July 11, 2017

Assistant Director for Permitting
WV Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

SUBJECT: Antero Midstream LLC – Tamela Compressor Station
West Virginia Department of Environmental Protection, Division of Air Quality, 45CSR13 Air Permit Modification, R13-3216A

To Whom it May Concern:

On behalf of Antero Midstream LLC, please find attached the 45CSR13 Air Permit Modification for permit number R13-3216A for the Tamela Compressor Station (Facility ID 017-00131) located in Doddridge County, West Virginia. A summary of the modifications in this application include:

1. Updating storage tank and loading emissions using ProMax 4.0,
2. New installation of a fuel conditioning heater (0.5 million BTU/hr capacity),
3. Increasing the dehydrator throughput to 110 MMscfd per dehydrator,
4. Updating fugitive counts based on current component counts at similar facilities, and
5. Modifying compressor blowdown and pigging events based on expected operations.

Enclosed are one hardcopy and two CDs containing the entire permit application including the application form and required attachments. Per 45CSR22, a $4,500 application fee is also enclosed, which covers the base 45CSR13 $1,000 application fee, an additional $1,000 for the NSPS fee, and an additional $2,500 for Hazardous Air Pollutant requirements.

A copy of the Air Quality Permit Notice for the advertisement is included as Attachment P. As the Notice is being submitted simultaneously with the application, the official affidavit of publication will be submitted to the Division of Air Quality separately once it is completed.

Please call if you have any questions or if I can be of further assistance. I can be reached at (719)632-3593 or by email at kmeszaros@kleinfelder.com.

Sincerely,
KLEINFELDER

Kaitlin Meszaros

Kaitlin Meszaros
Air Quality Specialist

Enclosures: Tamela Compressor Station R13-3216A Air Permit Modification

KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

Antero Midstream LLC

Tamela Compressor Station

NSR Permit Modification Application
West Virginia Department of Environmental Protection
Division of Air Quality
45CSR13 – R13-3216A

Doddridge County, West Virginia

July 2017

Prepared by:

1801 California Street, Suite 1100
Denver, CO 80202
(303) 237-6601
Fax (303) 237-6602
www.kleinfelder.com

DEN17O60997

Table of Contents

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☒ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Antero Midstream LLC

2. Federal Employer ID No. ***(FEIN):***
46-5517375

3. Name of facility *(if different from above):*
Tamela Compressor Station

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
1615 Wynkoop Street
Denver, CO 80202

5B. Facility's present physical address:
Long Run Rd
West Union, WV 26456

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

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

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

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

- If **YES,** please explain: Antero Midstream LLC owns the land for the proposed site
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Natural Gas Compressor Station

10. North American Industry Classification System **(NAICS)** code for the facility:
221210

11A. DAQ Plant ID No. (for existing facilities only):
017 – 00131

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-3216A

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

12A.

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

From Pennsboro, WV, head southeast on Collins Avenue. Turn left onto Main street and then the first right onto Wells Avenue. Make a slight right onto WV-74N and continue for 1.7 miles. Turn left onto facility entrance.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
Long Run West Union, WV 26456	West Union	Doddridge
12.E. UTM Northing (KM): 4352.966	12F. UTM Easting (KM): 513.556	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
Dehydrator capacities will be increased to 110 MMscfd per dehydrator, a fuel conditioning heater will be added to the facility, the number of venting events as well as the amount vented have been updated per current operations, and the storage tank emissions have been updated with a new ProMax 4.0 software simulation.

14A. Provide the date of anticipated installation or change: upon permit issuance – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: Upon permit issuance

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

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

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

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☒ Bulk Liquid Transfer Operations	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify: Dehydrator, Fuel conditioning heater, venting episodes

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☐ Other Collectors, specify :

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: 7/6/17

(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: Ward McNeilly		35C. Title: Vice President, Reserves Planning and Midstream
35D. E-mail: wmcneilly@anteroresources.com	36E. Phone: (303) 357-6822	36F. FAX: (303)357-7315
36A. Printed name of contact person (if different from above): Barry Schatz		36B. Title: Senior Environmental and Regulatory Manager
36C. E-mail: bschatz@anteroresources.com	36D. Phone: (303) 357-7276	36E. FAX: (303)357-7315

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☒ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☒ **Attachment E: Plot Plan**
☒ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☒ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☒ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☐ **Attachment Q: Business Confidential Claims**
☒ **Attachment R: Authority Forms**
☐ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
☐ ***For Title V Administrative Amendments:***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
☐ ***For Title V Minor Modifications:***
  ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  ☐ ***EPA has 45 day review period of a draft permit.***

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

Discussion of Nearby Facilities

Tamela Compressor Station – Closest Antero Facilities

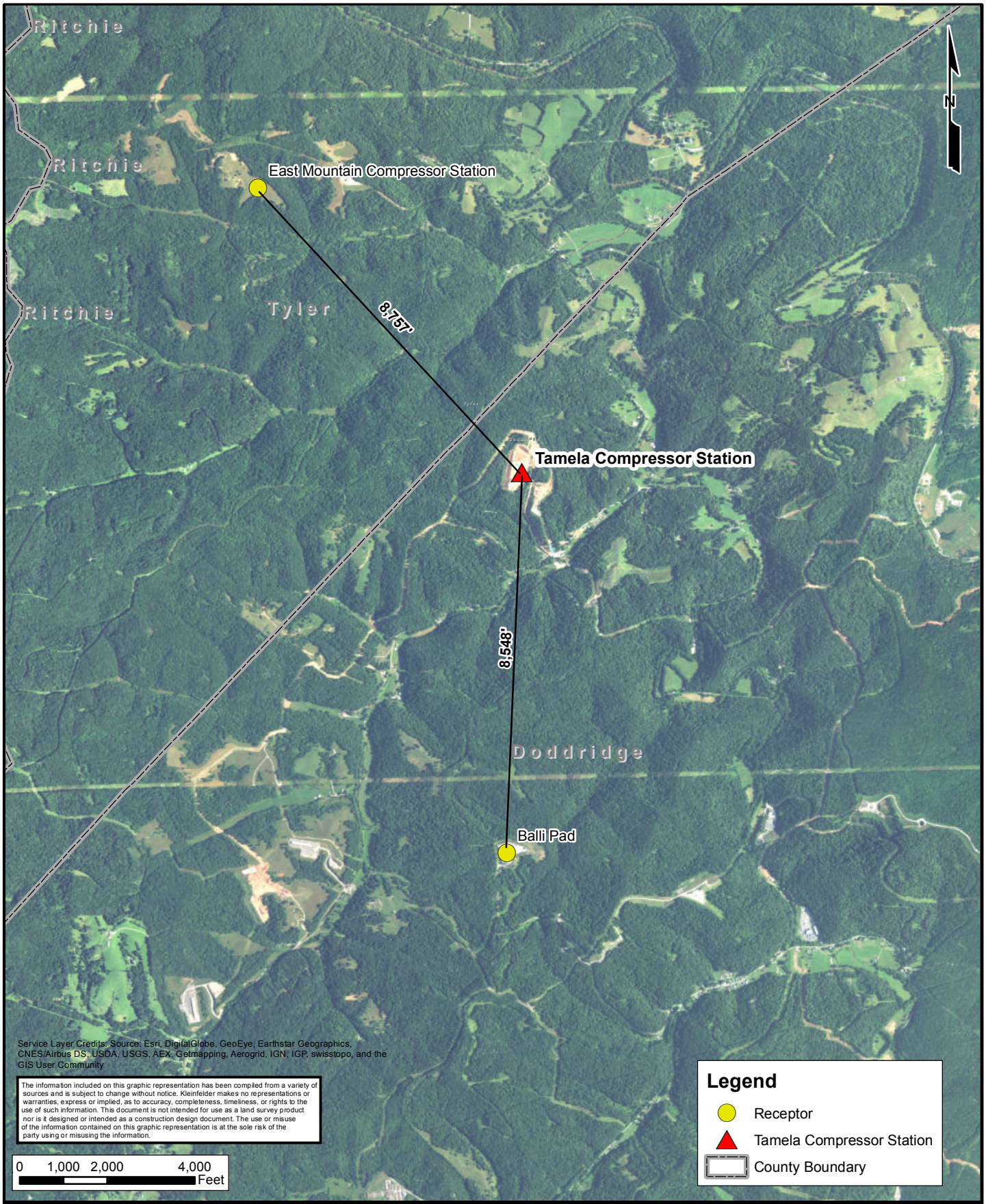
1. Common Control: Only those facilities that are owned and managed by Antero were included in the aggregation discussion. This includes Antero Resources Corporation production facilities in addition to the Antero Midstream LLC midstream facilities.

2. SIC Code: The Tamela Compressor Station will operate under SIC code 4923 (natural gas distribution). The closest facility owned by Antero Midstream LLC with this SIC code is the East Mountain Compressor station which is 1.7 miles northwest of the Facility. All Antero Resources Corporation production facilities operate under the SIC code of 1311 (crude petroleum and natural gas extraction). The closest facility operated by Antero Resources Corporation with the SIC code of 1311 is the Balli Pad 1.6 miles to the south.

3. Contiguous or Adjacent: The land between the Tamela Compressor Station and its nearest facility operating under SIC code 4923 is not owned or managed by Antero Midstream LLC or Antero Resources Corporation. Therefore, the two facilities are not contiguous or adjacent.

Based on this three-pronged evaluation, although the Tamela Compressor Station and East Mountain Compressor Station do belong to the same major industrial group, they should not be aggregated because they are not contiguous or adjacent.

The Tamela Compressor Station and Balli Pad should not be aggregated because they do not belong to the same major industrial group and do not directly rely on each other nor are they contiguous or adjacent.



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PROJECT NO.	20161767.001A
DRAWN:	6/20/2017
DRAWN BY:	N.Peace
CHECKED BY:	M. Steyskal
FILE NAME:	TamelaCompressor_UpdatedReceptor.mxd

Antero Midstream LLC

Tamela Compressor Station
Doddridge County, West Virginia

FIGURE

Attachment A.
Business Certificate

State of West Virginia

Certificate

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

ANTERO MIDSTREAM LLC

Control Number: 9A5E1

a limited liability company, organized under the laws of the State of Delaware

has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of April 29, 2014, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

to the limited liability company authorizing it to transact business in West Virginia

Given under my hand and the Great Seal of the State of West Virginia on this day of April 29, 2014

Natalie E Tennant

Secretary of State

FILED

APR 29 2014

IN THE OFFICE OF
WV SECRETARY OF STATE

Submitted by:
CT Corporation Rep-Terry Stamper
Terry.Stamper@wolterskluwer.com
304-776-1152

1152

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

Control # A45E1

FILE ONE ORIGINAL.
(Two if you want a filed stamped copy returned to you)
FEE: $150

WV APPLICATION FOR CERTIFICATE OF AUTHORITY OF LIMITED LIABILITY COMPANY

1. The **name** of the company as registered in its **home state** is: Antero Midstream LLC

   and the **state or country of organization** is: Delaware

☒ **CHECK HERE to indicate you have obtained and submitted with this application a CERTIFICATE OF EXISTENCE (GOOD STANDING), dated during the current tax year, from your home state of original incorporation as required to process your application. The certificate may be obtained by contacting the Secretary of State's Office in the home state of original incorporation.**

2. The **name** to be used in **West Virginia** will be: [The **name must contain one of the required terms** such as limited liability company" or abbreviations such as "LLC" or "PLLC". See instructions for complete list of acceptable terms and requirements for use of trade name.]
   ☒ **Home State name as listed above,** if available in WV (If name is not available, check DBA Name box below and follow special instructions in **Section 2.** attached.)
   ☐ **DBA name** _____ (See special instructions in **Section 2.** Regarding the **Letter of Resolution** attached to this application.)

3. The company will be a: [See instructions for limitations on professions which may form P.L.L.C. in WV. All members must have WV professional license. In most cases, a **Letter of Authorization/Approval from the appropriate State Licensing Board** is required to process the application.]
   ☒ regular **L.L.C.**
   ☐ **Professional L.L.C.** for the profession of _____

4. The street address of the **principal office** is:
   No. & Street: 1625 17th Street, Suite 300
   City/State/Zip: Denver, Colorado 80202

   and the mailing address (if different) is:
   Street/Box: _____
   City/State/Zip: _____

5. The **address** of the **designated office** of the company in WV, if any, will be:
   No. & Street: 5400 D Big Tyler Road
   City/State/Zip: Charleston, West Virginia 25313

6. **Agent of Process:** Properly designated person to whom notice of legal process may be sent, if any:
   Name: C T Corporation System
   Address: 5400 D Big Tyler Road
   City/State/Zip: Charleston, West Virginia 25313

RECEIVED

APR 29 2014

214913 3/2/2014 8:35:00

7. **E-mail address** where business correspondence may be received: jgiannaula@anteroresources.com

8. **Website address of the business,** if any: N/A

9. The company is:
   - [X] an **at-will** company, for an indefinite period
   - [ ] a **term** company, for the term of _____ years, which will expire on _____.

10. The company is:
   - [X] **member**-managed. [List the names and addresses of all members.]
   - [ ] **manager**-managed. [List the names and addresses of all managers.]

List the **Name(s) and Address(es) of the Member(s)/Manager(s)** of the company (attach additional pages if necessary).

Name	Street Address	City, State, Zip
Antero Resources Corporation	1625 17th Street, Suite 300	Denver, Colorado 80202

11. All or specified members of a limited liability company are liable in their capacity as members for all or specified debts, obligations or liabilities of the company.
   - [X] **No**--All debts, obligations and liabilities are those of the company.
   - [ ] **Yes**--Those persons who are liable in their capacity as members for all debts, obligations or liability of the company have consented in writing to the adoption of the provision or to be bound by the provision.

