1.32359	1.00663	0	1.34825	4.02553E-06	0.226246	2.73255	9.38180E-05	0.000207055	0.0967973	1.35376
2-Methylpentane		0	0	1.41243E-05	1.12072	1.05970	1.13576	0	0	1.12111	3.12239E-07	0.0368507	0.940430	2.91781E-06	0	0.0803301	1.13438
3-Methylpentane		0	0	2.45323E-05	0.789169	0.668812	0.801735	0	0	0.789633	1.41773E-06	0.0616707	0.593234	1.18389E-05	0	0.0565789	0.799326
n-Hexane		2.22203	2.24560	1.58441E-05	2.20883	1.50779	2.25328	2.24910	0	2.20733	2.79786E-07	0.0415255	0.0908754	1.27340E-07	0.000163232	0.158312	2.23977
Methylcyclopentane		0	0	1.29203E-05	0.170923	0.110324	0.174525	0	0	0.171122	2.00916E-06	0.0291128	0.0925076	1.20182E-05	0	0.0122613	0.173361
Benzene		0	0	0.000153314	0.0420095	0.0262530	0.0429162	0	0	0.0440036	0.000138300	0.0401932	0.00140203	5.09872E-05	0	0.00315295	0.0426143
2-Methylhexane		0	0	5.09057E-06	1.49553	0.434081	1.54050	0	0	1.49587	9.55127E-08	0.0133268	0.0247054	1.72848E-08	0	0.107182	1.52045
3-Methylhexane		0	0	4.22801E-06	1.25215	0.345422	1.29026	0	0	1.25244	8.28469E-08	0.0110593	0.296706	2.14979E-07	0	0.0897399	1.27314
Heptane		0	0	7.16735E-06	2.55106	0.558775	2.63235	0	0	2.55162	1.41214E-07	0.0187457	0.441985	2.67552E-07	0	0.182829	2.59477
Methylcyclohexane		0	0	2.47155E-05	1.53345	0.336283	1.58231	0	0	1.53405	2.68454E-06	0.0587808	0.270717	5.18277E-06	0	0.109918	1.55973

Toluene		0	0	0.000321308	0.397219	0.0688805	0.410336	0	0	0.401455	0.000283994	0.0998359	0.00780263	6.09361E-05	0	0.0287652	0.404149
Octane		0	0	4.46048E-06	8.54982	0.589279	8.85468	0	0	8.55146	5.83890E-08	0.0117447	0.439033	3.26671E-08	0	0.612731	8.70491
Ethylbenzene		0	0	0.000202007	0.817710	0.0477522	0.847085	0	0	0.820478	0.000176383	0.0685426	0.0100156	2.35320E-05	0	0.0587891	0.832601
m-Xylene		0	0	0.000144244	0.683917	0.0334253	0.708651	0	0	0.685912	0.000126495	0.0474809	0.00903530	1.81986E-05	0	0.0491471	0.696415
o-Xylene		0	0	0.000347863	1.37454	0.0598060	1.42443	0	0	1.37930	0.000315181	0.0875100	0.0140456	3.50681E-05	0	0.0988300	1.39971
Nonane		0	0	2.34365E-06	8.68772	0.197874	9.00760	0	0	8.68935	4.84207E-08	0.00612366	0.132236	8.02092E-09	0	0.622611	8.84797
C10+		0	0	3.80248E-06	59.0954	0.114266	61.3023	0	0	59.1064	2.09889E-07	0.00958516	0.0645123	2.49233E-09	0	4.23510	60.1935
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Water		1004.23	128.899	875.322	0.00645570	0.00235679	0.000922431	0	1004.23	0	875.313	0.00900873	4.04238E-06	0.0214353	875.329	875.329	0.00327922
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		546.743	546.742	0.00132350	0.00203597	0.000119625	2.92554E-06	546.743	0	0.00216657	4.41210E-05	0.00127937	1.46159E-05	1.73571E-06	0.00119289	0.00335947	0.000122550
Carbon Dioxide		254.765	254.743	0.0172544	0.00826005	0.00287444	0.000922545	254.765	0	0.00366554	0.0101464	0.00710807	0.0105089	0.000649731	0.0218490	0.0255145	0.00379698
Methane		49182.9	49182.7	0.218035	0.505133	0.0771818	0.00575978	49182.9	0	0.512709	0.0144279	0.203607	0.0491464	0.000767561	0.210459	0.723168	0.0829416
Ethane		16847.3	16847.3	0.0765788	0.988578	0.374424	0.179809	16847.3	0	0.986930	0.00584193	0.0707368	1.36241	0.000246105	0.0782263	1.06516	0.554233
Propane		7819.38	7819.34	0.0288728	1.27450	0.371831	0.688573	7819.38	0	1.26446	0.00241443	0.0264583	1.17031	2.24383E-05	0.0389130	1.30338	1.06040
Isobutane		1299.52	1299.51	0.00147517	0.500268	0.0801946	0.383939	1299.52	0	0.499659	4.53991E-05	0.00142977	0.235691	1.51838E-07	0.00208427	0.501743	0.464134
n-Butane		2715.09	2715.08	0.00506104	1.13918	0.136851	0.944098	2715.09	0	1.13487	0.000330765	0.00473027	0.396352	7.56022E-07	0.00937205	1.14424	1.08095
Isopentane		1067.35	1067.35	0.00106003	0.902729	0.0467560	0.837643	1067.35	0	0.901389	4.84783E-05	0.00101156	0.128720	4.05191E-08	0.00240028	0.903789	0.884399
n-Pentane		829.625	829.623	0.000777824	0.912296	0.0359390	0.862507	829.625	0	0.911261	3.52378E-05	0.000742586	0.0976433	2.16943E-08	0.00181318	0.913074	0.898446
2-Methylpentane		0	0	0.000123685	0.757618	0.0127439	0.740111	0	0	0.757742	2.73320E-06	0.000120951	0.0336048	6.74711E-10	0	0.757742	0.752855
3-Methylpentane		0	0	0.000214826	0.533486	0.00804309	0.522445	0	0	0.533701	1.24102E-05	0.000202416	0.0211983	2.73761E-09	0	0.533701	0.530488
n-Hexane		1853.63	1853.63	0.000138744	1.49319	0.0181326	1.46833	1853.63	0	1.49190	2.44912E-06	0.000136295	0.00324729	2.94459E-11	0.00142942	1.49333	1.48647
Methylcyclopentane		0	0	0.000113141	0.115546	0.00132675	0.113728	0	0	0.115659	1.75873E-05	9.55540E-05	0.00330561	2.77907E-09	0	0.115659	0.115055
Benzene		0	0	0.00134254	0.0283988	0.000315716	0.0279661	0	0	0.0297414	0.00121062	0.000131922	5.00992E-05	1.17902E-08	0	0.0297414	0.0282818
2-Methylhexane		0	0	4.45773E-05	1.01099	0.00522023	1.00386	0	0	1.01103	8.36076E-07	4.37413E-05	0.000882807	3.99691E-12	0	1.01103	1.00908
3-Methylhexane		0	0	3.70240E-05	0.846466	0.00415402	0.840790	0	0	0.846503	7.25205E-07	3.62988E-05	0.0106023	4.97116E-11	0	0.846503	0.844944
Heptane		0	0	6.27633E-05	1.72454	0.00671979	1.71535	0	0	1.72460	1.23612E-06	6.15272E-05	0.0157936	6.18683E-11	0	1.72460	1.72207
Methylcyclohexane		0	0	0.000216430	1.03662	0.00404412	1.03110	0	0	1.03684	2.34993E-05	0.000192930	0.00967363	1.19846E-09	0	1.03684	1.03514
Toluene		0	0	0.00281364	0.268524	0.000828352	0.267393	0	0	0.271337	0.00248596	0.000327681	0.000278814	1.40908E-08	0	0.271337	0.268221
Octane		0	0	3.90597E-05	5.77976	0.00708663	5.77009	0	0	5.77980	5.11111E-07	3.85486E-05	0.0156882	7.55389E-12	0	5.77980	5.77718
Ethylbenzene		0	0	0.00176895	0.552780	0.000574264	0.551997	0	0	0.554549	0.00154398	0.000224971	0.000357891	5.44151E-09	0	0.554549	0.552571
m-Xylene		0	0	0.00126313	0.462335	0.000401971	0.461787	0	0	0.463598	0.00110728	0.000155842	0.000322862	4.20822E-09	0	0.463598	0.462189
o-Xylene		0	0	0.00304618	0.929202	0.000719222	0.928223	0	0	0.932248	0.00275896	0.000287226	0.000501898	8.10910E-09	0	0.932248	0.928942
Nonane		0	0	2.05229E-05	5.87298	0.00237962	5.86974	0	0	5.87300	4.23854E-07	2.00991E-05	0.00472526	1.85475E-12	0	5.87300	5.87212
C10+		0	0	3.32977E-05	39.9491	0.00137415	39.9472	0	0	39.9491	1.83728E-06	3.14604E-05	0.00230524	5.76323E-13	0	39.9491	39.9486

