August 5, 2016 Reference No. 082715

Ms. Beverly McKeone
Division of Air Quality
WV Department of Environmental Protection
601 57th Street, SE
Charleston, West Virginia 25304

Dear Ms. Beverly McKeone:

Re: General Permit Registration G70-C Modification Application
Revival 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 Revival Well Pad.

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

1. Change in storage tanks service
2. Addition of 2 Cimarron enclosed combustors.
3. Addition of 10 line heaters.

Please refer to Table 13 in Attachment S - 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-C General Permit Modification Application.
- Two CD copies of the G70-C General Permit Modification Application.
- The application fee with check no. 461867 in the amount of $500.00.

GHD
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 Services Inc.

Manuel Bautista

MB/ma/263

Encl.

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

General Permit G70-C Modification Application

Change in storage tanks service, addition of 2 Cimarron enclosed combustors and 10 line heaters.

Revival Well Pad

Antero Resources Corporation

GHD
6320 Rothway Suite 100 Houston Texas 77040
082715 | Report No 263 | August 2016

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west virginia department of environmental protection

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

G70-C GENERAL PERMIT REGISTRATION APPLICATION

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

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

SECTION 1. GENERAL INFORMATION

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

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

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver	State: CO	ZIP Code: 80202

Facility Name: Revival Well Pad

Operating Site Physical Address: 3193 Morgans Run Rd

City: West Union	Zip Code: 26456	County: Doddridge

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.32423
Longitude: -80.69015

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 017-00097

CERTIFICATION OF INFORMATION

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

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

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

Responsible Official Signature:_____
Name and Title: Phone: Fax:
Email: Date:

If applicable:
Authorized Representative Signature: Barry Schatz
Name and Title: Barry Schatz/ Senior Environmental & Regulatory Manager Phone: 303-357-7276 Fax: 303-357-7315
Email: bschatz@anteroresources.com Date: 8/5/2016

If applicable:
Environmental Contact
Name and Title: Phone: Fax:
Email: Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: Change in storage tanks service, addition of 2 Cimarron enclosed combustors and 10 line heaters.	
Directions to the facility: At the intersection of Co Rte 50/30 and Co Rte 50/22 turn left to Co Rte 50/22 for 0.22 miles. Turn right to US 50 E and go for 2.5 miles. Turn left to Co Rte 20/ Morgans Run Rd and go for 1.5 miles. Turn right to Israels' Fork and go for 1.6 miles. Turn right to Main Camp Road and go for 0.22 miles. Entrance to the Facility will be straight ahead.	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☐$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-C Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☐ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☐ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
☒ Facility-wide Emission Summary Sheet(s) – Attachment T	
☒ Class I Legal Advertisement – Attachment U	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

GHD SERVICES INC.

▼ PLEASE DETACH AND RETAIN FOR YOUR RECORDS ▼

INVOICE NUMBER	DATE		VOUCHER NO.	AMOUNT
Account Number:		40WVDEPAQ	451867	
CR71216	7/12/2016	401013505		500.00

TOTAL : 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

NO. 451867

7/12/2016

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

TO THE ORDER OF

West Virginia Dept of Environmental
Protection - 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

⑈451867⑈ ⑆221370632⑆610000001189⑆10⑈

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 A
Single Source Determination Form

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

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

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

Is there a facility owned by or associated with the natural gas industry located within one (1) mile of the proposed facility? Yes ☒ No ☐

If Yes, please complete the questionnaire on the following page (Attachment A).

Please provide a source aggregation analysis for the proposed facility below:

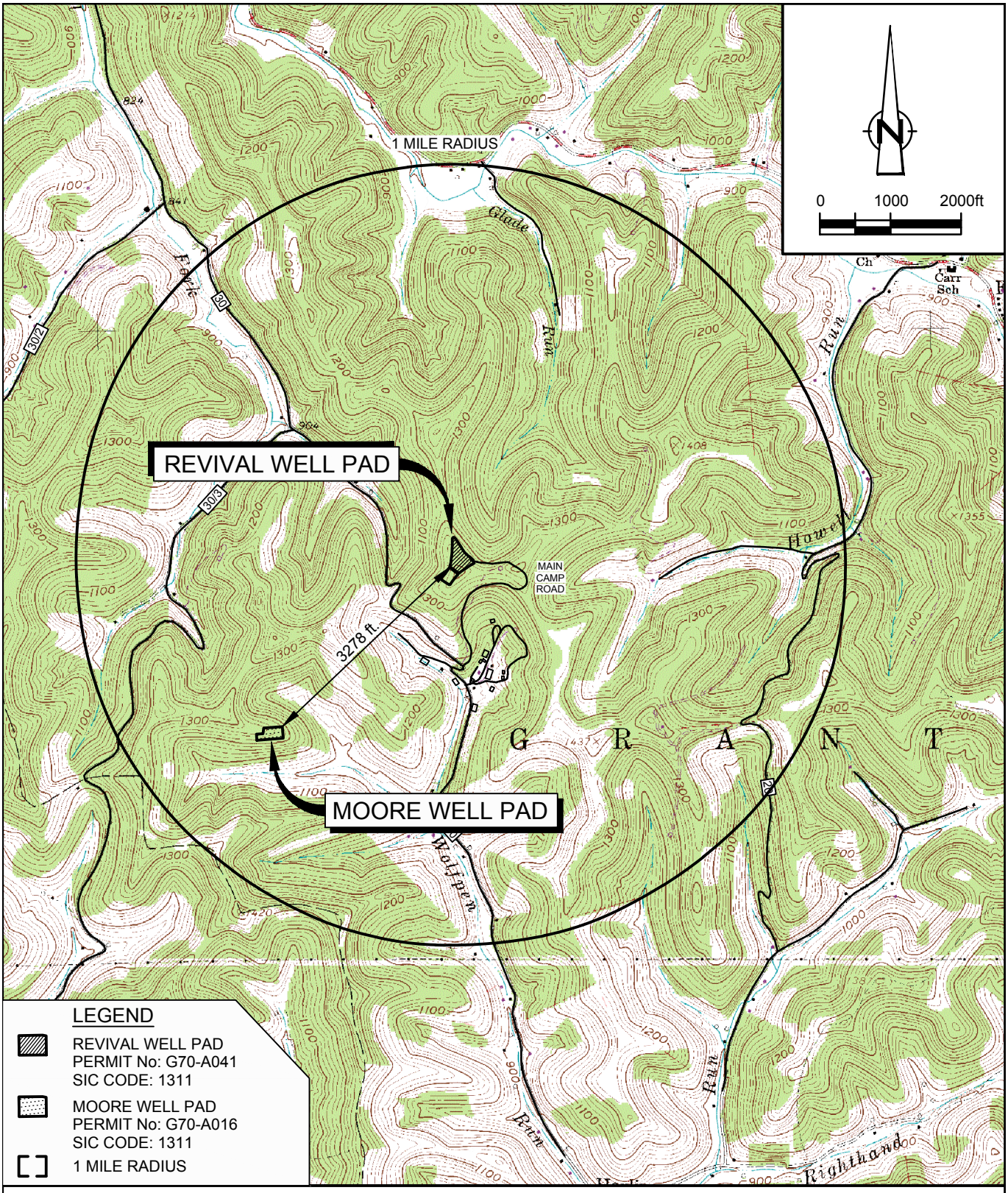
The Revival Well Pad calculation of potential to emit included all the emissions sources that belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under the control of the same person. The nearest emission source that belongs to the same industrial grouping and under the control of the same person but not located on contiguous or adjacent property is the Moore Well Pad. This operates independently and is approximately 0.62 miles southwest of the facility.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Answer each question with a detailed explanation to determine contiguous or adjacent properties which are under a common control and any support facilities. This section must be completed in its entirety.

Provide a map of contiguous or adjacent facilities (production facilities, compressor stations, dehydration facilities, etc.) which are under common control and those facilities that are not under common control but are support facilities. Please indicate the SIC code, permit number (if applicable), and the distance between facilities in question on the map.

Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility. **Antero Resources has 100% ownership of each facility.**	Yes ☒	No ☐
Does an entity such as a corporation have decision making authority over the operation of a second entity through a contractual agreement or voting interest? Please explain.	Yes ☐	No ☒
Is there a contract for service relationship between the two (2) companies or, a support/dependency relationship that exists between the two (2) companies? Please explain.	Yes ☐	No ☒
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes ☒	No ☐
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes ☐	No ☒
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes ☐	No ☒
Does one (1) facility operation support the operation of the other facility?	Yes ☐	No ☒
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain. **No, these facilities operate completely independently.**	Yes ☐	No ☒
Are there any financial arrangements between the two (2) entities?	Yes ☐	No ☒
Are there any legal or lease agreements between the two (2) facilities?	Yes ☐	No ☒
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain. **No, these facilities operate completely independently.**	Yes ☐	No ☒
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes. **1311**	Yes ☒	No ☐
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain. **No, these facilities operate completely independently.**	Yes ☐	No ☒
Will materials be routinely transferred between the two (2) facilities? Please explain the amount of transfer and how often the transfers take place and what percentages go to the various entities.	Yes ☐	No ☒
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain. **No, these facilities operate completely independently.**	Yes ☐	No ☒



SOURCE: USGS QUADRANGLE MAP;
SMITHBURG, WEST VIRGINIA

SITE COORDINATES: LAT. 39.32423, LONG. -80.69015

Attachment A

SINGLE SOURCE DETERMINATION MAP
REVIVAL WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(263)GN-WA004 AUG 5, 2016

Attachment B
Siting Criteria Waiver

Attachment B

Siting Waiver
Revival Well Pad
Antero Resources Corporation
Doddridge County, West Virginia

A Siting Waiver form is not required because there are no occupied dwelling structures within 300 feet of Revival Well Pad.

Attachment C
Current Business Certificate

State of West Virginia

Certificate

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

ANTERO RESOURCES CORPORATION

a corporation formed under the laws of Delaware, which is authorized to transact business in West Virginia by a Certificate of Authority has filed in my office as required by the provisions of the West Virginia Code, a copy of an amendment to its Articles of Incorporation authenticated by the proper office of the state or country of its incorporation and was found to conform to law.

Therefore, I issue this

CERTIFICATE OF AMENDMENT TO CERTIFICATE OF AUTHORITY

Given under my hand and the Great Seal of the State of West Virginia on this day of June 10, 2013

Natalie E Tennant

Secretary of State

FILED

JUN 10 2013

IN THE OFFICE OF SECRETARY OF STATE

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

Penney Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
Website: www.wvsos.com
E-mail: business@wvsos.com

Office Hours: Monday – Friday
8:30 a.m. – 5:00 p.m. ET

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

APPLICATION FOR AMENDED CERTIFICATE OF AUTHORITY

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

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation

2. Date Certificate of Authority was issued in West Virginia: 6/25/2008

3. Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of incorporation.)

4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)

5. Other amendments:
(attach additional pages if necessary)

6. **Name and phone number of contact person.** (This is optional, however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)

Alvyn A. Schopp — Contact Name
(303) 357-7310 — Phone Number

7. **Signature information** (See below ******Important Legal Notice Regarding Signature*):

Print Name of Signer: Alvyn A. Schopp Title/Capacity: Authorized Person

Signature: Alvyn A. Schopp **Date:** June 10, 2013

******Important Legal Notice Regarding Signature*: **Per West Virginia Code §31D-1-129. Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.**

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "ANTERO RESOURCES APPALACHIAN CORPORATION", CHANGING ITS NAME FROM "ANTERO RESOURCES APPALACHIAN CORPORATION" TO "ANTERO RESOURCES CORPORATION", FILED IN THIS OFFICE ON THE TENTH DAY OF JUNE, A.D. 2013, AT 9:37 O'CLOCK A.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

Jeffrey W. Bullock, Secretary of State

4520810 8100

130754186

AUTHENTICATION: 0496546

DATE: 06-10-13

You may verify this certificate online at corp.delaware.gov/authver.shtml

State of Delaware
Secretary of State
Division of Corporations
Delivered 09:37 AM 06/10/2013
FILED 09:37 AM 06/10/2013
SRV 130754186 - 4520810 FILE

AMENDMENT TO THE AMENDED AND RESTATED CERTIFICATE OF INCORPORATION OF ANTERO RESOURCES APPALACHIAN CORPORATION

Antero Resources Appalachian Corporation (the "Corporation"), a corporation organized and existing under the laws of the State of Delaware, hereby certifies as follows:

1. The original Certificate of Incorporation of the Corporation was filed under the name Antero Resources Barnett Corporation with the filing of the original Certificate of Incorporation of the Corporation with the Secretary of State of the State of Delaware on March 18, 2008.

2. This Amendment to the Amended and Restated Certificate of Incorporation has been duly adopted and approved in accordance with Sections 242 of the General Corporation Law of the State of Delaware.

3. Article FIRST of the Amended and Restated Certificate of Incorporation is hereby amended to read in its entirety as follows:

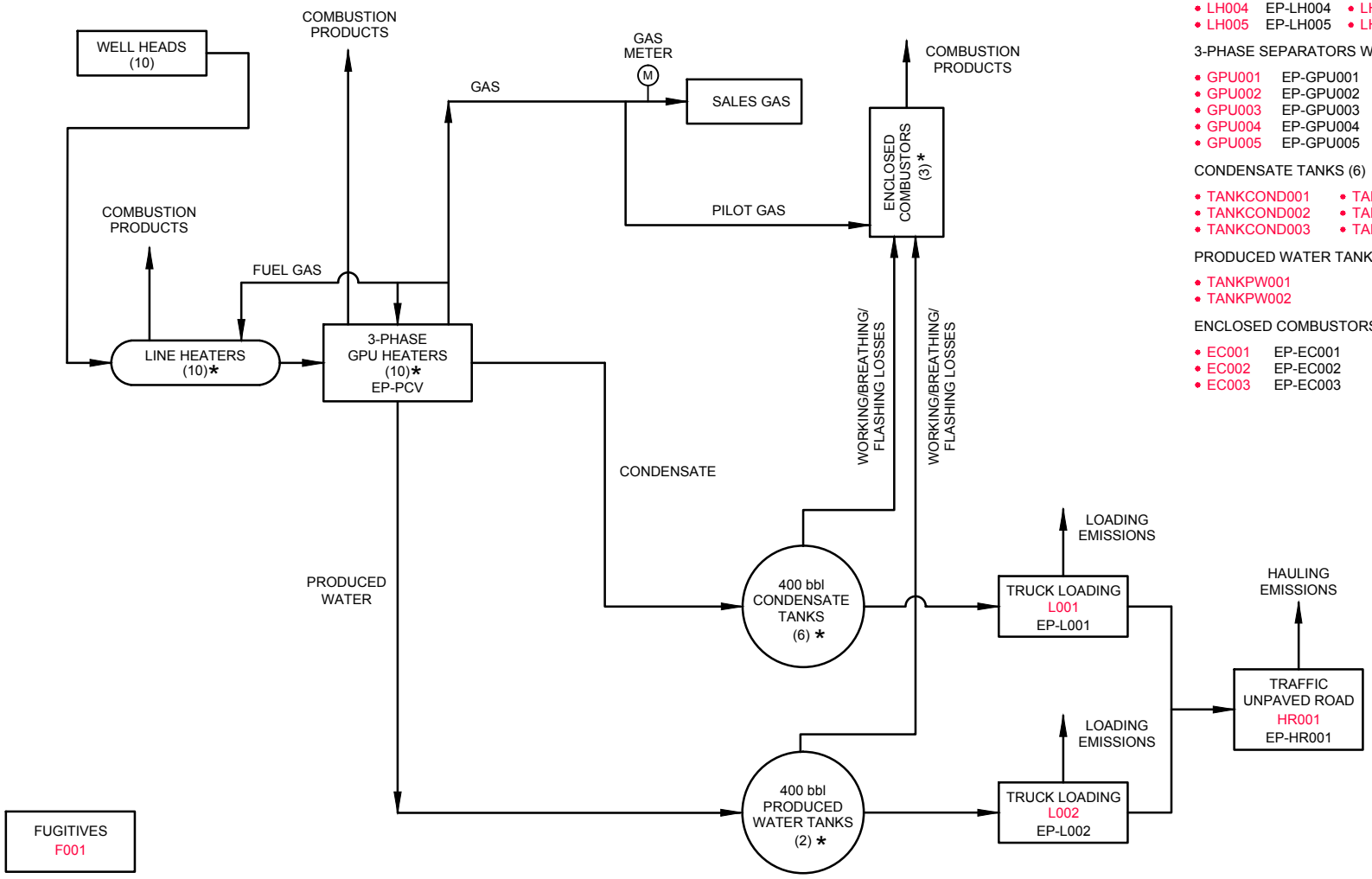
FIRST. The name of the Corporation is Antero Resources Corporation.

IN WITNESS WHEREOF, the Corporation has caused this Certificate of Amendment to be executed by its duly authorized officer on the 10th day of June, 2013.

ANTERO RESOURCES APPALACHIAN CORPORATION

By: _____
Name: Alvyn A. Schopp
Title: Vice President of Accounting & Administration / Treasurer

Attachment D
Process Flow Diagram



* LINE HEATERS (10)

- LH001 EP-LH001
- LH002 EP-LH002
- LH003 EP-LH003
- LH004 EP-LH004
- LH005 EP-LH005
- LH006 EP-LH006
- LH007 EP-LH007
- LH008 EP-LH008
- LH009 EP-LH009
- LH010 EP-LH010

3-PHASE SEPARATORS WITH HEATERS (10)

- GPU001 EP-GPU001
- GPU002 EP-GPU002
- GPU003 EP-GPU003
- GPU004 EP-GPU004
- GPU005 EP-GPU005
- GPU006 EP-GPU006
- GPU007 EP-GPU007
- GPU008 EP-GPU008
- GPU009 EP-GPU009
- GPU010 EP-GPU010

CONDENSATE TANKS (6)

- TANKCOND001
- TANKCOND002
- TANKCOND003
- TANKCOND004
- TANKCOND005
- TANKCOND006

PRODUCED WATER TANKS (2)

- TANKPW001
- TANKPW002

ENCLOSED COMBUSTORS (3)

- EC001 EP-EC001
- EC002 EP-EC002
- EC003 EP-EC003

Attachment D

PROCESS FLOW DIAGRAM - ANTERO RESOURCES REVIVAL WELL PAD

Doddridge County, West Virginia

Attachment E
Process Description

Attachment E

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

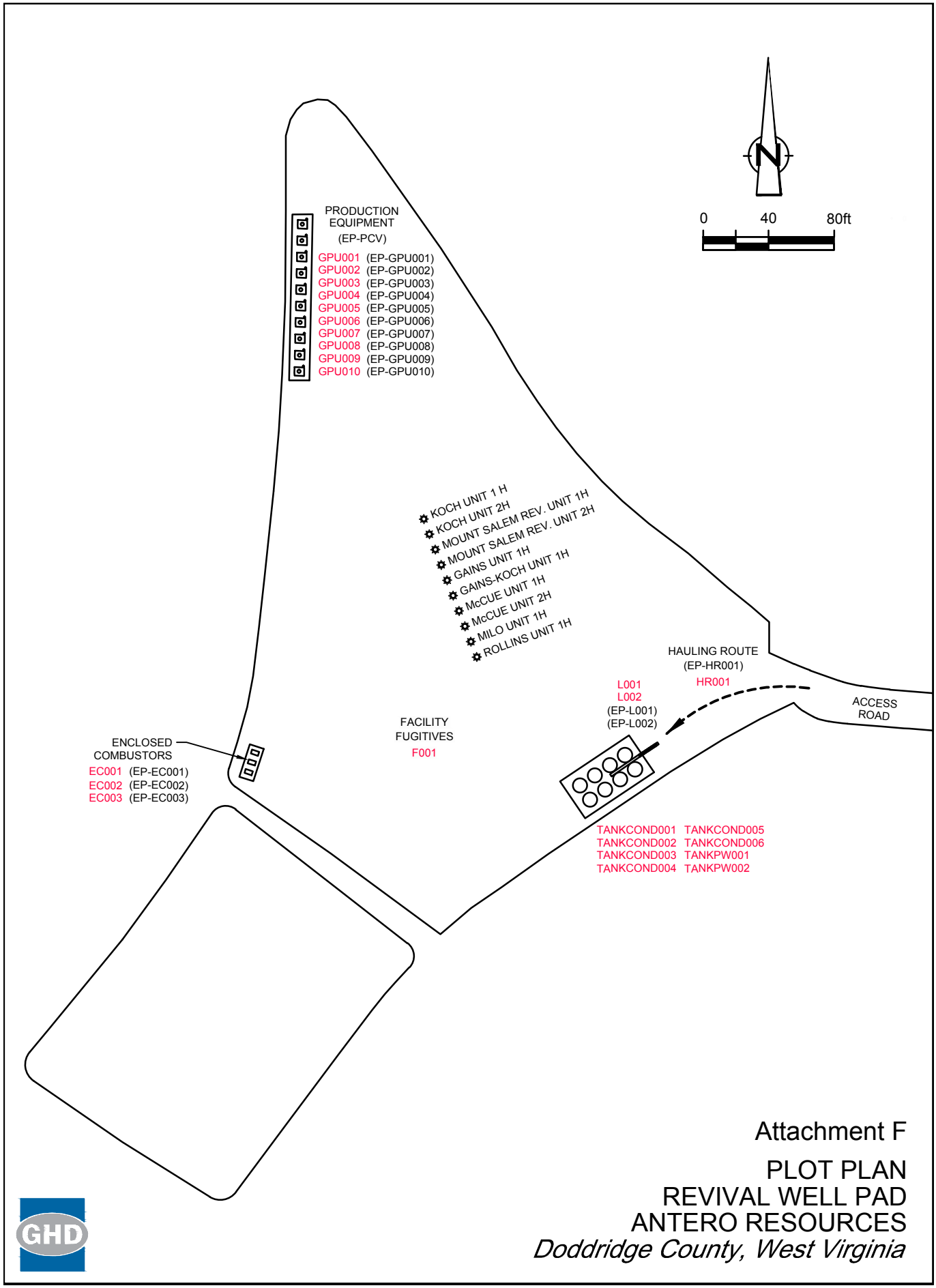
A mixture of condensate, water, and entrained gas from the condensate and gas wells enters the facility through a series of line heaters (LH001-010) and gas production units (GPU001-GPU010) which are 3 phase separators where the gas, condensate, and produced water are separated. The line heaters and GPUs are fueled by a slip stream of the separated gas. The separated gas is then metered and sent to the sales gas pipeline. The separated condensate and water from the separators flow to their respective storage tanks (TANKCOND001-006 and TANKPW001-002).