12. The **purpose** for which this limited liability company is formed are as follows:
(Describe the type(s) of business activity which will be conducted, for example, "real estate," "construction of residential and commercial buildings," "commercial printing," "professional practice of architecture.")

Midstream oil and gas operating company

13. Is the business a **Scrap Metal Dealer**?
   - [ ] **Yes** [If "Yes," you must complete the **Scrap Metal Dealer Registration Form** (Form SMD-1) and proceed to question 14.].
   - [X] **No** [Proceed to question 14.]

14. The number of pages attached and included in this application is: 3

15. The requested **effective date** is: [Requested date *may not be earlier than filing nor later than 90 days after filing in our office.*]
☒ the date & time of filing in the Secretary of State's Office
☐ the following date _____ and time _____

16. **Contact and Signature Information*** (See below ***Important Legal Notice Regarding Signature***):

a.	Alvyn A. Schopp	(313) 357-7310
	Contact Name	Phone Number
b.	Alvyn A. Schopp	Chief Administrative Officer and Regional Vice President
	Print or type name of signer	Title / Capacity of Signer
c.	_____	April 28, 2014
	Signature	**Date**

****Important Legal Notice Regarding Signature:* Per West Virginia Code §31B-2-209, Liability for false statement in filed record.** If a record authorized or required to be filed under this chapter contains a false statement, one who suffers loss by reliance on the statement may recover damages for the loss from a person who signed the record or caused another to sign it on the person's behalf and knew the statement to be false at the time the record was signed.

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "ANTERO MIDSTREAM LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTY-NINTH DAY OF APRIL, A.D. 2014.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE NOT BEEN ASSESSED TO DATE.

Jeffrey W. Bullock, Secretary of State

5466900 8300

140532521

AUTHENTICATION: 1328067

DATE: 04-29-14

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

Attachment B.
Area Map

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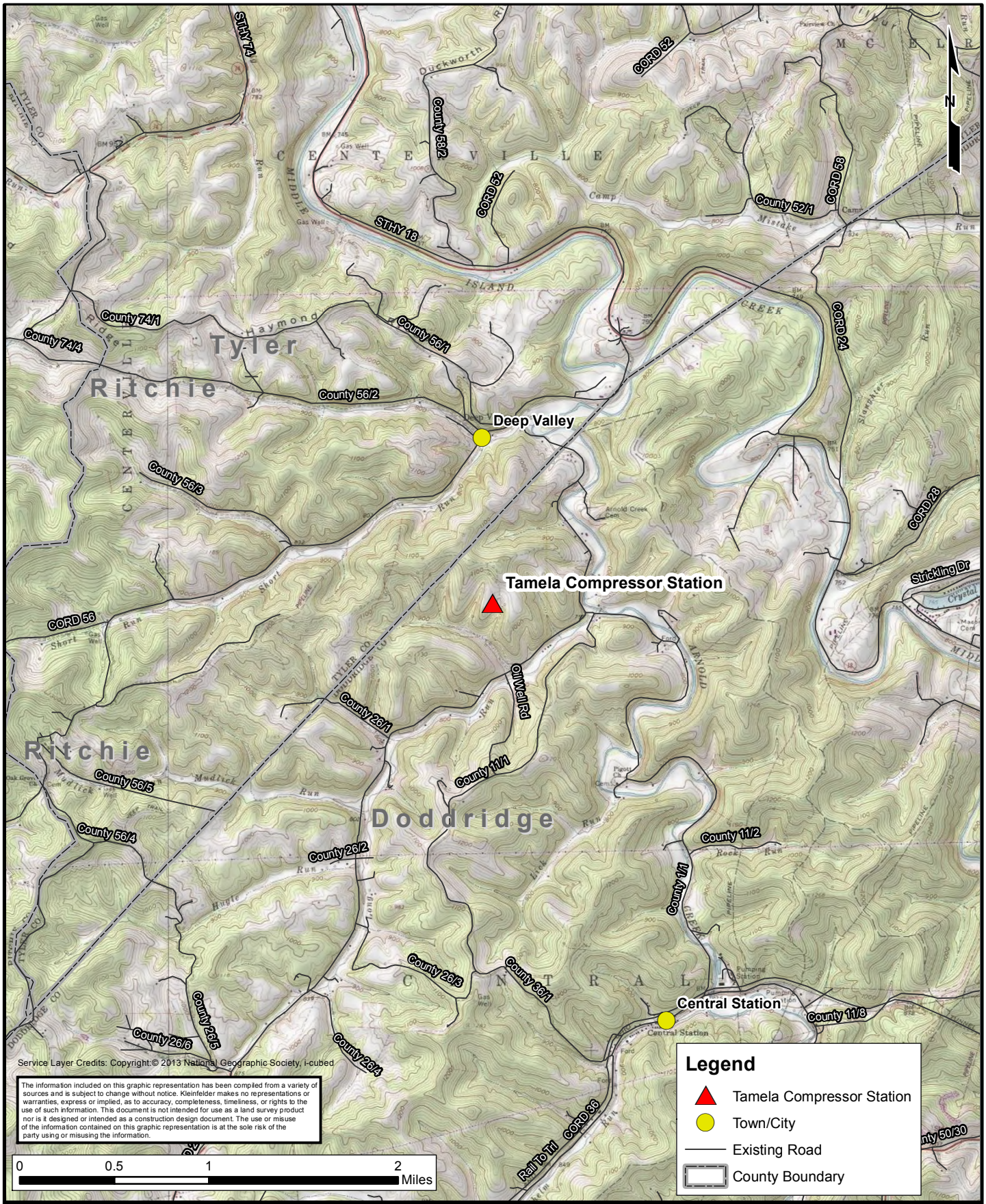
PROJECT NO.	20152091.001A
DRAWN:	10/6/2014
DRAWN BY:	J. Weber
CHECKED BY:	K.Meszaros
FILE NAME:	TamelaCompressor_Receptor_Aerial.mxd

Antero Midstream LLC

Tamela Compressor Station
Doddridge County, West Virginia

FIGURE



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PROJECT NO.	20152091.001A
DRAWN:	10/6/2014
DRAWN BY:	J. Weber
CHECKED BY:	K.Meszaros
FILE NAME:	TamelaCompressor_Topo.mxd

Antero Midstream LLC

Tamela Compressor Station
Doddridge County, West Virginia

FIGURE

Attachment C.
Installation and Startup Schedule

Tamela Compressor Station – Installation and Startup Schedule

The Tamela Compressor Station is an existing facility located in Doddridge County, WV, approximately 4.0 miles northwest of West Union, WV. Equipment is currently installed and operating per permit R13-3216A. The proposed new equipment and modifications are scheduled to be installed and operational upon permit issuance.

Attachment D.
Regulatory Discussion

Tamela Compressor Station – Regulatory Discussion

Federal Regulations

40 CFR Part 60 – Standards of Performance for New Stationary Sources

I. *Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.*

Applicability: Subpart Kb applies to volatile organic liquid storage tanks with a capacity greater than or equal to 75 m^3 (§60.110b(a)). Storage vessels with a design capacity less than 1,589.874 m3 do not apply to this subpart if they are used store condensate prior to custody transfer. The condensate and produced water storage tanks at the Tamela Compressor Station are 64 m^3. The settler tank is 79 m^3, but stores condensate prior to custody transfer. Therefore, Subpart Kb does not apply to the Tamela Compressor Station.

II. *Subpart GG - Standards of Performance for Stationary Gas Turbines*

Applicability: Subpart GG applies to all stationary gas turbines with a heat input at peak load equal to or greater than 10 million BTU per hour based on the lower heating value of the fuel (§60.330(a)). Since the microturbine generators at the Tamela Compressor Station have a heat input rating less than 10 million Btu per hour, Subpart GG does not apply.

III. *Subpart KKK - Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011.*

Applicability: Subpart KKK applies to facilities built or modified before August 23, 2011, so Subpart KKK will not apply as the Tamela Compressor Station was constructed after August 23, 2011.

IV. *Subpart LLL - Standards of Performance for SO_2 Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011.*

Applicability: Subpart LLL applies to facilities built or modified before August 23, 2011, so Subpart LLL will not apply as the Tamela Compressor Station was constructed after August 23, 2011.

V. *Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

Applicability: Subpart JJJJ applies to rich burn engines that were ordered after June 12, 2006 and manufactured on or after July 1, 2007 for engines with maximum power

greater than or equal to 500 hp (§60.4230(a)(4)(i)). Thus, Subpart JJJJ applies to the Tamela Compressor Station as the compressor engines were installed after July 1, 2007 and manufactured after July 1, 2010.

VI. *Subpart KKKK - Standards of Performance for Stationary Combustion Turbines*

Applicability: Subpart KKKK applies to all stationary combustion turbines with a heat input at peak load equal to or greater than 10 million BTU per hour based on the higher heating value of the fuel (§60.4305(a)). Since the microturbine generators at the Tamela Compressor Station have a heat input rating less than 10 million Btu per hour, Subpart KKKK does not apply.

VII. *Subpart OOOO - Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for Which Construction, Modification or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015*

Applicability: Subpart OOOO applies to reciprocating compressor facilities that were constructed, modified, or reconstructed after August 23, 2011 and on or before September 18, 2015 (§60.5365(c)). Tamela Compressor Station was not constructed during this time period, therefore Quad O does not apply.

VIII. *Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for Which Construction, Modification or Reconstruction Commenced after September 18, 2015*

Applicability: Subpart OOOOa applies to reciprocating compressor facilities that were constructed, modified, or reconstructed after September 18, 2015 (§60.5365a(c)). Also, Subpart OOOOa applies to storage vessel affected facilities with individual tank emissions greater than 6 tons per year (§60.5365a(e)). Lastly, the collection of fugitive emissions components at a compressor station is an affected facility under this Subpart (§60.5365a(j)). Since the Tamela Compressor Station was built after September 18, 2015 and is a compressor station with reciprocating compressors, Subpart OOOOa does apply. The pneumatic devices that were installed at Tamela Compressor Station are air-actuated or electric and therefore exempt from the requirements of this Subpart. The storage tank affected facility applicability for the onsite storage tanks will be determined within the first 30 days of production, per Subpart OOOOa.

40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants

I. *Subpart V – National Emission Standard for Equipment Leaks (Fugitive Emission Sources)*

Applicability: Subpart V applies to components such as compressors, valves, and pumps that are intended to operate in volatile hazardous air pollutant (VHAP) service (§61.240(a)). VHAP service means that a component contains or contacts a fluid that is at least 10 percent by weight a VHAP. Subpart V does not apply to the Tamela

Compressor Station because none of the components have fluid (natural gas, water, or condensate) that is over 10 percent by weight of any VHAP.

40 CFR Part 63 – National Emission Standards for Hazardous Air Pollutants for Source Categories

I. *Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities*

Applicability: Subpart HH applies to oil and natural gas production facilities that are a major or area source of HAP emissions, and that process, upgrade, or store hydrocarbon liquids or natural gas prior to the transmission and storage source category (§63.760(a)). Subpart HH does apply to the Tamela Compressor Station, and because it is an area source of HAP emissions, the two (2) TEG dehydrators are applicable sources under Subpart HH (§63.760(b)(2)). However, actual benzene emissions from the dehydrators at the Tamela Compressor Station are less than 1 ton per year, so both dehydrators are exempt from all requirements except recordkeeping (§63.764(e)(1)(ii)).

II. *Subpart HHH – National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities*

Applicability: Subpart HHH applies to natural gas transmission and storage facilities that are a major source of HAP emissions (§63.1270(a)). Subpart HHH does not apply to the Tamela Compressor Station as it is not a major source of HAP emissions. Further, the Tamela Compressor Station is prior to the gas transmission and storage phase.

III. *Subpart EEEE – National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)*

Applicability: Subpart EEEE applies to organic liquids distribution operations that are located at major source of HAP emissions (§63.2334(a)). Subpart EEEE does not apply to the Tamela Compressor Station as it is not a major source of HAP emissions.

IV. *Subpart YYYY – National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines*

Applicability: Subpart YYYY applies to stationary combustion turbines located at major sources of HAP emissions (§63.6085(a)). Since the Tamela Compressor Station is not a major source of HAP emissions, Subpart YYYY does not apply.

V. *Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

Applicability: Subpart ZZZZ applies to stationary RICE at a major or area source of HAP emissions (§63.6585). Subpart ZZZZ applies to the Tamela Compressor Station as the

compressor engines are new RICE. The engines will meet Subpart ZZZZ by meeting 40 CFR Part 60, Subpart JJJJ as the Tamela Compressor Station is an area source of HAP emissions (§63.6590(c)(1)).

VI. *Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*

Applicability: Subpart DDDDD applies to process heaters at a major source of HAP emissions (§63.7485). Subpart DDDDD does not apply to the Tamela Compressor Station as it is not a major source of HAP emissions.