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																
Temperature	°F	173.1	70.0	70.0	70.0	75.9	75.9	200.0	200.0	200.0	75.9	75.94	75.9425	75.9425	70	75.1550	70
Pressure	psig	200	198	198	198	0	0	300	200	300	0	0	8.61143	-14.2259	198	198	40
Mole Fraction Vapor	%	100	100	0	0	100	0	100	0	1.32215	0	100	100	100	0	0.00389972	0
Mole Fraction Light Liquid	%	0	0	100	100	0	100	0	100	98.6779	100	0	0	0	100	1.20722	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98.7889	0
Molecular Weight	lb/lbmol	20.8	20.9	18.0	113.6	38.1	126.5	20.9	18.0	113.6	18.0	19.8874	39.5055	18.3345	18.0164	19.1723	121.353
Mass Density	lb/ft^3	0.7	0.8	62.3	45.8	0.1	46.3	1.0	60.2	38.1	62.2	0.0510181	0.163733	0.00149994	62.2605	60.4499	46.2337
Molar Flow	lbmol/h	4001.3	3952.7	48.6	0.6	0.0	0.5	3945.6	55.7	0.6	48.6	0.0165039	0.0904517	0.00126122	48.6056	49.2005	0.546890
Mass Flow	lb/h	83420.6	82544.9	875.7	67.6	1.2	65.2	82416.3	1004.2	67.6	875.4	0.328220	3.57334	0.0231239	875.697	943.285	66.3669
Vapor Volumetric Flow	MCFH	122.8	99.8	0.0	0.0	0.0	0.0	85.5	0.0	0.0	0.0	0.00643341	0.0218241	0.0154165	0.0140650	0.0156044	0.00143547
Liquid Volumetric Flow	Mbbl/d	525.0	426.5	0.1	0.0	0.1	0.0	365.6	0.1	0.0	0.1	0.0275001	0.0932891	0.0658991	0.0601222	0.0667023	0.00613602
Std Vapor Volumetric Flow	MMSCFD	36.4	36.0	0.4	0.0	0.0	0.0	35.9	0.5	0.0	0.4	0.000150311	0.000823800	1.14867E-05	0.442681	0.448100	0.00498087
Std Liquid Volumetric Flow	Mbbl/d	16.6	16.5	0.1	0.0	0.0	0.0	16.5	0.1	0.0	0.1	6.61490E-05	0.000544432	1.74975E-06	0.0600670	0.0664759	0.00618250
Compressibility		0.970	0.945	0.011	0.093	0.987	0.007	0.964	0.009	0.133	0.001	0.996644	0.978361	0.999551	0.0108279	0.0117533	0.0252568
Specific Gravity		0.720	0.721	0.998	0.735	1.315	0.743	0.721	0.964		0.998	0.686660	1.36402	0.633041	0.998260		0.741292
API Gravity				10.0	59.9		57.1		10.0		10.0				10.0473		58.1953
Enthalpy	MMBtu/h	-136.9	-136.4	-6.0	-0.1	0.0	-0.1	-130.2	-6.7	-0.1	-6.0	-0.000606640	-0.00388047	-0.000128067	-5.97740	-6.02876	-0.0541225
Mass Enthalpy	Btu/lb	-1641.5	-1652.0	-6825.9	-829.0	-1121.3	-804.2	-1579.9	-6699.9	-759.9	-6822.4	-1848.27	-1085.95	-5538.31	-6825.88	-6391.23	-815.504
Mass Cp	Btu/(lb**F)	0.5	0.5	1.0	0.5	0.4	0.5	0.6	1.0	0.6	1.0	0.482040	0.410706	0.444342	0.983052	0.946851	0.476127
Ideal Gas CpCv Ratio		1.223	1.249	1.326	1.049	1.145	1.044	1.215	1.320	1.040	1.326	1.26242	1.14122	1.32249	1.32581	1.30474	1.04626
Dynamic Viscosity	cP	0.0	0.0	1.0	0.6	0.0	0.7	0.0	0.3		0.9	0.0108013	0.00869517	0.0102384	0.995519		0.655631
Kinematic Viscosity	cSt	1.1	0.8	1.0	0.8	5.6	0.9	0.8	0.3		0.9	13.2170	3.31528	426.126	0.998196		0.885279
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.0	0.3	0.1	0.0	0.1	0.0	0.4		0.3	0.0174352	0.0110751	0.0122571	0.346525		0.0685497
Surface Tension	lbf/ft			0.005	0.001		0.002		0.004		0.005				0.00503986		0.00159920
Net I.G. Heating Value	Btu/ft^3	1126.0	1139.8	0.4	5698.0	2004.9	6329.5	1141.9	0.0	5700.5	0.0	1045.24	2079.69	45.9812	0.392291	69.3177	6079.88
Net Liquid Heating Value	Btu/lb	20422.4	20650.2	-1051.1	18872.8	19817.8	18827.7	20684.2	-1059.8	18875.8	-1059.0	19863.8	19822.3	-34.5186	-1051.08	376.731	18845.6
Gross I.G. Heating Value	Btu/ft^3	1242.0	1256.6	50.7	6111.0	2183.5	6783.1	1258.8	50.3	6113.7	50.3	1155.36	2263.67	98.3227	50.7246	124.037	6517.59
Gross Liquid Heating Value	Btu/lb	22534.1	22773.0	9.0	20252.0	21597.1	20188.0	22808.7	0.0	20255.1	0.8	21965.2	21589.5	1048.8	9.1	1459.8	20213.5

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		1.39311	0.181013			0.414467	0.414467	0		0	3.02996	3.02996	0.000248073	94.3403	0.181013	0.215290	0.364875
H2S		0	0			0	0	0		0	0	0	0	0	0	0	0
Nitrogen		0.487767	0.493764			0.0135290	0.0135290	0.494658		0.289803	0.276723	0.276723	0.000576823	0.00491270	0.493764	0.513836	0.141346
Carbon Dioxide		0.144673	0.146440			0.206926	0.206926	0.146717		0.0720814	0.978632	0.978632	0.263994	1.17057	0.146440	0.121415	0.209858
Methane		76.6193	77.5612			15.2424	15.2424	77.7018		64.0769	76.9017	76.9017	3.38692	3.79360	77.5612	79.6237	54.4600
Ethane		14.0025	14.1747			39.4506	39.4506	14.2004		20.9154	14.2541	14.2541	50.0924	0.648949	14.1747	14.3552	29.8920
Propane		4.43171	4.48619			26.7153	26.7153	4.49433		7.72199	3.63564	3.63564	29.3419	0.0403462	4.48619	3.51779	10.0475

Isobutane		0.558772	0.565642			4.37132	4.37132	0.566666		1.24761	0.149053	0.149053	4.48316	0.000207133	0.565642	0.427609	1.28652
n-Butane		1.16744	1.18180			7.45958	7.45958	1.18394		2.24057	0.493126	0.493126	7.53916	0.00103134	1.18180	0.685202	2.07316
Isopentane		0.369720	0.374266			2.05313	2.05313	0.374944		0.769744	0.0849522	0.0849522	1.97242	4.45287E-05	0.374266	0.179335	0.525742
n-Pentane		0.287374	0.290907			1.57814	1.57814	0.291434		0.647835	0.0623637	0.0623637	1.49623	2.38411E-05	0.290907	0.135995	0.397250
2-Methylpentane		0	0			0.468522	0.468522	0		0.250771	0.00850436	0.00850436	0.431123	6.20788E-07	0	0.0406360	0.114388
3-Methylpentane		0	0			0.295699	0.295699	0		0.163094	0.0142323	0.0142323	0.271957	2.51882E-06	0	0.0256349	0.0719904
n-Hexane		0.537569	0.544179			0.666632	0.666632	0.545164		0.402760	0.00958320	0.00958320	0.0416601	2.70926E-08	0.544179	0.0583543	0.161478
Methylcyclopentane		0	0			0.0499453	0.0499453	0		0.0291809	0.00687954	0.00687954	0.0434242	2.61821E-06	0	0.00428945	0.0120755
Benzene		0	0			0.0128053	0.0128053	0		0.00776913	0.0102333	0.0102333	0.000709083	1.19678E-05	0	0.00109149	0.00310043
2-Methylhexane		0	0			0.165053	0.165053	0		0.140328	0.00264502	0.00264502	0.00974032	3.16269E-09	0	0.0150786	0.0394781
3-Methylhexane		0	0			0.131342	0.131342	0		0.111075	0.00219498	0.00219498	0.116979	3.93360E-08	0	0.0119857	0.0314322
Heptane		0	0			0.212466	0.212466	0		0.191416	0.00372053	0.00372053	0.174256	4.89555E-08	0	0.0197028	0.0509310
Methylcyclohexane		0	0			0.130492	0.130492	0		0.109480	0.0119060	0.0119060	0.108924	9.67792E-07	0	0.0117888	0.0312036
Toluene		0	0			0.0284829	0.0284829	0		0.0255947	0.0215489	0.0215489	0.00334548	1.21256E-05	0	0.00256005	0.00679793
Octane		0	0			0.196551	0.196551	0		0.267023	0.00204479	0.00204479	0.151838	5.24331E-09	0	0.0193386	0.0467527
Ethylbenzene		0	0			0.0171372	0.0171372	0		0.0225587	0.0128398	0.0128398	0.00372694	4.06394E-06	0	0.00163704	0.00406102
m-Xylene		0	0			0.0119956	0.0119956	0		0.0170931	0.00889440	0.00889440	0.00336216	3.14287E-06	0	0.00115557	0.00283562
o-Xylene		0	0			0.0214630	0.0214630	0		0.0312399	0.0163929	0.0163929	0.00522658	6.05620E-06	0	0.00206784	0.00506997
Nonane		0	0			0.0587817	0.0587817	0		0.118373	0.000949545	0.000949545	0.0407319	1.14662E-09	0	0.00611437	0.0138381
C10+		0	0			0.0272437	0.0272437	0		0.130297	0.00119289	0.00119289	0.0159486	2.85955E-10	0	0.00320456	0.00634529
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water		55.7431	7.15497			0.000130822	0	0		0	0	0.000500060	2.24386E-07	0.00118984	0	4.13073E-06	0
H2S		0	0			0	0	0		0	0	0	0	0	0	0	0
Nitrogen		19.5172	19.5171			4.27027E-06	0	19.5172		2.27954E-05	0	4.56701E-05	5.21746E-07	6.19599E-08	0	9.85888E-06	0
Carbon Dioxide		5.78886	5.78837			6.53141E-05	0	5.78886		5.66979E-06	0	0.000161512	0.000238787	1.47634E-05	0	2.32957E-06	0
Methane		3065.80	3065.78			0.00481109	0	3065.80		0.00504016	0	0.0126918	0.00306352	4.78456E-05	0	0.00152773	0
Ethane		560.288	560.286			0.0124521	0	560.288		0.00164517	0	0.00235248	0.0453094	8.18468E-06	0	0.000275431	0
Propane		177.328	177.327			0.00843238	0	177.328		0.000607397	0	0.000600022	0.0265403	5.08854E-07	0	6.74952E-05	0
Isobutane		22.3583	22.3583			0.00137976	0	22.3583		9.81348E-05	0	2.45995E-05	0.00405510	2.61240E-09	0	8.20447E-06	0
n-Butane		46.7134	46.7132			0.00235453	0	46.7134		0.000176239	0	8.13850E-05	0.00681929	1.30075E-08	0	1.31468E-05	0
Isopentane		14.7938	14.7937			0.000648049	0	14.7938		6.05466E-05	0	1.40204E-05	0.00178409	5.61605E-10	0	3.44087E-06	0
n-Pentane		11.4988	11.4988			0.000498123	0	11.4988		5.09575E-05	0	1.02924E-05	0.00135336	3.00689E-10	0	2.60930E-06	0
2-Methylpentane		0	0			0.000147884	0	0		1.97252E-05	0	1.40355E-06	0.000389958	7.82951E-12	0	7.79676E-07	0
3-Methylpentane		0	0			9.33340E-05	0	0		1.28287E-05	0	2.34888E-06	0.000245990	3.17679E-11	0	4.91853E-07	0
n-Hexane		21.5099	21.5099			0.000210415	0	21.5099		3.16803E-05	0	1.58160E-06	3.76823E-05	3.41697E-13	0	1.11963E-06	0
Methylcyclopentane		0	0			1.57647E-05	0	0		2.29532E-06	0	1.13539E-06	3.92779E-05	3.30214E-11	0	8.23009E-08	0
Benzene		0	0			4.04185E-06	0	0		6.11105E-07	0	1.68889E-06	6.41378E-07	1.50940E-10	0	2.09422E-08	0
2-Methylhexane		0	0			5.20971E-05	0	0		1.10380E-05	0	4.36531E-07	8.81028E-06	3.98885E-14	0	2.89310E-07	0
3-Methylhexane		0	0			4.14565E-05	0	0		8.73698E-06	0	3.62257E-07	0.000105809	4.96114E-13	0	2.29967E-07	0
Heptane		0	0			6.70625E-05	0	0		1.50564E-05	0	6.14032E-07	0.000157618	6.17437E-13	0	3.78035E-07	0
Methylcyclohexane		0	0			4.11883E-05	0	0		8.61149E-06	0	1.96495E-06	9.85235E-05	1.22060E-11	0	2.26189E-07	0
Toluene		0	0			8.99030E-06	0	0		2.01323E-06	0	3.55640E-06	3.02604E-06	1.52930E-10	0	4.91193E-08	0
Octane		0	0			6.20390E-05	0	0		2.10035E-05	0	3.37469E-07	0.000137340	6.61296E-14	0	3.71046E-07	0
Ethylbenzene		0	0			5.40917E-06	0	0		1.77442E-06	0	2.11907E-06	3.37108E-06	5.12552E-11	0	3.14096E-08	0
m-Xylene		0	0			3.78628E-06	0	0		1.34451E-06	0	1.46792E-06	3.04113E-06	3.96385E-11	0	2.21717E-08	0
o-Xylene		0	0			6.77457E-06	0	0		2.45727E-06	0	2.70546E-06	4.72753E-06	7.63820E-11	0	3.96752E-08	0
Nonane		0	0			1.85538E-05	0	0		9.31099E-06	0	1.56712E-07	3.68427E-05	1.44614E-14	0	1.17315E-07	0
C10+		0	0			8.59918E-06	0	0		1.02489E-05	0	1.96874E-07	1.44258E-05	3.60653E-15	0	6.14854E-08	0
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		1.20381	0.156156			0.195976	0.195976	0		0	2.74472	2.74472	0.000113126	92.6976	0.156156	0.194270	0.257402
H2S		0	0			0	0	0		0	0	0	0	0	0	0	0
Nitrogen		0.655405	0.662357			0.00994724	0.00994724	0.663391		0.322335	0.389792	0.389792	0.000409026	0.00750613	0.662357	0.720991	0.155052
Carbon Dioxide		0.305398	0.308612			0.239020	0.239020	0.309119		0.125953	2.16564	2.16564	0.294092	2.80979	0.308612	0.267645	0.361660
Methane		58.9578	59.5830			6.41795	6.41795	59.6762		40.8141	62.0337	62.0337	1.37536	3.31935	59.5830	63.9813	34.2118
Ethane		20.1957	20.4098			31.1347	31.1347	20.4417		24.9703	21.5517	21.5517	38.1271	1.06429	20.4098	21.6206	35.1967
Propane		9.37344	9.47284			30.9191	30.9191	9.48766		13.5195	8.06116	8.06116	32.7511	0.0970350	9.47284	7.76971	17.3494
Isobutane		1.55779	1.57431			6.66847	6.66847	1.57677		2.87912	0.435614	0.435614	6.59582	0.000656631	1.57431	1.24488	2.92809
n-Butane		3.25470	3.28921			11.3796	11.3796	3.29435		5.17057	1.44119	1.44119	11.0919	0.00326944	3.28921	1.99480	4.71848
Isopentane		1.27948	1.29305			3.88793	3.88793	1.29507		2.20502	0.308194	0.308194	3.60223	0.000175226	1.29305	0.648087	1.48535
n-Pentane		0.994508	1.00506			2.98846	2.98846	1.00663		1.85580	0.226246	0.226246	2.73255	9.38180E-05	1.00506	0.491462	1.12233
2-Methylpentane		0	0			1.05970	1.05970	0		0.858021	0.0368507	0.0368507	0.940430	2.91781E-06	0	0.175402	0.386002
3-Methylpentane		0	0			0.668812	0.668812	0		0.558032	0.0616707	0.0616707	0.593234	1.18389E-05	0	0.110651	0.242932
n-Hexane		2.22203	2.24560			1.50779	1.50779	2.24910		1.37806	0.0415255	0.0415255	0.0908754	1.27340E-07	2.24560	0.251881	0.544909
Methylcyclopentane		0	0			0.110324	0.110324	0		0.0975079	0.0291128	0.0291128	0.0925076	1.20182E-05	0	0.0180819	0.0397958