The Facility has six (6) tanks (TANKCOND001-006) 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 routed to three enclosed combustors (EC001-003) to control the emissions. The enclosed combustors that will be used to control emissions are designed to achieve a VOC destruction efficiency of 98 percent.

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 Moore Unit 1H, one of the wells in the Moore Well Pad. These extended analyses are considered representative of the materials from Revival Well Pad, being in the same Marcellus rock formation.

Attachment F
Plot Plan

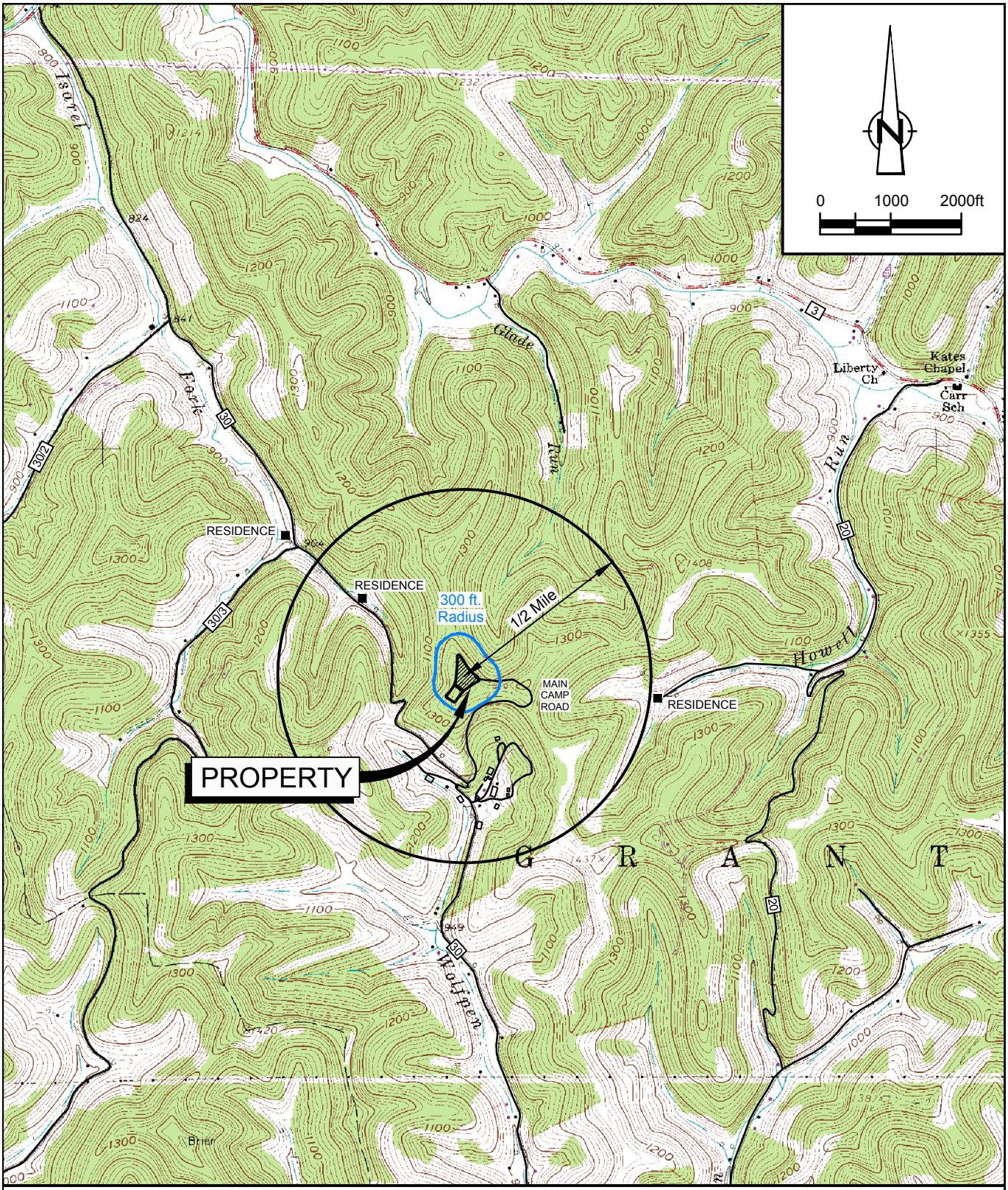


Attachment F

PLOT PLAN
REVIVAL WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(263)GN-WA002 JUL 28, 2016

Attachment G
Area Map



SOURCE: USGS QUADRANGLE MAP;
SMITHBURG, WEST VIRGINIA

SITE COORDINATES: LAT. 39.32423, LONG. -80.69015
SITE ELEVATION: 1374 ft AMSL

GHD

Attachment G

AREA MAP
REVIVAL WELL PAD
ANTERO RESOURCES
Doddridge County, West Virginia

82715-00(263)GN-WA003 JUL 8, 2016

Attachment H
G70-C Section Applicability Form

ATTACHMENT H – G70-C SECTION APPLICABILITY FORM

General Permit G70-C Registration
Section Applicability Form

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

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

GENERAL PERMIT G70-C APPLICABLE SECTIONS	
☒Section 5.0	Gas Well Affected Facility (NSPS, Subpart OOOO)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
☐Section 11.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐Section 12.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines, Microturbines
☒Section 14.0	Tanker Truck Loading[3]
☐Section 15.0	Glycol Dehydration Units[4]

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

2 *Applicants that are subject to Section 11 and 12 may also be subject to the applicable RICE requirements of Section 13.*

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

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

Attachment I
Emission Units/ ERD Table

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

Include ALL emission units and air pollution control devices /ERDs that will be part of this permit application review. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD (s)[6]
GPU001 through GPU0010	EP-GPU001 through EP-GPU0010	Gas Production Unit Heater	2014		1 MMBtu/hr per GPU	Existing	N/A	
LH001 through LH0010	EP-LH001 through EP-LH0010	Line Heater	2016		2.0 MMBtu/hr per Line Heater	New	N/A	
F001	F001	Fugitives	2014		N/A	Existing	N/A	
TANK001 through TANK008	EP-EC001	Condensate and Produced Water Tank F/W/B	2014		400 bbl each	Removal	EC001	
TANKCOND001 through TANKCOND006	EP-EC001, EP-EC002, EP-EC003	Condensate Tank F/W/B	2014		400 bbl each	New	EC001, EC002, EC003	
TANKPW001 through TANKPW002	EP-EC001, EP-EC002, EP-EC003	PW Tank F/W/B	2014		400 bbl each	New	EC001, EC002, EC003	
L001	EP-L001	Loading (Condensate)	2014		10080 gal/hr 766500 gal/yr	Existing	N/A	
L002	EP-L002	Loading (Produced Water)	2014		10080 gal/hr 9198000 gal/yr	Existing	N/A	
HR001	EP-HR001	Haul Truck	2014		40 ton capacity	Existing	N/A	
EC001	EP-EC001	Enclosed Combustor	2014		12 MMBtu/hr	Existing	N/A	
EC002	EP-EC002	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
EC003	EP-EC003	Enclosed Combustor	2016		12 MMBtu/hr	New	N/A	
PCV	EP-PCV	Pneumatic CV	2014		6.6 scf/day/PCV	Existing	N/A	

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

Attachment J
Fugitive Emissions Summary Sheet

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

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

Source/Equipment:

Leak Detection Method Used	☐ Audible, visual, and	☑ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Valves	☐ Yes ☑ No	500	EPA	gas	4.14	0.49	326.61
Valves	☐ Yes ☑ No	520	EPA	liquid	12.23	0.58	2.47
Connections (Not sampling)	☐ Yes ☑ No	590	EPA	gas	0.22	2.58E-02	17.13
Flanges	☐ Yes ☑ No	130	EPA	gas	0.09	1.11E-02	7.36
Loading	☐ Yes ☑ No	2	EPA	gas	0.12	1.72E-03	0.47

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

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

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

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

Attachment K
Gas Well Affected Facility Data Sheet

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device
47017063950000	1/23/2015	12/1/2014	Green
47017062180000	1/28/2015	12/1/2014	Green
47017062670000	7/9/2014	5/12/2014	Green
47017066550000	5/1/2017	3/1/2017	Green
47017066560000	5/1/2017	3/1/2017	Green
47017062700000	2/5/2015	12/1/2014	Green
47017062690000	7/10/2014	5/12/2014	Green
47017062680000	7/15/2014	5/12/2014	Green
47017066540000	5/1/2017	3/1/2017	Green
1 well not permitted			

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

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

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

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

Where,

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

Attachment L
Storage Vessel Data Sheet

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

☐ Composition of the representative sample used for the simulation
☐ For each stream that contributes to flashing emissions:
  ☐ Temperature and pressure (inlet and outlet from separator(s))
  ☐ Simulation-predicted composition
  ☐ Molecular weight
  ☐ Flow rate
☐ Resulting flash emission factor or flashing emissions from simulation
☐ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Tanks	2. Tank Name: Condensate Tank 001-006
3. Emission Unit ID number: TANKCOND001-006	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed , Modified or Relocated (for existing tanks)	6. Type of change:
2014 Was the tank manufactured after August 23, 2011? ☑ Yes ☐ No	☑ New construction ☐ New stored material ☐ Other ☐ Relocation

7A. Description of Tank Modification (if applicable)

7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material.
☐ Yes ☑ No

7C.Was USEPA Tanks simulation software utilized?

☐ Yes ☑ No

If Yes, please provide the appropriate documentation and items 8-42 below are not required.

TANK INFORMATION

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

9A. Tank Internal Diameter (ft): 12	9B. Tank Internal Height (or Length) (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" and considers design liquid levels and overflow valve heights.: 400bbls

13A. Maximum annual throughput (gal/yr): 766500	13B. Maximum daily throughput (gal/day): 2100
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 8	15. Maximum tank fill rate (gal/min) 168

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

17. Is the tank system a variable vapor space system? ☐ Yes ☑ No

If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):

☑ Fixed Roof ☑ vertical ☐ horizontal ☑ flat roof ☐ cone roof ☐ dome roof ☐ other (describe)
☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical
☐ other

ATTACHMENT L – STORAGE VESSEL DATA SHEET

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply

☐ Inert Gas Blanket of

☑ Vent to Vapor Combustion Device (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig)
Vacuum Pressure

☐ Emergency relief Valve (psig)
Vacuum Pressure

☐ Thief Hatch Weighted ☐ Yes ☐ No

Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emission Loss		[1]Estimation Method
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
Please see Table 6 and Table 7									

TANK CONSTRUCTION & OPERATION INFORMATION

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

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted 2014

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

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

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

24. Is the tank a Vertical Fixed Roof Tank? ☑ Yes ☐ No	24A. If yes, for dome roof provide radius (ft): NA	24B. If yes, for cone roof, provide slop (ft/ft): NA

25. Complete the following section for **Floating Roof Tanks** Does Not Apply

25A. Year Internal Floaters Installed:

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

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ Yes ☐ No

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

25E. Is the Floating Roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings

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

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

26C. Deck seam:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft wide ☐ 5 x 12 ft wide ☐ Other (describe)

26D. Deck seam length (ft)	26E. Area of deck (ft^2)	26F. For column supported tanks: Number of columns:	26G. For column supported tanks, Diameter of each column:

27. Closed Vent System with VRU ☐ Yes ☑ No

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

SITE INFORMATION

29. Provide the city and state on which the data in this section are based.: West Union, WV			
30. Daily Average Ambient Temperature (°F):	65.08	31. Annual Average Maximum Temperature (°F):	75.94
32. Annual Average Minimum Temperature (°F):	46.56	33. Average Wind Speed (miles/hr): 18.5mph	
34. Annual Average Solar Insulation Factor (BTU/(ft2·day))	1030.236	35. Atmospheric Pressure (psia): 14.8 (based off local conditions, could not find annual)	

LIQUID INFORMATION

36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56	36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0

38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.4462
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.7095
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.9177

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

41A. Material Name or Composition	Condensate		
41B. CAS Number	mix of HC		
41C. Liquid Density (lb/gal)	5.9800		
41D. Liquid Molecular Weight (lb/lb-mole)	111.40		
41E. Vapor Molecular Weight (lb/lb-mole)	42.3749		
Maximum Vapor Pressure 41F. True (psia)	0.9177		
41G. Reid (psia)	1.65		
Months Storage per Year 41H. From - To	year round		

ATTACHMENT L – STORAGE VESSEL DATA SHEET

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

The following information is REQUIRED:

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

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

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name: Tanks	2. Tank Name: Produced Water Tank 001-002
3. Emission Unit ID number: TANKPW001-002	4. Emission Point ID number. EP-EC001, EP-EC002, EP-EC003
5. Date Installed , Modified or Relocated (for existing tanks) 2014 Was the tank manufactured after August 23, 2011? ☑ Yes ☐ No	6. Type of change: ☑ New construction ☐ New stored material ☐ Other ☐ Relocation

7A. Description of Tank Modification (if applicable)

7B. Will more than one material be stored in this tank? If so, a separate form must be completed for each material.
☐ Yes ☑ No

7C.Was USEPA Tanks simulation software utilized?
☐ Yes ☑ No

If Yes, please provide the appropriate documentation and items 8-42 below are not required.

TANK INFORMATION

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

9A. Tank Internal Diameter (ft): 12	9B. Tank Internal Height (or Length) (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" and considers design liquid levels and overflow valve heights.: 400bbls

13A. Maximum annual throughput (gal/yr): 9198000	13B. Maximum daily throughput (gal/day): 25200
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 274	15. Maximum tank fill rate (gal/min) 168

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

17. Is the tank system a variable vapor space system? ☐ Yes ☑ No

If yes, (A) What is the volume expansion capacity of the system (gal)?
(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):

☑ Fixed Roof ☑ vertical ☐ horizontal ☑ flat roof ☐ cone roof ☐ dome roof ☐ other (describe)
☐ External Floating Roof ☐ pontoon roof ☐ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting
☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm
☐ Pressurized ☐ spherical ☐ cylindrical

ATTACHMENT L – STORAGE VESSEL DATA SHEET

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does not apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket ☐ Carbon Adsorption

☑ Vent to Vapor Combustion Device (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig)
Vacuum Pressure

☐ Emergency relief Valve (psig)
Vacuum Pressure

☐ Thief Hatch Weighted ☐ Yes ☐ No

Complete appropriate Air Pollution Control Device Sheet

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

Material Name	Flashing Loss		Breathing Loss		Working Loss		Total Emission Loss		[1] Estimation Method
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
Please see Table 6 and Table 7									

TANK CONSTRUCTION & OPERATION INFORMATION

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

21A. Shell Color: Green	21B. Roof Color: Green	21C. Year Last Painted 2014

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

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

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

24. Is the tank a Vertical Fixed Roof Tank? ☑ Yes ☐ No	24A. If yes, for dome roof provide radius (ft): NA	24B. If yes, for cone roof, provide slop (ft/ft): NA

25. Complete the following section for **Floating Roof Tanks** Does Not Apply

25A. Year Internal Floaters Installed:

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

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ Yes ☐ No

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

25E. Is the Floating Roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings

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

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

26C. Deck seam:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ Other

26D. Deck seam length (ft)	26E. Area of deck (ft^2)	26F. For column supported tanks: Number of columns:	26G. For column supported tanks, Diameter of each column:

27. Closed Vent System with VRU ☐ Yes ☑ No

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

SITE INFORMATION

29. Provide the city and state on which the data in this section are based.: West Union, WV			
30. Daily Average Ambient Temperature (°F):	65.08	31. Annual Average Maximum Temperature (°F):	75.94
32. Annual Average Minimum Temperature (°F):	46.56	33. Average Wind Speed (miles/hr): 5.9mph	
34. Annual Average Solar Insulation Factor (BTU/(ft2·day))	1030.236	35. Atmospheric Pressure (psia): 14.8 (based off local conditions, could not find annual)	

LIQUID INFORMATION

36. Average daily temperature range of bulk liquid (F):	65.08	36A. Minimum (°F):	46.56	36B. Maximum (°F)	75.94
37. Average operating pressure range of tank (psig):	0	37A. Minimum (psig)	0	37B. Maximum (psig)	0

38A. Minimum Liquid Surface Temperature (°F)	46.56	38B. Corresponding Vapor Pressure (psia)	0.2242
39A. Average Liquid Surface Temperature (°F)	65.08	39B. Corresponding Vapor Pressure (psia)	0.3713
40A. Maximum Liquid Surface Temperature (°F)	75.94	40B. Corresponding Vapor Pressure (psia)	0.4912

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

41A. Material Name or Composition	Produced Water		
41B. CAS Number	mix of HC and water		
41C. Liquid Density (lb/gal)	8.3300		
41D. Liquid Molecular Weight (lb/lb-mole)	18.02		
41E. Vapor Molecular Weight (lb/lb-mole)	18.4181		
Maximum Vapor Pressure 41F. True (psia)	0.4912		
41G. Reid (psia)	1.0211		
Months Storage per Year 41H. From - To	year round		

Attachment M
Natural Gas Fired Fuel Burning Unit(s) Data Sheet

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

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

Emission Unit ID#	Emission Point ID#	Emission Unit Description (Manufacturer, model#)	Year Installed/ Modified	Type and Date of Change	Maximum Design Heat Input (MMBTU/hr)	Fuel Heating Value (BTU/scf)
GPU001	EP-GPU001	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU002	EP-GPU002	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU003	EP-GPU003	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU004	EP-GPU004	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU005	EP-GPU005	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU006	EP-GPU006	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU007	EP-GPU007	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU008	EP-GPU008	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU009	EP-GPU009	Gas Production Unit Heater	2014	Existing	1	1247.06
GPU010	EP-GPU010	Gas Production Unit Heater	2014	Existing	1	1247.06
LH001	EP-LH001	Line Heater	2016	New	2	1247.06
LH002	EP-LH002	Line Heater	2016	New	2	1247.06
LH003	EP-LH003	Line Heater	2016	New	2	1247.06
LH004	EP-LH004	Line Heater	2016	New	2	1247.06
LH005	EP-LH005	Line Heater	2016	New	2	1247.06
LH006	EP-LH006	Line Heater	2016	New	2	1247.06
LH007	EP-LH007	Line Heater	2016	New	2	1247.06
LH008	EP-LH008	Line Heater	2016	New	2	1247.06
LH009	EP-LH009	Line Heater	2016	New	2	1247.06
LH010	EP-LH010	Line Heater	2016	New	2	1247.06

1. Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.
2. Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.
3. New, modification, removal.
4. Enter design heat input capacity in MMBtu/hr.
5. Enter the fuel heating value in BTU/standard cubic foot.

Attachment O
Tanker Truck Loading Data Sheet

ATTACHMENT O – TANKER TRUCK LOADING DATA S HEET

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

Truck Loadout Collection Efficiencies

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

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

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

Emission Unit ID#:	L001, L002	Emission Point ID#:	EP-L001, EP-L002	Year Installed/ Modified:	2014

Emission Unit Description: Condensate Loading, Produced Water Loading

Loading Area Data

Number of Pumps: 2 | Number of Liquids Loaded: 2 | Max number of trucks loading at one time: 2

Are Tanker trucks pressure tested for leaks at this any other location? ☑ Yes ☐ No ☐ Not Required

If Yes, Please 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.

Provide description of closed vent system and any bypasses

Are any of the following truck loadout systems utilized? No

☐ Closed System to Tanker Truck passing a MACT level annual leak test?

☐ Closed System to Tanker Truck passing a NSPS level annual leak test?

☐ Closed System to Tanker Truck not passing an annual leak test and has vapor return?

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

Time	Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec
Hours/day	3	3	3	3
Days/week	3	3	3	3

Bulk Liquid Data (use extra pages as necessary)

Liquid Name		Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)		2.10	25.20	
Max. Annual Throughput (1000 gal/yr)		766.50	9198.00	
Loading Method		BF	BF	
Max. Fill Rate (gal/min)		168	168	
Average Fill Time (min/loading)		50	50	
Max. Bulk Liquid Temperature (F)		65.1	65.1	
True Vapor Pressure		0.7	0.4	
Cargo Vessel Condition		U	U	
Control Equipment or Method		None	None	
Max. Collection Efficiency (%)		0	0	
Max. Control Efficiency (%)		0	0	
Max VOC Emission Rate	Loading (lb/hr)	3.0512	0.0014	
	Annual (ton/yr)	0.1160	0.0006	
Max HAP Emission Rate	Loading (lb/hr)	0.0452	1.81E-07	
	Annual (ton/yr)	0.0017	8.24E-08	
Estimation Method		Promax	Promax	

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

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

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

CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)

ECD Enclosed Combustion Device F Flare

TO Thermal Oxidization or Incineration

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

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

Attachment R
Air Pollution Control Device – Emission Reduction Device Sheets

ATTACHMENT R – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

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

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

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

Emission Unit ID:	NA	Make/Model:	NA
Primary Control Device ID:	NA	Make/Model	NA
Control Efficiency (%):	NA	APCD/ERD Data Sheet Completed	☐ Yes ☐ No
Secondary Control Device ID:	NA	Make/Model	NA
Control Efficiency (%):	NA	APCD/ERD Data Sheet Completed	☐ Yes ☐ No

VAPOR COMBUSTION (Including Enclosed Combustors)

General Information

Control Device ID#:	EC001-003	Installation Date: ☑ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity		Maximum Design Heating Input (from mfg. spec sheet)	Design Heat Content
5458 scfh	131000 scfd	12.0 MMBTU/hr	2300 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

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

Manufacturer: Cimarron Model: 48" HV ECD		Hours of operation per year?	8760

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

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
TANKCOND001-006	Condensate Tanks		
TANKPW001-002	Produced Water Tanks		

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

Assist Type (Flares only)	Flare height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☑ Non	25 feet	3.33 feet	☑ Yes ☐ No Provide determination

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emission Stream
9.72 (scfm)	2,093.13 BTU/ft^3	0.0186 (ft/s)

Please see Attachment S, Tables 6 & 7 for VOC composition/ characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
3	12.6 scfh	12800 BTU/hr	☑ Yes ☐ No

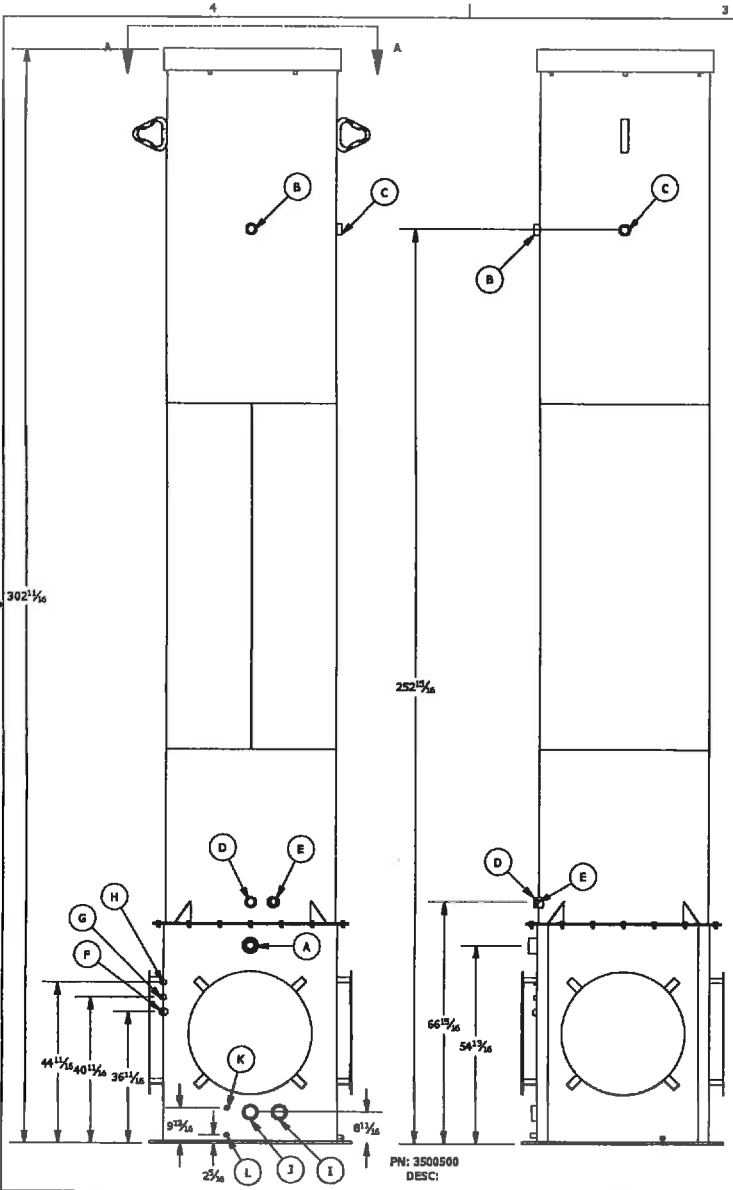
If automatic re-ignition is used, please describe the method. Flame Rectification, a thermocouple equivalent

Is pilot flame equipped with a monitor to detect the presence of the flame? ☑ Yes ☐ No	If Yes, What type? ☑ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

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

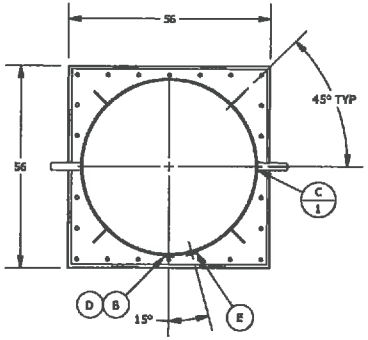
Additional information attached? ☑ Yes ☐ No Manufacturer's specs sheet

Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11 (b) and performance testing.