West Virginia State Regulations

Title 45 Legislative Rule – Division of Environmental Protection, Office of Air Quality

The following Title 45 Legislative Rules will be applicable to the Tamela Compressor Station:

I. *45CSR2 – To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers*

II. *45CSR2A – Testing, Monitoring, Recordkeeping and Reporting Requirements Under 45CSR2*

III. *45CSR4 – To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors*

IV. *45CSR6 – Control of Air Pollution from Combustion of Refuse*

V. *45CSR8 – Ambient Air Quality Standards*

VI. *45CSR11 – Prevention of Air Pollution Emergency Episodes*

VII. *45CSR13 – Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation*

VIII. *45CSR16 – Standards of Performance for New Stationary Sources Pursuant to 40 CFR, Part 60*

IX. *45CSR20 – Good Engineering Practice as Applicable to Stack Heights*

X. *45CSR22 – Air Quality Management Fee Program*

XI. *45CSR27 – To Prevent and Control the Emissions of Toxic Air Pollutants*

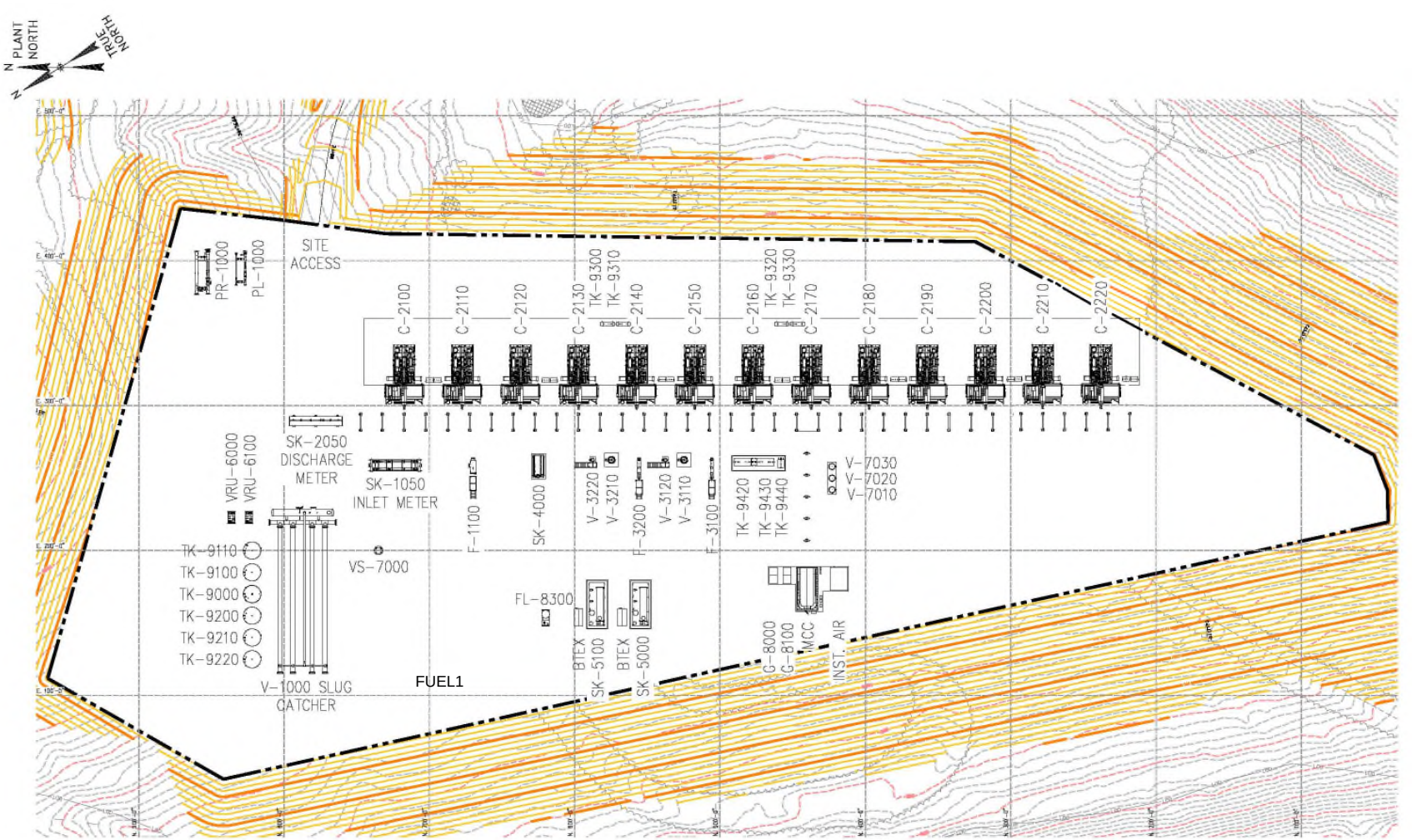
XII. *45CSR33 – Acid Rain Provisions and Permits*

XIII. *45CSR34 – Emission Standards for Hazardous Air Pollutants for Source Categories Pursuant to 40 CFR, Part 63*

XIV. *45CSR38 – Provisions for Determination of Compliance with Air Quality Management Rules*

XV. *45CSR42 – Greenhouse Gas Emissions Inventory*

Attachment E.
Plot Plan



NOTES:

REFERENCE DRAWINGS		
DWG. NO.	TITLE	

REVISIONS					
NO.	DESCRIPTION	BY	DATE	CHK	DATE	APPR	DATE
A	ISSUED FOR REVIEW	SM		JM		PS	

Antero Resources

TAMELA SMITH COMPRESSOR STA.

KAHUNA VENTURES LLC
WESTMINSTER, CO 80021
303-451-7374
DBA KAHUNA DESIGN LLC.

SITE
EQUIPMENT LOCATION PLAN

DRAWN BY: S. MINJAREZ	CHECKED: J. WARMAN	APPROVED: P. STOCKEBRAND
CREATION DATE: 09/09/14	CHECK DATE:	APPR. DATE:
Proj. No.:	DWG. No.: TSCS-PI-3006	SHEET No.: 1 OF 1
SCALE: 1"=30'		A

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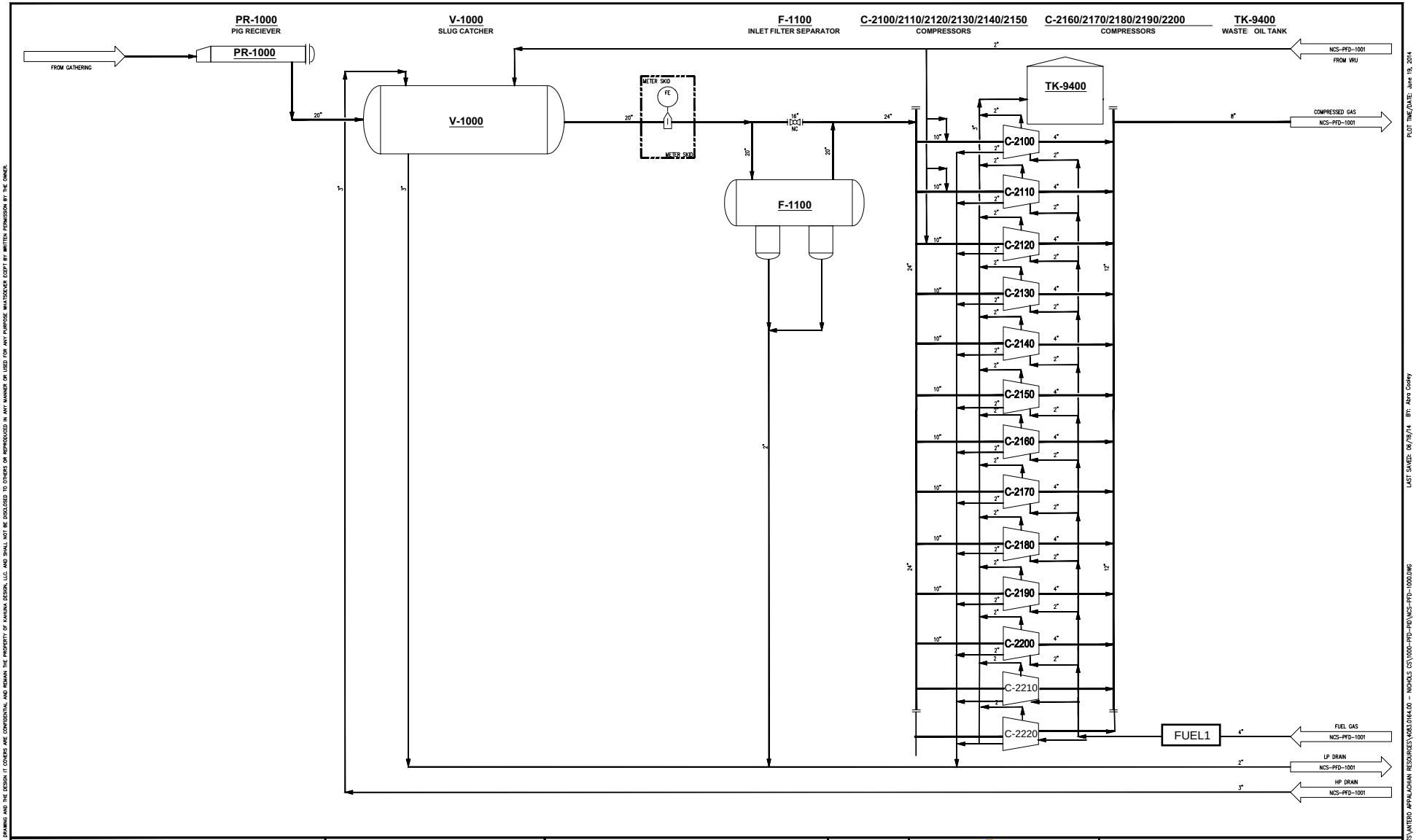
PLOT TIME/DATE: September 11, 2014

LAST SAVED: 09/11/14 BY: Kamalas Mayasz

FILE LOCATION:K:\PROJECTS\ANTERO RESOURCES\045402909.00 - WEST MOUNTAIN GS\000-SITE PLAN - 045\TSCS-PI-3006.DWG

Attachment F.
Process Flow Diagram



NOTES:

REFERENCE DRAWINGS		REVISIONS							
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		A	ISSUED FOR REVIEW	AC	05/08/14	JW	05/08/14	PS	05/08/14
DWG. NO.	TITLE	NO.	DESCRIPTION	BY	DATE	CHK.	DATE	APPR.	DATE

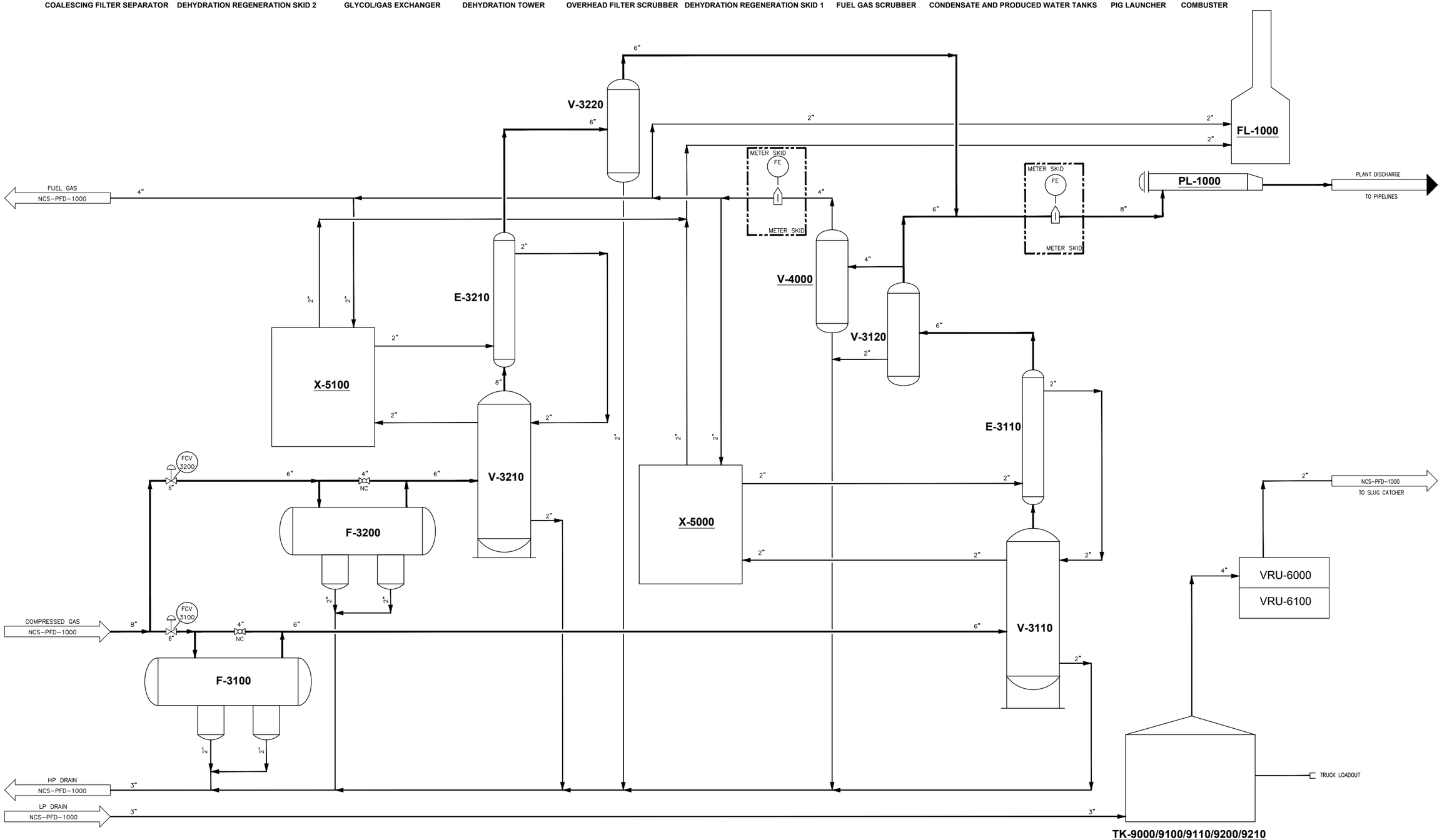
Antero Resources
KANUNA VENTURES LLC
WESTMINSTER, COLORADO
303-451-7574
BY: KANUNA DESIGN LLC.