Benzene		0	0			0.0262530	0.0262530	0		0.0240950	0.0401932	0.0401932	0.00140203	5.09872E-05	0	0.00427048	0.00948345	
2-Methylhexane		0	0			0.434081	0.434081	0		0.558289	0.0133268	0.0133268	0.0247054	1.72848E-08	0	0.0756791	0.154903	
3-Methylhexane		0	0			0.345422	0.345422	0		0.441908	0.0110593	0.0110593	0.296706	2.14979E-07	0	0.0601558	0.123333	
Heptane		0	0			0.558775	0.558775	0		0.761540	0.0187457	0.0187457	0.441985	2.67552E-07	0	0.0988882	0.199842	
Methylcyclohexane		0	0			0.336283	0.336283	0		0.426798	0.0587808	0.0587808	0.270717	5.18277E-06	0	0.0579773	0.119973	
Toluene		0	0			0.0688805	0.0688805	0		0.0936330	0.0998359	0.0998359	0.00780263	6.09361E-05	0	0.0118149	0.0245271	
Octane		0	0			0.589279	0.589279	0		1.21105	0.0117447	0.0117447	0.439033	3.26671E-08	0	0.110647	0.209126	
Ethylbenzene		0	0			0.0477522	0.0477522	0		0.0950895	0.0685426	0.0685426	0.0100156	2.35320E-05	0	0.00870523	0.0168828	
m-Xylene		0	0			0.0334253	0.0334253	0		0.0720509	0.0474809	0.0474809	0.00903530	1.81986E-05	0	0.00614493	0.0117884	
o-Xylene		0	0			0.0598060	0.0598060	0		0.131683	0.0875100	0.0875100	0.0140456	3.50681E-05	0	0.0109961	0.0210773	
Nonane		0	0			0.197874	0.197874	0		0.602789	0.00612366	0.00612366	0.132236	8.02092E-09	0	0.0392795	0.0694988	
C10+		0	0			0.114266	0.114266	0		0.826703	0.00958516	0.00958516	0.0645123	2.49233E-09	0	0.0256499	0.0397060	
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	
Water		1004.23	128.899			0.00235679	0	0		0	0	0.00900873	4.04238E-06	0.0214353	0	7.44163E-05	0	
H2S		0	0			0	0	0		0	0	0	0	0	0	0	0	
Nitrogen		546.743	546.742			0.000119625	0	546.743		0.000638576	0	0.00127937	1.46159E-05	1.73571E-06	0	0.000276181	0	
Carbon Dioxide		254.765	254.743			0.00287444	0	254.765		0.000249524	0	0.00710807	0.0105089	0.000649731	0	0.000102523	0	
Methane		49182.9	49182.7			0.0771818	0	49182.9		0.0808566	0	0.203607	0.0491464	0.000767561	0	0.0245085	0	
Ethane		16847.3	16847.3			0.374424	0	16847.3		0.0494686	0	0.0707368	1.36241	0.000246105	0	0.00828194	0	
Propane		7819.38	7819.34			0.371831	0	7819.38		0.0267835	0	0.0264583	1.17031	2.24383E-05	0	0.00297624	0	
Isobutane		1299.52	1299.51			0.0801946	0	1299.52		0.00570381	0	0.00142977	0.235691	1.51838E-07	0	0.000476862	0	
n-Butane		2715.09	2715.08			0.136851	0	2715.09		0.0102434	0	0.00473027	0.396352	7.56022E-07	0	0.000764124	0	
Isopentane		1067.35	1067.35			0.0467560	0	1067.35		0.00436836	0	0.00101156	0.128720	4.05191E-08	0	0.000248254	0	
n-Pentane		829.625	829.623			0.0359390	0	829.625		0.00367652	0	0.000742586	0.0976433	2.16943E-08	0	0.000188258	0	
2-Methylpentane		0	0			0.0127439	0	0		0.00169982	0	0.000120951	0.0336048	6.74711E-10	0	6.71888E-05	0	
3-Methylpentane		0	0			0.00804309	0	0		0.00110552	0	0.000202416	0.0211983	2.73761E-09	0	4.23856E-05	0	
n-Hexane		1853.63	1853.63			0.0181326	0	1853.63		0.00273006	0	0.000136295	0.00324729	2.94459E-11	0	9.64849E-05	0	
Methylcyclopentane		0	0			0.00132675	0	0		0.000193173	0	9.55540E-05	0.00330561	2.77907E-09	0	6.92640E-06	0	
Benzene		0	0			0.000315716	0	0		4.77345E-05	0	0.000131922	5.00992E-05	1.17902E-08	0	1.63584E-06	0	
2-Methylhexane		0	0			0.00522023	0	0		0.00110602	0	4.37413E-05	0.000882807	3.99691E-12	0	2.89894E-05	0	
3-Methylhexane		0	0			0.00415402	0	0		0.000875462	0	3.62988E-05	0.0106023	4.97116E-11	0	2.30431E-05	0	
Heptane		0	0			0.00671979	0	0		0.00150868	0	6.15272E-05	0.0157936	6.18683E-11	0	3.78798E-05	0	
Methylcyclohexane		0	0			0.00404412	0	0		0.000845528	0	0.000192930	0.00967363	1.19846E-09	0	2.22086E-05	0	
Toluene		0	0			0.000828352	0	0		0.000185496	0	0.000327681	0.000278814	1.40908E-08	0	4.52577E-06	0	
Octane		0	0			0.00708663	0	0		0.00239920	0	3.85486E-05	0.0156882	7.55389E-12	0	4.23841E-05	0	
Ethylbenzene		0	0			0.000574264	0	0		0.000188382	0	0.000224971	0.000357891	5.44151E-09	0	3.33460E-06	0	
m-Xylene		0	0			0.000401971	0	0		0.000142740	0	0.000155842	0.000322862	4.20822E-09	0	2.35386E-06	0	
o-Xylene		0	0			0.000719222	0	0		0.000260876	0	0.000287226	0.000501898	8.10910E-09	0	4.21212E-06	0	
Nonane		0	0			0.00237962	0	0		0.00119418	0	2.00991E-05	0.00472526	1.85475E-12	0	1.50463E-05	0	
C10+		0	0			0.00137415	0	0		0.00163778	0	3.14604E-05	0.00230524	5.76323E-13	0	9.82536E-06	0	