48" DIA x 302 5/8" HEIGHT, 88 ORIFICES EMISSION CONTROL DEVICE

* >98% TVOC DRE, CERTIFIED USEPA 40 CFR 60, APPENDIX A, SOURCE EMMISIONS TEST METHODS REFERENCED. MEETS ALL EPA & CDPHE REGULATIONS.
* DESTROYS OIL/CONDENSATE PRODUCTION TANK VAPORS W/ NO VISIBLE FLAME.
* EXCELLENT OPACITY AND SMOKELESS OPERATION.
* RELIABLE AND CUSTOMIZABLE IGNITION.
* VERY LOW CAPITAL AND OPERATING COST.
* EASY TO OPERATE AND MAINTAIN.
* FIELD TESTED TO DESTROY UP TO 119.5 MDSCFD (131 MCFD) @ 10 oz/in^2; 2300 BTU/CF WASTE GAS (SG 1.45)
* STRUCTURE CERTIFIED FOR 90 MPH 3-SEC WIND GUST PER ASCE 7-05 & IBC 2006 STANDARDS. HIGHER WIND LOAD RATED STRUCTURES AVAILABLE.



VIEW A-A

PN: 3500500
DESC:

SCHEDULE OF NOZZLES				
MARK	QTY	DESCRIPTION	SERIES	SERVICE
A	1	3" HALF COUPLING	2000#	BURNER WASTE GAS IN
B	1	2" FULL COUPLING	3000#	FLOW TEST/AUTOMATION
C	1	2" FULL COUPLING	3000#	FLOW TEST/AUTOMATION
D	1	2" FULL COUPLING	3000#	SIGHT GLASS
E	1	2" FULL COUPLING	3000#	MANUAL LIGHTING
F	1	1" FULL COUPLING	3000#	PILOT GAS IN
G	1	1/2" FULL COUPLING	3000#	IGNITOR CABLE
H	1	1/2" FULL COUPLING	3000#	AUTOMATION
I	1	3" HALF COUPLING	3000#	DRIP TANK WASTE GAS IN
J	1	3" HALF COUPLING	3000#	DRIP TANK WASTE GAS OUT
K	1	1/2" FULL COUPLING	3000#	AUTOMATION
L	1	1/2" FULL COUPLING	3000#	LIQUID DRAIN

UNLESS OTHERWISE SPECIFIED

1. REMOVE ALL BURRS AND SHARP CORNERS.
2. COR. RAD .03
3. DO NOT SCALE DRAWING.
4. ALL DIMENSIONS ARE IN INCHES.
5. MACHINE FIN.
6. FABRICATION
   .X = ± 0.25
   .XX = ± 0.125
   .XXX = ± 0.06
   ANGLES ± 3°
7. MACHINE
   .X = ±0.030
   .XX = ±0.015
   .XXX = ±0.005
   ANGLES ±1/2°
   CONTRICITY WITHIN 0.010 TIR

APPROVED FOR A.S.M.E CODE, SECTION VIII DIV 1
_____ED,_____ ADDENDA BY_____ DATE_____

CIMARRON
Energy Inc.

TITLE:
48" HIGH VOLUME ECD

DATE:	WO No.:	SHEET: 1 OF 1

DRAWN BY: TDS | REV. | DRAW NO.: 3500500

Attachment S
Emissions Calculations

Table 1

Facility Information
Revival 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	Revival Well Pad
Nearest City/Town	Revival Well Pad
API Number/SIC Code	1311
Latitude/Longitude	39.32423, -80.69015
County	Doddridge County

Technical Information	
Max Condensate Site Throughput (bbl/day):	50
Max Produced Water Site Throughput (bbl/day):	600
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	10
Gas Production Unit Heaters	10
Line Heaters	10
Condensate Tanks	6
Produced Water Tanks	2
Loading Jobs	2
Enclosed Combustors	3

Table 2

Uncontrolled/Controlled Emissions Summary
Revival 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, Engine, Gas Production Unit Heaters, Line Heaters)																								
Fugitive Emissions (Component Count, PCV and Hauling)[1]	3.8952	17.0612			87.500	383.25							1.2759	0.3813			0.2632	1.1530	0.0013	0.0056	6.92E-02	3.03E-01		
Flashing, Working and Breathing (F/W/B) Losses[2]	42.3910	185.6724			172.5941	755.9621											7.9970	35.0270	0.0002	0.0010	0.0100	0.0437		
Gas Production Unit Heater Emissions[3]	0.0441	0.1932	0.8019	3.5123	962.26	4,214.71	0.6736	2.9503	0.0048	0.0211	0.0609	0.2669	0.0609	0.2669	4.01E-06	1.76E-05	0.015	0.066	1.68E-05	7.38E-05			0.0006	0.0026
Line Heater Emissions[3]	0.0882	0.3863	1.6038	7.0245	1,924.53	8,429.43	1.3472	5.9006	0.0096	0.0421	0.1219	0.5339	0.1219	0.5339	8.02E-06	3.51E-05	0.030	0.132	3.37E-05	1.48E-04			0.0012	0.0053
TOTALS:	**46.4185**	**203.3131**	**2.4057**	**10.5368**	**3146.8835**	**13783.3496**	**2.0208**	**8.8509**	**0.0144**	**0.0632**	**0.1828**	**0.8008**	**1.4587**	**1.1821**	**1.20E-05**	**5.27E-05**	**8.3056**	**36.3784**	**0.0016**	**0.0068**	**0.0791**	**0.3467**	**0.0018**	**0.0079**
TOTALS (Excluding Fugitives):	**42.5233**	**186.2520**	**2.4057**	**10.5368**	**3059.3838**	**13400.1011**	**2.0208**	**8.8509**	**0.0144**	**0.0632**	**0.1828**	**0.8008**	**0.1828**	**0.8008**	**1.20E-05**	**5.27E-05**	**8.0423**	**35.2253**	**0.0003**	**0.0012**	**0.0100**	**0.0437**	**0.0018**	**0.0079**
UNCONTROLLED (Truck Loading Emissions)																								
Truck Loading Emissions[4]	3.0525	0.1166			3.4976	0.4747											0.0452	1.72E-03	0.0000	4.04E-08	0.0002	7.69E-06		
CONTROLLED EMISSIONS																								
Enclosed Combustor Emissions (from F/W/B losses)[5]	0.8480	3.7144	0.0621	0.2720	186.6967	817.7314	0.0522	0.2284	2.27E-05	0.0001	0.0035	0.0155	0.0047	0.0207	3.10E-07	1.36E-06	0.1600	0.7008	0.0000	0.0000	0.0002	0.0009	2.84E-06	1.24E-05
Controlled Fugitive Emissions from Hauling													0.6379	0.1906										
TOTALS:	**0.848**	**3.714**	**0.062**	**0.272**	**186.697**	**817.731**	**0.052**	**0.228**	**2.27E-05**	**9.93E-05**	**0.004**	**0.016**	**0.643**	**0.211**	**3.10E-07**	**1.36E-06**	**0.160**	**0.701**	**4.55E-06**	**1.99E-05**	**0.000**	**0.001**	**2.84E-06**	**1.24E-05**
POTENTIAL TO EMIT[6]	**4.8756**	**21.4717**	**2.4677**	**10.8087**	**3160.9861**	**13845.5937**	**2.0729**	**9.0793**	**0.0145**	**0.0633**	**0.1864**	**0.8163**	**0.8255**	**1.0121**	**1.23E-05**	**5.40E-05**	**0.4685**	**2.0539**	**0.0013**	**0.0058**	**0.0694**	**0.3039**	**0.0018**	**0.0079**
POTENTIAL TO EMIT (Excluding Fugitives)	**0.9803**	**4.2939**	**2.4677**	**10.8087**	**3073.4864**	**13461.8704**	**2.0729**	**9.0793**	**0.0145**	**0.0633**	**0.1864**	**0.8163**	**0.1875**	**0.8215**	**1.23E-05**	**5.40E-05**	**0.2053**	**0.8992**	**0.0001**	**0.0002**	**0.0002**	**0.0009**	**0.0018**	**0.0079**

Enter any notes here:	1 - See Tables 4 and 5 for fugitive emission calculations; Table 12 for PM emissions from hauling. 2 - See Tables 6 and 7 for tanks emission calculations 3 - See Table 9 for gas production unit heater and line heater emission 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 50 barrels per day, VOC emissions would be 3.0525 pounds per hour when there are truck loading activities. Average hourly VOC emissions from truck loading is 0.0266 pound per hour. 5 - See Table 10 and 11 for enclosed combustion emission calculations. 6 - The hourly potential to emit is the sum of emissions from gas production unit heaters, line heaters, storage tanks, enclosed combustors, and fugitives. Does not include emissions from loading (see footnote 5). 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

Revival Well Pad

Doddridge County, West Virginia

Antero Resources Corporation

Pollutant		Emissions		Threshold Exceeded?		
		Uncontrolled	Controlled	Threshold	Uncontrolled	Controlled
VOC	lbs/hr	46.4185	4.8756	6	**Yes**	
	tons/yr	203.4298	21.4717	10	**Yes**	**Yes**
NO_X	lbs/hr	2.4057	2.4677	6		
	tons/yr	10.5368	10.8087	10	**Yes**	**Yes**
CO	lbs/hr	2.0208	2.0729	6		
	tons/yr	8.8509	9.0793	10		
SO_2	lbs/hr	0.0144	0.0145	6		
	tons/yr	0.0632	0.0633	10		
$PM_{2.5}$	lbs/hr	0.1828	0.1864	6		
	tons/yr	0.8008	0.8163	10		
PM_{10}	lbs/hr	1.4587	0.8255	6		
	tons/yr	1.1821	1.0121	10		
Lead	lbs/hr	1.20E-05	1.23E-05	6		
	tons/yr	5.27E-05	5.40E-05	10		
Total HAPs	lbs/hr	8.3056	0.4685	2	**Yes**	
	tons/yr	36.3801	2.0539	5	**Yes**	
Total TAPs	lbs/hr	0.0034	0.0031	1.14		
n-Hexane	lbs/hr	8.1762	0.3553			
	tons/yr	35.8135	1.5580			
Toluene	lbs/hr	0.0154	0.0132			
	tons/yr	0.0674	0.0580			
Ethylbenzene	lbs/hr	0.0314	0.0274			
	tons/yr	0.1376	0.1201			
Xylenes	lbs/hr	0.0791	0.0694			
	tons/yr	0.3467	0.3039			
Benzene	lbs/hr	0.0016	0.0013			
	tons/yr	0.0068	0.0058			

Enter any notes here:	1. Emissions are based on 98% Enclosed Combustor DRE operating 100% of the time. 2. Please see Attachment J - Fugitive Emissions Data Summary Sheet and Attachment T - Emission Points Summary Sheet for sitewide sources and breakdown of emission quantities.

Table 4

Fugitive Emissions
Revival 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
	Benzene frac	0.000
	Toluene	0.000
	Ethylbenzene	0.000
	Xylenes	0.000
	n-Hexane	0.023
	HAPs	0.023
	Methane	0.603

Gas					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
500	Valves	Gas VOC	0.004500	0.43	8,280.76
		Non VOC	0.004500	1.82	35,081.24
		HAPs	0.004500	0.05	984.86
		CO2e	0.004500	33.90	653,229.45
590	Connectors	VOC	0.000200	0.02	434.28
		Non-VOC	0.000200	0.10	1,839.82
		HAPs	0.000200	0.00	51.65
		CO2e	0.000200	1.78	34,258.26
130	Flanges	VOC	0.000390	0.01	186.59
		Non-VOC	0.000390	0.04	790.50
		HAPs	0.000390	0.00	22.19
		CO2e	0.000390	0.763773	14719.436969
			Total VOCs:	0.46	8901.63
			Total THC:	2.42	46613.19

Light Liquid Weight Fraction From Analysis:	VOC frac	0.977
	Benzene frac	0.000
	Toluene	0.005
	Ethylbenzene	0.010
	Xylenes	0.024
	n-hexane	0.007
	HAPs	0.046
	Methane	0.008

Light Liquid					
Number	Component	Pollutant	Emission Factor (kg/hr of THC per component)	kg/hr	lb/yr
520	Valves	Light Liquid VOC	0.002500	1.27	24,468.54
		Light Liquid Non-VOC	0.002500	0.03	585.06
		Light Liquid HAPs	0.002500	0.06	1,157.86
		CO2e	0.002500	0.26	4944.91
			Total VOC:	1.27	24,468.54
			Total THC:	1.30	25,053.60

Fugitive Total Emissions			
	Annual Emissions (lb/yr)	Annual Emissions (lb/hr)	Annual Emissions (tpy)
VOC	33,370.17	3.81	16.69
Ethylbenzene		0.03	0.12
Toluene		0.01	0.06
Xylenes		0.07	0.30
n-Hexane		0.14	0.62
TAPs (Benzene)		0.00	0.01
HAPs		0.25	1.11
CO_{2e}	707,152.06	80.73	353.58

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
Revival Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Number of PCVs	30
Bleed Rate (scf/day/PCV)	6.6
Total Bleed Rate (scf/day)	198

Component	Mol%	Molecular Weight (lb/lb-mole)	Component Flow (scf/day)	Component Moles (lb-moles)	Component Emissions (lbs/day)	(lbs/hr)	(tons/year)
H2S	0.00E+00	34.08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.4946	14.01	0.979308	2.58E-03	0.04	1.51E-03	0.01
Carbon Dioxide	0.1467	44.01	0.290466	7.65E-04	0.03	1.40E-03	6.15E-03
Methane	77.6927	16.04	153.831546	0.41	6.50	0.27	1.19
Ethane	14.1987	30.07	28.113426	0.07	2.23	0.09	0.41
Propane	4.4938	44.1	8.897724	0.02	1.03	0.04	0.19
Isobutane	0.5666	58.12	1.121868	2.96E-03	0.17	0.01	0.03
n-Butane	1.1838	58.12	2.343924	6.18E-03	0.36	0.01	0.07
Isopentane	0.3749	72.15	0.742302	1.96E-03	0.14	5.88E-03	0.03
n-Pentane	0.2914	72.15	0.576972	1.52E-03	0.11	4.57E-03	0.02
2-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-Methylpentane	0.00E+00	86.18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.5451	86.18	1.079298	2.84E-03	0.25	0.01	0.04
Methylcyclopentane	0.00E+00	84.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	0.00E+00	78.11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylhexane	0.00E+00	100.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-Methylhexane	0.00E+00	100.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptane	0.00E+00	100.21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methylcyclohexane	0.00E+00	98.186	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	92.14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Octane	0.00E+00	114.23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	0.00E+00	106.17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m & p-Xylene	0.00E+00	106.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
o-Xylene	0.00E+00	106.16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nonane	0.00E+00	128.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C10+	0.00E+00	174.28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	lb/hr	tpy
VOC Emissions	0.0859	0.3761
Benzene Emissions	0.00E+00	0.00E+00
Toluene Emissions	0.00E+00	0.00E+00
Ethylbenzene Emissions	0.00E+00	0.00E+00
Xylene Emissions	0.00E+00	0.00E+00
n-Hexane Emissions	0.0102	0.0447
HAPs Emissions	0.0102	0.0447
TAPs Emissions	0.00E+00	0.00E+00
CO_{2e} emissions	6.7745	29.6725

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
Revival 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	0.0908	0.0486	0.2130	2.6427	0.0873	0.3824
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0360	0.0192	0.0843	0.3388	0.0112	0.0490
Carbon Dioxide	0.1694	0.0907	0.3973	2.6045	0.0860	0.3769
Methane	9.1355	4.8912	21.4233	57.7581	1.9081	8.3574
Ethane	17.4345	9.3344	40.8848	21.2860	0.7032	3.0800
Propane	22.5199	12.0572	52.8104	10.5243	0.3477	1.5228
Isobutane	6.3457	3.3975	14.8809	0.5982	0.0198	0.0866
n-Butane	15.4357	8.2643	36.1975	2.5913	0.0856	0.3750
Isopentane	7.5503	4.0425	17.7060	0.6788	0.0224	0.0982
n-Pentane	6.1530	3.2943	14.4292	0.5128	0.0169	0.0742
2-Methylpentane	0.0096	0.0051	0.0224	0.0003	0.0000	0.0000
3-Methylpentane	0.0070	0.0037	0.0164	0.0007	0.0000	0.0001
n-Hexane	14.8054	7.9268	34.7195	0.4128	0.0136	0.0597
Methylcyclopentane	0.0041	0.0022	0.0096	0.0011	0.0000	0.0002
Benzene	0.0004	0.0002	0.0009	0.0006	0.0000	0.0001
2-Methylhexane	0.0143	0.0077	0.0336	0.0004	0.0000	0.0001
3-Methylhexane	0.0118	0.0063	0.0277	0.0004	0.0000	0.0001
Heptane	0.0213	0.0114	0.0500	0.0007	0.0000	0.0001
Methylcyclohexane	0.0161	0.0086	0.0377	0.0028	0.0001	0.0004
Toluene	0.0037	0.0020	0.0088	0.0053	0.0002	0.0008
Octane	0.0733	0.0393	0.1720	0.0014	0.0000	0.0002
Ethylbenzene	0.0069	0.0037	0.0162	0.0096	0.0003	0.0014
m & p-Xylene	0.0057	0.0031	0.0134	0.0078	0.0003	0.0011
o-Xylene	0.0111	0.0060	0.0261	0.0157	0.0005	0.0023
Nonane	0.0598	0.0320	0.1402	0.0018	0.0001	0.0003
C10+	0.0786	0.0421	0.1843	0.0030	0.0001	0.0004
Total VOCs	73.134	39.16	171.5	15.370	0.5078	2.2240
Total CO_{2e}		122.37	536.0		47.79	209.3
Total TAPs (Benzene)		0.0002	0.0009		0.0000	0.0001
Toluene		0.0020	0.0088		0.0002	0.0008
Ethylbenzene		0.0037	0.0162		0.0003	0.0014
Xylenes		0.0090	0.0395		0.0008	0.0034
n-Hexane		7.927	34.719		0.0136	0.0597
Total HAPs		7.942	34.785		0.0149	0.0654
Total	100.00	53.54	234.5	100.00	3.304	14.47

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

Table 7

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

Condensate Tank Information	
Number of Tanks	6
Maximum Working Losses (lbs/hr)	0.9067
Maximum Breathing Losses (lbs/hr)	2.9527
# Hours Operational	8760