PROCESS FLOW DIAGRAM

DRAWN BY: A. COOLEY	CHECKED: J. WARMAN	APPROVED: P. STOCKEBRAND
CREATION DATE: 05/05/14	CHECK DATE: 05/05/14	APPR. DATE: 05/05/14
Proj. No.: 4083.0164.00	DWG. No.: TCS-PFD-1000	SHEET No.: 1 OF 2
SCALE: NONE		B

PLOT TIME/DATE: June 19, 2014
LAST SAVED: 06/19/14 BY: Alva Cooley
FILE LOCATION: K:\PROJECTS\ANTERO APPALACHIAN RESOURCES\4083.0164.00 - NICHOLS CS\100-PFD-PID\NCS-PFD-1000.DWG

F-3100/3200 COALESCING FILTER SEPARATOR | **X-5100** DEHYDRATION REGENERATION SKID 2 | **E-3110/3210** GLYCOL/GAS EXCHANGER | **V-3110/3210** DEHYDRATION TOWER | **V-3120/3220** OVERHEAD FILTER SCRUBBER | **X-5000** DEHYDRATION REGENERATION SKID 1 | **V-4000** FUEL GAS SCRUBBER | **TK-9000/9100/9110/9200/9210** CONDENSATE AND PRODUCED WATER TANKS | **PL-1000** PIG LAUNCHER | **FL-1000** COMBUSTER



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REFERENCE DRAWINGS

DWG. NO.	TITLE

REVISIONS

NO.	DESCRIPTION	BY	DATE	CHK.	DATE	APPR.	DATE
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A	ISSUED FOR REVIEW	AC	05/06/14	JW	05/06/14	PS	05/06-14

Antero Resources

KAHUNA VENTURES LLC
WESTMINSTER, CO 80021
303-451-7374
BY: KAHUNA DESIGN LLC.

PROCESS FLOW DIAGRAM

DRAWN BY: A. COOLEY	CHECKED: J. WARMAN	APPROVED: P. STOCKEBRAND
CREATION DATE: 05/05/14	CHECK DATE: 05/05/14	APPR. DATE: 05/06/14
Proj. No.: 4083.0164.00	DWG. No.: TCS-PFD-1001	SHEET No. 2 OF 2
SCALE: NONE		B

PLOT TIME/DATE: June 19, 2014

LAST SAVED: 06/18/14 BY: Abra Cooley

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Attachment G.
Process Description

Tamela Compressor Station – Process Description

The Tamela Compressor Station is located in Doddridge County, West Virginia. Gas from surrounding pipelines enters the facility through one (1) receiver and associated slug catcher. From there, the gas is metered and routed through a filter separator. Any produced liquids from the scrubber or separator are sent to the 500 barrel settling tank (TK-9000). Gas from the filter separator is sent to thirteen (13) 1680 hp Waukesha compressor engines (C-2100 – C-2220). The thirteen (13) compressor engines are controlled with NSCR catalysts and air-fuel ratio controllers (1C – 11C, 15C & 16C). Fuel gas for the compressor engines will be treated prior to the engines by a fuel conditioning skid with a 0.5 MMBtu/hr heater (FUEL1) to allow more complete combustion. Produced fluids are routed to the settling tank and high pressure gas is sent to one of the two (2) TEG dehydrators.

Each TEG dehydrator (V-3110 & V-3210) contains a flash gas tank and 1.5 MMBtu/hr reboiler (F-3100 & F-3200). Each dehydrator has a design rate of 110 MMscf/day. Within the dehydrator unit, vent gas from the flash gas tank (V-3120 & V-3220) is routed to the reboiler (F-3100 & F-3200) and used as fuel. In the case where the flash tank gas cannot be used by the reboiler due to excess gas or the reboiler being offline, the gas will be sent to the VRUs (VRU-6000 and VRU-6100) via the storage tanks (TK-9000 –TK-9210) and thus controlled by 98%. Combustion emissions from each reboiler are routed to the atmosphere. The dehydrator still vents (V-3110 & V-3210) are controlled by a flare with at least 98% control efficiency (FL-1000). Produced fluids from the dehydrator are routed to the settling tank. The dry gas from the dehydration process is either routed to a fuel gas scrubber, metered, and routed to the compressors as fuel gas or metered and sent to the high pressure facility discharge pipeline.

All produced fluids enter one (1) 500 barrel settling tank (TK-9000) where the fluids settle out as either condensate or produced water. The produced water goes to two (2) 400 barrel produced water tanks (TK-9200 – TK-9210) and the condensate goes to two (2) 400 barrel condensate tanks (TK-9100 – TK-9110). Flashing only occurs at the settling tank as the fluids stabilize in the settling tank before going to the other storage tanks. All five (5) tanks are connected to a primary vapor recovery unit (VRU-6000) where tank vapors are collected and recycled back into the gas system right before the initial filter scrubber. A second vapor recovery unit (VRU-6100) is used as back-up to the primary vapor recovery unit. The produced fluids are trucked out via tanker trucks as needed (LDOUT1). The loading emissions are uncontrolled. The anticipated production is 150 barrels per day of condensate and 45 barrels per day of produced water.

Two (2) natural gas microturbine generators, each rated at 200 kWe, will supply power to the facility (G-8000 & G-8100). Typically, no more than 200 kWe will be operational at any given time and the remaining 200 kWe unit will be on standby. G-8000 and G-8100 may switch between primary and standby status depending on their need for maintenance. Emissions were calculated as though each generator operates 8760 hours per year as to not limit operations however. The fuel line for the generators will be heated by a small catalytic heater (CATHT1) with a burner rating of 24 Btu/hr.

There will also be small storage tanks located at the facility. Their ID number, description, and exact size are listed in the table below.

Fugitive emissions from component leaks and emissions from venting or blowdown events (VENT1) will also occur.

Tag Number	Description	Gallons
TK-9300 & TK-9320	Compressor Skid Oily Water Tanks	500 each
TK-9310 & TK-9330	Used Oil Tank	500 each
TK-9410	TEG Make-Up Tank	1,000
TK-9420	Compressor Coolant Tank	2,000
TK-9430	Engine Lube Oil Tank	2,000
TK-9440	Compressor Lube Oil Tank	2,000
TK-9400	Compressor Waste Oil Tank	4,200

Attachment H.
Material Safety Data Sheets

Material Safety Data Sheet
(TRIETHYLENE GLYCOL (TEG))

JMN Specialties, Inc.
1100 Victory Drive
Westwego, LA 70094
(504) 341-3749
ISO 9001 Registered

HMIS HEALTH:.....2
HMIS FLAMMABILITY: 1
HMIS REACTIVITY:.....0
PERSONAL PROTECTION: C

EMERGENCY NUMBER: 800-255-3924

SECTION 1 – IDENTIFICATION OF CHEMICAL PRODUCT

PRODUCT NAME:..... TRIETHYLENE GLYCOL (TEG)
EFFECTIVE DATE:..... October 1, 2007
CHEMICAL FAMILY:..... Glycol
FORMULA: $C_6H_{14}O_4$
CAS NUMBER:..... 112-27-6

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENT	PERCENT	CAS NUMBER	PEL
TRIETHYLENE GLYCOL	> 99	112-27-6	None Established by ACGIH or OSHA.

The criteria for listing components in the composition section are as follows: Carcinogens are listed when present at 0.1% or greater; components which are otherwise hazardous according to OSHA are listed when present at 1.0% or greater. Non-hazardous components may be listed at 3.0% or greater if not proprietary in nature. This is not intended to be complete compositional disclosure. Refer to section 14 for applicable states right to know and other regulatory information.

SECTION 3 – HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE / ODOR:..... Clear Liquid / Mild Odor

SHORT TERM EXPOSURE: **Inhalation:** No adverse health effects expected from inhalation. **Ingestion:** No adverse effects expected. **Skin Contact:** Prolonged exposure may cause skin irritation. **Eye Contact:** Splashing in eye causes irritation with transitory disturbances of corneal epithelium. However, these effects diminish and no permanent injury is expected. Vapors are non-irritating. **Chronic Exposure:** Possible skin irritation. **Aggravation of Pre-existing Conditions:** No information found.

OSHA REGULATED:..... No

LISTED CARCINOGEN: ..... NTP: No **IARC MONOGRAPHS:** No

POTENTIAL HEALTH EFFECTS

INHALATION: ..... Unlikely
INGESTION:..... Irritant
SKIN (DERMAL): ..... Slight Irritant After Prolonged Contact

OVER EXPOSURE EFFECTS: **Inhalation:** No adverse health effects expected from inhalation. **Ingestion:** No adverse effects expected. **Skin Contact:** Prolonged exposure may cause skin irritation. **Eye Contact:** Splashing in eye causes irritation with transitory disturbances of corneal epithelium. However, these effects diminish and no permanent injury is expected. Vapors are non-irritating. **Chronic Exposure:** Possible skin irritation. **Aggravation of Pre-existing Conditions:** No information found.

SECTION 4 – FIRST AID MEASURES

FIRST AID: **SKIN CONTACT:** Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately. **EYE CONTACT:** Flush eyes immediately with large amounts of water or normal saline solution, occasionally lifting upper and lower lids until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately. **INGESTION:** Give large amounts of fresh water or milk immediately. Do not give anything by mouth if person is unconscious or otherwise unable to swallow. If vomiting occurs, keep head below hips to prevent aspiration. Treat symptomatically and supportively. Seek medical attention immediately. **INHALATION:** Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial resuscitation. Keep person warm and at rest. Treat symptomatically and supportively. Seek medical attention immediately. Qualified medical personnel should consider administering oxygen.

NOTE TO PHYSICIAN: ..... Ethylene Glycol (EG) and diethylene glycol (DEG) intoxication may initially produce behavioral changes, drowsiness, vomiting, diarrhea, thirst, and convulsions. EG and DEG are nephrotoxic. End stages of poisoning may include renal damage or failure with acidosis. Supportive measures, supplemented with hemodialysis if indicated, may limit the progression and severity of toxic effects. Primary toxic effects of EG when swallowed are kidney damage and metabolic acidosis. This product may contain trace amounts of Ethylene Glycol (EG) or Diethylene Glycol (DEG).

SECTION 5 - FIRE FIGHTING MEASURES

FLASHPOINT:..... 350°F

EXTINGUISHING MEDIA: Water fog or spray, Foam, Dry Powder, Carbon Dioxide (CO_2).

DECOMPOSITION PRODUCTS:..... From fire; Smoke, Carbon dioxide, & Carbon Monoxide

LOWER FLAME LIMIT:..... < 0.9

HIGHER FLAME LIMIT:..... > 9

UNUSUAL FIRE AND EXPLOSION HAZARDS:..... Toxic levels of carbon monoxide, carbon dioxide, irritation aldehydes and ketones may be formed on burning. Heating in air may produce irritating aldehydes, acids, and ketones.

FIRE FIGHTING

EQUIPMENT: ..... Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CHEMTEL EMERGENCY NUMBER (24 Hour): **1-800-255-3924**

SPILL: ..... Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

RCRA STATUS: ..... None

SECTION 7 – HANDLING AND STORAGE

HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND PROMPT REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.

HANDLING AND STORAGE: .. No special storage requirements. Do not store above 120°F.

PRECAUTIONARY MEASURES: ..... Provide fresh air ventilation during and after application. Close container after each use. Avoid prolonged or repeated contact with skin. Avoid contact with skin, eyes, and clothing. After handling this product, wash hands before eating, drinking, or smoking. If needed, take first aid action shown in Section 4.

SECTION 8 – EXPOSURE CONTROL / PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment.

EYE PROTECTION: ..... Chemical safety goggles meeting the specifications of OSHA 29CFR 1910.133 / ANSI Standard Z87.1 should be worn whenever there is the possibility of splashing or other contact with the eyes. Wear safety glasses meeting the specifications of OSHA 29CFR 1910.133 / ANSI Standard Z87.1 where no contact with the eye is anticipated.

RESPIRATORY PROTECTION: ..... Not normally needed. Use NIOSH approved vapor respirator if exposure is unknown or exceeds permissible limits. A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use.

Use NIOSH / MSHA approved respiratory protection equipment when airborne exposure limits are exceeded (see below). Consult the respirator manufacturer to determine appropriate type of

equipment for a given application. Observe respirator use limitations specified by NIOSH / MSHA or the manufacturer. Respiratory protection programs must comply with 29 CFR 1910.134.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
PROTECTIVE GLOVES:..... Wear impervious gloves
VENTILATION: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
MECHANICAL EXHAUST: ..... Desired in closed places
LOCAL EXHAUST: ..... Recommended

VENTILATION NOTES: Provide natural or mechanical ventilation to control exposure levels below Airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment. Consult NFPA Standard 91 for design of exhaust systems.