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																
Temperature	°F	173.1	70.0			75.9	75.9	200.0		200.0	75.9	75.94	75.9425	75.9425	70	75.1550	70
Pressure	psig	200	198			0	0	300		300	0	0	8.61143	-14.2259	198	198	40
Mole Fraction Vapor	%	100	100			100	100	100		100	100	100	100	100	100	100	100
Mole Fraction Light Liquid	%	0	0			0	0	0		0	0	0	0	0	0	0	0
Mole Fraction Heavy Liquid	%	0	0			0	0	0		0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.8	20.9			38.1	38.1	20.9		25.2	19.9	19.8874	39.5055	18.3345	20.8830	19.9646	25.5371
Mass Density	lb/ft^3	0.7	0.8			0.1	0.1	1.0		1.2	0.1	0.0510181	0.163733	0.00149994	0.827315	0.777962	0.251249
Molar Flow	lbmol/h	4001.3	3952.7			0.0	0.0	3945.6		0.0	0.0	0.0165039	0.0904517	0.00126122	0	0.00191868	0
Mass Flow	lb/h	83420.6	82544.9			1.2	0.0	82416.3		0.2	0.0	0.328220	3.57334	0.0231239	0	0.0383057	0
Vapor Volumetric Flow	MCFH	122.8	99.8			0.0	0.0	85.5		0.0	0.0	0.00643341	0.0218241	0.0154165	0	4.92385E-05	0
Liquid Volumetric Flow	Mbbl/d	525.0	426.5			0.1	0.0	365.6		0.0	0.0	0.0275001	0.0932891	0.0658991	0	0.000210474	0
Std Vapor Volumetric Flow	MMSCFD	36.4	36.0			0.0	0.0	35.9		0.0	0.0	0.000150311	0.000823800	1.14867E-05	0	1.74746E-05	0
Std Liquid Volumetric Flow	Mbbl/d	16.6	16.5			0.0	0.0	16.5		0.0	0.0	6.61490E-05	0.000544432	1.74975E-06	0	7.87034E-06	0
Compressibility		0.970	0.945			0.987	0.987	0.964		0.943	0.997	0.996644	0.978361	0.999551	0.944521	0.951011	0.978033
Specific Gravity		0.720	0.721			1.315	1.315	0.721		0.870	0.687	0.686660	1.36402	0.633041	0.721033	0.689323	0.881728
API Gravity																	
Enthalpy	MMBtu/h	-136.9	-136.4			0.0	0.0	-130.2		0.0	0.0	-0.000606640	-0.00388047	-0.000128067	0	-6.50661E-05	0
Mass Enthalpy	Btu/lb	-1641.5	-1652.0			-1121.3	-1121.3	-1579.9		-1383.1	-1848.3	-1848.27	-1085.95	-5538.31	-1651.95	-1698.60	-1431.95
Mass Cp	Btu/(lb**F)	0.5	0.5			0.4	0.4	0.6		0.5	0.5	0.482040	0.410706	0.444342	0.505707	0.512015	0.453959
Ideal Gas CpCv Ratio		1.223	1.249			1.145	1.145	1.215		1.180	1.262	1.26242	1.14122	1.32249	1.24908	1.25805	1.21113

Dynamic Viscosity	cP	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0108013	0.00869517	0.0102384	0.0107482	0.0109227	0.00995640
Kinematic Viscosity	cSt	1.1	0.8			5.6	5.6	0.8		0.7	13.2	13.2170	3.31528	426.126	0.811046	0.876500	2.47387
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.0			0.0	0.0	0.0		0.0	0.0	0.0174352	0.0110751	0.0122571	0.0177466	0.0182192	0.0151985
Surface Tension	lbf/ft																
Net I.G. Heating Value	Btu/ft^3	1126.0	1139.8			2004.9	2004.9	1141.9		1360.9	1045.2	1045.24	2079.69	45.9812	1139.83	1093.86	1375.65
Net Liquid Heating Value	Btu/lb	20422.4	20650.2			19817.8	19817.8	20684.2		20410.4	19863.8	19863.8	19822.3	-34.5186	20650.2	20735.7	20337.8
Gross I.G. Heating Value	Btu/ft^3	1242.0	1256.6			2183.5	2183.5	1258.8		1493.4	1155.4	1155.36	2263.67	98.3227	1256.65	1207.37	1509.34
Gross Liquid Heating Value	Btu/lb	22534.1	22773.0			21597.1	21597.1	22808.7		22405.7	21965.2	21965.2	21589.5	1048.8	22773.0	22893.2	22324.3

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water			99.9642	99.9640	0.0602046	0.00993598	0.00993598		100	0	99.9969	99.9969	8.70574E-06	100.0000	99.9642	0.0686480	0.0332836
H2S			0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen			8.76093E-05	9.72016E-05	0.0122105	2.02655E-05	2.02655E-05		0	0.00929122	3.24148E-06	3.24148E-06	1.41211E-06	1.84074E-09	8.76093E-05	0.0113421	0.000799925
Carbon Dioxide			0.00102141	0.000806624	0.0315329	0.00406780	0.00406780		0	0.0132218	0.000474492	0.000474492	0.00800538	1.82492E-05	0.00102141	0.0317612	0.0157758
Methane			0.0269905	0.0279622	5.29007	0.0696712	0.0696712		0	4.58544	0.00185096	0.00185096	0.0251441	2.92948E-06	0.0269905	5.14131	0.945369
Ethane			0.00535239	0.00523969	5.52355	1.16040	1.16040		0	5.31068	0.000399853	0.000399853	2.35519	5.87309E-07	0.00535239	5.49220	3.37033
Propane			0.00181557	0.00134713	4.85594	3.03021	3.03021		0	4.78112	0.000112689	0.000112689	5.28335	4.05320E-08	0.00181557	4.85674	4.39720
Isobutane			7.37779E-05	5.22177E-05	1.44607	1.28185	1.28185		0	1.44764	1.60757E-06	1.60757E-06	2.06016	7.26991E-11	7.37779E-05	1.44770	1.46016
n-Butane			0.000331747	0.000179149	3.29288	3.15205	3.15205		0	3.29595	1.17123E-05	1.17123E-05	4.98414	7.97677E-10	0.000331747	3.29724	3.40066
Isopentane			6.84458E-05	3.02279E-05	2.10211	2.25293	2.25293		0	2.11782	1.38287E-06	1.38287E-06	3.37211	2.37194E-11	6.84458E-05	2.10593	2.24140
n-Pentane			5.17041E-05	2.21804E-05	2.12439	2.31981	2.31981		0	2.14277	1.00518E-06	1.00518E-06	3.41790	1.25733E-11	5.17041E-05	2.12836	2.27700
2-Methylpentane			0	2.95290E-06	1.47705	1.66660	1.66660		0	1.49444	6.52759E-08	6.52759E-08	2.38233	1.56422E-13	0	1.48002	1.59745
3-Methylpentane			0	5.12885E-06	1.04008	1.17646	1.17646		0	1.05276	2.96387E-07	2.96387E-07	1.67834	1.72205E-12	0	1.04218	1.12562
n-Hexane			3.41264E-05	3.31244E-06	2.91112	3.30643	3.30643		0	2.94359	5.84913E-08	5.84913E-08	0.320300	5.43462E-15	3.41264E-05	2.91706	3.15408
Methylcyclopentane			0	2.76589E-06	0.230663	0.262230	0.262230		0	0.233704	4.30091E-07	4.30091E-07	0.351038	5.36722E-12	0	0.231137	0.249978
Benzene			0	3.53613E-05	0.0610816	0.0694756	0.0694756		0	0.0647534	3.18974E-05	3.18974E-05	0.00583081	1.22117E-09	0	0.0611630	0.0662049
2-Methylhexane			0	9.15282E-07	1.69511	1.94408	1.94408		0	1.71684	1.71725E-08	1.71725E-08	0.175849	6.77366E-16	0	1.69864	1.84140
3-Methylhexane			0	7.60193E-07	1.41925	1.62828	1.62828		0	1.43754	1.48953E-08	1.48953E-08	2.22047	8.80403E-15	0	1.42222	1.54188
Heptane			0	1.28868E-06	2.89150	3.32197	3.32197		0	2.92920	2.53892E-08	2.53892E-08	4.15921	1.10319E-14	0	2.89755	3.14250
Methylcyclohexane			0	4.53507E-06	1.77378	2.03783	2.03783		0	1.79732	4.92571E-07	4.92571E-07	2.59594	1.31852E-12	0	1.77747	1.92775
Toluene			0	6.28268E-05	0.489631	0.563154	0.563154		0	0.501289	5.55287E-05	5.55287E-05	0.100461	1.02766E-09	0	0.490475	0.532295
Octane			0	7.03511E-07	8.50085	9.80226	9.80226		0	8.61538	9.20885E-09	9.20885E-09	11.4961	7.83264E-16	0	8.51876	9.24787
Ethylbenzene			0	3.42807E-05	0.874778	1.00896	1.00896		0	0.889462	2.99311E-05	2.99311E-05	0.331253	3.13178E-10	0	0.876555	0.951716
m-Xylene			0	2.44783E-05	0.731648	0.844070	0.844070		0	0.743606	2.14655E-05	2.14655E-05	0.356791	2.50904E-10	0	0.733117	0.796047
o-Xylene			0	5.90325E-05	1.47047	1.69664	1.69664		0	1.49536	5.34845E-05	5.34845E-05	0.621939	6.53501E-10	0	1.47337	1.59995
Nonane			0	3.29216E-07	7.69327	8.88101	8.88101		0	7.79854	6.80151E-09	6.80151E-09	9.39482	2.73831E-16	0	7.70951	8.37183
C10+			0	4.28701E-07	42.0008	48.5096	48.5096		0	42.5823	2.36626E-08	2.36626E-08	42.3033	1.90624E-16	0	42.0895	45.7114
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water			0	48.5878	0.000358346	0	5.12027E-05		55.7431	0	48.5873	0	0	0	48.5881	0.000407740	0.000182024
H2S			0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen			0	4.72451E-05	7.26784E-05	0	1.04433E-07		0	5.45452E-05	1.57500E-06	0	0	0	4.25830E-05	6.73670E-05	4.37471E-06
Carbon Dioxide			0	0.000392062	0.000187688	0	2.09624E-05		0	7.76200E-05	0.000230550	0	0	0	0.000496460	0.000188648	8.62765E-05
Methane			0	0.0135911	0.0314872	0	0.000359033		0	0.0269193	0.000899358	0	0	0	0.0131189	0.0305372	0.00517013
Ethane			0	0.00254676	0.0328769	0	0.00597986		0	0.0311770	0.000194284	0	0	0	0.00260156	0.0326214	0.0184320
Propane			0	0.000654776	0.0289032	0	0.0156154		0	0.0280681	5.47544E-05	0	0	0	0.000882468	0.0288470	0.0240478
Isobutane			0	2.53805E-05	0.00860718	0	0.00660573		0	0.00849856	7.81098E-07	0	0	0	3.58602E-05	0.00859873	0.00798549
n-Butane			0	8.70758E-05	0.0195997	0	0.0162433		0	0.0193493	5.69086E-06	0	0	0	0.000161247	0.0195842	0.0185979
Isopentane			0	1.46923E-05	0.0125120	0	0.0116099		0	0.0124329	6.71921E-07	0	0	0	3.32685E-05	0.0125083	0.0122580
n-Pentane			0	1.07808E-05	0.0126447	0	0.0119546		0	0.0125793	4.88404E-07	0	0	0	2.51311E-05	0.0126416	0.0124527
2-Methylpentane			0	1.43527E-06	0.00879159	0	0.00858843		0	0.00877330	3.17167E-08	0	0	0	0	0.00879072	0.00873631
3-Methylpentane			0	2.49289E-06	0.00619070	0	0.00606258		0	0.00618036	1.44011E-07	0	0	0	0	0.00619009	0.00615591
n-Hexane			0	1.61002E-06	0.0173274	0	0.0170389		0	0.0172807	2.84202E-08	0	0	0	1.65873E-05	0.0173261	0.0172493
Methylcyclopentane			0	1.34437E-06	0.00137294	0	0.00135134		0	0.00137199	2.08976E-07	0	0	0	0	0.00137285	0.00136710
Benzene			0	1.71875E-05	0.000363566	0	0.000358026		0	0.000380142	1.54986E-05	0	0	0	0	0.000363283	0.000362068
2-Methylhexane			0	4.44875E-07	0.0100895	0	0.0100183		0	0.0100789	8.34391E-09	0	0	0	0	0.0100892	0.0100704
3-Methylhexane			0	3.69494E-07	0.00844760	0	0.00839095		0	0.00843923	7.23743E-09	0	0	0	0	0.00844736	0.00843241
Heptane			0	6.26368E-07	0.0172106	0	0.0171189		0	0.0171962	1.23363E-08	0	0	0	0	0.0172103	0.0171860
Methylcyclohexane			0	2.20428E-06	0.0105578	0	0.0105015		0	0.0105513	2.39334E-07	0	0	0	0	0.0105574	0.0105427
Toluene			0	3.05371E-05	0.00291435	0	0.00290208		0	0.00294288	2.69807E-05	0	0	0	0	0.00291322	0.00291107
Octane			0	3.41944E-07	0.0505982	0	0.0505136		0	0.0505776	4.47446E-09	0	0	0	0	0.0505978	0.0505756
Ethylbenzene			0	1.66622E-05	0.00520680	0	0.00519943		0	0.00522169	1.45432E-05	0	0	0	0	0.00520637	0.00520484
m-Xylene			0	1.18978E-05	0.00435487	0	0.00434971		0	0.00436542	1.04298E-05	0	0	0	0	0.00435441	0.00435350