	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
H2S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0020	1.86E-05	8.13E-05	0.0001	0.0003	0.0001	0.0003
Carbon Dioxide	0.2410	0.0022	0.0096	0.0071	0.0312	0.0093	0.0407
Methane	2.4734	0.0224	0.0982	0.0730	0.3199	0.0955	0.4181
Ethane	26.6193	0.2414	1.0571	0.7860	3.4426	1.0273	4.4998
Propane	28.6632	0.2599	1.1383	0.8463	3.7069	1.1062	4.8453
Isobutane	7.5716	0.0687	0.3007	0.2236	0.9792	0.2922	1.2799
n-Butane	18.2367	0.1654	0.7242	0.5385	2.3585	0.7038	3.0828
Isopentane	8.2882	0.0751	0.3292	0.2447	1.0719	0.3199	1.4011
n-Pentane	6.6263	0.0601	0.2632	0.1957	0.8570	0.2557	1.1201
2-Methylpentane	0.0099	0.0001	0.0004	0.0003	0.0013	0.0004	0.0017
3-Methylpentane	0.0072	0.0001	0.0003	0.0002	0.0009	0.0003	0.0012
n-Hexane	1.0392	0.0094	0.0413	0.0307	0.1344	0.0401	0.1757
Methylcyclopentane	0.0040	0.0000	0.0002	0.0001	0.0005	0.0002	0.0007
Benzene	0.0000	2.04E-07	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylhexane	0.0010	8.95E-06	0.0000	0.0000	0.0001	0.0000	0.0002
3-Methylhexane	0.0122	0.0001	0.0005	0.0004	0.0016	0.0005	0.0021
Heptane	0.0204	0.0002	0.0008	0.0006	0.0026	0.0008	0.0034
Methylcyclohexane	0.0151	0.0001	0.0006	0.0004	0.0020	0.0006	0.0026
Toluene	0.0005	4.41E-06	1.93E-05	0.0000	0.0001	0.0000	0.0001
Octane	0.0640	0.0006	0.0025	0.0019	0.0083	0.0025	0.0108
Ethylbenzene	0.0016	1.48E-05	6.48E-05	0.0000	0.0002	0.0001	0.0003
m & p-Xylene	0.0017	1.57E-05	6.89E-05	0.0001	0.0002	0.0001	0.0003
o-Xylene	0.0029	2.65E-05	0.0001	0.0001	0.0004	0.0001	0.0005
Nonane	0.0471	0.0004	0.0019	0.0014	0.0061	0.0018	0.0080
C10+	0.0513	4.65E-04	0.0020	0.0015	0.0066	0.0020	0.0087
Total VOCs	70.664	0.6407	2.806	2.0865	9.1389	2.7272	11.945
Total CO_{2e}		0.5629	2.4653	1.8329	8.0283	2.3958	10.494
Total TAPs (Benzene)		2.04E-07	8.95E-07	0.0000	0.0000	0.0000	0.0000
Toluene		4.41E-06	1.93E-05	0.0000	0.0001	0.0000	0.0001
Ethylbenzene		1.48E-05	6.48E-05	0.0000	0.0002	0.0001	0.0003
Xylenes		4.22E-05	0.0002	0.0001	0.0006	0.0002	0.0008
n-Hexane		0.0094	0.0413	0.0307	0.1344	0.0401	0.1757
Total HAPs		0.0095	0.0415	0.0309	0.1353	0.0404	0.1768
Total	100.00	0.9067	3.9713	2.9527	12.9328	3.8594	16.904

Table 7

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

Produced Water Tank Information	
Number of Tanks	2
Maximum Working Losses (lbs/hr)	0.0399
Maximum Breathing Losses (lbs/hr)	0.0083

	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
H2S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0067	2.69E-06	1.18E-05	5.57E-07	2.44E-06	3.24E-06	1.42E-05
Carbon Dioxide	3.4866	0.0014	0.0061	0.0003	0.0013	0.0017	0.0074
Methane	3.1889	0.0013	0.0056	0.0003	0.0012	0.0015	0.0067
Ethane	1.0844	0.0004	0.0019	0.0001	0.0004	0.0005	0.0023
Propane	0.1307	5.21E-05	0.0002	1.08E-05	4.73E-05	6.29E-05	0.0003
Isobutane	0.0009	3.71E-07	1.63E-06	7.69E-08	3.37E-07	4.48E-07	1.96E-06
n-Butane	0.0061	2.42E-06	1.06E-05	5.01E-07	2.20E-06	2.92E-06	1.28E-05
Isopentane	0.0004	1.59E-07	6.96E-07	3.29E-08	1.44E-07	1.92E-07	8.40E-07
n-Pentane	0.0002	8.75E-08	3.83E-07	1.81E-08	7.94E-08	1.06E-07	4.63E-07
2-Methylpentane	2.78E-08	1.11E-11	4.87E-11	2.30E-12	1.01E-11	1.34E-11	5.87E-11
3-Methylpentane	1.30E-07	5.20E-11	2.28E-10	1.08E-11	4.72E-11	6.28E-11	2.75E-10
n-Hexane	1.30E-06	5.21E-10	2.28E-09	1.08E-10	4.73E-10	6.29E-10	2.75E-09
Methylcyclopentane	4.66E-07	1.86E-10	8.15E-10	3.86E-11	1.69E-10	2.25E-10	9.84E-10
Benzene	7.62E-07	3.04E-10	1.33E-09	6.30E-11	2.76E-10	3.67E-10	1.61E-09
2-Methylhexane	5.86E-10	2.34E-13	1.02E-12	4.85E-14	2.12E-13	2.82E-13	1.24E-12
3-Methylhexane	7.56E-09	3.02E-12	1.32E-11	6.25E-13	2.74E-12	3.64E-12	1.59E-11
Heptane	1.05E-08	4.18E-12	1.83E-11	8.66E-13	3.79E-12	5.04E-12	2.21E-11
Methylcyclohexane	2.53E-07	1.01E-10	4.43E-10	2.09E-11	9.17E-11	1.22E-10	5.34E-10
Toluene	3.32E-06	1.33E-09	5.80E-09	2.75E-10	1.20E-09	1.60E-09	7.01E-09
Octane	4.14E-09	1.65E-12	7.23E-12	3.42E-13	1.50E-12	1.99E-12	8.73E-12
Ethylbenzene	3.40E-06	1.36E-09	5.94E-09	2.81E-10	1.23E-09	1.64E-09	7.17E-09
m & p-Xylene	3.10E-06	1.24E-09	5.42E-09	2.56E-10	1.12E-09	1.49E-09	6.54E-09
o-Xylene	6.50E-06	2.60E-09	1.14E-08	5.38E-10	2.36E-09	3.13E-09	1.37E-08
Nonane	2.43E-09	9.70E-13	4.25E-12	2.01E-13	8.81E-13	1.17E-12	5.13E-12
C10+	3.23E-10	1.29E-13	5.64E-13	2.67E-14	1.17E-13	1.55E-13	6.81E-13
Total VOCs	0.1383	5.52E-05	0.0002	1.14E-05	5.01E-05	6.66E-05	0.0003
Total CO_{2e}		0.0332	0.1454	0.0069	0.0301	0.0401	0.1756
Total TAPs (Benzene)		3.04E-10	1.33E-09	6.30E-11	2.76E-10	3.67E-10	1.61E-09
Toluene		1.33E-09	5.80E-09	2.75E-10	1.20E-09	1.60E-09	7.01E-09
Ethylbenzene		1.36E-09	5.94E-09	2.81E-10	1.23E-09	1.64E-09	7.17E-09
Xylenes		3.83E-09	1.68E-08	7.94E-10	3.48E-09	4.63E-09	2.03E-08
n-Hexane		5.21E-10	2.28E-09	1.08E-10	4.73E-10	6.29E-10	2.75E-09
Total HAPs		7.34E-09	3.21E-08	1.52E-09	6.66E-09	8.86E-09	3.88E-08
Total	100.00	0.0399	0.1748	0.0083	0.0362	0.0482	0.2110

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

Table 8

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

Annual Loading	Oil Truck Loading	Water Truck Loading
RVP	1.65	1.0211
Annual Average Temp (F)	65.076213	65.076213
S (saturation factor)	0.6	0.6
P (true vapor pressure)	0.71	0.37
M (MW of vapor)	42.37	18.42
Collection Efficiency (%)	0.00	0.00
Loading Loss (lb/10^3 gal)*	0.43	0.10
Maximum Throughput (gallons/hr)**	10,080	10,080
Average Throughput (gallons/yr)	766,500	9,198,000
Loading Emissions (lbs/hr)	4.32	0.98
Loading Emissions (tpy)	0.16	0.45

	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
H2S	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	0.0020	8.84E-05	3.36E-06	0.0067	6.61E-05	3.02E-05
Carbon Dioxide	0.2410	0.0104	3.96E-04	3.4866	3.42E-02	1.56E-02
Methane	2.4734	0.1068	4.06E-03	3.1889	3.13E-02	1.43E-02
Ethane	26.6193	1.1494	0.0437	1.0844	1.06E-02	4.86E-03
Propane	28.6632	1.2376	4.71E-02	0.1307	1.28E-03	5.85E-04
Isobutane	7.5716	0.3269	1.24E-02	0.0009	9.13E-06	4.17E-06
n-Butane	18.2367	0.7874	2.99E-02	0.0061	5.95E-05	2.72E-05
Isopentane	8.2882	0.3579	1.36E-02	0.0004	3.91E-06	1.78E-06
n-Pentane	6.6263	0.2861	1.09E-02	0.0002	2.15E-06	9.82E-07
2-Methylpentane	0.0099	0.0004	1.63E-05	2.78E-08	2.73E-10	1.25E-10
3-Methylpentane	0.0072	0.0003	1.19E-05	1.30E-07	1.28E-09	5.84E-10
n-Hexane	1.0392	0.0449	1.71E-03	1.30E-06	1.28E-08	5.85E-09
Methylcyclopentane	0.0040	0.0002	6.53E-06	4.66E-07	4.58E-09	2.09E-09
Benzene	0.0000	0.0000	3.70E-08	0.0000	7.48E-09	3.41E-09
2-Methylhexane	0.0010	0.0000	1.62E-06	5.86E-10	5.76E-12	2.63E-12
3-Methylhexane	0.0122	0.0005	2.01E-05	7.56E-09	7.42E-11	3.39E-11
Heptane	0.0204	0.0009	3.35E-05	1.05E-08	1.03E-10	4.69E-11
Methylcyclohexane	0.0151	0.0007	2.48E-05	2.53E-07	2.49E-09	1.13E-09
Toluene	0.0005	0.0000	7.99E-07	0.0000	3.26E-08	1.49E-08
Octane	0.0640	0.0028	1.05E-04	4.14E-09	4.06E-11	1.85E-11
Ethylbenzene	0.0016	0.0001	2.68E-06	3.40E-06	3.34E-08	1.52E-08
m & p-Xylene	0.0017	0.0001	2.85E-06	3.10E-06	3.04E-08	1.39E-08
o-Xylene	0.0029	0.0001	4.80E-06	6.50E-06	6.39E-08	2.91E-08
Nonane	0.0471	0.0020	7.73E-05	2.43E-09	2.39E-11	1.09E-11
C10+	0.0513	0.0022	8.41E-05	3.23E-10	3.17E-12	1.45E-12
Total VOCs	70.6642	3.0512	0.1160	0.1383	1.36E-03	6.20E-04
Total CO_{2e}		2.6804	0.1019		0.8172	0.3728
Total TAPs (Benzene)		0.0000	3.70E-08		7.48E-09	3.41E-09
Toluene		0.0000	7.99E-07		3.26E-08	1.49E-08
Ethylbenzene		0.0001	2.68E-06		3.34E-08	1.52E-08
Xylenes		0.0002	7.64E-06		9.43E-08	4.30E-08
n-Hexane		0.0449	1.71E-03		1.28E-08	5.85E-09
Total HAPs		0.0452	1.72E-03		1.81E-07	8.24E-08
Total	100.0000	4.3179	0.1642	100.0000	0.9821	0.4481

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

** Maximum throughput in gallons per hour obtained from actual transfer rate of 200 barrels in 50 minutes. (10,080 gal/hr = 200 bbl / 50 min x 42 gal/bbl x 60 min/hr)

Loading emissions are vented to the atmosphere.

Table 9

Gas Production Unit Heater and Line Heater Emissions
Revival Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Gas Production Unit Heater Emissions

Number of Units	10
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	0.802	3.512
CO	84	0.674	2.950
CO_2	120,000	962.263	4214.713
Lead	0.0005	4.01E-06	1.76E-05
N_2O	2.2	0.018	0.077
PM (Total)	7.6	0.061	0.267
SO_2	0.6	0.005	0.021
TOC	11	0.088	0.386
Methane	2.3	0.018	0.081
VOC	5.5	0.044	0.193
HAPS			
2-Methylnaphthalene	2.40E-05	1.92E-07	8.43E-07
Benzene	2.10E-03	1.68E-05	7.38E-05
Dichlorobenzene	1.20E-03	9.62E-06	4.21E-05
Fluoranthene	3.00E-06	2.41E-08	1.05E-07
Fluorene	2.80E-06	2.25E-08	9.83E-08
Formaldehyde	7.50E-02	6.01E-04	2.63E-03
Hexane	1.80E+00	1.44E-02	6.32E-02
Naphthalene	6.10E-04	4.89E-06	2.14E-05
Phenanathrene	1.70E-05	1.36E-07	5.97E-07
Toluene	3.40E-03	2.73E-05	1.19E-04

Line Heater Emissions

Number of Units	10
Line Heater Rating (MMBtu/hr)	2.00
Operating hours/year	8760
Fuel Heat Value (Btu/scf)	1,247

Pollutant	Emission Factors (lb/MMscf)	lb/hr	tpy
NOx	100	1.604	7.025
CO	84	1.347	5.901
CO_2	120,000	1924.526	8429.426
Lead	0.0005	8.02E-06	3.51E-05
N_2O	2.2	0.035	0.155
PM (Total)	7.6	0.122	0.534
SO_2	0.6	0.010	0.042
TOC	11	0.176	0.773
Methane	2.3	0.037	0.162
VOC	5.5	0.088	0.386
HAPS			
2-Methylnaphthalene	2.40E-05	3.85E-07	1.69E-06
Benzene	2.10E-03	3.37E-05	1.48E-04
Dichlorobenzene	1.20E-03	1.92E-05	8.43E-05
Fluoranthene	3.00E-06	4.81E-08	2.11E-07
Fluorene	2.80E-06	4.49E-08	1.97E-07
Formaldehyde	7.50E-02	1.20E-03	5.27E-03
Hexane	1.80E+00	2.89E-02	1.26E-01
Naphthalene	6.10E-04	9.78E-06	4.28E-05
Phenanathrene	1.70E-05	2.73E-07	1.19E-06
Toluene	3.40E-03	5.45E-05	2.39E-04

	lb/hr	tpy
TOTAL Uncontrolled VOC	0.132	0.580
TOTAL Uncontrolled HAPs	0.045	0.198
TOTAL Uncontrolled TAPs (Benzene)	5.05E-05	2.21E-04
TOTAL Uncontrolled Toluene	8.18E-05	3.58E-04
TOTAL Uncontrolled Hexane	4.33E-02	1.90E-01
TOTAL Uncontrolled TAPs (Formaldehyde)	1.80E-03	7.90E-03
TOTAL CO_{2e} Emissions	2,903.94	12,719.28

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

Table 10

Enclosed Combustor Emissions
Revival Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

General Information	
Unit Name:	EC001, EC002, EC003

Pollutant	Emission Factor (lb/MMscf)
NOx	100
CO	84
PM10	7.6
PM2.5	5.7
SO_2	0.6
CO_2	120,000
VOC	5.5
benzene	2.10E-03
Hexane	1.80E+00
Toluene	3.40E-03
Formaldehyde	7.50E-02
N_2O	2.20
Lead	5.00E-04

Constants	
Btu/MMBtu	1,000,000
scf/MMscf	1,000,000
lb/ton	2,000
H_2S molecular weight	34.08
SO_2 molecular weight	64.06
seconds/hour	3,600
inches/ft	12

Destruction Efficiency	
VOC percent destruction efficiency (%)	98
H_2S percent destruction efficiency (%)	98

Enclosed Combustor operating hours	8760
No. of Enclosed Combustors	3

Stream Information							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed/Vapor Combustor (Enter Name of Each Stream Here)	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
Maximum Expected Hourly Volumetric Flow Rate of Stream (scf/hr)	37.8	--	479.47	68.07	34.56	0.99	620.89
Maximum Expected Annual Volumetric Flow Rate of Stream (scf/yr)	331,128.00	--	4,200,156.78	596,262.05	302,764.51	8,694.59	5,439,005.94
Heating Content (Btu/ft3)	1,247		2,366.99	1,191.24	2,416.73	97.55	2,093.13

Mass Flow Rates of the Vapors Sent to this Control Device, Hourly Basis (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
H2S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	39.156	0.508	2.727	0.000	42.39
Benzene	-	-	0.000	0.000	0.000	0.000	0.000
Toluene	-	-	0.002	0.000	0.000	0.000	0.002
Ethylbenzene	-	-	0.004	0.000	0.000	0.000	0.004
Xylenes	-	-	0.009	0.001	0.000	0.000	0.010
n-Hexane	-	-	7.927	0.014	0.040	0.000	7.981
HAPs	-	-	7.942	0.015	0.040	0.000	7.997
Total Mass Flow	-	-	53.540	3.304	3.859	0.048	60.751
Mass Flow Rates of the Vapors Sent to this Control Device, Annual Basis (tpy)							
H2S	-	-	0.000	0.000	0.000	0.000	0.000
Total VOC	-	-	171.503	2.224	11.945	0.000	185.672
Benzene	-	-	0.001	0.000	0.000	0.000	0.001
Toluene	-	-	0.009	0.001	0.000	0.000	0.010
Ethylbenzene	-	-	0.016	0.001	0.000	0.000	0.018
Xylenes	-	-	0.039	0.003	0.001	0.000	0.044
n-Hexane	-	-	34.719	0.060	0.176	0.000	34.955
HAP	-	-	34.785	0.065	0.177	0.000	35.027
Total Mass Flow	-	-	234.506	14.470	16.904	0.211	266.091

Table 10

Enclosed Combustor Emissions
Revival Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Controlled Emissions							
Hourly (lb/hr)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.004	-	0.048	0.007	0.003	0.000	0.06
CO	0.003	-	0.040	0.006	0.003	0.000	0.05
PM2.5	0.000	-	0.003	0.000	0.000	0.000	0.00
PM10	0.000	-	0.004	0.001	0.000	0.000	0.00
H2S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO_2	0.000	-	0.000	0.000	0.000	0.000	0.00
CO_2	4.536	-	-	-	-	-	4.54
Total VOC	0.000	-	0.783	0.010	0.055	0.000	0.85
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.000	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.000	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.159	0.000	0.001	0.000	0.16
HAP	0.000	-	0.159	0.000	0.001	0.000	0.16
N_2O	0.000	-	0.001	0.000	0.000	0.000	0.00
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00
Annual (tpy)							
	1	2	3	4	5	6	Total
Stream Sent to Enclosed Combustor/Vapor Combustor	pilot(s)	added fuel stream(s)	Oil Tank Flash Emissions	Water Tank Flash Emissions	Oil Tank W/B Emissions	Water Tank W/B Emissions	-
NOx	0.017	-	0.210	0.030	0.015	0.000	0.27
CO	0.014	-	0.176	0.025	0.013	0.000	0.23
PM2.5	0.001	-	0.012	0.002	0.001	0.000	0.02
PM10	0.001	-	0.016	0.002	0.001	0.000	0.02
H_2S	0.000	-	0.000	0.000	0.000	0.000	0.00
SO_2	0.000	-	0.000	0.000	0.000	0.000	0.00
CO_2	19.868	-	-	-	-	-	19.87
Total VOC	0.001	-	3.430	0.044	0.239	0.000	3.71
Benzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Toluene	0.000	-	0.000	0.000	0.000	0.000	0.00
Ethylbenzene	0.000	-	0.000	0.000	0.000	0.000	0.00
Xylenes	0.000	-	0.001	0.000	0.000	0.000	0.00
n-Hexane	0.000	-	0.694	0.001	0.004	0.000	0.70
HAP	0.000	-	0.696	0.001	0.004	0.000	0.70
N_2O	0.000	-	0.005	0.001	0.000	0.000	0.01
Lead	0.000	-	0.000	0.000	0.000	0.000	0.00
Formaldehyde	0.000	-	-	-	-	-	0.00

Enclosed Combustor/Vapor Combustor Total Emissions		
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Total VOC	0.85	3.71
NOx	0.062	0.272
CO	0.052	0.228
PM2.5	0.004	0.016
PM10	0.005	0.021
H_2S	1.21E-05	5.28E-05
SO_2	2.27E-05	9.93E-05
Benzene (TAPs)	4.55E-06	1.99E-05
Toluene	4.40E-05	0.000
Ethylbenzene	8.16E-05	0.000
Xylenes	0.000	0.001
Hexanes	0.160	0.699
Formaldehyde (TAPs)	2.84E-06	1.24E-05
HAPs	0.16	0.70
CO_2e	186.70	817.73
N_2O	0.001	0.006
Lead	3.10E-07	1.36E-06

Enter any notes here as needed
1. Emission Factors from AP-42 Tables 1.4-1, 1.4-2, and 1.4.3

Table 11

Enclosed Combustor GHG Emissions
Revival Well Pad
Doddridge County, West Virginia
Antero Resources Corporation

Enclosed Combustor CO_2 and CH_4 Emissions

Components	Mole fraction of oil flash gas constituents[a]	Volume of oil flash gas sent to Enclosed Combustor *scf/year*	Mole fraction of water flash gas constituents[a]	Volume of water flash gas sent to Enclosed Combustor *scf/year*	Mole fraction of oil tank vapors constituents[a]	Volume of oil tank vapor sent to Enclosed Combustor *scf/year*	Mole fraction of water tank vapors constituents[a]	Volume of water tank vapors sent to Enclosed Combustor *scf/year*	Component volume of gas sent to Enclosed Combustor *scf/year*	Number of carbon atoms	Combustion Efficiency	Combusted CO_2 Volume[b] *scf/year*	Uncombusted CO_2 and CH_4 Volume[b] *scf/year*	Volume GHGs Emitted *scf/year*
CO_2	0.002	4,200,157	0.0122	596,262	0.0023	302,765	0.015	8,695	14,805	1	0	--	14,805	13,145,117
Methane	0.236	4,200,157	0.7418	596,262	0.0653	302,765	0.037	8,695	1,454,738	1	0.98	1,425,643	29,095	29,095
Ethane	0.241	4,200,157	0.1458	596,262	0.3751	302,765	0.007	8,695	1,210,758	2	0.98	2,373,086	--	
Propane	0.212	4,200,157	0.0492	596,262	0.2754	302,765	0.001	8,695	1,002,425	3	0.98	2,947,128	--	
i-Butane	0.045	4,200,157	0.0021	596,262	0.0552	302,765	0.000	8,695	208,204	4	0.98	816,161	--	
n-Butane	0.110	4,200,157	0.0092	596,262	0.1330	302,765	0.000	8,695	508,454	4	0.98	1,993,140	--	
Pentane	0.079	4,200,157	0.0034	596,262	0.0876	302,765	0.000	8,695	359,462	5	0.98	1,761,362	--	
Hexane	0.071	4,200,157	0.0010	596,262	0.0052	302,765	0.000	8,695	301,816	6	0.98	1,774,677	--	
Benzene	0.000	4,200,157	0.0000	596,262	0.0000	302,765	0.000	8,695	9	6	0.98	55	--	
Heptanes	0.000	4,200,157	0.0000	596,262	0.0002	302,765	0.000	8,695	963	7	0.98	6,608	--	
Toluene	0.000	4,200,157	0.0000	596,262	0.0000	302,765	0.000	8,695	78	7	0.98	537	--	
Octane	0.000	4,200,157	0.0000	596,262	0.0003	302,765	0.000	8,695	1,500	8	0.98	11,762	--	
Ethyl benzene	0.000	4,200,157	0.0000	596,262	0.0000	302,765	0.000	8,695	126	8	0.98	992	--	
Xylenes	0.000	4,200,157	0.0000	596,262	0.0000	302,765	0.000	8,695	309	8	0.98	2,424	--	
Nonane	0.000	4,200,157	0.0000	596,262	0.0002	302,765	0.000	8,695	862	9	0.98	7,600	--	
Decane plus	0.000	4,200,157	0.0000	596,262	0.0001	302,765	0.000	8,695	932	10	0.98	9,136	--	
											Subtotal	**13,130,312**	--	

Pollutant	Volume Emitted *scf/year*	Density of GHG[c] *lb/scf*	Conversion Factor *lb/ton*	GWF	Emissions[c] *lbs/hr*	Emissions[c] *(tons/yr)*
CO_2	13,145,117	0.12	2000	1	174.01	762.17
CH_4	29,095	0.09	2000	25	0.31	1.35
				CO_2e Emissions	**181.7**	**796.01**

GHG Emissions Summary

Notes

a Flashing/Working/Breathing Losses from ProMax output reports

b 40 CFR 98.233 (n)(4): Eqns: W-19, W-20 and W-21

c 40 CFR 98.233(v) Eqn W-36 - density at 60F and 14.7 psia

Table 12

Haul Road Emissions
Revival 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)	50
PW Production (bbl/day)	600
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	0.3600	1	92	0.3600	33.1200	3.8175	1.7179
Tanker Trucks PW	10	40	10	0.3600	1	1095	0.3600	394.2000	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	1.3743	126.4366	0.0632	0.6184	56.8965	0.0284	0.6872	63.2183	0.0316	0.3092	28.4482	0.0142
Tanker Trucks PW	1.3743	1504.8701	0.7524	0.6184	677.1915	0.3386	0.6872	752.4350	0.3762	0.3092	338.5958	0.1693
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	2.8353	1,694.5757	0.8473	1.2759	762.5591	0.3813	1.4176	847.2879	0.4236	0.6379	381.2795	0.1906

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 13

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

	Potential Emissions		Previous Permit Application Emissions		Change in Emissions	
Pollutant	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**	**Hourly PTE**	**Yearly PTE**
PM	1.6052	1.2451	0.4131	0.4790	1.19E+00	0.7661
PM10	0.8255	1.0121	0.2213	0.3706	0.6042	0.6415
VOC (uncontrolled)	46.4185	203.4298	18.3473	80.4442	28.0712	122.9856
CO	2.0729	9.0793	0.7113	3.1156	1.3616	5.9637
NOx	2.4677	10.8087	0.8468	3.7090	1.6209	7.0997
SO2	0.0145	0.0633	0.0048	0.0211	9.64E-03	4.22E-02
Pb	1.23E-05	5.40E-05	0.0000	0.0000	8.10E-06	3.55E-05
HAPs	0.4685	2.0539	0.3204	1.4038	0.1481	0.6502
TAPs	0.0031	0.0137	0.0020	0.0089	1.11E-03	0.0049

Notes:
1. Change in emissions due to change in storage tanks service, addition of 2 Cimarron enclosed combustors and 10 line heaters.
2. Change in permit from G70A to G70C.