THRESHOLD LIMIT VALUE: . None Established
PROTECTIVE EQUIPMENT:... HMIS PERSONAL PROTECTION: C: Safety Glasses, Gloves, Apron
The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE / ODOR: ..... Clear Liquid / Mild Odor
BOILING POINT: ..... > 500°F
FREEZING POINT: ..... < 32°F
VAPOR PRESSURE:..... > 1
VAPOR DENSITY (AIR=1): 5.1
SPECIFIC GRAVITY: 1.1
pH: 8.2
SOLUBILITY IN WATER: ..... Complete

SECTION 10 – STABILITY AND REACTIVITY

STABILITY:..... Stable
HAZARDOUS
POLYMERIZATION:..... Will Not Occur
POLYMERIZATION AVOID:... None
INCOMPATIBILITY:..... Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures. Therefore, avoid strong acids and strong bases at elevated temperatures. Avoid contamination with strong oxidizing agentsand materials reactive with hydroxyl compounds. Avoid burning or heating in air. This may produce irritating aldehydes, acids, and ketones.
CONDITIONS TO AVOID:..... Excessive heat. Will ignite in air at 700°F

SECTION 11 – TOXICOLOGICAL INFORMATION

EYE EFFECTS:
The eye irritation hazard is based on data from information supplied by raw material(s) supplier(s).
SKIN EFFECTS:
The skin irritation hazard is based on data from information supplied by raw material(s) supplier(s).
ACUTE ORAL EFFECTS:
The acute oral toxicity is based on data from information supplied by raw material(s) supplier(s).
ACUTE INHALATION EFFECTS:
The acute respiratory toxicity is based on data from information supplied by raw material(s) supplier(s).

SECTION 12 – ECOLOGICAL INFORMATION

Data from laboratory studies and from scientific literature is noted below if available.

SECTION 13 DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: ..... Treatment, storage, transportation and disposal must be in accordance with Federal, State/Provincial and Local Regulations. Regulations may vary in different locations. Characterization and compliance with applicable laws are the responsibility solely of the generator. Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14- TRANSPORTATION INFORMATION

The data provided in this section is for information only. The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate regulations to properly classify your shipment for transportation.

PROPER SHIPPING NAME:..... DOT NON-REGULATED - TRIETHYLENE GLYCOL (TEG)
REPORTABLE QUANTITY:..... None
HAZARD CLASS AND LABEL: NON-REGULATED
UN NUMBER: ..... None
NA NUMBER: ..... None
PACKAGING SIZE:..... Pail, Drum & Bulk

SECTION 15 - REGULATORY INFORMATION

SARA 311 CATEGORIES:
EPA ACUTE:..... Yes (Eyes)

EPA CHRONIC: ..... No
EPA IGNITABILITY: ..... No
EPA REACTIVITY: ..... No
EPA SUDDEN RELEASE
OF PRESSURE: ..... No

CERCLA RQ VALUE: ..... None
SARA TPQ: ..... None
SARA RQ: ..... None
EPA HAZARD WASTE #: ..... None
CLEAN AIR: ..... NA
CLEAN WATER: ..... NA
SARA SECTION 313: ..... No
NFPA HEALTH: 2
NFPA FLAMMABILITY: 1
NFPA REACTIVITY: 0
DEA Chemical Trafficking Act:.. No
TSCA STATUS: ..... All ingredients in this product are on the TSCA Inventory List.

SECTION 16 - ADDITIONAL INFORMATION

FOOT NOTES: NA - NOT APPLICABLE ND - NO DATA AVAILABLE > = GREATER THAN < = LESS THAN

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Company Health and Risk Assessment Unit, PO Box 1519, Gretna, LA 70054-1519.

REVISION STATEMENT: Changes have been made throughout this Material Safety Data Sheet. Please read the entire document.

DISCLAIMER:
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SAFETY DATA SHEET

Material Name: Produced Water **US GHS**

SYNONYMS: **Produced Brine Water, Brine, Brine Water, Formation Water**

* * * Section 1 – PRODUCT AND COMPANY IDENTIFICATION * * *

PRODUCT NAME: **Produced Water**
PRODUCT CODES: **Mixture**

EMERGENCY PHONE: **(800) 878-1373**
AFTER HOURS: **(800) 878-1373**

PRODUCER: **Antero Resources**
ADDRESS: **1615 Wynkoop Street**
Denver, Colorado 80202

CHEMTREC PHONE: **(800) 424-9300**

* * * Section 2 – HAZARDS IDENTIFICATION * * *

GHS Classification:

Eye Irritant – Category 2A.

GHS LABEL ELEMENTS
Symbol(s)

Signal Word

Warning

Hazard Statements

Causes serious eye irritation

Precautionary Statements

Prevention

Wear protective gloves/protective clothing/eye protection/face protection.

Response

If on SKIN (or hair): Rinse skin with water / shower. Remove / Take off all contaminated clothing immediately.

If in EYES: Rinse cautiously with water for at least fifteen (15) minutes. Remove Contact Lenses, if present and easy to do. Continue rinsing.

If EYE irritation persists, get medical advice / attention.

Storage
Store in a secure area.

Disposal
Dispose of contents/containers in accordance with regulations.

* * * Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS #	Component	Percent
7732-18-5	Water	80
7647-14-5	Sodium Chloride	20

Because brine water is a natural product, composition can vary greatly.

* * * Section 4 – FIRST AID MEASURES * * *

First Aid: Eyes
Flush eyes with clean running water for at least fifteen (15) minutes. If irritation or redness develops from exposure, following flushing, seek medical attention.

First Aid: Skin
First aid is not required, normally. However, it is a good practice to wash any chemical from the skin.

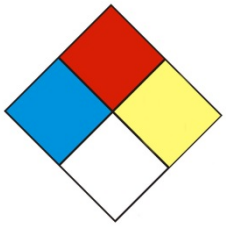
First Aid: Ingestion (Swallowing)
First aid is not required, normally. If spontaneous vomiting occurs, lean the victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. If symptoms develop, seek medical attention.

First Aid: Inhalation (Breathing)
Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

Most important symptoms and effects

None known or anticipated.

* * * Section 5 – FIRE FIGHTING MEASURES * * *



NFPA 704 Hazard Class

Health: 1 Flammability: 0 Instability: 0 (0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe)

General Fire Hazards

No fire hazards are expected.

General Fire Hazards

No unusual fire or explosion hazards are expected. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media

The material is non-flammable. Use extinguishing agent suitable for the type of surrounding fire.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment / Instructions

Small fires in the beginning stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Isolate area around container involved in fire and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from the immediate hazard area if it can be done safely. Cool equipment exposed to fire with water, if it can be done safely.

Hazardous Combustion Products

None Anticipated. See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

* * * Section 6 – ACCIDENTAL RELEASE MEASURES * * *

Recovery and Neutralization

Contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios of this material. However, local conditions and regulations may influence or limit the choice of appropriate actions to be taken. See Section 13 for information on appropriate disposal.

Emergency Measures

The material is not considered hazardous. Nevertheless, evacuate nonessential personnel and secure the area. Stay upwind and uphill, if possible.

Personal Precautions and Protective Equipment

Stay upwind and away from the spill/release. Avoid direct contact with the material. For large spillages, notify persons downstream of the spill/release. Isolate the immediate hazard area and keep unauthorized personnel out. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking or absorbents, if possible. Do not flush down sewer or drainage systems. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If a spill occurs on water, notify appropriate authorities and advise shipping of any hazard.

Prevention of Secondary Hazards

None

* * * Section 7 – HANDLING AND STORAGE * * *

Handling Procedures

Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29 CFR 1910.146. Do not wear contaminated clothing or shoes.

Storage Procedures

Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well ventilated areas. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

Incompatibilities

Keep away from excessive heat to prevent rupture of container.

* * * Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

Water (7732-18-5)

ACGIH: Not listed

Sodium Chloride (7647-14-5)

ACGIH: Not listed

Engineering Measures

If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Personal Protective Equipment: Respiratory

Emergencies or conditions that could result in significant airborne exposures may require the use of NIOSH approved respiratory protection. An industrial hygienist or other appropriate health and safety professional should be consulted for specific guidance under these situations.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR

1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use.

Personal Protective Equipment: Skin and Hands

The use of skin protection is not normally required; however, good industrial hygiene practice suggests the use of gloves or other appropriate skin protection whenever working with chemicals.

Personal Protective Equipment: Eyes

Safety glasses or goggles that meet or exceed ANSI Z-87.1 are recommended where there is a possibility of splashing or spraying.

Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove contaminated clothing and launder before reuse.

* * * Section 9 – PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance:	Clear to Brown	**Odor:**	Salty
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	< 0.36 psia @ 70°F / 21.1°C	**Vapor Density:**	> 1
Boiling Point:	212°F / 100°C	**Melting Point:**	2.4°F / -16.5°C
Solubility (H2O):	Complete	**Specific Gravity:**	1.1 @ 68°F / 20°C
Evaporation Rate:	Variable	**VOC:**	ND
Octanol / H2O Coeff.:	ND	**Flash Point:**	ND
Flash Point Method:	ND		
Lower Flammability Limit: (LFL):	ND	**Upper Flammability Limit: (UFL):**	ND
Auto Ignition:	ND	**Burning Rate:**	ND

* * * Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will react with alkali and alkaline metals to form flammable hydrogen gas.

Conditions to Avoid

Avoid contact with alkali metals (lithium, sodium, potassium), alkaline metals (beryllium, magnesium, calcium, strontium, and barium), and metallic hydrides like lithium aluminum hydride.

Hazardous Decomposition Products

Not anticipated under normal conditions of use.

Hazardous Polymerization

Not known to occur.

* * * Section 11 – TOXICOLOGICAL INFORMATION * * *

Acute Toxicity

A: General Product Information

Unlikely to be harmful.

B. Component Analysis – D50/LC50

Water (7732-18-5)

Oral LD50 Rat 90 g/kg

Sodium Chloride (7647-14-5)

Oral LD50 Rat 3 g/kg

Potential Health Effects: Skin Corrosion Property / Stimulativeness

May cause skin irritation with prolonged or repeated contact. Not expected to be a skin sensitizer.

Potential Health Effects: Eye Critical Damage / Stimulativeness

Contact with eyes may cause moderate irritation.

Potential Health Effects: Ingestion

Ingestion may result in nausea, vomiting, diarrhea, abdominal cramps, and dehydration (thirst).

Potential Health Effects: Inhalation

No information available on the mixture. However, none of the components have been classified for respiratory sensitization (or are below the concentration threshold for classification).

Generative Cell Mutagenicity

Not expected to cause genetic effects.

Carcinogenicity

General Product Information

Not expected to cause cancer. This substance is not listed as a carcinogen by IARC, NTP or OSHA.

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity multiple exposure effects.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 – ECOLOGICAL INFORMATION * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

Persistence / Degradability

No information available

Bioaccumulation

No information available

Mobility in Soil

No information available

* * * Section 13 – DISPOSAL CONSIDERATIONS * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

Disposal of Contaminated Containers or Packaging

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.

This material, if discarded as produced, is not a RCRA "listed" hazardous waste, and is not believed to exhibit characteristics of hazardous waste. Consult state and local regulations regarding the proper disposal of this material. Do not dispose of brine water by draining onto the ground. This will result in soil and groundwater contamination. Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate should not be considered a RCRA hazardous waste but must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

* * * Section 14 – TRANSPORTATION INFORMATION * * *

DOT Information

Shipping Description: Not Regulated

UN #: Not Regulated

* * * Section 15 – REGULATORY INFORMATION * * *

CERCLA/SARA – Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372,

CERCLA/SARA – Section 313 and 40 CFR 372):
This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds):
This material does not contain any chemicals with CERCLA Reportable Quantities.

State Regulations

Component Analysis

The following components appear on one or more of the following state hazardous substances list.

California Proposition 65:
This material does not contain any chemicals that are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

National Chemical Inventories:
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.

U.S. Export control classification Number: EAR99.

* * * Section 16 – OTHER INFORMATION * * *

NFPA® Hazard Rating

Health	1
Fire	0
Reactivity	0

HMIS® Hazard Rating

Health	1	Slight
Fire	0	Minimal
Physical	0	Minimal

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act: ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Date of Preparation: January 28, 2014

Date of Last Revision: March 4, 2014

End of Sheet

SAFETY DATA SHEET

Material Name: Natural Gas Condensate **US GHS**

SYNONYMS: **Drips; Condensate; Field Condensate; Gas Well Condensate; High Pressure Inlet Liquids; Lease Condensate; Natural Gas Liquids; Pipeline Liquids**

* * * Section 1 – PRODUCT AND COMPANY IDENTIFICATION * * *

PRODUCT NAME: **Natural Gas Condensate**
PRODUCT CODES: **64741-47-5**

EMERGENCY PHONE: **(800) 878-1373**
AFTER HOURS: **(800) 878-1373**

PRODUCER: **Antero Resources**
ADDRESS: **1615 Wynkoop Street**
Denver, Colorado 80202

CHEMTREC PHONE: **(800) 424-9300**

* * * Section 2 – HAZARDS IDENTIFICATION * * *

GHS Classification:

Flammable Liquids – Category 2.
Acute Toxicity Inhalation – Category 3
Germ Cell Mutagenicity – Category 1B
Carcinogenicity – Category 1A
Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 3
Specific Target Organ Systemic Toxicity (STOT) – Repeat Exposure Category 1
Aspiration Toxicity – Category 1
Toxic to the Aquatic Environment Acute – Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor.
Toxic if inhaled.
May cause genetic defects.
May cause cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May cause damage to organs (liver, kidneys, blood, nervous system, and skin) through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Do not breathe gas/mist/vapors/spray.
Do not handle until all safety precautions have been read and understood.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Avoid release to the environment.

Response

If on SKIN (or hair): Wash with plenty of soap and water. Remove / Take off all contaminated clothing immediately. Rinse skin with water/shower.
If INHALED: Remove victim to fresh air and keep comfortable for breathing. Call a poison center/doctor if the victim feels unwell.
If SWALLOWED: Immediately call a poison center or doctor / physician. Do not Induce vomiting.
If exposed or concerned: Get medical advice/attention.
In case of fire: Use water spray, fog or fire-fighting foam.

Storage

Store in a well-ventilated place. Keep cool.
Store in a secure area.

Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

* * * Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS #	Component	Percent
111-65-9	Octanes	25 - 95
142-82-5	Heptanes	25 - 95
110-54-3	Hexanes as n-Hexane	25 - 95
109-66-0	Pentanes as n-Pentane	5 - 70
106-97-8	N-butane	0 - 45
74-98-6	Propane	0 - 15
78-84-0	Ethane	0 - 5
71-43-2	Benzene	< 1
108-88-3	Toluene	< 1
1330-20-7	m-,o-,p-Xylene	< 1

Because natural gas condensate is a natural product, composition can vary greatly.

* * * Section 4 – FIRST AID MEASURES * * *

First Aid: Eyes

Flush eyes with clean running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Wash contaminated clothing before reuse.

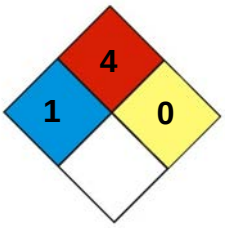
First Aid: Ingestion (swallowing)

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean the victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation (breathing)

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 – FIRE FIGHTING MEASURES * * *



NFPA 704 Hazard Class

Health: 1 **Flammability:** 4 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

General Fire Hazards

See Section 9 for Flammability Properties.
Extremely flammable. Vapors may be ignited rapidly when exposed to heat, spark, open flame, or other source of ignition (e.g., static electricity, pilot lights, mechanical / electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Flammable vapors can burn in the open or explode in confined spaces. Vapors are heavier than air, and may travel distances to an ignition source and flash back. Runoff to sewer systems may cause fire or explosion.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, firefighting foam, water spray, carbon dioxide (CO_2), or other gaseous extinguishing agents. Use caution when applying CO2 in confined spaces.

LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment / Instructions

Small fires in the beginning stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full face piece and full protective clothing.

* * * Section 6 – ACCIDENTAL RELEASE MEASURES * * *

Recovery and Neutralization

Contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

Emergency Measures

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8). Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of

ignition and hot metal surfaces away from spill/release if safe to do so.

The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons downwind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of firefighting foam may be useful in certain situations to reduce vapors. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Prevention of Secondary Hazards

None

* * * Section 7 – HANDLING AND STORAGE * * *

Handling Procedures

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use non-sparking tools. Use only outdoors or in well ventilated areas. Wear protective gloves / clothing and eye / face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Storage Procedures

Store only in approved containers. Bond and ground containers. Keep away from flame, sparks, excessive temperatures and open flames. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

* * * Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

Octanes (111-65-9)

ACGIH: 300 ppm TWA (listed under Octane, all isomers)

Heptanes (142-82-5)

ACGIH: 400 ppm TWA (listed under n-Heptane)

n-Hexane (110-54-3)

ACGIH: 20 ppm TWA (listed under n-Hexane)

n-Pentane (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

n-Butane (106-97-8)

ACGIH: 600 ppm TWA (listed under n-Butane)

Propane (74-98-6)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases C1-C4)

Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases C1-C4)

Benzene (71-43-2)

ACGIH: 0.5 ppm (TWA); NIOSH: 0.1 ppm (TWA); OSHA 1 ppm (TWA)

Toluene (108-88-3)

ACGIH: 20 ppm TWA (listed under Toluene)

m-, o-, p-Xylene (1330-20-7)

ACGIH: 100 ppm TWA (listed under Xylene o, m & p isomers)

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

Personal Protective Equipment: Respiratory

Use a NIOSH-approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere (oxygen content less than 19.5 percent). A respiratory program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant the use of a respirator.

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29 CFR 1910.1028 – Benzene).

CAUTION: Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile or neoprene are recommended.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Eye protection that meets or exceeds ANSI Z.87.1 is recommended. Depending on conditions of use, a face shield may be necessary.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use gasoline or solvents (naphtha, kerosene, etc.) for washing this product from

exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

* * * Section 9 – PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance:	Colorless to straw yellow	**Odor:**	Aromatic, Gasoline;
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	110 – 200 psia (Reid VP) @ 100°F/37.8°C	**Vapor Density (air = 1):**	> 1
Boiling Point:	Approx. 85 - 437°F (39 – 200°C)	**Melting Point:**	ND
Solubility (H2O):	Insoluble to slightly soluble	**Specific Gravity:**	AP 0.62-0.76 (varies)
Evaporation Rate:	High	**VOC:**	ND
Octanol / H2O Coeff.:	ND	**Flash Point:**	-40°F -40°C
Flash Point Method:	Tag Closed Cup (TCC)		
Lower Flammability Limit: (LFL):	ND (NFPA Gasoline 1.4)	**Upper Flammability Limit: (UFL):**	ND (NFPA Gasoline 7.6)
Auto Ignition:	AP 480°F (250°C)	**Burning Rate:**	ND

* * * Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Keep away from ignition sources and high temperatures.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 – TOXICOLOGICAL INFORMATION * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B. Component Analysis – LD50/LC50

Octanes (111-65-9)
Inhalation LC50 rat = 118,000 mg/m3 / 4H

Heptanes (142-82-5)
Inhalation LC50 rat = 103,000 mg/m3 / 4H

Hexanes as n-Hexane (110-53-3)
Inhalation LC50 rat = 48,000 ppm / 4H

Pentanes as n-Pentane (109-66-0)
Inhalation LC50 rat = 364,000 mg/m3 / 4H

Butanes as n-Butane (106-97-8)
Inhalation LC50 rat 658,000 mg/l / 4H

Propane (74-98-6)
Inhalation LC50 Rat > 800,000 ppm / 0.25H

Ethane (74-84-0)
Inhalation LC50 Rat 658,000 mg/l / 4H

Benzene (71-43-2)
Inhalation LC50 Rat 44,700 mg/m3 /

Toluene (108-88-3)
Inhalation LD50 Rat 12/5 mg/l / 4H

m-, o-, p-Xylene (1330-20-7)
Inhalation LC50 Rat 5000 ppm / 4H

Potential Health Effects: Skin Corrosion Property / Stimulativeness

May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Potential Health Effects: Eye Critical Damage / Stimulativeness

Contact with eyes may cause moderate irritation.

Potential Health Effects: Ingestion (swallowing)

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation (breathing)

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

Respiratory Organs Sensitization / Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

May cause genetic defects. Some crude oils and crude oil fractions have been positive in mutagenicity studies.

Carcinogenicity

A: General Product Information

May cause cancer.

This product contains benzene, although at very low concentrations. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Exposure to light hydrocarbons in the same boiling range as this product have been associated in animal studies with effects to the central nervous system, peripheral nervous system, liver, and kidneys. The significance of these animal models to predict similar human response is uncertain. Observing good work practices and personal hygiene procedures (Sections 7 and 8) can minimize potential risks to humans.

B: Component Carcinogenicity

Benzene (71-43-2)

ACGIH:	A1 - Confirmed Human Carcinogen
OSHA:	5 ppm STEL (Cancer hazard, Flammable, See 29 CFR 1910.1028, 15 min); 0.5 ppm Action Level; 1 ppm TWA
NIOSH:	potential occupational carcinogen
NTP:	Known Human Carcinogen (Select Carcinogen)

IARC: Monograph 100F [in preparation]; Supplement 7 [1987]; Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 – ECOLOGICAL INFORMATION * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

B: Component Analysis – Ecotoxicity – Aquatic Toxicity

Benzene (71-43-2)

Test and Species	Conditions
96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]
96 Hr LC50 Pimephales promelas	22330-41160 µg/L [static]
96 Hr LC50 Lepomis macrochirus	70000-142000 µg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L
48 Hr EC50 Daphnia magna	8.76 - 15.6 mg/L [static]
48 Hr EC50 Daphnia magna	10 mg/L

Natural Gas condensates (68919-39-1)

Test and Species	Conditions
96 Hr LC50 Alburnus alburnus	119 mg/L [static]
96 Hr LC50 Cyprinodon variegatus	82 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	56 mg/L
24 Hr EC50 Daphnia magna	170 mg/L

Persistence / Degradability

No information available

Bioaccumulation

No information available

Mobility in Soil

No information available

* * * Section 13 – DISPOSAL CONSIDERATIONS * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

Disposal of Contaminated Containers or Packaging

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.
This material, if discarded should be fully characterized for ignitability (D001), reactivity (D003) and benzene (D018) prior to disposal (40 CFR261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material. Do not dispose of by draining onto the ground. This will result in soil and groundwater contamination. Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

* * * Section 14 – TRANSPORTATION INFORMATION * * *

DOT Information

Shipping Name: Petroleum Products, n.o.s. (condensate)

UN #: 1268 **Hazard Class:** 3

Additional Info.: Dependent on the product's properties, the shipper may also elect to classify as Gasoline UN1203 or Petroleum Crude Oil UN1267 - reference 49 CFR 172.101 for further description (e.g., packing group determination).

Placard:

* * * Section 15 – REGULATORY INFORMATION * * *

Regulatory Information

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Benzene (71-43-2)

SARA 313: 0.1% de minimis concentration

CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

SARA SECTION 313 – SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION PERCENT BY WEIGHT
Benzene (71-43-2)	<0.1 to 2

Canadian Regulatory Information

DSL/NDSL Inventory	This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.
Workplace Hazardous Materials Information System	B2 - Flammable Liquid D1A – Material Causing Immediate and Serious Toxic Effects - Very Toxic Material D2A: Material Causing Other Toxic Effects Very Toxic D2B - Material Causing Other Toxic Effects - Toxic Material

European Union Regulatory Information

Labeling	Product is dangerous as defined by the European Union Dangerous Substances / Preparations Directives. Contains: Low Boiling Point Naphtha
Symbol	**F+** Extremely Flammable **T** Toxic **N** Dangerous for the Environment
Risk Phrases	R12-45-38-65-67-51/53 Extremely flammable. May cause cancer. Irritating to skin. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Phrases	S16-53-45-2-23-24-29-43-62 Keep away from sources of ignition – No smoking. Avoid exposure – obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/dry powder/CO2. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

State Regulations

Component Analysis – State

The following components appear on one or more of the following state hazardous substances lists

Component	CAS	CA	MA	MN	NJ	PA	RI
Octanes	111-65-9	Yes	No	Yes	Yes	Yes	Yes
Heptanes	142-82-5	Yes	No	Yes	Yes	Yes	Yes
n-Hexane	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
n-Pentane	109-66-0	Yes	No	Yes	Yes	Yes	Yes
n-Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	Yes
m-, o-, p-Xylene	1330-20-7	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

WARNING! This product contains a chemical known to the state of California to cause Reproductive / developmental effects.

Component Analysis – WHMIS IDL

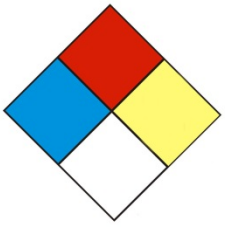
The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Benzene	71-43-2	0.1%

* * * Section 16 – OTHER INFORMATION * * *

NFPA® Hazard Rating

Health	1
Fire	4
Reactivity	0



HMIS® Hazard Rating

Health	1	Slight
Fire	4	Severe
Physical	0	Minimal
		* Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act: ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Date of Preparation: January 29, 2014

Date of Last Revision: March 4, 2014

End of Sheet

SAFETY DATA SHEET

Material Name: Wet Field Natural Gas

SYNONYMS: **CNG, Natural Gas, Methane.**

* * * Section 1 – PRODUCT AND COMPANY IDENTIFICATION * * *

PRODUCT NAME: **Wet Field Natural Gas**
PRODUCT CODES: **CAS Reg. No. 68410-63-9**

EMERGENCY PHONE: **(800) 878-1373**
AFTER HOURS: **(800) 878-1373**

PRODUCER: **Antero Resources**
ADDRESS: **1615 Wynkoop Street**
Denver, Colorado 80202

CHEMTREC PHONE: **(800) 424-9300**

* * * Section 2 – HAZARDS IDENTIFICATION * * *

GHS Classification:

Flammable Gas – Category 1.
Gases Under Pressure – Gas.
Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 2.

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

Danger

Hazard Statements

Extremely flammable gas.
Contains gas under pressure, may explode if heated.
May cause damage to central nervous and respiratory systems.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Do not breathe fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.

Response

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
If exposed to gas, or concerned about possible exposure: Call a POISON CENTER or doctor/physician.

Storage

Protect from sunlight. Store in a well-ventilated place.
Store in a secure area.

Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

* * * Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS #	Component	Percent
74-82-8	Methane	72 - 97
78-84-0	Ethane	2.2 - 14
74-98-6	Propane	0.0 – 8.0
106-97-8	Butanes	0.0 – 3.5
109-66-0	Pentanes	0.0 – 1.4
110-54-3	Hexanes	0.0 – 0.5
7727-37-9	Nitrogen	< 0.4
124-38-9	Carbon Dioxide	< 0.2
7782-44-7	Oxygen	< 0.04

Because natural gas is a natural product, composition can vary greatly.

* * * Section 4 – FIRST AID MEASURES * * *

First Aid: Eyes

In case of freeze burn, cover eyes to protect from light. Flush eyes with running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

First Aid: Skin

Remove contaminated clothing. In case of blistering, frostbite or freeze burns, seek immediate medical attention.

Material Name: Wet Field Natural Gas

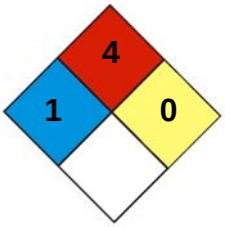
First Aid: Ingestion

Risk of ingestion is extremely low. However, if oral exposure occurs, seek immediate medical assistance.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 – FIRE FIGHTING MEASURES * * *



NFPA 704 Hazard Class

Health: **1** Flammability: **4** Instability: **0** (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

General Fire Hazards

See Section 9 for Flammability Properties.
Forms a flammable mixture with air. If released, the resulting vapors will disperse with the prevailing wind. If a source of ignition is present where the vapor exists at a 5 – 15% concentration in air, the vapor will burn along the flame front toward the source of the fuel.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

Any extinguisher suitable for Class B fires, dry chemical, firefighting foam, CO2, and other gaseous agents. However, fire should not be extinguished unless flow of gas can be immediately stopped.