o-Xylene			0	2.86929E-05	0.00875243	0	0.00874321		0	0.00877867	2.59875E-05	0	0	0	0	0.00875118	0.00874998
Nonane			0	1.60017E-07	0.0457914	0	0.0457661		0	0.0457822	3.30477E-09	0	0	0	0	0.0457913	0.0457847
C10+			0	2.08371E-07	0.249994	0	0.249982		0	0.249984	1.14974E-08	0	0	0	0	0.249994	0.249991
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water			99.9580	99.9587	0.00954972	0.00141555	0.00141555		100	0	99.9951	99.9951	1.31247E-06	100.0000	99.9580	0.0108704	0.00494105
H2S			0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen			0.000136222	0.000151138	0.00301175	4.48948E-06	4.48948E-06		0	0.00226738	5.04035E-06	5.04035E-06	3.31037E-07	2.86231E-09	0.000136222	0.00279277	0.000184656
Carbon Dioxide			0.00249504	0.00197040	0.0122188	0.00141572	0.00141572		0	0.00506900	0.00115911	0.00115911	0.00294830	4.45809E-05	0.00249504	0.0122863	0.00572120
Methane			0.0240333	0.0248988	0.747227	0.00883886	0.00883886		0	0.640822	0.00164823	0.00164823	0.00337560	2.60868E-06	0.0240333	0.724976	0.124974
Ethane			0.00893304	0.00874502	1.46237	0.275931	0.275931		0	1.39109	0.000667377	0.000667377	0.592637	9.80269E-07	0.00893304	1.45159	0.835104
Propane			0.00444366	0.00329717	1.88533	1.05667	1.05667		0	1.83658	0.000275822	0.000275822	1.94961	9.92093E-08	0.00444366	1.88243	1.59779
Isobutane			0.000238013	0.000168460	0.740031	0.589187	0.589187		0	0.732976	5.18636E-06	5.18636E-06	1.00204	2.34547E-10	0.000238013	0.739604	0.699346
n-Butane			0.00107024	0.000577953	1.68515	1.44880	1.44880		0	1.66882	3.77864E-05	3.77864E-05	2.42424	2.57352E-09	0.00107024	1.68450	1.62875
Isopentane			0.000274099	0.000121052	1.33538	1.28543	1.28543		0	1.33108	5.53812E-06	5.53812E-06	2.03598	9.49930E-11	0.000274099	1.33552	1.33259
n-Pentane			0.000207055	8.88247E-05	1.34953	1.32359	1.32359		0	1.34676	4.02553E-06	4.02553E-06	2.06363	5.03546E-11	0.000207055	1.34975	1.35376
2-Methylpentane			0	1.41243E-05	1.12072	1.13576	1.13576		0	1.12188	3.12239E-07	3.12239E-07	1.71802	7.48239E-13	0	1.12106	1.13438
3-Methylpentane			0	2.45323E-05	0.789169	0.801735	0.801735		0	0.790314	1.41773E-06	1.41773E-06	1.21034	8.23736E-12	0	0.789410	0.799326
n-Hexane			0.000163232	1.58441E-05	2.20883	2.25328	2.25328		0	2.20977	2.79786E-07	2.79786E-07	0.230985	2.59963E-14	0.000163232	2.20957	2.23977
Methylcyclopentane			0	1.29203E-05	0.170923	0.174525	0.174525		0	0.171339	2.00916E-06	2.00916E-06	0.247230	2.50733E-11	0	0.170982	0.173361
Benzene			0	0.000153314	0.0420095	0.0429162	0.0429162		0	0.0440621	0.000138300	0.000138300	0.00381144	5.29483E-09	0	0.0419937	0.0426143
2-Methylhexane			0	5.09057E-06	1.49553	1.54050	1.54050		0	1.49862	9.55127E-08	9.55127E-08	0.147455	3.76754E-15	0	1.49609	1.52045
3-Methylhexane			0	4.22801E-06	1.25215	1.29026	1.29026		0	1.25482	8.28469E-08	8.28469E-08	1.86194	4.89685E-14	0	1.25262	1.27314
Heptane			0	7.16735E-06	2.55106	2.63235	2.63235		0	2.55688	1.41214E-07	1.41214E-07	3.48763	6.13602E-14	0	2.55203	2.59477
Methylcyclohexane			0	2.47155E-05	1.53345	1.58231	1.58231		0	1.53730	2.68454E-06	2.68454E-06	2.13299	7.18613E-12	0	1.53402	1.55973
Toluene			0	0.000321308	0.397219	0.410336	0.410336		0	0.402360	0.000283994	0.000283994	0.0774611	5.25595E-09	0	0.397225	0.404149
Octane			0	4.46048E-06	8.54982	8.85468	8.85468		0	8.57304	5.83890E-08	5.83890E-08	10.9892	4.96640E-15	0	8.55321	8.70491
Ethylbenzene			0	0.000202007	0.817710	0.847085	0.847085		0	0.822611	0.000176383	0.000176383	0.294296	1.84557E-09	0	0.817973	0.832601
m-Xylene			0	0.000144244	0.683917	0.708651	0.708651		0	0.687717	0.000126495	0.000126495	0.316985	1.47859E-09	0	0.684121	0.696415
o-Xylene			0	0.000347863	1.37454	1.42443	1.42443		0	1.38297	0.000315181	0.000315181	0.552552	3.85112E-09	0	1.37490	1.39971
Nonane			0	2.34365E-06	8.68772	9.00760	9.00760		0	8.71312	4.84207E-08	4.84207E-08	10.0834	1.94946E-15	0	8.69120	8.84797
C10+			0	3.80248E-06	59.0954	61.3023	61.3023		0	59.2777	2.09889E-07	2.09889E-07	56.5712	1.69088E-15	0	59.1193	60.1935
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Water			0	875.322	0.00645570	0	0.000922431		1004.23	0	875.313	0	0	0	875.329	0.00734556	0.00327922
H2S			0	0	0	0	0		0	0	0	0	0	0	0	0	0
Nitrogen			0	0.00132350	0.00203597	0	2.92554E-06		0	0.00152800	4.41210E-05	0	0	0	0.00119289	0.00188718	0.000122550
Carbon Dioxide			0	0.0172544	0.00826005	0	0.000922545		0	0.00341602	0.0101464	0	0	0	0.0218490	0.00830232	0.00379698
Methane			0	0.218035	0.505133	0	0.00575978		0	0.431852	0.0144279	0	0	0	0.210459	0.489892	0.0829416
Ethane			0	0.0765788	0.988578	0	0.179809		0	0.937461	0.00584193	0	0	0	0.0782263	0.980893	0.554233
Propane			0	0.0288728	1.27450	0	0.688573		0	1.23768	0.00241443	0	0	0	0.0389130	1.27203	1.06040
Isobutane			0	0.00147517	0.500268	0	0.383939		0	0.493955	4.53991E-05	0	0	0	0.00208427	0.499777	0.464134
n-Butane			0	0.00506104	1.13918	0	0.944098		0	1.12462	0.000330765	0	0	0	0.00937205	1.13828	1.08095
Isopentane			0	0.00106003	0.902729	0	0.837643		0	0.897020	4.84783E-05	0	0	0	0.00240028	0.902459	0.884399
n-Pentane			0	0.000777824	0.912296	0	0.862507		0	0.907585	3.52378E-05	0	0	0	0.00181318	0.912075	0.898446
2-Methylpentane			0	0.000123685	0.757618	0	0.740111		0	0.756042	2.73320E-06	0	0	0	0	0.757543	0.752855
3-Methylpentane			0	0.000214826	0.533486	0	0.522445		0	0.532595	1.24102E-05	0	0	0	0	0.533433	0.530488
n-Hexane			0	0.000138744	1.49319	0	1.46833		0	1.48917	2.44912E-06	0	0	0	0.00142942	1.49309	1.48647
Methylcyclopentane			0	0.000113141	0.115546	0	0.113728		0	0.115466	1.75873E-05	0	0	0	0	0.115539	0.115055
Benzene			0	0.00134254	0.0283988	0	0.0279661		0	0.0296936	0.00121062	0	0	0	0	0.0283767	0.0282818
2-Methylhexane			0	4.45773E-05	1.01099	0	1.00386		0	1.00993	8.36076E-07	0	0	0	0	1.01096	1.00908
3-Methylhexane			0	3.70240E-05	0.846466	0	0.840790		0	0.845627	7.25205E-07	0	0	0	0	0.846442	0.844944
Heptane			0	6.27633E-05	1.72454	0	1.71535		0	1.72309	1.23612E-06	0	0	0	0	1.72450	1.72207
Methylcyclohexane			0	0.000216430	1.03662	0	1.03110		0	1.03600	2.34993E-05	0	0	0	0	1.03659	1.03514
Toluene			0	0.00281364	0.268524	0	0.267393		0	0.271152	0.00248596	0	0	0	0	0.268419	0.268221
Octane			0	3.90597E-05	5.77976	0	5.77009		0	5.77740	5.11111E-07	0	0	0	0	5.77971	5.77718
Ethylbenzene			0	0.00176895	0.552780	0	0.551997		0	0.554360	0.00154398	0	0	0	0	0.552734	0.552571
m-Xylene			0	0.00126313	0.462335	0	0.461787		0	0.463455	0.00110728	0	0	0	0	0.462286	0.462189
o-Xylene			0	0.00304618	0.929202	0	0.928223		0	0.931987	0.00275896	0	0	0	0	0.929069	0.928942
Nonane			0	2.05229E-05	5.87298	0	5.86974		0	5.87181	4.23854E-07	0	0	0	0	5.87296	5.87212
C10+			0	3.32977E-05	39.9491	0	39.9472		0	39.9475	1.83728E-06	0	0	0	0	39.9491	39.9486