Bryan Research & Engineering, Inc.

ProMax® 3.2

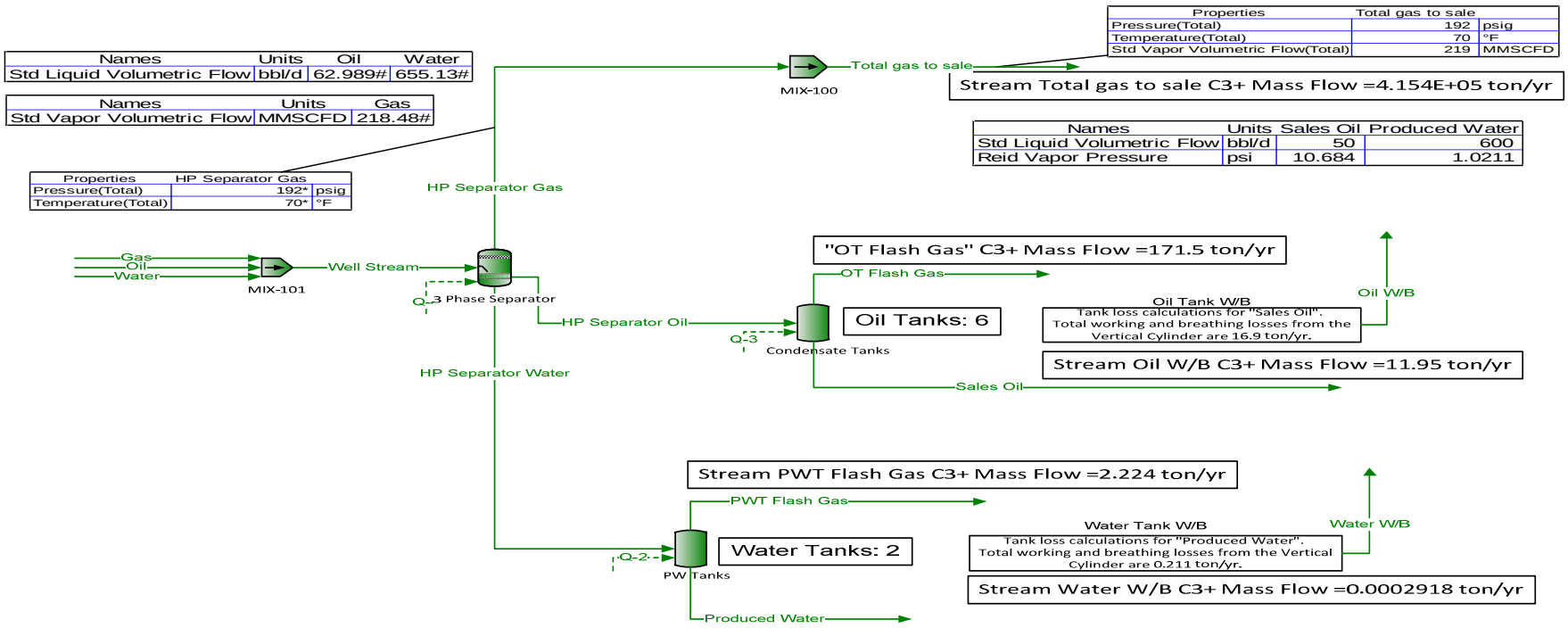
with

TSWEET® & PROSIM®

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

Project Name:	PROMAX SCENARIO 3
File Name:	ProMax@C:\Users\ychen1\Documents\Drafts\082715- ANTERO\ProMax Report\1 HP\PROMAX SCENARIO 3.pmx
ProMax Version:	

Report Created:	7/27/2016 15:51


Names | Units | Oil | Water
Std Liquid Volumetric Flow | bbl/d | 62.989# | 655.13#
Names | Units | Gas
Std Vapor Volumetric Flow | MMSCFD | 218.48#
Properties | HP Separator Gas
Pressure(Total) | 192* | psig
Temperature(Total) | 70* | °F
Gas
Oil
Water
MIX-101
Well Stream
3 Phase Separator
HP Separator Gas
HP Separator Oil
HP Separator Water
MIX-100
Total gas to sale
Properties | Total gas to sale
Pressure(Total) | 192 | psig
Temperature(Total) | 70 | °F
Std Vapor Volumetric Flow(Total) | 219 | MMSCFD
Stream Total gas to sale C3+ Mass Flow =4.154E+05 ton/yr
Names | Units | Sales Oil | Produced Water
Std Liquid Volumetric Flow | bbl/d | 50 | 600
Reid Vapor Pressure | psi | 10.684 | 1.0211
"OT Flash Gas" C3+ Mass Flow =171.5 ton/yr
OT Flash Gas
Q-3
Condensate Tanks
Oil Tanks: 6
Oil Tank W/B
Tank loss calculations for "Sales Oil".
Total working and breathing losses from the Vertical Cylinder are 16.9 ton/yr.
Oil W/B
Stream Oil W/B C3+ Mass Flow =11.95 ton/yr
Sales Oil
Stream PWT Flash Gas C3+ Mass Flow =2.224 ton/yr
PWT Flash Gas
Q-2
PW Tanks
Water Tanks: 2
Water Tank W/B
Tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.211 ton/yr.
Water W/B
Stream Water W/B C3+ Mass Flow =0.0002918 ton/yr
Produced Water

Process Streams		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	Well Stream	Total gas to sale
Phase: Total	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.185958	99.9651	0.0491243	0.209292	0.00421459	0	100	0	99.9970	3.02985	0.000121692	94.15409752	2.16340	0.185958
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.493741	8.51150E-05	0.0117325	0.0532653	8.69779E-05	0.494658	0	0.013	2.92600E-06	0.249764	0.003096884	0.004425802	0.483842	0.493741
Carbon Dioxide		0.146416	0.000994686	0.0373882	0.159758	0.00307659	0.146717	0	0	0.000592639	1.22236	0.232008095	1.459148771	0.143508	0.146416
Methane		77.5576	0.0262600	5.26415	23.6350	0.113085	77.7018	0	5.429	0.00178987	74.3632	6.53339622	3.661144776	76.0036	77.5576
Ethane		14.1739	0.00522144	5.85425	24.0648	0.748129	14.2004	0	5.67	0.000410077	14.6215	37.51338584	0.664228651	13.8911	14.1739
Propane		4.48555	0.00177489	6.56176	21.1965	2.45828	4.49433	0	4.895	0.000152740	4.92964	27.54469686	0.054577644	4.39719	4.48555
Isobutane		0.565438	7.22474E-05	2.05836	4.53136	1.36495	0.566666	0	1.346	2.29161E-06	0.212589	5.520174468	0.000294687	0.554592	0.565438
n-Butane		1.18102	0.000324876	6.16880	11.0224	4.80787	1.18394	0	3.278	2.18591E-05	0.920849	13.29578036	0.001921025	1.15882	1.18102
Isopentane		0.373609	6.71078E-05	4.70786	4.34342	4.81005	0.374944	0	2.12	3.16121E-06	0.194328	4.867898652	0.000101591	0.367247	0.373609
n-Pentane		0.290263	5.06685E-05	4.85208	3.53961	5.22009	0.291434	0	2.304	2.36429E-06	0.146792	3.891794537	5.59663E-05	0.285607	0.290263
2-Methylpentane		0.000350316	2.75284E-08	0.0137384	0.00460191	0.0163002	0	0	1.46	6.26911E-10	8.17506E-05	0.00487378	5.9503E-09	0.000346590	0.000350316
3-Methylpentane		0.000254784	5.52045E-08	0.0111236	0.00336833	0.0132981	0	0	1.063	3.28291E-09	0.000157786	0.003553187	2.78445E-08	0.000252346	0.000254784
n-Hexane		0.537285	3.31629E-05	28.9665	7.13067	35.0891	0.545164	0	0.952	6.03340E-07	0.0989446	0.51101537	2.7891E-07	0.533466	0.537285
Methylcyclopentane		0.000150262	1.05310E-07	0.00861128	0.00202296	0.0104586	0	0	0.629	1.68017E-08	0.000268983	0.002001813	1.0208E-07	0.000149318	0.000150262
Benzene		1.50417E-05	5.30096E-07	0.000853760	0.000202040	0.00103650	0	0	0.063	4.79587E-07	0.000153968	1.22273E-05	1.79584E-07	1.49556E-05	1.50417E-05
2-Methylhexane		0.000452946	3.03317E-08	0.0575676	0.00593951	0.0720437	0	0	1.928	5.86231E-10	9.03932E-05	0.000417206	1.07754E-10	0.000457688	0.000452946
3-Methylhexane		0.000373460	2.61154E-08	0.0497750	0.00490046	0.0623575	0	0	1.592	5.27117E-10	7.77600E-05	0.005178007	1.38928E-09	0.000377925	0.000373460
Heptane		0.000682308	4.92733E-08	0.113109	0.00882999	0.142348	0	0	2.931	9.99977E-10	0.000146697	0.008630571	1.92435E-09	0.000695791	0.000682308
Methylcyclohexane		0.000511877	2.17091E-07	0.0839769	0.00678764	0.105620	0	0	2.198	2.42247E-08	0.000586120	0.006525221	4.75021E-08	0.000521784	0.000511877
Toluene		0.000126593	3.43433E-06	0.0258357	0.00168129	0.0326084	0	0	0.549	3.04600E-06	0.00118314	0.0002239	6.6383E-07	0.000130327	0.000126593
Octane		0.00213480	8.70548E-08	1.04132	0.0266500	1.32582	0	0	9.866	1.17383E-09	0.000260982	0.023737287	6.67032E-10	0.00234209	0.00213480
Ethylbenzene		0.000211129	4.96368E-06	0.119640	0.00270180	0.152429	0	0	0.993	4.35035E-06	0.00186818	0.000650785	5.89509E-07	0.000235728	0.000211129
m-Xylene		0.000175231	4.18192E-06	0.117913	0.00223195	0.150349	0	0	0.843	3.68071E-06	0.00152677	0.000692199	5.37846E-07	0.000200120	0.000175231
o-Xylene		0.000341409	1.09905E-05	0.256730	0.00434931	0.327495	0	0	1.67	9.98553E-06	0.00306381	0.001166071	1.12846E-06	0.000396442	0.000341409
Nonane		0.00159327	9.75458E-08	2.29694	0.0193537	2.93556	0	0	8.901	2.07499E-09	0.000290125	0.01556161	3.49117E-10	0.00211301	0.00159327
C10+		0.00185746	1.29757E-07	31.2709	0.0201382	40.0333	0	0	39.307	3.45061E-09	0.000383832	0.013407163	3.66777E-11	0.00933110	0.00185746
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
Water		44.6916	485.880	0.00289373	0.00269983	0.000193898	0	530.575	0	485.875	0.00484608	1.10833E-07	0.002462596	530.575	44.6916
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		118.661	0.000413701	0.000691117	0.000687115	4.00154E-06	118.662	0	0.000756861	1.42171E-05	0.000399484	2.82056E-06	1.15757E-07	118.663	118.661
Carbon Dioxide		35.1885	0.00483467	0.00220240	0.00206086	0.000141543	35.1955	0	0	0.00287957	0.00195510	0.000211306	3.8164E-05	35.1955	35.1885
Methane		18639.5	0.127637	0.310092	0.304889	0.00520265	18639.6	0	0.316077	0.00869678	0.118940	0.005950434	9.57571E-05	18639.9	18639.5
Ethane		3406.44	0.0253788	0.344852	0.310433	0.0344188	3406.48	0	0.330108	0.00199252	0.0233863	0.034166142	1.73729E-05	3406.81	3406.44
Propane		1078.02	0.00862683	0.386529	0.273433	0.113097	1078.13	0	0.284987	0.000742149	0.00788468	0.025086939	1.42748E-06	1078.41	1078.02
Isobutane		135.892	0.000351159	0.121251	0.0584540	0.0627967	135.936	0	0.0783642	1.11347E-05	0.000340024	0.00502762	7.70753E-09	136.014	135.892
n-Butane		283.837	0.00157906	0.363381	0.142188	0.221193	284.011	0	0.190845	0.000106211	0.00147285	0.012109425	5.02443E-08	284.202	283.837
Isopentane		89.7898	0.000326177	0.277323	0.0560296	0.221293	89.9440	0	0.123427	1.53600E-05	0.000310817	0.004433546	2.6571E-09	90.0675	89.7898
n-Pentane		69.7592	0.000246274	0.285818	0.0456604	0.240158	69.9111	0	0.134139	1.14879E-05	0.000234786	0.003544538	1.4638E-09	70.0453	69.7592
2-Methylpentane		0.0841919	1.33802E-07	0.000809276	5.93640E-05	0.000749912	0	0	0.0850013	3.04610E-09	1.30756E-07	4.4389E-06	1.5563E-13	0.0850013	0.0841919
3-Methylpentane		0.0612324	2.68321E-07	0.000655249	4.34510E-05	0.000611798	0	0	0.0618879	1.59513E-08	2.52370E-07	3.23614E-06	7.28272E-13	0.0618879	0.0612324
n-Hexane		129.126	0.000161188	1.70631	0.0919848	1.61432	130.778	0	0.0554255	2.93157E-06	0.000158256	0.000465419	7.29487E-12	130.833	129.126
Methylcyclopentane		0.0361127	5.11861E-07	0.000507259	2.60959E-05	0.000481163	0	0	0.0366204	8.16376E-08	4.30224E-07	1.8232E-06	2.66989E-12	0.0366204	0.0361127
Benzene		0.00361500	2.57653E-06	5.02919E-05	2.60629E-06	4.76856E-05	0	0	0.00366787	2.33027E-06	2.46264E-07	1.11363E-08	4.69701E-12	0.00366787	0.00361500
2-Methylhexane		0.108857	1.47427E-07	0.00339109	7.66189E-05	0.00331448	0	0	0.112248	2.84844E-09	1.44579E-07	3.7998E-07	2.81831E-15	0.112248	0.108857
3-Methylhexane		0.0897542	1.26934E-07	0.00293206	6.32153E-05	0.00286885	0	0	0.0926864	2.56121E-09	1.24373E-07	4.71598E-06	3.63366E-14	0.0926864	0.0897542
Heptane		0.163980	2.39493E-07	0.00666283	0.000113906	0.00654892	0	0	0.170643	4.85878E-09	2.34634E-07	7.86048E-06	5.03313E-14	0.170643	0.163980
Methylcyclohexane		0.123020	1.05517E-06	0.00494677	8.75597E-05	0.00485921	0	0	0.127968	1.17705E-07	9.37466E-07	5.94299E-06	1.24241E-12	0.127968	0.123020
Toluene		0.0304242	1.66926E-05	0.00152188	2.16884E-05	0.00150020	0	0	0.0319628	1.48002E-05	1.89236E-06	2.03922E-07	1.73624E-11	0.0319628	0.0304242
Octane		0.513059	4.23130E-07	0.0613401	0.000343782	0.0609963	0	0	0.574399	5.70352E-09	4.17426E-07	2.16193E-05	1.74462E-14	0.574399	0.513059
Ethylbenzene		0.0507409	2.41260E-05	0.00704755	3.48529E-05	0.00701270	0	0	0.0578125	2.11379E-05	2.98804E-06	5.92717E-07	1.54186E-11	0.0578125	0.0507409
m-Xylene		0.0421134	2.03262E-05	0.00694579	2.87919E-05	0.00691700	0	0	0.0490795	1.78842E-05	2.44199E-06	6.30435E-07	1.40673E-11	0.0490795	0.0421134
o-Xylene		0.0820511	5.34191E-05	0.0151230	5.61055E-05	0.0150669	0	0	0.0972275	4.85187E-05	4.90040E-06	1.06202E-06	2.95148E-11	0.0972275	0.0820511
Nonane		0.382912	4.74121E-07	0.135304	0.000249661	0.135055	0	0	0.518217	1.00822E-08	4.64039E-07	1.41731E-05	9.13114E-15	0.518217	0.382912
C10+		0.446406	6.30684E-07	1.84205	0.000259780	1.84179	0	0	2.28846	1.67662E-08	6.13918E-07	1.22109E-05	9.59304E-16	2.28846	0.446406
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.160396	99.9589	0.00904494	0.0908445	0.000668134	0	100	0	99.9957	2.64269	5.1736E-05	92.09504254	1.86945	0.160396
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		0.662219	0.000132344	0.00335910	0.0359514	2.14408E-05	0.663391	0	0.00321130	4.54981E-06	0.338750	0.002047301	0.006731531	0.650137	0.662219
Carbon Dioxide		0.308512	0.00242977	0.0168170	0.169401	0.00119147	0.309119	0	0	0.00144774	2.60453	0.24095751	3.486599147	0.302941	0.308512
Methane		59.5705	0.0233829	0.863112	9.13552	0.0159641	59.6762	0	0.768003	0.00159384	57.7581	2.473437017	3.188921873	58.4845	59.5705
Ethane		20.4054	0.00871450	1.79911	17.4345	0.197953	20.4417	0	1.50340	0.000684445	21.2860	26.61930551	1.084409164	20.0351	20.4054
Propane		9.46995	0.00434408	2.95722	22.5199	0.953878	9.48766	0	1.90336	0.000373854	10.5243	28.66317825	0.130667098	9.30050	9.46995
Isobutane		1.57349	0.000233076	1.22274	6.34566	0.698115	1.57677	0	0.689857	7.39325E-06	0.598226	7.571566528	0.000929949	1.54615	1.57349
n-Butane		3.28653	0.00104807	3.66447	15.4357	2.45902	3.29435	0	1.68005	7.05224E-05	2.59128	18.23672171	0.00606221	3.23068	3.28653
Isopentane		1.29057	0.000268741	3.47153	7.55035	3.05383	1.29507	0	1.34877	1.26601E-05	0.678810	8.288222734	0.000397959	1.27093	1.29057
n-Pentane		1.00267	0.000202908	3.57788	6.15304	3.31416	1.00663	0	1.46583	9.46855E-06	0.512762	6.626280098	0.000219236	0.988401	1.00267
2-Methylpentane		0.00144537	1.31673E-07	0.0121000	0.00955492	0.0123607	0	0	1.10945	2.99876E-09	0.000341081	0.009911513	2.78405E-08	0.00143263	0.00144537