Unsuitable Extinguishing Media

None.

Fire Fighting Equipment / Instructions

Gas fires should not be extinguished unless flow of gas can be immediately stopped. Shut off gas source and allow gas to burn out. If spill or leak has not ignited, determine

if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and piping exposed to fire and excessive heat. For large fire, the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around piping. Let the fire burn unless leak can be stopped. Concentrate fire-fighting efforts on objects / materials ignited by the initial fire. Withdraw immediately in the event of a rising sound from a venting safety device.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH-approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

* * * Section 6 – ACCIDENTAL RELEASE MEASURES * * *

Recovery and Neutralization

Stop the source of the release, if safe to do so.

Materials and Methods for Clean-Up

Consider the use of water spray to disperse gas vapors. Do not use water spray to direct gas vapors toward sewer or drainage systems. Isolate the area until gas has dispersed. Ventilate and gas test area before entering.

Emergency Measures

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

Personal Precautions and Protective Equipment

Cooling effect of expanding gas from leak may present frostbite / freeze burn hazard. Wear flame retardant (FR) clothing around un-ignited leak. Wear fire protective clothing around an active fire.

Environmental Precautions

Do not flush gas vapors toward sewer or drainage systems.

Prevention of Secondary Hazards

None.

* * * Section 7 – HANDLING AND STORAGE * * *

Handling Procedures

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use only in well ventilated areas.

Storage Procedures

Natural gas will be contained in the pipeline. Keep away from flame, sparks, excessive temperatures and open flames. Empty pipeline segments may contain explosive residues from natural gas liquids. Do not cut, heat, weld or expose containers to sources of ignition sections of pipeline unless the sections have been purged of natural gas residues.

Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

* * * Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

Methane (74-82-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Propane (74-98-6)

ACGIH: 2500 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Butane (106-97-8)

ACGIH: 800 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Pentanes (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

Hexanes (110-54-3)

ACGIH: 50 ppm TWA (listed under n-Hexane)

Material Name: Wet Field Natural Gas

Nitrogen (7727-37-9)

Simple Asphyxiant

Carbon Dioxide (124-38-9)

ACGIH: 5000 ppm TWA (listed under Carbon Dioxide)

Oxygen (7782-44-7)

N/A – Necessary for life

Engineering Measures

Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

Personal Protective Equipment: Respiratory

Use a NIOSH approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere. CAUTION: Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

Personal Protective Equipment: Hands

Use cold-impervious, insulating flame-retardant (FR) gloves where contact with pressurized gas may occur.

Personal Protective Equipment: Eyes

Where there is a possibility of pressurized gas contact, wear splash-proof safety goggles and faceshield.

Personal Protective Equipment: Skin and Body

Where contact with pressurized gas may occur, wear flame-retardant (FR) and a faceshield.

* * * Section 9 – PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance:	Colorless	**Odor:**	Odorless to slight petroleum odor
Physical State:	Gas	**pH:**	ND
Vapor Pressure:	40 atm @ -187°F (-86°C)	**Vapor Density:**	0.6
Boiling Point:	-259°F (-162°C)	**Melting Point:**	ND
Solubility (H2O):	3.5%	**Specific Gravity:**	0.4 @ -263°F (-164°C)

Material Name: Wet Field Natural Gas

Evaporation Rate:	ND	**VOC:**	ND
Octanol / H2O Coeff.:	ND	**Flash Point:**	Flammable Gas
Flash Point Method:	N/A		
Lower Flammability Limit: (LFL):	3.8 – 6.5	**Upper Flammability Limit: (UFL):**	13-17
Auto Ignition:	900-1170°F (482-632°C)	**Burning Rate:**	ND

* * * Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Keep away from strong oxidizers, ignition sources and heat.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 – TOXICOLOGICAL INFORMATION * * *

Acute Toxicity

A: General Product Information

Methane and ethane, the main components of natural gas, are considered practically inert in terms of physiological effects. At high concentrations these materials act as simple asphyxiants and may cause death due to lack of oxygen.

B. Component Analysis – LD50/LC50

Methane (74-82-8)

Inhalation LC50 Mouse 326 g/m3 2h

Ethane (74-84-0)

Inhalation LC50 Rat 658 mg/l 4h

Propane (74-98-6)

Inhalation LC50 Rat 658 mg/l 4h

Material Name: Wet Field Natural Gas

Butanes (106-97-8)
Inhalation LC50 Rat 658 g/m3 4h

Pentanes (109-66-0)
Inhalation LD50 Rat 364 g/m3 4h

Hexanes (110-54-3)
Inhalation LC50 Rat > 20 mg/l 4h

Nitrogen (7727-37-9)
Simple Asphyxiant

Carbon Dioxide (124-38-9)
Inhalation LC50 Human 100,000 ppm 1minute

Oxygen (7782-44-7)
N/A – Necessary for life

Potential Health Effects: Skin Corrosion Property / Stimulativeness
This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity
This product is not reported to have any mutagenic effects.

Carcinogenicity

A: General Product Information
This product is not reported to have any carcinogenic effects.

B: Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Reproductive Toxicity
This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure
This product may cause damage to the heart.

Specified Target Organ General Toxicity: Repeated Exposure
This product is not reported to have any specific target organ repeat effects.

Aspiration Respiratory Organs Hazard
This product is not reported to have any aspiration hazard effects.

* * * Section 12 – ECOLOGICAL INFORMATION * * *

Ecotoxicity

A: General Product Information

Keep gas and vapors out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

B: Component Analysis – Ecotoxicity – Aquatic Toxicity

No ecotoxicity data are available for this product's components.

Persistance / Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 – DISPOSAL CONSIDERATIONS * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents / container in accordance with local / regional / national / international regulations.

* * * Section 14 – TRANSPORTATION INFORMATION * * *

DOT Information

Shipping Name: Natural Gas, Compressed

UN #: 1971 **Hazard Class:** 2.1

Placard:

* * * Section 15 – REGULATORY INFORMATION * * *

Regulatory Information

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A.
n-hexane is listed under SARA Section 313 (40 CFR 372.65). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

n-hexane is listed under CERCLA (40 CFR 302.4). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
---	---	X	X	---

SARA Section 313 – Supplier Notification

This product contains one chemical (n-Hexane) that is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-know act (EPCRA) of 1986 and of 40 CFR 372. However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

State Regulations

Component Analysis – State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Methane	74-82-8	No	No	Yes	Yes	Yes	No
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Pentanes	109-66-0	Yes	No	Yes	Yes	Yes	Yes
Hexanes	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
Nitrogen	7727-37-9	No	No	No	No	No	No
Carbon Dioxide	124-38-9	Yes	No	Yes	Yes	Yes	Yes
Oxygen	7782-44-7	No	No	No	No	No	No

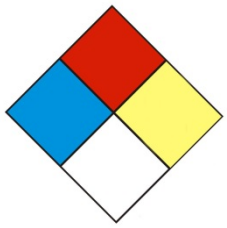
SAFETY DATA SHEET

Material Name: Wet Field Natural Gas

*** * * Section 16 – OTHER INFORMATION * * ***

NFPA® Hazard Rating

Health	1
Fire	4
Reactivity	0



HMIS® Hazard Rating

Health	1	Moderate
Fire	4	Severe
Physical	0	Minimal
		* Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act: ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Date of Preparation: February 7, 2014

Date of Last Revision: March 4,, 2014

End of Sheet

SAFETY DATA SHEET

Material Name: Dry Field Natural Gas **US GHS**

SYNONYMS: **CNG, Natural Gas, Methane.**

* * * Section 1 – PRODUCT AND COMPANY IDENTIFICATION * * *

PRODUCT NAME: **Dry Field Natural Gas**
PRODUCT CODES: **CAS Reg. No. 68410-63-9**

EMERGENCY PHONE: **(800) 878-1373**
AFTER HOURS: **(800) 878-1373**

PRODUCER: **Antero Resources**
ADDRESS: **1615 Wynkoop Street**
Denver, Colorado 80202

CHEMTREC PHONE: **(800) 424-9300**

* * * Section 2 – HAZARDS IDENTIFICATION * * *

GHS Classification:

Flammable Gas – Category 1.
Gases Under Pressure – Gas.
Specific Target Organ Systemic Toxicity (STOT) – Single Exposure Category 2.

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

Danger

Hazard Statements

Extremely flammable gas.
Contains gas under pressure, may explode if heated.
May cause damage to central nervous and respiratory systems.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Do not breathe fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.

Response

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
If exposed to gas, or concerned about possible exposure: Call a POISON CENTER or doctor/physician.

Storage

Protect from sunlight. Store in a well-ventilated place.
Store in a secure area.

Disposal

Dispose of contents/containers in accordance with local/regional/national/international regulations.

* * * Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS #	Component	Percent
74-82-8	Methane	95.01
78-84-0	Ethane	3.99
74-98-6	Propane	0.32
106-97-8	Butanes	0.07
109-66-0	Pentanes	0.02
110-54-3	Hexanes	0.01
7727-37-9	Nitrogen	0.35
124-38-9	Carbon Dioxide	0.19
7782-44-7	Oxygen	0.03

Because natural gas is a natural product, composition can vary greatly.

* * * Section 4 – FIRST AID MEASURES * * *

First Aid: Eyes

In case of freeze burn, cover eyes to protect from light. Flush eyes with running water for at least fifteen (15) minutes. Following flushing, seek medical attention.

First Aid: Skin

Remove contaminated clothing. In case of blistering, frostbite or freeze burns, seek immediate medical attention.

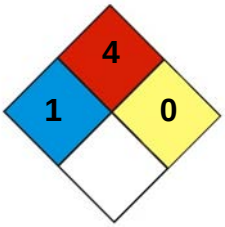
First Aid: Ingestion

Risk of ingestion is extremely low. However, if oral exposure occurs, seek immediate medical assistance.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 – FIRE FIGHTING MEASURES * * *



NFPA 704 Hazard Class

Health: **1** Flammability: **4** Instability: **0** (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

General Fire Hazards

See Section 9 for Flammability Properties.
Forms a flammable mixture with air. If released, the resulting vapors will disperse with the prevailing wind. If a source of ignition is present where the vapor exists at a 5 – 15% concentration in air, the vapor will burn along the flame front toward the source of the fuel.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

Any extinguisher suitable for Class B fires, dry chemical, fire fighting foam, CO2, and other gaseous agents. However, fire should not be extinguished unless flow of gas can be immediately stopped.

Unsuitable Extinguishing Media

None.

Fire Fighting Equipment / Instructions

Gas fires should not be extinguished unless flow of gas can be immediately stopped. Shut off gas source and allow gas to burn out. If spill or leak has not ignited, determine

if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and piping exposed to fire and excessive heat. For large fire, the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around piping. Let the fire burn unless leak can be stopped. Concentrate fire-fighting efforts on objects / materials ignited by the initial fire. Withdraw immediately in the event of a rising sound from a venting safety device.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH-approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

* * * Section 6 – ACCIDENTAL RELEASE MEASURES * * *

Recovery and Neutralization

Stop the source of the release, if safe to do so.

Materials and Methods for Clean-Up

Consider the use of water spray to disperse gas vapors. Do not use water spray to direct gas vapors toward sewer or drainage systems. Isolate the area until gas has dispersed. Ventilate and gas test area before entering.

Emergency Measures

Evacuate nonessential personnel and secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction. Stay upwind and uphill, if possible. Vapor cloud may be white, but color will dissipate as cloud disperses. Fire and explosion hazard is still present.

Personal Precautions and Protective Equipment

Cooling effect of expanding gas from leak may present frostbite / freeze burn hazard. Wear flame retardant (FR) clothing around un-ignited leak. Wear fire protective clothing around an active fire.

Environmental Precautions

Do not flush gas vapors toward sewer or drainage systems.

Prevention of Secondary Hazards

None.

* * * Section 7 – HANDLING AND STORAGE * * *

Handling Procedures

Keep away from flame, sparks and excessive temperatures. Bond and ground containers. Use only in well ventilated areas.

Storage Procedures

Natural gas will be contained in the pipeline. Keep away from flame, sparks, excessive temperatures and open flames. Empty pipeline segments may contain explosive residues from natural gas liquids. Do not cut, heat, weld or expose containers to sources of ignition sections of pipeline unless the sections have been purged of natural gas residues.

Incompatibilities

Keep away from strong oxidizers, ignition sources and heat.

* * * Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

Methane (74-82-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Ethane (74-84-0)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Propane (74-98-6)

ACGIH: 2500 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Butane (106-97-8)

ACGIH: 800 ppm TWA (listed under Aliphatic hydrocarbon gases : Alkane C1-4)

Pentanes (109-66-0)

ACGIH: 600 ppm TWA (listed under Pentane, all isomers)

Hexanes (110-54-3)

ACGIH: 50 ppm TWA (listed under n-Hexane)

Nitrogen (7727-37-9)

Simple Asphyxiant

Carbon Dioxide (124-38-9)

ACGIH: 5000 ppm TWA (listed under Carbon Dioxide)

Oxygen (7782-44-7)

N/A – Necessary for life

Engineering Measures

Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

Personal Protective Equipment: Respiratory

Use a NIOSH approved positive-pressure, supplied air respirator with escape bottle or self-contained breathing apparatus (SCBA) for gas concentrations above occupational exposure limits, for potential for uncontrolled release, if exposure levels are not known, or in an oxygen-deficient atmosphere. CAUTION: Flammability limits (i.e., explosion hazard should be considered when assessing the need to expose personnel to concentrations requiring respiratory protection.