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																
Temperature	°F		70.0	70.0	70.0	75.9	75.9		200.0	200.0	75.9	75.94	75.9425	75.9425	70	75.1550	70

Pressure	psig		198	198	198	0	0		200	300	0	0	8.61143	-14.2259	198	198	40
Mole Fraction Vapor	%		0	0	0	0	0		0	0	0	0	0	0	0	0	0
Mole Fraction Light Liquid	%		100	100	100	100	100		100	100	100	100	100	100	100	100	100
Mole Fraction Heavy Liquid	%		0	0	0	0	0		0	0	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol		18.0	18.0	113.6	126.5	126.5		18.0	114.8	18.0	18.0156	119.497	18.0153	18.0164	113.768	121.353
Mass Density	lb/ft^3		62.3	62.3	45.8	46.3	46.3		60.2	41.9	62.2	62.2170	45.6123	62.2179	62.2605	45.6750	46.2337
Molar Flow	lbmol/h		0.0	48.6	0.6	0.0	0.5		55.7	0.6	48.6	0	0	0	48.6056	0.593958	0.546890
Mass Flow	lb/h		0.0	875.7	67.6	0.0	65.2		1004.2	67.4	875.4	0	0	0	875.697	67.5736	66.3669
Vapor Volumetric Flow	MCFH		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0	0	0	0.0140650	0.00147944	0.00143547
Liquid Volumetric Flow	Mbbl/d		0.0	0.1	0.0	0.0	0.0		0.1	0.0	0.1	0	0	0	0.0601222	0.00632401	0.00613602
Std Vapor Volumetric Flow	MMSCFD		0.0	0.4	0.0	0.0	0.0		0.5	0.0	0.4	0	0	0	0.442681	0.00540955	0.00498087
Std Liquid Volumetric Flow	Mbbl/d		0.0	0.1	0.0	0.0	0.0		0.1	0.0	0.1	0	0	0	0.0600670	0.00640417	0.00618250
Compressibility			0.011	0.011	0.093	0.007	0.007		0.009	0.122	0.001	0.000740329	0.0106231	2.36775E-05	0.0108279	0.0923053	0.0252568
Specific Gravity			0.998	0.998	0.735	0.743	0.743		0.964	0.672	0.998	0.997563	0.731330	0.997577	0.998260	0.732335	0.741292
API Gravity			10.0	10.0	59.9	57.1	57.1		10.0	59.4	10.0	10.0154	60.0348	10.0135	10.0473	59.8156	58.1953
Enthalpy	MMBtu/h		0.0	-6.0	-0.1	0.0	-0.1		-6.7	-0.1	-6.0	0	0	0	-5.97740	-0.0558281	-0.0541225
Mass Enthalpy	Btu/lb		-6825.9	-6825.9	-829.0	-804.2	-804.2		-6699.9	-758.0	-6822.4	-6822.39	-838.394	-6822.67	-6825.88	-826.182	-815.504
Mass Cp	Btu/(lb*°F)		1.0	1.0	0.5	0.5	0.5		1.0	0.6	1.0	0.982734	0.483066	0.982746	0.983052	0.482857	0.476127
Ideal Gas CpCv Ratio			1.326	1.326	1.049	1.044	1.044		1.320	1.040	1.326	1.32555	1.04620	1.32556	1.32581	1.04888	1.04626
Dynamic Viscosity	cP		1.0	1.0	0.6	0.7	0.7		0.3	0.3	0.9	0.924439	0.602424	0.924435	0.995519	0.554788	0.655631
Kinematic Viscosity	cSt		1.0	1.0	0.8	0.9	0.9		0.3	0.4	0.9	0.927573	0.824517	0.927556	0.998196	0.758277	0.885279
Thermal Conductivity	Btu/(h*ft*°F)		0.3	0.3	0.1	0.1	0.1		0.4	0.1	0.3	0.349784	0.0680884	0.349835	0.346525	0.0677839	0.0685497
Surface Tension	lbf/ft		0.005	0.005	0.001	0.002	0.002		0.004	0.001	0.005	0.00499713	0.00155843	0.00499737	0.00503986	0.00145370	0.00159920
Net I.G. Heating Value	Btu/ft^3		0.4	0.4	5698.0	6329.5	6329.5		0.0	5758.7	0.0	0.0351925	6001.74	3.72636E-05	0.392291	5707.41	6079.88
Net Liquid Heating Value	Btu/lb		-1051.1	-1051.1	18872.8	18827.7	18827.7		-1059.8	18871.3	-1059.0	-1058.97	18895.9	-1059.76	-1051.08	18871.8	18845.6
Gross I.G. Heating Value	Btu/ft^3		50.7	50.7	6111.0	6783.1	6783.1		50.3	6175.6	50.3	50.3468	6439.32	50.3100	50.7246	6121.05	6517.59
Gross Liquid Heating Value	Btu/lb		9.1	9.0	20252.0	20188.0	20188.0		0.0	20248.8	0.8	0.803611	20284.9	0.000832568	9.08775	20250.7	20213.5

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water					99.9640											99.9653	
H2S					0											0	
Nitrogen					9.72016E-05											8.78469E-05	
Carbon Dioxide					0.000806624											0.000799866	
Methane					0.0279622											0.0267740	
Ethane					0.00523969											0.00519889	
Propane					0.00134713											0.00132391	
Isobutane					5.22177E-05											5.27152E-05	
n-Butane					0.000179149											0.000183935	
Isopentane					3.02279E-05											3.08434E-05	
n-Pentane					2.21804E-05											2.31361E-05	
2-Methylpentane					2.95290E-06											3.13687E-06	
3-Methylpentane					5.12885E-06											5.37762E-06	
n-Hexane					3.31244E-06											3.52502E-06	
Methylcyclopentane					2.76589E-06											2.76806E-06	
Benzene					3.53613E-05											3.59019E-05	
2-Methylhexane					9.15282E-07											9.26928E-07	
3-Methylhexane					7.60193E-07											7.71956E-07	
Heptane					1.28868E-06											1.26060E-06	
Methylcyclohexane					4.53507E-06											4.71548E-06	
Toluene					6.28268E-05											6.50637E-05	
Octane					7.03511E-07											7.57149E-07	
Ethylbenzene					3.42807E-05											3.50999E-05	
m-Xylene					2.44783E-05											2.53826E-05	
o-Xylene					5.90325E-05											6.15318E-05	
Nonane					3.29216E-07											3.54566E-07	
C10+					4.28701E-07											4.61669E-07	
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Water					0											48.5877	
H2S					0											0	
Nitrogen					0											4.26976E-05	
Carbon Dioxide					0											0.000388772	
Methane					0											0.0130134	

Ethane					0											0.00252690	
Propane					0											0.000643482	
Isobutane					0											2.56220E-05	
n-Butane					0											8.94008E-05	
Isopentane					0											1.49913E-05	
n-Pentane					0											1.12452E-05	
2-Methylpentane					0											1.52466E-06	
3-Methylpentane					0											2.61377E-06	
n-Hexane					0											1.71332E-06	
Methylcyclopentane					0											1.34540E-06	
Benzene					0											1.74500E-05	
2-Methylhexane					0											4.50530E-07	
3-Methylhexane					0											3.75206E-07	
Heptane					0											6.12709E-07	
Methylcyclohexane					0											2.29194E-06	
Toluene					0											3.16240E-05	
Octane					0											3.68009E-07	
Ethylbenzene					0											1.70602E-05	
m-Xylene					0											1.23371E-05	
o-Xylene					0											2.99073E-05	
Nonane					0											1.72335E-07	
C10+					0											2.24392E-07	
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water					99.9587											99.9598	
H2S					0											0	
Nitrogen					0.000151138											0.000136593	
Carbon Dioxide					0.00197040											0.00195389	
Methane					0.0248988											0.0238407	
Ethane					0.00874502											0.00867691	
Propane					0.00329717											0.00324033	
Isobutane					0.000168460											0.000170064	
n-Butane					0.000577953											0.000593391	
Isopentane					0.000121052											0.000123517	
n-Pentane					8.88247E-05											9.26520E-05	
2-Methylpentane					1.41243E-05											1.50043E-05	
3-Methylpentane					2.45323E-05											2.57222E-05	
n-Hexane					1.58441E-05											1.68609E-05	
Methylcyclopentane					1.29203E-05											1.29305E-05	
Benzene					0.000153314											0.000155657	
2-Methylhexane					5.09057E-06											5.15534E-06	
3-Methylhexane					4.22801E-06											4.29343E-06	
Heptane					7.16735E-06											7.01114E-06	
Methylcyclohexane					2.47155E-05											2.56987E-05	
Toluene					0.000321308											0.000332748	
Octane					4.46048E-06											4.80055E-06	
Ethylbenzene					0.000202007											0.000206834	
m-Xylene					0.000144244											0.000149573	
o-Xylene					0.000347863											0.000362591	
Nonane					2.34365E-06											2.52410E-06	
C10+					3.80248E-06											4.09489E-06	
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Water					0											875.321	
H2S					0											0	
Nitrogen					0											0.00119611	
Carbon Dioxide					0											0.0171097	
Methane					0											0.208767	
Ethane					0											0.0759814	
Propane					0											0.0283747	
Isobutane					0											0.00148921	
n-Butane					0											0.00519617	
Isopentane					0											0.00108161	
n-Pentane					0											0.000811329	
2-Methylpentane					0											0.000131389	
3-Methylpentane					0											0.000225242	

n-Hexane					0											0.000147646	
Methylcyclopentane					0											0.000113229	
Benzene					0											0.00136305	
2-Methylhexane					0											4.51439E-05	
3-Methylhexane					0											3.75964E-05	
Heptane					0											6.13946E-05	
Methylcyclohexane					0											0.000225037	
Toluene					0											0.00291378	
Octane					0											4.20371E-05	
Ethylbenzene					0											0.00181119	
m-Xylene					0											0.00130977	
o-Xylene					0											0.00317511	
Nonane					0											2.21029E-05	
C10+					0											3.58579E-05	