3-Methylpentane		0.00105121	2.64052E-07	0.00979706	0.00699364	0.0100841	0	0	0.807772	1.57035E-08	0.000658317	0.007225902	1.3028E-07	0.00104307	0.00105121
n-Hexane		2.21679	0.000158623	25.5122	14.8054	26.6086	2.24910	0	0.723423	2.88602E-06	0.412818	1.039221118	1.30498E-06	2.20509	2.21679
Methylcyclopentane		0.000605464	4.91934E-07	0.00740694	0.00410201	0.00774539	0	0	0.466795	7.84890E-08	0.00109600	0.003975735	4.66443E-07	0.000602770	0.000605464
Benzene		5.62537E-05	2.29828E-06	0.000681586	0.000380242	0.000712446	0	0	0.0433940	2.07940E-06	0.000582279	2.25392E-05	7.61624E-07	5.60345E-05	5.62537E-05
2-Methylhexane		0.00217300	1.68696E-07	0.0589552	0.0143395	0.0635242	0	0	1.70355	3.26060E-09	0.000438526	0.000986548	5.86228E-10	0.00219979	0.00217300
3-Methylhexane		0.00179167	1.45247E-07	0.0509748	0.0118309	0.0549834	0	0	1.40667	2.93181E-09	0.000377238	0.012244179	7.55828E-09	0.00181642	0.00179167
Heptane		0.00327335	2.74044E-07	0.115835	0.0213178	0.125514	0	0	2.58979	5.56185E-09	0.000711675	0.020408286	1.04693E-08	0.00334418	0.00327335
Methylcyclohexane		0.00240631	1.18311E-06	0.0842709	0.0160574	0.0912564	0	0	1.90305	1.32027E-07	0.00278625	0.015119449	2.53232E-07	0.00245740	0.00240631
Toluene		0.000558453	1.75637E-05	0.0243293	0.00373241	0.0264385	0	0	0.446052	1.55784E-05	0.00527787	0.000486839	3.32088E-06	0.000575985	0.000558453
Octane		0.0116753	5.51950E-07	1.21570	0.0733463	1.33268	0	0	9.93775	7.44274E-09	0.00144334	0.063987705	4.13692E-09	0.0128326	0.0116753
Ethylbenzene		0.00107316	2.92494E-05	0.129815	0.00691100	0.142402	0	0	0.929614	2.56365E-05	0.00960246	0.001630459	3.39803E-06	0.00120041	0.00107316
m-Xylene		0.000890693	2.46428E-05	0.127941	0.00570916	0.140458	0	0	0.789189	2.16904E-05	0.00784765	0.001734215	3.10024E-06	0.00101908	0.000890693
o-Xylene		0.00173537	6.47633E-05	0.278564	0.0111252	0.305952	0	0	1.56340	5.88445E-05	0.0157481	0.002921442	6.50463E-06	0.00201881	0.00173537
Nonane		0.00978362	6.94409E-07	3.01088	0.0598061	3.31309	0	0	10.0667	1.47721E-08	0.00180154	0.047099908	2.43109E-09	0.0129990	0.00978362
C10+		0.0144069	1.16675E-06	51.7753	0.0786035	57.0694	0	0	56.1510	3.10288E-08	0.00301050	0.051255774	3.22607E-10	0.0725075	0.0144069
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
Water		805.131	8753.27	0.0521314	0.0486383	0.00349313	0	9558.45	0	8753.18	0.0873035	1.9967E-06	0.044364354	9558.45	805.131
H2S		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen		3324.11	0.0115892	0.0193605	0.0192484	0.000112097	3324.12	0	0.0212023	0.000398270	0.0111909	7.90133E-05	3.24274E-06	3324.14	3324.11
Carbon Dioxide		1548.63	0.212771	0.0969265	0.0906972	0.00622924	1548.94	0	0	0.126729	0.0860429	0.009299493	0.001679577	1548.94	1548.63
Methane		299023	2.04761	4.97463	4.89117	0.0834633	299025	0	5.07065	0.139518	1.90809	0.095459607	0.001536179	299030	299023
Ethane		102428	0.763116	10.3694	9.33443	1.03494	102429	0	9.92603	0.0599133	0.703203	1.027343096	0.000522385	102439	102428
Propane		47535.9	0.380405	17.0442	12.0572	4.98706	47540.8	0	12.5667	0.0327255	0.347680	1.106224138	6.29454E-05	47553.3	47535.9
Isobutane		7898.37	0.0204101	7.04735	3.39747	3.64988	7900.88	0	4.55470	0.000647172	0.0197629	0.292216361	4.47978E-07	7905.44	7898.37
n-Butane		16497.2	0.0917783	21.1205	8.26428	12.8562	16507.3	0	11.0924	0.00617322	0.0856051	0.703826406	2.92031E-06	16518.4	16497.2
Isopentane		6478.22	0.0235333	20.0085	4.04247	15.9660	6489.35	0	8.90508	0.00110821	0.0224251	0.319874927	1.91706E-07	6498.26	6478.22
n-Pentane		5033.04	0.0177684	20.6214	3.29435	17.3271	5044.00	0	9.67797	0.000828835	0.0169395	0.255734061	1.05611E-07	5053.68	5033.04
2-Methylpentane		7.25527	1.15304E-05	0.0697396	0.00511571	0.0646239	0	0	7.32502	2.62498E-07	1.12679E-05	0.000382524	1.34114E-11	7.32502	7.25527
3-Methylpentane		5.27673	2.31227E-05	0.0564663	0.00374440	0.0527219	0	0	5.33322	1.37461E-06	2.17481E-05	0.000278876	6.27591E-11	5.33322	5.27673
n-Hexane		11127.5	0.0138904	147.042	7.92682	139.115	11269.8	0	4.77631	0.000252629	0.0136378	0.040107607	6.28638E-10	11274.6	11127.5
Methylcyclopentane		3.03922	4.30780E-05	0.0426906	0.00219622	0.0404944	0	0	3.08196	6.87058E-06	3.62074E-05	0.000153439	2.24697E-10	3.08196	3.03922
Benzene		0.282374	0.000201257	0.00392839	0.000203582	0.00372481	0	0	0.286504	0.000182021	1.92361E-05	8.69876E-07	3.66892E-10	0.286504	0.282374
2-Methylhexane		10.9077	1.47725E-05	0.339794	0.00767736	0.332117	0	0	11.2475	2.85419E-07	1.44871E-05	3.80747E-05	2.824E-13	11.2475	10.9077
3-Methylhexane		8.99354	1.27190E-05	0.293798	0.00633429	0.287464	0	0	9.28735	2.56638E-07	1.24624E-05	0.000472551	3.641E-12	9.28735	8.99354
Heptane		16.4311	2.39977E-05	0.667628	0.0114136	0.656214	0	0	17.0988	4.86860E-07	2.35108E-05	0.000787636	5.04329E-12	17.0988	16.4311
Methylcyclohexane		12.0788	0.000103603	0.485704	0.00859714	0.477106	0	0	12.5646	1.15570E-05	9.20461E-05	0.000583519	1.21988E-10	12.5646	12.0788
Toluene		2.80324	0.00153803	0.140224	0.00199834	0.138226	0	0	2.94500	0.00136367	0.000174359	1.8789E-05	1.59975E-09	2.94500	2.80324
Octane		58.6060	4.83335E-05	7.00678	0.0392697	6.96751	0	0	65.6128	6.51504E-07	4.76820E-05	0.002469536	1.99285E-12	65.6128	58.6060
Ethylbenzene		5.38690	0.00256133	0.748204	0.00370016	0.744503	0	0	6.13767	0.00224411	0.000317226	6.29258E-05	1.63691E-09	6.13767	5.38690
m-Xylene		4.47097	0.00215793	0.737400	0.00305669	0.734343	0	0	5.21053	0.00189868	0.000259254	6.69301E-05	1.49346E-09	5.21053	4.47097
o-Xylene		8.71096	0.00567124	1.60553	0.00595644	1.59958	0	0	10.3222	0.00515098	0.000520251	0.00011275	3.13343E-09	10.3222	8.71096
Nonane		49.1104	6.08085E-05	17.3535	0.0320202	17.3215	0	0	66.4640	1.29309E-06	5.95154E-05	0.00181777	1.17112E-12	66.4640	49.1104
C10+		72.3177	0.000102171	298.412	0.0420844	298.370	0	0	370.730	2.71612E-06	9.94546E-05	0.001978161	1.55407E-13	370.730	72.3177

Process Streams		**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**	**Well Stream**	**Total gas to sale**
Phase: Total	**Status**	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	85.0	85.0	85.0	75.9	75.9	75.942503	75.942503	84.1414	70
Pressure	psig	192	192	192	0	0	1000	1000	1000	0	0	13.23189234	-14.2249892	1000	192
Mole Fraction Vapor	%	100	0	0	100	0	100	0	0	0	100	100	100	97.8398	100
Mole Fraction Light Liquid	%	0	100	100	0	100	0	100	100	100	0	0	0	0.0677011	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0	0	0	0	0	0	2.09254	0
Molecular Weight	lb/lbmol	20.9	18.0	97.8	41.5	113.6	20.9	18.0	113.4	18.0	20.7	42.37494095	18.41806446	20.8480	20.8864
Mass Density	lb/ft^3	0.8	62.3	43.6	0.1	44.7	4.7	62.2	45.5	62.2	0.1	0.212123661	0.00150976	4.76587	0.802798
Molar Flow	lbmol/h	24033.1	486.0	5.9	1.3	4.6	23988.7	530.6	5.8	485.9	0.2	0.091077202	0.002615495	24525.1	24033.1
Mass Flow	lb/h	501965.6	8756.9	576.4	53.5	522.8	501080.1	9558.4	660.2	8753.6	3.3	3.859391056	0.048172358	511299	501966
Vapor Volumetric Flow	MCFH	625.3	0.1	0.0	0.5	0.0	107.4	0.2	0.0	0.1	0.1	18.19406211	31.90729621	107.284	625.270
Liquid Volumetric Flow	Mbbl/d	2672.8	0.6	0.1	2.1	0.1	459.2	0.7	0.1	0.6	0.3	2.2683506	3.978052514	458.592	2672.77
Std Vapor Volumetric Flow	MMSCFD	218.9	4.4	0.1	0.0	0.0	218.5	4.8	0.1	4.4	0.0	0.000829497	2.3821E-05	223.365	218.885
Std Liquid Volumetric Flow	Mbbl/d	100.3	0.6	0.1	0.0	0.0	100.2	0.7	0.1	0.6	0.0	0.016209721	0.000106237	100.930	100.272
Compressibility		0.946	0.011	0.082	0.986	0.007	0.777	0.050	0.433	0.001	0.996	0.970605196	0.999551028	0.760583	0.946063
Specific Gravity		0.721	0.998	0.699	1.433	0.716	0.721	0.997	0.729	0.998	0.713	1.463091744	0.635925796		0.721151
API Gravity			10.0	69.5		64.0		9.9	59.5	10.0					
Enthalpy	MMBtu/h	-829.1	-59.8	-0.5	-0.1	-0.5	-838.6	-65.1	-0.5	-59.7	0.0	-4100.524001	-266.2758125	-904.261	-829.061
Mass Enthalpy	Btu/lb	-1651.6	-6825.9	-900.0	-1090.1	-862.1	-1673.6	-6810.9	-825.4	-6822.4	-1815.7	-1062.479531	-5527.564404	-1768.56	-1651.63
Mass Cp	Btu/(lb*°F)	0.5	1.0	0.5	0.4	0.5	0.7	1.0	0.5	1.0	0.5	0.411983488	0.442536353	0.684547	0.504766
Ideal Gas CpCv Ratio		1.249	1.326	1.056	1.131	1.048	1.245	1.325	1.048	1.326	1.254	1.130394843	1.322287865	1.24629	1.24905
Dynamic Viscosity	cP	0.0	1.0	0.4	0.0	0.5	0.0	0.8	0.6	0.9	0.0	0.008526734	0.010262357		0.0107381
Kinematic Viscosity	cSt	0.8	1.0	0.6	5.0	0.7	0.2	0.8	0.8	0.9	12.6	2.509416613	424.3442866		0.835026
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.3	0.1	0.0	0.1	0.0	0.4	0.1	0.3	0.0	0.010929901	0.012225082		0.0177224
Surface Tension	lbf/ft		0.005	0.001		0.002		0.005	0.001	0.005					
Net I.G. Heating Value	Btu/ft^3	1139.9	0.4	4948.9	2175.7	5726.5	1141.9	0.0	5696.0	0.0	1078.7	2222.295411	45.3844674	1118.27	1139.94
Net Liquid Heating Value	Btu/lb	20648.9	-1051.3	19038.7	19748.9	18966.0	20684.2	-1059.8	18893.6	-1059.1	19732.3	19748.45075	-45.3402675	20275.4	20648.9

Gross I.G. Heating Value	Btu/ft^3	1256.8	50.7	5320.6	2367.0	6148.7	1258.8	50.3	6110.8	50.3	1191.2	2416.729932	97.55330801	1233.84	1256.77
Gross Liquid Heating Value	Btu/lb	22771.4	8.9	20480.2	21497.7	20376.0	22808.7	0.0	20281.0	0.7	21799.9	21489.68534	1029.542877	22379.0	22771.4

Process Streams		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	Well Stream	Total gas to sale
Phase: Vapor	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.185958	0.185958	0.185958	0.209292	0.209292	0			3.02985	3.02985	0.000121692	94.15409752	0.0750243	0.185958
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		0.493741	0.493741	0.493741	0.0532653	0.0532653	0.494658			0.249764	0.249764	0.003096884	0.004425802	0.494465	0.493741
Carbon Dioxide		0.146416	0.146416	0.146416	0.159758	0.159758	0.146717			1.22236	1.22236	0.232008095	1.459148771	0.146536	0.146416
Methane		77.5576	77.5576	77.5576	23.6350	23.6350	77.7018			74.3632	74.3632	6.53339622	3.661144776	77.6618	77.5576
Ethane		14.1739	14.1739	14.1739	24.0648	24.0648	14.2004			14.6215	14.6215	37.51338584	0.664228651	14.1860	14.1739
Propane		4.48555	4.48555	4.48555	21.1965	21.1965	4.49433			4.92964	4.92964	27.54469686	0.054577644	4.48563	4.48555
Isobutane		0.565438	0.565438	0.565438	4.53136	4.53136	0.566666			0.212589	0.212589	5.520174468	0.000294687	0.564842	0.565438
n-Butane		1.18102	1.18102	1.18102	11.0224	11.0224	1.18394			0.920849	0.920849	13.29578036	0.001921025	1.17900	1.18102
Isopentane		0.373609	0.373609	0.373609	4.34342	4.34342	0.374944			0.194328	0.194328	4.867898652	0.000101591	0.372363	0.373609
n-Pentane		0.290263	0.290263	0.290263	3.53961	3.53961	0.291434			0.146792	0.146792	3.891794537	5.59663E-05	0.289057	0.290263
2-Methylpentane		0.000350316	0.000350316	0.000350316	0.00460191	0.00460191	0			8.17506E-05	8.17506E-05	0.00487378	5.9503E-09	0.000347873	0.000350316
3-Methylpentane		0.000254784	0.000254784	0.000254784	0.00336833	0.00336833	0			0.000157786	0.000157786	0.003553187	2.78445E-08	0.000252891	0.000254784
n-Hexane		0.537285	0.537285	0.537285	7.13067	7.13067	0.545164			0.0989446	0.0989446	0.51101537	2.7891E-07	0.533093	0.537285
Methylcyclopentane		0.000150262	0.000150262	0.000150262	0.00202296	0.00202296	0			0.000268983	0.000268983	0.002001813	1.0208E-07	0.000148925	0.000150262
Benzene		1.50417E-05	1.50417E-05	1.50417E-05	0.000202040	0.000202040	0			0.000153968	0.000153968	1.22273E-05	1.79584E-07	1.49156E-05	1.50417E-05
2-Methylhexane		0.000452946	0.000452946	0.000452946	0.00593951	0.00593951	0			9.03932E-05	9.03932E-05	0.000417206	1.07754E-10	0.000450085	0.000452946
3-Methylhexane		0.000373460	0.000373460	0.000373460	0.00490046	0.00490046	0			7.77600E-05	7.77600E-05	0.005178007	1.38928E-09	0.000371027	0.000373460
Heptane		0.000682308	0.000682308	0.000682308	0.00882999	0.00882999	0			0.000146697	0.000146697	0.008630571	1.92435E-09	0.000679222	0.000682308
Methylcyclohexane		0.000511877	0.000511877	0.000511877	0.00678764	0.00678764	0			0.000586120	0.000586120	0.006525221	4.75021E-08	0.000507869	0.000511877
Toluene		0.000126593	0.000126593	0.000126593	0.00168129	0.00168129	0			0.00118314	0.00118314	0.0002239	6.6383E-07	0.000125752	0.000126593
Octane		0.00213480	0.00213480	0.00213480	0.0266500	0.0266500	0			0.000260982	0.000260982	0.023737287	6.67032E-10	0.00218366	0.00213480
Ethylbenzene		0.000211129	0.000211129	0.000211129	0.00270180	0.00270180	0			0.00186818	0.00186818	0.000650785	5.89509E-07	0.000215682	0.000211129
m-Xylene		0.000175231	0.000175231	0.000175231	0.00223195	0.00223195	0			0.00152677	0.00152677	0.000692199	5.37846E-07	0.000180786	0.000175231
o-Xylene		0.000341409	0.000341409	0.000341409	0.00434931	0.00434931	0			0.00306381	0.00306381	0.001166071	1.12846E-06	0.000354218	0.000341409
Nonane		0.00159327	0.00159327	0.00159327	0.0193537	0.0193537	0			0.000290125	0.000290125	0.01556161	3.49117E-10	0.00178562	0.00159327
C10+		0.00185746	0.00185746	0.00185746	0.0201382	0.0201382	0			0.000383832	0.000383832	0.013407163	3.66777E-11	0.00462220	0.00185746
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
Water		44.6916	0	0	0.00269983	0	0			0	0.00484608	1.10833E-07	0.002462596	18.0023	44.6916
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		118.661	0	0	0.000687115	0	118.662			0	0.000399484	2.82056E-06	1.15757E-07	118.648	118.661
Carbon Dioxide		35.1885	0	0	0.00206086	0	35.1955			0	0.00195510	0.000211306	3.8164E-05	35.1616	35.1885
Methane		18639.5	0	0	0.304889	0	18639.6			0	0.118940	0.005950434	9.57571E-05	18635.1	18639.5
Ethane		3406.44	0	0	0.310433	0	3406.48			0	0.0233863	0.034166142	1.73729E-05	3403.96	3406.44
Propane		1078.02	0	0	0.273433	0	1078.13			0	0.00788468	0.025086939	1.42748E-06	1076.34	1078.02
Isobutane		135.892	0	0	0.0584540	0	135.936			0	0.000340024	0.00502762	7.70753E-09	135.535	135.892
n-Butane		283.837	0	0	0.142188	0	284.011			0	0.00147285	0.012109425	5.02443E-08	282.905	283.837
Isopentane		89.7898	0	0	0.0560296	0	89.9440			0	0.000310817	0.004433546	2.6571E-09	89.3495	89.7898
n-Pentane		69.7592	0	0	0.0456604	0	69.9111			0	0.000234786	0.003544538	1.4638E-09	69.3600	69.7592
2-Methylpentane		0.0841919	0	0	5.93640E-05	0	0			0	1.30756E-07	4.4389E-06	1.5563E-13	0.0834731	0.0841919
3-Methylpentane		0.0612324	0	0	4.34510E-05	0	0			0	2.52370E-07	3.23614E-06	7.28272E-13	0.0606819	0.0612324
n-Hexane		129.126	0	0	0.0919848	0	130.778			0	0.000158256	0.000465419	7.29487E-12	127.917	129.126
Methylcyclopentane		0.0361127	0	0	2.60959E-05	0	0			0	4.30224E-07	1.8232E-06	2.66989E-12	0.0357348	0.0361127
Benzene		0.00361500	0	0	2.60629E-06	0	0			0	2.46264E-07	1.11363E-08	4.69701E-12	0.00357903	0.00361500
2-Methylhexane		0.108857	0	0	7.66189E-05	0	0			0	1.44579E-07	3.7998E-07	2.81831E-15	0.107999	0.108857
3-Methylhexane		0.0897542	0	0	6.32153E-05	0	0			0	1.24373E-07	4.71598E-06	3.63366E-14	0.0890290	0.0897542
Heptane		0.163980	0	0	0.000113906	0	0			0	2.34634E-07	7.86048E-06	5.03313E-14	0.162981	0.163980
Methylcyclohexane		0.123020	0	0	8.75597E-05	0	0			0	9.37466E-07	5.94299E-06	1.24241E-12	0.121865	0.123020
Toluene		0.0304242	0	0	2.16884E-05	0	0			0	1.89236E-06	2.03922E-07	1.73624E-11	0.0301745	0.0304242
Octane		0.513059	0	0	0.000343782	0	0			0	4.17426E-07	2.16193E-05	1.74462E-14	0.523976	0.513059
Ethylbenzene		0.0507409	0	0	3.48529E-05	0	0			0	2.98804E-06	5.92717E-07	1.54186E-11	0.0517534	0.0507409
m-Xylene		0.0421134	0	0	2.87919E-05	0	0			0	2.44199E-06	6.30435E-07	1.40673E-11	0.0433800	0.0421134