Process Streams		Well Stream	HP Separator Gas	HP Separator Water	HP Separator Oil	OT Flash Gas	Sales Oil	Gas	Water	Oil	Produced Water	PWT Flash Gas	Oil W/B	Water W/B	1	3	LP Separator Oil
Phase: Heavy Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	Units																
Temperature	°F				70.0											75.1550	
Pressure	psig				198											198	
Mole Fraction Vapor	%				0											0	
Mole Fraction Light Liquid	%				0											0	
Mole Fraction Heavy Liquid	%				100											100	
Molecular Weight	lb/lbmol				18.0											18.0163	
Mass Density	lb/ft^3				62.3											62.2116	
Molar Flow	lbmol/h				0.0											48.6046	
Mass Flow	lb/h				0.0											875.673	
Vapor Volumetric Flow	MCFH				0.0											0.0140757	
Liquid Volumetric Flow	Mbbl/d				0.0											0.0601679	
Std Vapor Volumetric Flow	MMSCFD				0.0											0.442673	
Std Liquid Volumetric Flow	Mbbl/d				0.0											0.0600638	
Compressibility					0.011											0.0107319	
Specific Gravity					0.998											0.997476	
API Gravity					10.0											10.0456	
Enthalpy	MMBtu/h				0.0											-5.97286	
Mass Enthalpy	Btu/lb				-6825.9											-6820.88	
Mass Cp	Btu/(lb*°F)				1.0											0.982675	
Ideal Gas CpCv Ratio					1.326											1.32556	
Dynamic Viscosity	cP				1.0											0.933460	
Kinematic Viscosity	cSt				1.0											0.936706	
Thermal Conductivity	Btu/(h*ft*°F)				0.3											0.348919	
Surface Tension	lbf/ft				0.005											0.00500065	
Net I.G. Heating Value	Btu/ft^3				0.4											0.378672	
Net Liquid Heating Value	Btu/lb				-1051.1											-1051.38	
Gross I.G. Heating Value	Btu/ft^3				50.7											50.7100	
Gross Liquid Heating Value	Btu/lb				9.0											8.8	

October 7, 2013

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Antero Resources Appalachian Corp.
1625 17th Street
Denver, Colorado 80202

Sample: Yoke No. 1H (Maxwell Horizontal Pad)
Separator Hydrocarbon Liquid
Sampled @ 200 psig & 69 °F

Date Sampled: 09/25/13 Job Number: 35843.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.014	0.005	0.006
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.282	2.094	1.685
2,2 Dimethylpropane	0.111	0.086	0.071
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
2,2 Dimethylbutane	0.190	0.160	0.144
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.281	0.233	0.214
2 Methylpentane	1.478	1.241	1.125
3 Methylpentane	1.041	0.860	0.792
n-Hexane	1.974	1.643	1.502
Heptanes Plus	70.350	82.174	86.993
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7687	(Water=1)
°API Gravity	52.59	@ 60°F
Molecular Weight	140.0	
Vapor Volume	17.42	CF/Gal
Weight	6.40	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.7261	(Water=1)
°API Gravity	63.39	@ 60°F
Molecular Weight	113.2	
Vapor Volume	20.35	CF/Gal
Weight	6.05	Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: T-943

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.014	0.005	0.006
Nitrogen	0.013	0.003	0.003
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.393	2.180	1.756
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
Other C-6's	2.989	2.494	2.275
Heptanes	6.705	6.069	5.827
Octanes	10.280	9.819	9.895
Nonanes	7.698	8.452	8.624
Decanes Plus	42.021	55.063	59.304
Benzene	0.064	0.036	0.044
Toluene	0.495	0.336	0.403
E-Benzene	0.878	0.686	0.823
Xylenes	2.210	1.712	2.072
n-Hexane	1.974	1.643	1.502
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.7261	(Water=1)
°API Gravity	63.39	@ 60°F
Molecular Weight	113.2	
Vapor Volume	20.35	CF/Gal
Weight	6.05	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7820	(Water=1)
Molecular Weight	159.8	

Characteristics of Atmospheric Sample:

°API Gravity	56.94	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	2.51	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	T-943*	T-966
Pressure, PSIG	200	198	209
Temperature, °F	69	70	70

* Sample used for analysis

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.014	0.005	0.006
Methane	5.372	1.842	0.761
Ethane	5.517	2.986	1.465
Propane	4.820	2.687	1.877
Isobutane	1.445	0.957	0.742
n-Butane	3.282	2.094	1.685
2,2 Dimethylpropane	0.111	0.086	0.071
Isopentane	2.100	1.554	1.338
n-Pentane	2.012	1.476	1.282
2,2 Dimethylbutane	0.190	0.160	0.144
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.281	0.233	0.214
2 Methylpentane	1.478	1.241	1.125
3 Methylpentane	1.041	0.860	0.792
n-Hexane	1.974	1.643	1.502
Methylcyclopentane	0.231	0.166	0.172
Benzene	0.064	0.036	0.044
Cyclohexane	0.465	0.321	0.346
2-Methylhexane	1.696	1.596	1.501
3-Methylhexane	1.420	1.319	1.256
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.906	0.814	0.794
n-Heptane	1.987	1.855	1.758
Methylcyclohexane	1.775	1.444	1.539
Toluene	0.495	0.336	0.403
Other C-8's	6.320	6.110	6.152
n-Octane	2.185	2.265	2.204
E-Benzene	0.878	0.686	0.823
M & P Xylenes	0.734	0.576	0.688
O-Xylene	1.476	1.136	1.384
Other C-9's	5.324	5.750	5.936
n-Nonane	2.373	2.702	2.688
Other C-10's	8.709	10.336	10.867
n-decane	2.435	3.024	3.060
Undecanes(11)	11.327	13.792	14.705
Dodecanes(12)	8.408	11.059	11.955
Tridecanes(13)	5.532	7.802	8.550
Tetradecanes(14)	2.884	4.357	4.840
Pentadecanes(15)	1.477	2.391	2.688
Hexadecanes(16)	0.586	1.013	1.148
Heptadecanes(17)	0.267	0.487	0.558
Octadecanes(18)	0.187	0.359	0.414
Nonadecanes(19)	0.095	0.190	0.220
Eicosanes(20)	0.047	0.098	0.114
Heneicosanes(21)	0.025	0.055	0.065
Docosanes(22)	0.019	0.043	0.051
Tricosanes(23)	0.008	0.020	0.024
Tetracosanes(24)	0.005	0.013	0.015
Pentacosanes(25)	0.003	0.008	0.010
Hexacosanes(26)	0.002	0.005	0.005
Heptacosanes(27)	0.001	0.003	0.004
Octacosanes(28)	0.001	0.002	0.003
Nonacosanes(29)	0.001	0.002	0.002
Triacontanes(30)	0.000	0.001	0.001
Hentriacontanes Plus(31+)	0.001	0.003	0.004
Total	100.000	100.000	100.000

October 14, 2013

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Antero Resources Appalachian Corp.
1625 17th Street
Denver, Colorado 80202

Date Sampled: 09/25/2013

Date Analyzed: 10/02/2013

Sample: Yoke No. 1H(Maxwell Horizontal Pad)

Job Number: J35843

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	**Stock Tank**
Pressure, psig	200	0
Temperature, °F	69	70
Gas Oil Ratio (1)	-----	142
Gas Specific Gravity (2)	-----	1.144
Separator Volume Factor (3)	1.0761	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.9293
Oil API Gravity at 60 °F	56.94
Reid Vapor Pressure, psi (5)	2.51

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	-----	T-943*	T-966
Pressure, psig	200	198	209
Temperature, °F	69	70	70

(1) - Scf of flashed vapor per barrel of stock tank oil
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
(4) - Fraction of first stage separator liquid
(5) - Absolute pressure at 100 deg F
Analyst: O. A.
* Sample used for flash study
Base Conditions: 14.73 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

October 14, 2013

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Antero Resources Appalachian Corp.
1625 17th Street
Denver, Colorado 80202

Sample: Yoke No. 1H (Maxwell Horizontal Pad)
Gas Evolved from Hydrocarbon Liquid Flashed
From 200 psig & 69 °F to 0 psig & 70 °F

Date Sampled: 09/25/13 Job Number: 35843.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.250	
Carbon Dioxide	0.123	
Methane	35.935	
Ethane	30.932	8.225
Propane	18.489	5.065
Isobutane	3.361	1.094
n-Butane	5.774	1.810
2-2 Dimethylpropane	0.073	0.028
Isopentane	1.682	0.612
n-Pentane	1.243	0.448
Hexanes	1.135	0.466
Heptanes Plus	1.003	0.440
Totals	100.000	18.186

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.585	(Air=1)
Molecular Weight	102.82	
Gross Heating Value	5398	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.144	(Air=1)
Compressibility (Z)	0.9902	
Molecular Weight	32.81	
Gross Heating Value		
Dry Basis	1914	BTU/CF
Saturated Basis	1882	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: ANB
Cylinder ID: ST-20

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.250		0.213
Carbon Dioxide	0.123		0.165
Methane	35.935		17.569
Ethane	30.932	8.225	28.350
Propane	18.489	5.065	24.850
Isobutane	3.361	1.094	5.954
n-Butane	5.774	1.810	10.229
2,2 Dimethylpropane	0.073	0.028	0.161
Isopentane	1.682	0.612	3.699
n-Pentane	1.243	0.448	2.734
2,2 Dimethylbutane	0.070	0.029	0.184
Cyclopentane	0.102	0.042	0.218
2,3 Dimethylbutane	0.371	0.151	0.975
2 Methylpentane	0.231	0.095	0.607
3 Methylpentane	0.000	0.000	0.000
n-Hexane	0.361	0.148	0.948
Methylcyclopentane	0.035	0.012	0.090
Benzene	0.019	0.005	0.045
Cyclohexane	0.053	0.018	0.136
2-Methylhexane	0.106	0.049	0.324
3-Methylhexane	0.105	0.048	0.321
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.117	0.051	0.354
n-Heptane	0.114	0.052	0.348
Methylcyclohexane	0.101	0.040	0.302
Toluene	0.038	0.013	0.107
Other C8's	0.159	0.074	0.534
n-Octane	0.039	0.020	0.136
Ethylbenzene	0.002	0.001	0.006
M & P Xylenes	0.018	0.007	0.058
O-Xylene	0.002	0.001	0.006
Other C9's	0.062	0.031	0.239
n-Nonane	0.012	0.007	0.047
Other C10's	0.018	0.010	0.078
n-Decane	0.003	0.002	0.013
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	18.186	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.144	(Air=1)
Compressibility (Z)	0.9902	
Molecular Weight	32.81	
Gross Heating Value		
Dry Basis	1914	BTU/CF
Saturated Basis	1882	BTU/CF