o-Xylene		0.0820511	0	0	5.61055E-05	0	0			0	4.90040E-06	1.06202E-06	2.95148E-11	0.0849956	0.0820511
Nonane		0.382912	0	0	0.000249661	0	0			0	4.64039E-07	1.41731E-05	9.13114E-15	0.428464	0.382912
C10+		0.446406	0	0	0.000259780	0	0			0	6.13918E-07	1.22109E-05	9.59304E-16	1.10911	0.446406
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.160396	0.160396	0.160396	0.0908445	0.0908445	0			2.64269	2.64269	5.1736E-05	92.09504254	0.0647157	0.160396
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		0.662219	0.662219	0.662219	0.0359514	0.0359514	0.663391			0.338750	0.338750	0.002047301	0.006731531	0.663237	0.662219
Carbon Dioxide		0.308512	0.308512	0.308512	0.169401	0.169401	0.309119			2.60453	2.60453	0.24095751	3.486599147	0.308785	0.308512
Methane		59.5705	59.5705	59.5705	9.13552	9.13552	59.6762			57.7581	57.7581	2.473437017	3.188921873	59.6548	59.5705
Ethane		20.4054	20.4054	20.4054	17.4345	17.4345	20.4417			21.2860	21.2860	26.61930551	1.084409164	20.4242	20.4054
Propane		9.46995	9.46995	9.46995	22.5199	22.5199	9.48766			10.5243	10.5243	28.66317825	0.130667098	9.47079	9.46995
Isobutane		1.57349	1.57349	1.57349	6.34566	6.34566	1.57677			0.598226	0.598226	7.571566528	0.000929949	1.57194	1.57349
n-Butane		3.28653	3.28653	3.28653	15.4357	15.4357	3.29435			2.59128	2.59128	18.23672171	0.00606221	3.28113	3.28653
Isopentane		1.29057	1.29057	1.29057	7.55035	7.55035	1.29507			0.678810	0.678810	8.288222734	0.000397959	1.28636	1.29057
n-Pentane		1.00267	1.00267	1.00267	6.15304	6.15304	1.00663			0.512762	0.512762	6.626280098	0.000219236	0.998573	1.00267
2-Methylpentane		0.00144537	0.00144537	0.00144537	0.00955492	0.00955492	0			0.000341081	0.000341081	0.009911513	2.78405E-08	0.00143539	0.00144537
3-Methylpentane		0.00105121	0.00105121	0.00105121	0.00699364	0.00699364	0			0.000658317	0.000658317	0.007225902	1.3028E-07	0.00104348	0.00105121
n-Hexane		2.21679	2.21679	2.21679	14.8054	14.8054	2.24910			0.412818	0.412818	1.039221118	1.30498E-06	2.19965	2.21679
Methylcyclopentane		0.000605464	0.000605464	0.000605464	0.00410201	0.00410201	0			0.00109600	0.00109600	0.003975735	4.66443E-07	0.000600117	0.000605464
Benzene		5.62537E-05	5.62537E-05	5.62537E-05	0.000380242	0.000380242	0			0.000582279	0.000582279	2.25392E-05	7.61624E-07	5.57857E-05	5.62537E-05
2-Methylhexane		0.00217300	0.00217300	0.00217300	0.0143395	0.0143395	0			0.000438526	0.000438526	0.000986548	5.86228E-10	0.00215942	0.00217300
3-Methylhexane		0.00179167	0.00179167	0.00179167	0.0118309	0.0118309	0			0.000377238	0.000377238	0.012244179	7.55828E-09	0.00178012	0.00179167
Heptane		0.00327335	0.00327335	0.00327335	0.0213178	0.0213178	0			0.000711675	0.000711675	0.020408286	1.04693E-08	0.00325878	0.00327335
Methylcyclohexane		0.00240631	0.00240631	0.00240631	0.0160574	0.0160574	0			0.00278625	0.00278625	0.015119449	2.53232E-07	0.00238764	0.00240631
Toluene		0.000558453	0.000558453	0.000558453	0.00373241	0.00373241	0			0.00527787	0.00527787	0.000486839	3.32088E-06	0.000554782	0.000558453
Octane		0.0116753	0.0116753	0.0116753	0.0733463	0.0733463	0			0.00144334	0.00144334	0.063987705	4.13692E-09	0.0119434	0.0116753
Ethylbenzene		0.00107316	0.00107316	0.00107316	0.00691100	0.00691100	0			0.00960246	0.00960246	0.001630459	3.39803E-06	0.00109638	0.00107316
m-Xylene		0.000890693	0.000890693	0.000890693	0.00570916	0.00570916	0			0.00784765	0.00784765	0.001734215	3.10024E-06	0.000918992	0.000890693
o-Xylene		0.00173537	0.00173537	0.00173537	0.0111252	0.0111252	0			0.0157481	0.0157481	0.002921442	6.50463E-06	0.00180061	0.00173537
Nonane		0.00978362	0.00978362	0.00978362	0.0598061	0.0598061	0			0.00180154	0.00180154	0.047099908	2.43109E-09	0.0109655	0.00978362
C10+		0.0144069	0.0144069	0.0144069	0.0786035	0.0786035	0			0.00301050	0.00301050	0.051255774	3.22607E-10	0.0358534	0.0144069
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
Water		805.131	0	0	0.0486383	0	0			0	0.0873035	1.9967E-06	0.044364354	324.316	805.131
H2S		0	0	0	0	0	0			0	0	0	0	0	0
Nitrogen		3324.11	0	0	0.0192484	0	3324.12			0	0.0111909	7.90133E-05	3.24274E-06	3323.74	3324.11
Carbon Dioxide		1548.63	0	0	0.0906972	0	1548.94			0	0.0860429	0.009299493	0.001679577	1547.44	1548.63
Methane		299023	0	0	4.89117	0	299025			0	1.90809	0.095459607	0.001536179	298954	299023
Ethane		102428	0	0	9.33443	0	102429			0	0.703203	1.027343096	0.000522385	102354	102428
Propane		47535.9	0	0	12.0572	0	47540.8			0	0.347680	1.106224138	6.29454E-05	47461.9	47535.9
Isobutane		7898.37	0	0	3.39747	0	7900.88			0	0.0197629	0.292216361	4.47978E-07	7877.61	7898.37
n-Butane		16497.2	0	0	8.26428	0	16507.3			0	0.0856051	0.703826406	2.92031E-06	16443.1	16497.2
Isopentane		6478.22	0	0	4.04247	0	6489.35			0	0.0224251	0.319874927	1.91706E-07	6446.46	6478.22
n-Pentane		5033.04	0	0	3.29435	0	5044.00			0	0.0169395	0.255734061	1.05611E-07	5004.24	5033.04
2-Methylpentane		7.25527	0	0	0.00511571	0	0			0	1.12679E-05	0.000382524	1.34114E-11	7.19333	7.25527
3-Methylpentane		5.27673	0	0	0.00374440	0	0			0	2.17481E-05	0.000278876	6.27591E-11	5.22928	5.27673
n-Hexane		11127.5	0	0	7.92682	0	11269.8			0	0.0136378	0.040107607	6.28638E-10	11023.3	11127.5
Methylcyclopentane		3.03922	0	0	0.00219622	0	0			0	3.62074E-05	0.000153439	2.24697E-10	3.00742	3.03922
Benzene		0.282374	0	0	0.000203582	0	0			0	1.92361E-05	8.69876E-07	3.66892E-10	0.279564	0.282374
2-Methylhexane		10.9077	0	0	0.00767736	0	0			0	1.44871E-05	3.80747E-05	2.824E-13	10.8217	10.9077
3-Methylhexane		8.99354	0	0	0.00633429	0	0			0	1.24624E-05	0.000472551	3.641E-12	8.92088	8.99354
Heptane		16.4311	0	0	0.0114136	0	0			0	2.35108E-05	0.000787636	5.04329E-12	16.3310	16.4311
Methylcyclohexane		12.0788	0	0	0.00859714	0	0			0	9.20461E-05	0.000583519	1.21988E-10	11.9654	12.0788
Toluene		2.80324	0	0	0.00199834	0	0			0	0.000174359	1.8789E-05	1.59975E-09	2.78023	2.80324
Octane		58.6060	0	0	0.0392697	0	0			0	4.76820E-05	0.002469536	1.99285E-12	59.8530	58.6060
Ethylbenzene		5.38690	0	0	0.00370016	0	0			0	0.000317226	6.29258E-05	1.63691E-09	5.49440	5.38690
m-Xylene		4.47097	0	0	0.00305669	0	0			0	0.000259254	6.69301E-05	1.49346E-09	4.60543	4.47097
o-Xylene		8.71096	0	0	0.00595644	0	0			0	0.000520251	0.00011275	3.13343E-09	9.02356	8.71096
Nonane		49.1104	0	0	0.0320202	0	0			0	5.95154E-05	0.00181777	1.17112E-12	54.9527	49.1104

C10+		72.3177	0	0	0.0420844	0	0			0	9.94546E-05	0.001978161	1.55407E-13	179.676	72.3177

Process Streams		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	Well Stream	Total gas to sale
Phase: Vapor	Status	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	85.0			75.9	75.9	75.942503	75.942503	84.1414	70
Pressure	psig	192	192	192	0	0	1000			0	0	13.23189234	-14.2249892	1000	192
Mole Fraction Vapor	%	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
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0			0	0	0	0	0	0
Molecular Weight	lb/lbmol	20.9	20.9	20.9	41.5	41.5	20.9			20.7	20.7	42.37494095	18.41806446	20.8849	20.8864
Mass Density	lb/ft^3	0.8	0.8	0.8	0.1	0.1	4.7			0.1	0.1	0.212123661	0.00150976	4.67879	0.802798
Molar Flow	lbmol/h	24033.1	0.0	0.0	1.3	0.0	23988.7			0.0	0.2	0.091077202	0.002615495	23995.3	24033.1
Mass Flow	lb/h	501965.6	0.0	0.0	53.5	0.0	501080.1			0.0	3.3	3.859391056	0.048172358	501140	501966
Vapor Volumetric Flow	MCFH	625.3	0.0	0.0	0.5	0.0	107.4			0.0	0.1	18.19406211	31.90729621	107.109	625.270
Liquid Volumetric Flow	Mbbl/d	2672.8	0.0	0.0	2.1	0.0	459.2			0.0	0.3	2.2683506	3.978052514	457.845	2672.77
Std Vapor Volumetric Flow	MMSCFD	218.9	0.0	0.0	0.0	0.0	218.5			0.0	0.0	0.000829497	2.3821E-05	218.540	218.885
Std Liquid Volumetric Flow	Mbbl/d	100.3	0.0	0.0	0.0	0.0	100.2			0.0	0.0	0.016209721	0.000106237	100.182	100.272
Compressibility		0.946	0.946	0.946	0.986	0.986	0.777			0.996	0.996	0.970605196	0.999551028	0.776109	0.946063
Specific Gravity		0.721	0.721	0.721	1.433	1.433	0.721			0.713	0.713	1.463091744	0.635925796	0.721100	0.721151
API Gravity															
Enthalpy	MMBtu/h	-829.1	0.0	0.0	-0.1	0.0	-838.6			0.0	0.0	-4100.524001	-266.2758125	-840.340	-829.061
Mass Enthalpy	Btu/lb	-1651.6	-1651.6	-1651.6	-1090.1	-1090.1	-1673.6			-1815.7	-1815.7	-1062.479531	-5527.564404	-1676.86	-1651.63
Mass Cp	Btu/(lb*°F)	0.5	0.5	0.5	0.4	0.4	0.7			0.5	0.5	0.411983488	0.442536353	0.679254	0.504766
Ideal Gas CpCv Ratio		1.249	1.249	1.249	1.131	1.131	1.245			1.254	1.254	1.130394843	1.322287865	1.24528	1.24905
Dynamic Viscosity	cP	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.008526734	0.010262357	0.0132439	0.0107381
Kinematic Viscosity	cSt	0.8	0.8	0.8	5.0	5.0	0.2			12.6	12.6	2.509416613	424.3442866	0.176710	0.835026
Thermal Conductivity	Btu/(h*ft*°F)	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.010929901	0.012225082	0.0223801	0.0177224
Surface Tension	lbf/ft														
Net I.G. Heating Value	Btu/ft^3	1139.9	1139.9	1139.9	2175.7	2175.7	1141.9			1078.7	1078.7	2222.295411	45.3844674	1140.97	1139.94
Net Liquid Heating Value	Btu/lb	20648.9	20648.9	20648.9	19748.9	19748.9	20684.2			19732.3	19732.3	19748.45075	-45.3402675	20670.0	20648.9
Gross I.G. Heating Value	Btu/ft^3	1256.8	1256.8	1256.8	2367.0	2367.0	1258.8			1191.2	1191.2	2416.729932	97.55330801	1257.85	1256.77
Gross Liquid Heating Value	Btu/lb	22771.4	22771.4	22771.4	21497.7	21497.7	22808.7			21799.9	21799.9	21489.68534	1029.542877	22793.7	22771.4

Process Streams		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	Well Stream	Total gas to sale
Phase: Light Liquid	Status	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		0.0491243	99.9651	0.0491243	0.00421459	0.00421459		100	0	99.9970	99.9970			0.0546805	0.0491243
H2S		0	0	0	0	0		0	0	0	0			0	0
Nitrogen		0.0117325	8.51150E-05	0.0117325	8.69779E-05	8.69779E-05		0	0.013	2.92600E-06	2.92600E-06			0.0737750	0.0117325
Carbon Dioxide		0.0373882	0.000994686	0.0373882	0.00307659	0.00307659		0	0	0.000592639	0.000592639			0.107171	0.0373882
Methane		5.26415	0.0262600	5.26415	0.113085	0.113085		0	5.429	0.00178987	0.00178987			25.7020	5.26415
Ethane		5.85425	0.00522144	5.85425	0.748129	0.748129		0	5.67	0.000410077	0.000410077			16.7291	5.85425
Propane		6.56176	0.00177489	6.56176	2.45828	2.45828		0	4.895	0.000152740	0.000152740			12.3929	6.56176
Isobutane		2.05836	7.22474E-05	2.05836	1.36495	1.36495		0	1.346	2.29161E-06	2.29161E-06			2.87989	2.05836
n-Butane		6.16880	0.000324876	6.16880	4.80787	4.80787		0	3.278	2.18591E-05	2.18591E-05			7.79728	6.16880
Isopentane		4.70786	6.71078E-05	4.70786	4.81005	4.81005		0	2.12	3.16121E-06	3.16121E-06			4.32187	4.70786
n-Pentane		4.85208	5.06685E-05	4.85208	5.22009	5.22009		0	2.304	2.36429E-06	2.36429E-06			4.12543	4.85208
2-Methylpentane		0.0137384	2.75284E-08	0.0137384	0.0163002	0.0163002		0	1.46	6.26911E-10	6.26911E-10			0.00920317	0.0137384
3-Methylpentane		0.0111236	5.52045E-08	0.0111236	0.0132981	0.0132981		0	1.063	3.28291E-09	3.28291E-09			0.00726249	0.0111236
n-Hexane		28.9665	3.31629E-05	28.9665	35.0891	35.0891		0	0.952	6.03340E-07	6.03340E-07			17.5610	28.9665
Methylcyclopentane		0.00861128	1.05310E-07	0.00861128	0.0104586	0.0104586		0	0.629	1.68017E-08	1.68017E-08			0.00533120	0.00861128
Benzene		0.000853760	5.30096E-07	0.000853760	0.00103650	0.00103650		0	0.063	4.79587E-07	4.79587E-07			0.000520549	0.000853760
2-Methylhexane		0.0575676	3.03317E-08	0.0575676	0.0720437	0.0720437		0	1.928	5.86231E-10	5.86231E-10			0.0255911	0.0575676
3-Methylhexane		0.0497750	2.61154E-08	0.0497750	0.0623575	0.0623575		0	1.592	5.27117E-10	5.27117E-10			0.0220269	0.0497750
Heptane		0.113109	4.92733E-08	0.113109	0.142348	0.142348		0	2.931	9.99977E-10	9.99977E-10			0.0461458	0.113109
Methylcyclohexane		0.0839769	2.17091E-07	0.0839769	0.105620	0.105620		0	2.198	2.42247E-08	2.42247E-08			0.0367537	0.0839769

Toluene		0.0258357	3.43433E-06	0.0258357	0.0326084	0.0326084		0	0.549	3.04600E-06	3.04600E-06			0.0106994	0.0258357
Octane		1.04132	8.70548E-08	1.04132	1.32582	1.32582		0	9.866	1.17383E-09	1.17383E-09			0.303688	1.04132
Ethylbenzene		0.119640	4.96368E-06	0.119640	0.152429	0.152429		0	0.993	4.35035E-06	4.35035E-06			0.0364208	0.119640
m-Xylene		0.117913	4.18192E-06	0.117913	0.150349	0.150349		0	0.843	3.68071E-06	3.68071E-06			0.0342670	0.117913
o-Xylene		0.256730	1.09905E-05	0.256730	0.327495	0.327495		0	1.67	9.98553E-06	9.98553E-06			0.0735083	0.256730
Nonane		2.29694	9.75458E-08	2.29694	2.93556	2.93556		0	8.901	2.07499E-09	2.07499E-09			0.540559	2.29694
C10+		31.2709	1.29757E-07	31.2709	40.0333	40.0333		0	39.307	3.45061E-09	3.45061E-09			7.10290	31.2709
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**
Water		0	485.880	0.00289373	0	0.000193898		530.575	0	485.875	0			0.00907901	0
H2S		0	0	0	0	0		0	0	0	0			0	0
Nitrogen		0	0.000413701	0.000691117	0	4.00154E-06		0	0.000756861	1.42171E-05	0			0.0122494	0
Carbon Dioxide		0	0.00483467	0.00220240	0	0.000141543		0	0	0.00287957	0			0.0177944	0
Methane		0	0.127637	0.310092	0	0.00520265		0	0.316077	0.00869678	0			4.26750	0
Ethane		0	0.0253788	0.344852	0	0.0344188		0	0.330108	0.00199252	0			2.77766	0
Propane		0	0.00862683	0.386529	0	0.113097		0	0.284987	0.000742149	0			2.05769	0
Isobutane		0	0.000351159	0.121251	0	0.0627967		0	0.0783642	1.11347E-05	0			0.478170	0
n-Butane		0	0.00157906	0.363381	0	0.221193		0	0.190845	0.000106211	0			1.29464	0
Isopentane		0	0.000326177	0.277323	0	0.221293		0	0.123427	1.53600E-05	0			0.717592	0
n-Pentane		0	0.000246274	0.285818	0	0.240158		0	0.134139	1.14879E-05	0			0.684976	0
2-Methylpentane		0	1.33802E-07	0.000809276	0	0.000749912		0	0.0850013	3.04610E-09	0			0.00152807	0
3-Methylpentane		0	2.68321E-07	0.000655249	0	0.000611798		0	0.0618879	1.59513E-08	0			0.00120584	0
n-Hexane		0	0.000161188	1.70631	0	1.61432		0	0.0554255	2.93157E-06	0			2.91578	0
Methylcyclopentane		0	5.11861E-07	0.000507259	0	0.000481163		0	0.0366204	8.16376E-08	0			0.000885179	0
Benzene		0	2.57653E-06	5.02919E-05	0	4.76856E-05		0	0.00366787	2.33027E-06	0			8.64307E-05	0
2-Methylhexane		0	1.47427E-07	0.00339109	0	0.00331448		0	0.112248	2.84844E-09	0			0.00424909	0
3-Methylhexane		0	1.26934E-07	0.00293206	0	0.00286885		0	0.0926864	2.56121E-09	0			0.00365729	0
Heptane		0	2.39493E-07	0.00666283	0	0.00654892		0	0.170643	4.85878E-09	0			0.00766193	0
Methylcyclohexane		0	1.05517E-06	0.00494677	0	0.00485921		0	0.127968	1.17705E-07	0			0.00610249	0
Toluene		0	1.66926E-05	0.00152188	0	0.00150020		0	0.0319628	1.48002E-05	0			0.00177650	0
Octane		0	4.23130E-07	0.0613401	0	0.0609963		0	0.574399	5.70352E-09	0			0.0504235	0
Ethylbenzene		0	2.41260E-05	0.00704755	0	0.00701270		0	0.0578125	2.11379E-05	0			0.00604721	0
m-Xylene		0	2.03262E-05	0.00694579	0	0.00691700		0	0.0490795	1.78842E-05	0			0.00568961	0
o-Xylene		0	5.34191E-05	0.0151230	0	0.0150669		0	0.0972275	4.85187E-05	0			0.0122051	0
Nonane		0	4.74121E-07	0.135304	0	0.135055		0	0.518217	1.00822E-08	0			0.0897530	0
C10+		0	6.30684E-07	1.84205	0	1.84179		0	2.28846	1.67662E-08	0			1.17935	0

Process Streams		**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**	**Well Stream**	**Total gas to sale**
Phase: Light Liquid	**Status**	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		85.0	85.0	75.9	75.9			84.1414	70
Pressure	psig	192	192	192	0	0		1000	1000	0	0			1000	192
Mole Fraction Vapor	%	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
Mole Fraction Heavy Liquid	%	0	0	0	0	0		0	0	0	0			0	0
Molecular Weight	lb/lbmol	97.8	18.0	97.8	113.6	113.6		18.0	113.4	18.0	18.0			54.9886	97.8435
Mass Density	lb/ft^3	43.6	62.3	43.6	44.7	44.7		62.2	45.5	62.2	62.2			35.2443	43.5920
Molar Flow	lbmol/h	0.0	486.0	5.9	0.0	4.6		530.6	5.8	485.9	0.0			16.6037	0
Mass Flow	lb/h	0.0	8756.9	576.4	0.0	522.8		9558.4	660.2	8753.6	0.0			913.016	0
Vapor Volumetric Flow	MCFH	0.0	0.1	0.0	0.0	0.0		0.2	0.0	0.1	0.0			0.0259054	0
Liquid Volumetric Flow	Mbbl/d	0.0	0.6	0.1	0.0	0.1		0.7	0.1	0.6	0.0			0.110735	0
Std Vapor Volumetric Flow	MMSCFD	0.0	4.4	0.1	0.0	0.0		4.8	0.1	4.4	0.0			0.151221	0
Std Liquid Volumetric Flow	Mbbl/d	0.0	0.6	0.1	0.0	0.0		0.7	0.1	0.6	0.0			0.112287	0
Compressibility		0.082	0.011	0.082	0.007	0.007		0.050	0.433	0.001	0.001			0.271274	0.0816183
Specific Gravity		0.699	0.998	0.699	0.716	0.716		0.997	0.729	0.998	0.998			0.565092	0.698937
API Gravity		69.5	10.0	69.5	64.0	64.0		9.9	59.5	10.0	10.0			111.499	69.4777
Enthalpy	MMBtu/h	0.0	-59.8	-0.5	0.0	-0.5		-65.1	-0.5	-59.7	0.0			-0.996165	0
Mass Enthalpy	Btu/lb	-900.0	-6825.9	-900.0	-862.1	-862.1		-6810.9	-825.4	-6822.4	-6822.4			-1091.07	-900.006
Mass Cp	Btu/(lb*°F)	0.5	1.0	0.5	0.5	0.5		1.0	0.5	1.0	1.0			0.583411	0.497503

Ideal Gas CpCv Ratio		1.056	1.326	1.056	1.048	1.048		1.325	1.048	1.326	1.326			1.09718	1.05620
Dynamic Viscosity	cP	0.4	1.0	0.4	0.5	0.5		0.8	0.6	0.9	0.9			0.150883	0.409745
Kinematic Viscosity	cSt	0.6	1.0	0.6	0.7	0.7		0.8	0.8	0.9	0.9			0.267259	0.586794
Thermal Conductivity	Btu/(h*ft*°F)	0.1	0.3	0.1	0.1	0.1		0.4	0.1	0.3	0.3			0.0614062	0.0669177
Surface Tension	lbf/ft	0.001	0.005	0.001	0.002	0.002		0.005	0.001	0.005	0.005			0.000397794	0.00131420
Net I.G. Heating Value	Btu/ft^3	4948.9	0.4	4948.9	5726.5	5726.5		0.0	5696.0	0.0	0.0			2840.26	4948.91
Net Liquid Heating Value	Btu/lb	19038.7	-1051.3	19038.7	18966.0	18966.0		-1059.8	18893.6	-1059.1	-1059.1			19455.1	19038.7
Gross I.G. Heating Value	Btu/ft^3	5320.6	50.7	5320.6	6148.7	6148.7		50.3	6110.8	50.3	50.3			3074.99	5320.56
Gross Liquid Heating Value	Btu/lb	20480.2	8.9	20480.2	20376.0	20376.0		0.0	20281.0	0.7	0.7			21075.0	20480.2

Process Streams		**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**	**Well Stream**	**Total gas to sale**
Phase: Heavy Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Mole Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		99.9651		99.9651										99.8766	99.9651
H2S		0		0										0	0
Nitrogen		8.51150E-05		8.51150E-05										0.000404844	8.51150E-05
Carbon Dioxide		0.000994686		0.000994686										0.00313379	0.000994686
Methane		0.0262600		0.0262600										0.102173	0.0262600
Ethane		0.00522144		0.00522144										0.0137655	0.00522144
Propane		0.00177489		0.00177489										0.00320259	0.00177489
Isobutane		7.22474E-05		7.22474E-05										0.000105354	7.22474E-05
n-Butane		0.000324876		0.000324876										0.000465726	0.000324876
Isopentane		6.71078E-05		6.71078E-05										6.75872E-05	6.71078E-05
n-Pentane		5.06685E-05		5.06685E-05										5.37297E-05	5.06685E-05
2-Methylpentane		2.75284E-08		2.75284E-08										2.42536E-08	2.75284E-08
3-Methylpentane		5.52045E-08		5.52045E-08										4.65127E-08	5.52045E-08
n-Hexane		3.31629E-05		3.31629E-05										2.68397E-05	3.31629E-05
Methylcyclopentane		1.05310E-07		1.05310E-07										8.19444E-08	1.05310E-07
Benzene		5.30096E-07		5.30096E-07										4.69160E-07	5.30096E-07
2-Methylhexane		3.03317E-08		3.03317E-08										1.65237E-08	3.03317E-08
3-Methylhexane		2.61154E-08		2.61154E-08										1.44752E-08	2.61154E-08
Heptane		4.92733E-08		4.92733E-08										2.28526E-08	4.92733E-08
Methylcyclohexane		2.17091E-07		2.17091E-07										1.38038E-07	2.17091E-07
Toluene		3.43433E-06		3.43433E-06										2.30187E-06	3.43433E-06
Octane		8.70548E-08		8.70548E-08										3.91881E-08	8.70548E-08
Ethylbenzene		4.96368E-06		4.96368E-06										2.31596E-06	4.96368E-06
m-Xylene		4.18192E-06		4.18192E-06										1.94085E-06	4.18192E-06
o-Xylene		1.09905E-05		1.09905E-05										5.22232E-06	1.09905E-05
Nonane		9.75458E-08		9.75458E-08										3.37915E-08	9.75458E-08
C10+		1.29757E-07		1.29757E-07										5.28693E-08	1.29757E-07
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Water		99.9589		99.9589										99.8674	99.9589
H2S		0		0										0	0
Nitrogen		0.000132344		0.000132344										0.000629466	0.000132344
Carbon Dioxide		0.00242977		0.00242977										0.00765483	0.00242977
Methane		0.0233829		0.0233829										0.0909758	0.0233829
Ethane		0.00871450		0.00871450										0.0229737	0.00871450
Propane		0.00434408		0.00434408										0.00783818	0.00434408
Isobutane		0.000233076		0.000233076										0.000339868	0.000233076
n-Butane		0.00104807		0.00104807										0.00150242	0.00104807
Isopentane		0.000268741		0.000268741										0.000270653	0.000268741
n-Pentane		0.000202908		0.000202908										0.000215160	0.000202908
2-Methylpentane		1.31673E-07		1.31673E-07										1.16006E-07	1.31673E-07
3-Methylpentane		2.64052E-07		2.64052E-07										2.22471E-07	2.64052E-07
n-Hexane		0.000158623		0.000158623										0.000128375	0.000158623
Methylcyclopentane		4.91934E-07		4.91934E-07										3.82773E-07	4.91934E-07
Benzene		2.29828E-06		2.29828E-06										2.03403E-06	2.29828E-06
2-Methylhexane		1.68696E-07		1.68696E-07										9.18970E-08	1.68696E-07

3-Methylhexane		1.45247E-07		1.45247E-07										8.05045E-08	1.45247E-07
Heptane		2.74044E-07		2.74044E-07										1.27096E-07	2.74044E-07
Methylcyclohexane		1.18311E-06		1.18311E-06										7.52257E-07	1.18311E-06
Toluene		1.75637E-05		1.75637E-05										1.17717E-05	1.75637E-05
Octane		5.51950E-07		5.51950E-07										2.48455E-07	5.51950E-07
Ethylbenzene		2.92494E-05		2.92494E-05										1.36468E-05	2.92494E-05
m-Xylene		2.46428E-05		2.46428E-05										1.14365E-05	2.46428E-05
o-Xylene		6.47633E-05		6.47633E-05										3.07726E-05	6.47633E-05
Nonane		6.94409E-07		6.94409E-07										2.40548E-07	6.94409E-07
C10+		1.16675E-06		1.16675E-06										4.75376E-07	1.16675E-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**
Water		0		0										9233.97	0
H2S		0		0										0	0
Nitrogen		0		0										0.0582019	0
Carbon Dioxide		0		0										0.707783	0
Methane		0		0										8.41183	0
Ethane		0		0										2.12420	0
Propane		0		0										0.724736	0
Isobutane		0		0										0.0314250	0
n-Butane		0		0										0.138917	0
Isopentane		0		0										0.0250252	0
n-Pentane		0		0										0.0198942	0
2-Methylpentane		0		0										1.07261E-05	0
3-Methylpentane		0		0										2.05702E-05	0
n-Hexane		0		0										0.0118698	0
Methylcyclopentane		0		0										3.53921E-05	0
Benzene		0		0										0.000188071	0
2-Methylhexane		0		0										8.49701E-06	0
3-Methylhexane		0		0										7.44363E-06	0
Heptane		0		0										1.17516E-05	0
Methylcyclohexane		0		0										6.95554E-05	0
Toluene		0		0										0.00108844	0
Octane		0		0										2.29727E-05	0
Ethylbenzene		0		0										0.00126182	0
m-Xylene		0		0										0.00105744	0
o-Xylene		0		0										0.00284530	0
Nonane		0		0										2.22416E-05	0
C10+		0		0										4.39544E-05	0

Process Streams		**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**	**Well Stream**	**Total gas to sale**
Phase: Heavy Liquid	**Status**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Property	**Units**														
Temperature	°F	70.0		70.0										84.1414	70
Pressure	psig	192		192										1000	192
Mole Fraction Vapor	%	0		0										0	0
Mole Fraction Light Liquid	%	0		0										0	0
Mole Fraction Heavy Liquid	%	100		100										100	100
Molecular Weight	lb/lbmol	18.0		18.0										18.0169	18.0164
Mass Density	lb/ft^3	62.3		62.3										62.0953	62.2609
Molar Flow	lbmol/h	0.0		0.0										513.197	0
Mass Flow	lb/h	0.0		0.0										9246.23	0
Vapor Volumetric Flow	MCFH	0.0		0.0										0.148904	0
Liquid Volumetric Flow	Mbbl/d	0.0		0.0										0.636502	0
Std Vapor Volumetric Flow	MMSCFD	0.0		0.0										4.67400	0
Std Liquid Volumetric Flow	Mbbl/d	0.0		0.0										0.635413	0
Compressibility		0.011		0.011										0.0504482	0.0105224
Specific Gravity		0.998		0.998										0.995611	0.998266
API Gravity		10.0		10.0										10.0988	10.0464

Enthalpy	MMBtu/h	0.0		0.0										-62.9250	0
Mass Enthalpy	Btu/lb	-6825.9		-6825.9										-6805.48	-6825.94
Mass Cp	Btu/(lb*°F)	1.0		1.0										0.981414	0.983055
Ideal Gas CpCv Ratio		1.326		1.326										1.32508	1.32581
Dynamic Viscosity	cP	1.0		1.0										0.840462	0.995519
Kinematic Viscosity	cSt	1.0		1.0										0.844965	0.998190
Thermal Conductivity	Btu/(h*ft*°F)	0.3		0.3										0.351647	0.346539
Surface Tension	lbf/ft	0.005		0.005										0.00492429	0.00503993
Net I.G. Heating Value	Btu/ft^3	0.4		0.4										1.24963	0.383413
Net Liquid Heating Value	Btu/lb	-1051.3		-1051.3										-1032.09	-1051.27
Gross I.G. Heating Value	Btu/ft^3	50.7		50.7										51.6294	50.7152
Gross Liquid Heating Value	Btu/lb	8.9		8.9										29.0	8.9

October 7, 2013

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

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

Sample: Morre No. 1H (Moore Pad)
Separator Hydrocarbon Liquid
Sampled @ 200 psig & 71 °F

Date Sampled: 09/25/13 Job Number: 35844.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.000	0.000	0.000
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.278	2.103	1.711
2,2 Dimethylpropane	0.112	0.087	0.072
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
2,2 Dimethylbutane	0.171	0.146	0.133
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.285	0.238	0.221
2 Methylpentane	1.460	1.234	1.130
3 Methylpentane	1.063	0.883	0.822
n-Hexane	2.076	1.737	1.606
Heptanes Plus	69.889	81.775	86.555
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7602	(Water=1)
°API Gravity	54.63	@ 60°F
Molecular Weight	137.9	
Vapor Volume	17.49	CF/Gal
Weight	6.33	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.7182	(Water=1)
°API Gravity	65.51	@ 60°F
Molecular Weight	111.4	
Vapor Volume	20.47	CF/Gal
Weight	5.98	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: W-1570

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.000	0.000	0.000
Nitrogen	0.013	0.003	0.003
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.390	2.190	1.783
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
Other C-6's	2.980	2.501	2.306
Heptanes	7.576	6.844	6.648
Octanes	12.065	11.665	11.797
Nonanes	8.901	9.909	10.137
Decanes Plus	37.229	50.209	54.133
Benzene	0.063	0.036	0.045
Toluene	0.549	0.374	0.454
E-Benzene	0.993	0.780	0.947
Xylenes	2.513	1.958	2.395
n-Hexane	2.076	1.737	1.606
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.7182	(Water=1)
°API Gravity	65.51	@ 60°F
Molecular Weight	111.4	
Vapor Volume	20.47	CF/Gal
Weight	5.98	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7744	(Water=1)
Molecular Weight	162.0	

Characteristics of Atmospheric Sample:

°API Gravity	58.66	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	1.65	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-1570*	----
Pressure, PSIG	200	192	----
Temperature, °F	71	70	----

* Sample used for analysis

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.013	0.003	0.003
Carbon Dioxide	0.000	0.000	0.000
Methane	5.429	1.872	0.782
Ethane	5.670	3.086	1.531
Propane	4.895	2.744	1.938
Isobutane	1.346	0.896	0.702
n-Butane	3.278	2.103	1.711
2,2 Dimethylpropane	0.112	0.087	0.072
Isopentane	2.120	1.578	1.374
n-Pentane	2.192	1.617	1.420
2,2 Dimethylbutane	0.171	0.146	0.133
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.285	0.238	0.221
2 Methylpentane	1.460	1.234	1.130
3 Methylpentane	1.063	0.883	0.822
n-Hexane	2.076	1.737	1.606
Methylcyclopentane	0.629	0.453	0.475
Benzene	0.063	0.036	0.045
Cyclohexane	0.496	0.344	0.375
2-Methylhexane	1.928	1.824	1.735
3-Methylhexane	1.592	1.487	1.432
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.623	0.570	0.555
n-Heptane	2.308	2.167	2.076
Methylcyclohexane	2.198	1.798	1.938
Toluene	0.549	0.374	0.454
Other C-8's	7.225	7.113	7.150
n-Octane	2.641	2.754	2.709
E-Benzene	0.993	0.780	0.947
M & P Xylenes	0.843	0.666	0.804
O-Xylene	1.670	1.292	1.591
Other C-9's	6.223	6.843	7.054
n-Nonane	2.678	3.066	3.083
Other C-10's	8.998	10.873	11.414
n-decane	2.504	3.128	3.199
Undecanes(11)	9.521	11.804	12.566
Dodecanes(12)	6.162	8.252	8.907
Tridecanes(13)	3.969	5.699	6.237
Tetradecanes(14)	2.330	3.584	3.976
Pentadecanes(15)	1.359	2.238	2.513
Hexadecanes(16)	0.796	1.402	1.587
Heptadecanes(17)	0.538	1.001	1.144
Octadecanes(18)	0.366	0.717	0.825
Nonadecanes(19)	0.238	0.486	0.562
Eicosanes(20)	0.164	0.348	0.405
Heneicosanes(21)	0.099	0.222	0.259
Docosanes(22)	0.065	0.150	0.177
Tricosanes(23)	0.049	0.118	0.139
Tetracosanes(24)	0.031	0.078	0.093
Pentacosanes(25)	0.013	0.033	0.040
Hexacosanes(26)	0.009	0.023	0.027
Heptacosanes(27)	0.006	0.015	0.019
Octacosanes(28)	0.005	0.015	0.018
Nonacosanes(29)	0.003	0.010	0.012
Triacontanes(30)	0.001	0.003	0.004
Hentriacontanes Plus(31+)	0.002	0.008	0.010
Total	100.000	100.000	100.000

October 15, 2013

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

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

Date Sampled: 09/25/13

Date Analyzed: 10/02/13

Sample: Morre No. 1H
(Moore Pad)

Job Number: J35844

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	**Stock Tank**
Pressure, psig	200	0
Temperature, °F	71	70
Gas Oil Ratio (1)	------	139
Gas Specific Gravity (2)	------	1.149
Separator Volume Factor (3)	1.0837	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.9228
Oil API Gravity at 60 °F	58.66
Reid Vapor Pressure, psi (5)	1.65

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1570*	----
Pressure, psig	200	192	----
Temperature, °F	71	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: M. G.
* Sample used for flash study
Base Conditions: 14.85 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

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

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

Sample: Morre No. 1H (Moore Pad)
Gas Evolved from Hydrocarbon Liquid Flashed
From 200 psig & 71 °F to 0 psig & 70 °F

Date Sampled: 09/25/13 Job Number: 35844.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.054	
Carbon Dioxide	0.117	
Methane	35.770	
Ethane	31.071	8.375
Propane	18.617	5.169
Isobutane	3.229	1.065
n-Butane	5.838	1.855
2-2 Dimethylpropane	0.101	0.039
Isopentane	1.708	0.630
n-Pentane	1.353	0.494
Hexanes	1.101	0.457
Heptanes Plus	1.041	0.471
Totals	100.000	18.556

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.643	(Air=1)
Molecular Weight	104.45	
Gross Heating Value	5573	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.149	(Air=1)
Compressibility (Z)	0.9899	
Molecular Weight	32.94	
Gross Heating Value		
Dry Basis	1951	BTU/CF
Saturated Basis	1918	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: 0.063 Gr/100 CF, 1.0 PPMV or 0.0001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: ANB
Cylinder ID: FL# 15 S

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.054		0.046
Carbon Dioxide	0.117		0.156
Methane	35.770		17.417
Ethane	31.071	8.375	28.359
Propane	18.617	5.169	24.919
Isobutane	3.229	1.065	5.697
n-Butane	5.838	1.855	10.300
2,2 Dimethylpropane	0.101	0.039	0.221
Isopentane	1.708	0.630	3.741
n-Pentane	1.353	0.494	2.963
2,2 Dimethylbutane	0.063	0.027	0.165
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.081	0.033	0.212
2 Methylpentane	0.363	0.152	0.950
3 Methylpentane	0.229	0.094	0.599
n-Hexane	0.365	0.151	0.955
Methylcyclopentane	0.034	0.012	0.087
Benzene	0.010	0.003	0.024
Cyclohexane	0.050	0.017	0.128
2-Methylhexane	0.110	0.052	0.335
3-Methylhexane	0.110	0.050	0.335
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.119	0.052	0.358
n-Heptane	0.120	0.056	0.365
Methylcyclohexane	0.101	0.041	0.301
Toluene	0.023	0.008	0.064
Other C8's	0.177	0.083	0.592
n-Octane	0.039	0.020	0.135
Ethylbenzene	0.002	0.001	0.006
M & P Xylenes	0.014	0.005	0.045
O-Xylene	0.002	0.001	0.006
Other C9's	0.074	0.038	0.284
n-Nonane	0.015	0.009	0.058
Other C10's	0.031	0.018	0.133
n-Decane	0.004	0.002	0.017
Undecanes (11)	0.006	0.004	0.027
Totals	100.000	18.556	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.149	(Air=1)
Compressibility (Z)	0.9899	
Molecular Weight	32.94	

Gross Heating Value

Dry Basis	1951	BTU/CF
Saturated Basis	1918	BTU/CF

Antero Resources
Moore Unit 1H - Moore Pad

Tag Name	Value	Units	Timestamp
Accumulated Gas Flow	1154650	MCF	12/3/2013 10:05
Casing Pressure	287.85	PSIA	12/3/2013 10:05
Current Day Gas Flow	422.39	MCF	12/3/2013 10:05
Differential Pressure	13.27	inH2O	12/3/2013 10:05
Flow Rate	4797.37	MCF Per Day	12/3/2013 10:05
Pressure	203.88	PSIA	12/3/2013 10:05
Previous Day Energy	5930.91	MBTU	12/3/2013 10:05
Previous Day Gas Flow	4755.91	MCF	12/3/2013 10:05
Temperature	69.77	F	12/3/2013 10:05
Tubing Pressure	287.85	PSIA	12/3/2013 10:05
Daily AP	12.9	PSIA	12/3/2013 9:00
Daily DP	206.96	inH2O	12/3/2013 9:00
Daily Energy	5930.91	MBTU	12/3/2013 9:00
Daily Flow	4755.91	MCF	12/3/2013 9:00
Daily Tf	68.31	F	12/3/2013 9:00
Hourly AP	197.13	PSIA	12/3/2013 11:00
Hourly DP	13.86	Inches	12/3/2013 11:00
Hourly Energy	250.4	MBTU	12/3/2013 11:00
Hourly Flow Time	3600	Seconds	12/3/2013 11:00
Hourly Tf	69.4	F	12/3/2013 11:00
Hourly Volume	200.8	MCF	12/3/2013 11:00
Audited Accumulated Gas Volume		MCF	
Audited Casing Pressure	293	PSI	11/30/2013 9:00
Audited Gas Volume	4772.87	MCF	11/30/2013 9:00
Audited Oil Volume	0	Barrels	11/30/2013 9:00
Audited Tubing Pressure	293	PSI	11/30/2013 9:00
Audited Water Volume	0	Barrels	11/30/2013 9:00
Argon	0	%	12/3/2013 10:05
BTU	1247.06	BTU	12/3/2013 10:05
C02	0.1467	%	12/3/2013 10:05
Carbon Monoxide	0	%	12/3/2013 10:05
Decane	0	%	12/3/2013 10:05
Ethane	14.1987	%	12/3/2013 10:05
Helium	0	%	12/3/2013 10:05
Heptane	0	%	12/3/2013 10:05
Hexane	0.5451	%	12/3/2013 10:05
Hydrogen	0	%	12/3/2013 10:05
Hydrogen Sulfide	0	%	12/3/2013 10:05
Iso-Butane	0.5666	%	12/3/2013 10:05
Iso-Pentane	0.3749	%	12/3/2013 10:05
Methane	77.6927	%	12/3/2013 10:05
N2	0.4946	%	12/3/2013 10:05
N-Butane	1.1838	%	12/3/2013 10:05
Nonane	0	%	12/3/2013 10:05
N-Pentane	0.2914	%	12/3/2013 10:05
Octane	0	%	12/3/2013 10:05
Oxygen	0.0117	%	12/3/2013 10:05
Plate Size	3.75	Inches	12/3/2013 10:05
Propane	4.4938	%	12/3/2013 10:05
SPG	0.7248		12/3/2013 10:05
Water	0	%	12/3/2013 10:05

Attachment T
Facility-wide Emissions Summary Sheet(s)

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	NOx		CO		VOC		SO2		PM10		PM2.5		GHG (CO2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001									0.6379	0.1906				
EP-PCV					0.0859	0.3761							6.7745	29.6725
F001					3.8094	16.6851							80.7251	353.5760
EP-L001					3.0512	0.1160							2.6804	0.1019
EP-L002					1.36E-03	6.20E-04							0.8172	0.3728
EP-GPU001 through EP-GPU0010 (emission per EPN)	0.0802	0.3512	0.0674	0.2950	0.0044	0.0193	0.0005	0.0021	0.0061	0.0267	0.0061	0.0267	96.2263	421.4713
EP-LH001 through EP-LH0010 (emission per EPN)	0.1604	0.7025	0.1347	0.5901	0.0088	0.0386	0.0010	0.0042	0.0122	0.0534	0.0122	0.0534	192.4526	842.9426
EP-EC001 through EP-EC003 (emission per EPN)	0.0207	0.0907	0.0174	0.0761	0.2827	1.2381	0.0000	0.0000	0.0016	0.0069	0.0012	0.0052	62.2322	272.5771
TOTAL	2.4677	10.8087	2.0729	9.0793	0.9803	4.2939	0.0145	0.0633	0.1875	0.8215	0.1864	0.8163	3073.4864	13461.8704

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-HR001														
EP-PCV			0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0102	0.0447	0.0102	0.0447
F001			0.0013	0.0056	0.0131	0.0574	0.0273	0.1197	0.0692	0.3030	0.1421	0.6225	0.2530	1.1083
EP-L001			9.73E-07	3.70E-08	2.10E-05	7.99E-07	7.04E-05	2.68E-06	0.000	7.64E-06	0.045	0.002	0.045	0.002
EP-L002			7.48E-09	3.41E-09	3.26E-08	1.49E-08	3.34E-08	1.52E-08	9.43E-08	4.30E-08	1.28E-08	5.85E-09	1.81E-07	8.24E-08
EP-GPU001 through EP-GPU0010 (emission per EPN)	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0063	0.0015	0.0066
EP-LH001 through EP-LH0010 (emission per EPN)	0.0001	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0126	0.0030	0.0132
EP-EC001 through EP-EC003 (emission per EPN)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001	0.0003	0.0532	0.2331	0.0533	0.2336
TOTAL	0.0018	0.0079	0.0001	0.0002	0.0001	0.0006	0.0001	0.0004	0.0002	0.0009	0.2030	0.8891	0.2053	0.8992

Annual emissions shall be based on 8760 hours per year of operation for all emission units except emergency generators.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above

Attachment U
Class I Legal Advertisement

Attachment U

Air Quality Permit Notice
Notice of Application
Revival 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-C General Permit Modification for an Oil and Natural Gas Production facility located at 3193 Morgans Run Rd West Union,WV 26456, near Revival Well Pad in Doddridge County, West Virginia.

The latitude and longitude coordinates are: 39.32423 and -80.69015

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

Pollutants	TOTALS (tpy):
NO_X	10.8087
CO	9.0793
$PM_{2.5}$	0.8163
PM_{10}	0.8215
VOC	4.2939
SO_2	0.0633
Formaldehyde	0.0079
Benzene	0.0002
Toluene	0.0006
Ethylbenzene	0.0004
Xylenes	0.0009
Hexane	0.8891
Total HAPs	0.8992

Proposed new equipment will be installed on or about January 1, 2017. Startup of operation using new equipment is planned to begin on or about May 01, 2017. 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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.
Dated this the __ day of _____, 2016

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

www.ghd.com