Antero Resources
Yoke Unit 1H - Maxwell Horizontal Pad

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	1096710	MCF	10/22/2013 15:07:41
Casing Pressure	230.75	PSIA	10/22/2013 15:07:40
Current Day Gas Flow	884.15	MCF	10/22/2013 15:07:41
Differential Pressure	8.09	inH2O	10/22/2013 15:07:41
Flow Rate	3450.06	MCF Per Day	10/22/2013 15:07:41
Pressure	170	PSIA	10/22/2013 15:07:41
Previous Day Energy	4288.41	MBTU	10/22/2013 15:07:41
Previous Day Gas Flow	3438.81	MCF	10/22/2013 15:07:41
Temperature	65.59	F	10/22/2013 15:07:41
Tubing Pressure	372.66	PSIA	10/22/2013 15:07:40
Daily AP	8.05	PSIA	10/22/2013 09:00:00
Daily DP	169.51	inH2O	10/22/2013 09:00:00
Daily Energy	4288.41	MBTU	10/22/2013 09:00:00
Daily Flow	3438.81	MCF	10/22/2013 09:00:00
Daily Tf	65.05	F	10/22/2013 09:00:00
Hourly AP	169.39	PSIA	10/22/2013 10:00:00
Hourly DP	8	Inches	10/22/2013 10:00:00
Hourly Energy	178.4	MBTU	10/22/2013 10:00:00
Hourly Flow Time	3600	Seconds	10/22/2013 10:00:00
Hourly Tf	63.5	F	10/22/2013 10:00:00
Hourly Volume	143	MCF	10/22/2013 10:00:00
Argon	0	%	10/22/2013 15:07:44
BTU	1247.06	BTU	10/22/2013 15:07:41
C02	0.1467	%	10/22/2013 15:07:44
Carbon Monoxide	0	%	10/22/2013 15:07:44
Decane	0	%	10/22/2013 15:07:44
Ethane	14.1987	%	10/22/2013 15:07:44
Helium	0	%	10/22/2013 15:07:44
Heptane	0	%	10/22/2013 15:07:44
Hexane	0.5451	%	10/22/2013 15:07:44
Hydrogen	0	%	10/22/2013 15:07:44
Hydrogen Sulfide	0	%	10/22/2013 15:07:44
Iso-Butane	0.5666	%	10/22/2013 15:07:44
Iso-Pentane	0.3749	%	10/22/2013 15:07:44
Methane	77.6927	%	10/22/2013 15:07:44
N2	0.4946	%	10/22/2013 15:07:44
N-Butane	1.1838	%	10/22/2013 15:07:44
Nonane	0	%	10/22/2013 15:07:44
N-Pentane	0.2914	%	10/22/2013 15:07:44
Octane	0	%	10/22/2013 15:07:44
Oxygen	0.0117	%	10/22/2013 15:07:44
Plate Size	3.75	Inches	10/22/2013 15:07:43
Propane	4.4938	%	10/22/2013 15:07:44
SPG	0.7248		10/22/2013 15:07:41
Water	0	%	10/22/2013 15:07:44

Attachment J
Class I Legal Advertisement

Attachment J

Air Quality Permit Notice
Notice of Application
Snake Run Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

Notice is given that Antero Resources Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-A Permit Modification Application for an Oil and Natural Gas facility located at 4795 Meathouse Ford Rd. New Milton, WV 26411 in Doddridge County, West Virginia.

The latitude and longitude coordinates are: 39.204868 degrees N and -80.651022 degrees W

The applicant estimates the increased potential to discharge the following Regulated Air Pollutants will be:

Pollutants	TOTALS (tpy):
VOC	23.2285
NO_X	2.1074
CO_{2e}	2795.1122
CO	1.7702
SO_2	0.0126
$PM_{2.5}$	0.1602
PM_{10}	0.1746
Lead	1.05E-05
Total HAPs	0.9277
Benzene	0.0056
Formaldehyde	0.0016
Xylenes	0.1690

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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.
Dated this the __ day of _____, 2015

By: Antero Resources Corporation
Barry Schatz
Senior Environmental & Regulatory Manager
1615 Wynkoop Street
Denver, CO 80202

Attachment L
General Permit Modification Application Fee

GHD SERVICES INC.

▼ PLEASE DETACH AND RETAIN FOR YOUR RECORDS ▼

INVOICE NUMBER	DATE		VOUCHER NO.	AMOUNT
Account Number:		40WVDEPAQ	429142	
CR100915	10/9/2015	400974463		1,500.00

TOTAL: 1,500.00

THIS DOCUMENT IS PROTECTED BY A MICRO-PRINT SIGNATURE LINE, FLUORESCENT PAPER FIBERS, A WATERMARKED BACKER, AND IS REACTIVE TO CHEMICAL ALTERATION

GHD SERVICES INC.
2055 NIAGARA FALLS BLVD, SUITE 3
NIAGARA FALLS, NY 14304

M&T BANK
MANUFACTURERS AND TRADERS TRUST COMPANY
Commercial Banking
Main Office, Ithaca, NY 14850
50-7063-2213

10/9/2015 NO. 429142

PAY **********1,500 DOLLARS AND **********00 CENTS $**********1,500.00

TO THE ORDER OF
WV Dept. of Environmental Protectio
Division Air Quality
601 57th Street SE
Charleston,, WV 25304 US

GHD SERVICES INC.

AUTHORIZED SIGNATURES

WARNING: THIS DOCUMENT IS VOID IF ACCOUNT NUMBER DOES NOT APPEAR ON THE REVERSE SIDE IN RED

⑈429142⑈ ⑆221370632⑆6100000011891O⑈

Attachment O
Emissions Summary Sheet

Attachment O: G70-A Emissions Summary Sheet

Emission Points Data Summary Sheet

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type1	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS3 *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions 4		Maximum Potential Controlled Emissions 5		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used 6
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
EP-H001, EP-H002, EP-H003, EP-H004, EP-H005, EP-H006	Vertical Stack	H001, H002, H003, H004, H005, H006	Gas Production Unit Heaters	N/A		CO (630080)	0.4042	1.7702	0.4042	1.7702	Gas/Vapor /Solid (for PM)	MB AP-42
						NOx (10102439)	0.4811	2.1074	0.4811	2.1074		
						CO2 Equivalent N2O (10024972), CO2 (124389), CH4 (74828)	577.3579	2528.8278	577.3579	2528.8278		
						SO2 (7446095)	2.89E-03	0.0126	2.89E-03	0.0126		
						PM, PM10, PM2.5	0.0366	0.1602	0.0366	0.1602		
						Hexane (110543)	0.0087	0.0379	0.0087	0.0379		
						Formaldehyde (50000)	3.61E-04	0.0016	3.61E-04	1.58E-03		
						Total VOCs	0.0265	0.1159	0.0265	0.1159		
F001	N/A	F001	Fugitives	N/A		Benzene (71432)	0.0008	0.0034	0.0008	0.0034	Gas/Vapor	MB
						Toluene (108883)	0.0070	0.0308	0.0070	0.0308		
						Ethyl benzene (100414)	0.0144	0.0630	0.0144	0.0630		
						Hexane (110543)	0.1112	0.4871	0.1112	0.4871		
						o,m,p-xylenes (95476,108383,106423)	0.0362	0.1586	0.0362	0.1586		
						CO2 Equivalent CO2 (124389)), CH4	48.4288	212.1180	48.4288	212.1180		
						VOCs	2.2868	10.0162	2.2868	10.0162		
EP-L001, EP-L002	N/A	L001, L002	Loading (Condensate), Loading (Water)	N/A		VOCs	4.9184	0.0225	4.9184	0.0225	Gas/Vapor	MB
						hexane (110543)	0.0074	0.0000	0.0074	0.0000		
						CO2 Equivalent CO2 (124389), CH4	3.8275	0.0583	3.8275	0.0583		
EP-HR001	N/A	HR001	Haul Truck	N/A		PM, PM10, PM2.5	1.1556	0.0640	0.5778	0.0320	Solid Gas/Vapor/ Solid (for PM)	MB MB
TANKCOND001-004, TANKPW001-002	N/A	EP-TANKCOND001, EP-TANKCOND002, EP-TANKCOND003, EP-TANKCOND004, , EP-TANKPW001, EP-TANKPW002	Condensate Tank F/W/B, PW Tank F/W/B,	N/A		CO2 Equivalent N2O (10024972), CO2 (124389), CH4	8.2887	36.3046	8.2887	36.3046		
						hexane (110543)	2.15E-02	9.42E-02	2.15E-02	9.42E-02		
						o,m,p-xylenes (95476,108383,106423)	2.39E-03	1.05E-02	2.39E-03	1.05E-02		
						VOCs	2.9334	12.8483	2.9334	12.8483		
EP-PCV	valve	PCV	Pneumatic CV	N/A		hexane (110543)	6.13E-03	0.0268	6.13E-03	0.0268	Gas/Vapor	MB
						CO2 Equivalent CO2 (124389)), CH4	4.0647	17.8035	4.0647	17.8035		
						VOCs	0.0515	0.2257	0.0515	0.2257		

Attachment C/O: G70-A Emissions Summary Sheet

Fugitive Emissions Data Summary Sheet

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	n/a					
Unpaved Haul Roads	PM, PM10, PM2.5	1.1556	0.0640	0.5778	0.0320	MB
Loading/Unloading Operations	VOCs	4.9184	0.0225	4.9184	0.0225	MB
	CO2 Equivalent CO2 (124389), CH4	3.8275	0.0583	3.8275	0.0583	
Equipment Leaks (Components)	Toluene (108883)	Does not apply	0.0308	Does not apply	0.0308	MB
	Ethyl benzene (100414)		0.0630		0.0630	
	Hexane (110543)		0.4871		0.4871	
	o,m,p-xylenes (95476,108383,106423)		0.1586		0.1586	
	CO2 Equivalent CO2 (124389)), CH4		212.1180		212.1180	
Equipment Leaks (PCVs)	CO2 Equivalent CO2 (124389)), CH4	4.0647	17.8035	4.0647	17.8035	MB
	VOCs	0.0515	0.2257	0.0515	0.2257	

1 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

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

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

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