Personal Protective Equipment: Hands

Use cold-impervious, insulating flame-retardant (FR) gloves where contact with pressurized gas may occur.

Personal Protective Equipment: Eyes

Where there is a possibility of pressurized gas contact, wear splash-proof safety goggles and faceshield.

Personal Protective Equipment: Skin and Body

Where contact with pressurized gas may occur, wear flame-retardant (FR) and a faceshield.

* * * Section 9 – PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance:	Colorless	**Odor:**	Odorless to slight petroleum odor
Physical State:	Gas	**pH:**	ND
Vapor Pressure:	40 atm @ -187°F (-86°C)	**Vapor Density:**	0.6
Boiling Point:	-259°F (-162°C)	**Melting Point:**	ND
Solubility (H2O):	3.5%	**Specific Gravity:**	0.4 @ -263°F (-164°C)

Evaporation Rate:	ND	**VOC:**	ND
Octanol / H2O Coeff.:	ND	**Flash Point:**	Flammable Gas
Flash Point Method:	N/A		
Lower Flammability Limit: (LFL):	3.8 – 6.5	**Upper Flammability Limit: (UFL):**	13-17
Auto Ignition:	900-1170°F (482-632°C)	**Burning Rate:**	ND

* * * Section 10 – CHEMICAL STABILITY & REACTIVITY INFORMATION * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Keep away from strong oxidizers, ignition sources and heat.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 – TOXICOLOGICAL INFORMATION * * *

Acute Toxicity

A: General Product Information

Methane and ethane, the main components of natural gas, are considered practically inert in terms of physiological effects. At high concentrations these materials act as simple asphyxiants and may cause death due to lack of oxygen.

B. Component Analysis – LD50/LC50

Methane (74-82-8)

Inhalation LC50 Mouse 326 g/m3 2h

Ethane (74-84-0)

Inhalation LC50 Rat 658 mg/l 4h

Propane (74-98-6)

Inhalation LC50 Rat 658 mg/l 4h

Butanes (106-97-8)
Inhalation LC50 Rat 658 g/m3 4h

Pentanes (109-66-0)
Inhalation LD50 Rat 364 g/m3 4h

Hexanes (110-54-3)
Inhalation LC50 Rat > 20 mg/l 4h

Nitrogen (7727-37-9)
Simple Asphyxiant

Carbon Dioxide (124-38-9)
Inhalation LC50 Human 100,000 ppm 1minute

Oxygen (7782-44-7)
N/A – Necessary for life

Potential Health Effects: Skin Corrosion Property / Stimulativeness
This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity
This product is not reported to have any mutagenic effects.

Carcinogenicity

A: General Product Information
This product is not reported to have any carcinogenic effects.

B: Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Reproductive Toxicity
This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure
This product may cause damage to the heart.

Specified Target Organ General Toxicity: Repeated Exposure
This product is not reported to have any specific target organ repeat effects.

Aspiration Respiratory Organs Hazard
This product is not reported to have any aspiration hazard effects.

* * * Section 12 – ECOLOGICAL INFORMATION * * *

Ecotoxicity

A: General Product Information

Keep gas and vapors out of sewers, drainage areas, and waterways. Report spills and releases, as applicable under Federal and State regulations.

B: Component Analysis – Ecotoxicity – Aquatic Toxicity

No ecotoxicity data are available for this product's components.

Persistance / Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 – DISPOSAL CONSIDERATIONS * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment Recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents / container in accordance with local / regional / national / international regulations.

* * * Section 14 – TRANSPORTATION INFORMATION * * *

DOT Information

Shipping Name: Natural Gas, Compressed

UN #: 1971 **Hazard Class:** 2.1

Placard:

* * * Section 15 – REGULATORY INFORMATION * * *

Regulatory Information

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A.
n-hexane is listed under SARA Section 313 (40 CFR 372.65). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

n-hexane is listed under CERCLA (40 CFR 302.4). However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
---	---	X	X	---

SARA Section 313 – Supplier Notification

This product contains one chemical (n-Hexane) that is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-know act (EPCRA) of 1986 and of 40 CFR 372. However the concentration of this component is approximately 0.01 % in compressed natural gas and is therefore far under the reporting threshold for the chemical.

State Regulations

Component Analysis – State

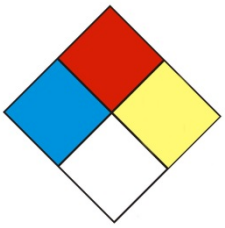
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Methane	74-82-8	No	No	Yes	Yes	Yes	No
Ethane	78-84-0	No	No	Yes	Yes	Yes	No
Propane	74-98-6	No	No	Yes	Yes	Yes	Yes
Butane	106-97-8	Yes	No	Yes	Yes	Yes	Yes
Pentanes	109-66-0	Yes	No	Yes	Yes	Yes	Yes
Hexanes	110-54-3	Yes	Yes	Yes	Yes	Yes	Yes
Nitrogen	7727-37-9	No	No	No	No	No	No
Carbon Dioxide	124-38-9	Yes	No	Yes	Yes	Yes	Yes
Oxygen	7782-44-7	No	No	No	No	No	No

* * * Section 16 – OTHER INFORMATION * * *

NFPA® Hazard Rating

Health	1
Fire	4
Reactivity	0



HMIS® Hazard Rating

Health	1	Moderate
Fire	4	Severe
Physical	0	Minimal
		* Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act: ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

The information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Date of Preparation: January 30, 2014

Date of Last Revision: March 4, 2014

End of Sheet

Attachment I.
Emission Units Table

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
C-2100	1E	Compressor Engine #1	2016	1,680 hp	N/A	NSCR (1C)
C-2110	2E	Compressor Engine #2	2016	1,680 hp	N/A	NSCR (2C)
C-2120	3E	Compressor Engine #3	2016	1,680 hp	N/A	NSCR (3C)
C-2130	4E	Compressor Engine #4	2016	1,680 hp	N/A	NSCR (4C)
C-2140	5E	Compressor Engine #5	2016	1,680 hp	N/A	NSCR (5C)
C-2150	6E	Compressor Engine #6	2016	1,680 hp	N/A	NSCR (6C)
C-2160	7E	Compressor Engine #7	2016	1,680 hp	N/A	NSCR (7C)
C-2170	8E	Compressor Engine #8	2016	1,680 hp	N/A	NSCR (8C)
C-2180	9E	Compressor Engine #9	2016	1,680 hp	N/A	NSCR (9C)
C-2190	10E	Compressor Engine #10	2016	1,680 hp	N/A	NSCR(10C)
C-2200	11E	Compressor Engine #11	2016	1,680 hp	N/A	NSCR(11C)
G-8000	12E	Microturbine Generator #1	2016	200 kWe	N/A	None
G-8100	13E	Microtrubine Generator #2	2016	200 kWe	N/A	None
V-3110	14E	Dehydrator Still Vent #1	2016	110 MMscfd	Modified	FL-1000 (12C)
V-3120	15E	Dehydrator Flash Tank #1	2016	110 MMscfd	Modified	98% control
F-3100	16E	Dehydrator Reboiler #1	2016	1.5 mmbtu/hr	N/A	None
V-3210	17E	Dehydrator Still Vent #2	2016	110 MMscfd	Modified	FL-1000 (12C)
V-3220	18E	Dehydrator Flash Tank #2	2016	110 MMscfd	Modified	98% contol
F-3200	19E	Dehydrator Reboiler #2	2016	1.5 mmbtu/hr	N/A	None
TK-9000	20E	Settling Tank 1	2016	500 barrel	Modified	VRU-6000 & VRU-6100 (13C & 14C)
TK-9200	21E	Condensate Tank 1	2016	400 barrel	Modified	VRU-6000 & VRU-6100 (13C & 14C)
TK-9210	22E	Condensate Tank 2	2016	400 barrel	Modified	VRU-6000 & VRU-6100 (13C & 14C)
TK-9100	23E	Produced Water Tank 1	2016	400 barrel	Modified	VRU-6000 & VRU-6100 (13C & 14C)

TK-9110	24E	Produced Water Tank 2	2016	400 barrel	Modified	VRU-6000 & VRU-6100 (13C & 14C)
CATHT1	27E	Catalytic Heater for Generator Fuel	2016	0.024 MMBtu/hr	N/A	None
-----	-----	NSCR Catalyst for Compressor #1	2016	-----	N/A	1C
-----	-----	NSCR Catalyst for Compressor #2	2016	-----	N/A	2C
-----	-----	NSCR Catalyst for Compressor #3	2016	-----	N/A	3C
-----	-----	NSCR Catalyst for Compressor #4	2016	-----	N/A	4C
-----	-----	NSCR Catalyst for Compressor #5	2016	-----	N/A	5C
----	----	NSCR Catalyst for Compressor #6	2016	----	N/A	6C
----	----	NSCR Catalyst for Compressor #7	2016	----	N/A	7C
----	----	NSCR Catalyst for Compressor #8	2016	----	N/A	8C
----	----	NSCR Catalyst for Compressor #9	2016	----	N/A	9C
----	----	NSCR Catalyst for Compressor #10	2016	----	N/A	10C
----	----	NSCR Catalyst for Compressor #11	2016	----	N/A	11C
FL-1000	26E	Flare Combustion Device 1	2016	4.8 MMBtu/hr	N/A	12C
----	-----	Vapor Recovery Unit 1	2016	40 Mscfd	N/A	13C
----	----	Vapor Recovery Unit 2	2016	40 Mscfd	N/A	14C
C-2210	28E	Compressor Engine #12	2016	1,680 hp	N/A	NSCR (15C)
C-2220	29E	Compressor Engine #13	2016	1,680 hp	N/A	NSCR (16C)
----	----	NSCR Catalyst for Compressor #12	2016	----	N/A	15C
----	----	NSCR Catalyst for Compressor #13	2016	----	N/A	16C
LDOUT1	30E	Hydrocarbon Truck loading	2016	195 bbl/day	N/A	None
FUEL1	31E	Fuel Conditioning Heater	2017	0.5 MMBtu/hr	New	None
VENT1	32E	Venting Episodes	2016	Variable	Modified	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment J.
Emission Point Data Summary Sheet

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1E	Upward Vertical Stack	C-2100	Com-pressor engine 1	1C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
2E	Upward Vertical Stack	C-2110	Com-pressor engine 2	2C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
3E	Upward Vertical Stack	C-2120	Com-pressor engine 3	3C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	

4E	Upward Vertical Stack	C-2130	Com-pressor engine 4	4C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
5E	Upward Vertical Stack	C-2140	Com-pressor engine 5	5C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
6E	Upward Vertical Stack	C-2150	Com-pressor engine 6	6C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
7E	Upward Vertical Stack	C-2160	Com-pressor engine 7	7C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	

8E	Upward Vertical Stack	C-2170	Com-pressor engine 8	8C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
9E	Upward Vertical Stack	C-2180	Com-pressor engine 9	9C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
10E	Upward Vertical Stack	C-2190	Com-pressor engine 10	10C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
11E	Upward Vertical Stack	C-2200	Com-pressor engine 11	11C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	

12E	Upward Vertical Stack	G8000	Microturbine Generator	----	----	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.080 0.22 0.020 0.014 0.007 0.002 0.001 266	0.35 0.96 0.088 0.060 0.031 0.009 0.006 1166	0.080 0.22 0.020 0.014 0.007 0.002 0.001 266	0.35 0.96 0.088 0.060 0.031 0.009 0.006 1166	Gas/Vapor	EE	
13E	Upward Vertical Stack	G8100	Microturbine Generator	----	----	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.080 0.22 0.020 0.014 0.007 0.002 0.001 266	0.35 0.96 0.088 0.060 0.031 0.009 0.006 1166	0.080 0.22 0.020 0.014 0.007 0.002 0.001 266	0.35 0.96 0.088 0.060 0.031 0.009 0.006 1166	Gas/Vapor	EE	
14E	Upward Vertical Stack	V-3110	Dehydrator Still Vent 1	12C	Flare-98% Control	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	16.88 5.04 1.18 2.67 0.17 0.59 0.44 462.5	73.93 22.10 5.16 11.70 0.74 2.59 1.91 2026	0.34 0.10 0.024 0.053 0.003 0.012 0.009 9.51	1.48 0.44 0.10 0.23 0.015 0.052 0.038 41.66	Gas/Vapor	EE	
15E	Used for fuel in 16E	V-3120	Dehydrator Flash Gas 1	Used for Fuel in 16E	98% Combustion	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	48.87 1.31 0.094 0.12 0.004 0.009 1.08 2876	214.06 5.73 0.41 0.53 0.017 0.038 4.73 12595	0.98 0.026 0.002 0.002 0.0001 0.0002 0.022 59.74	4.28 0.11 0.0083 0.011 0.0003 0.0008 0.095 261.7	Gas/Vapor	EE	

16E	Upward Vertical Stack	F-3100	Dehydrator Reboiler 1	---	----	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.15 0.12 0.008 0.011 0.001 0.003 0.0001 176.1	0.64 0.54 0.035 0.049 0.0039 0.012 0.0005 771.2	0.15 0.12 0.008 0.011 0.001 0.003 0.0001 176.1	0.64 0.54 0.035 0.049 0.0039 0.012 0.0005 771.2	Gas/Vapor	EE	
17E	Upward Vertical Stack	V-3210	Dehydrator Still Vent 2	12C	Flare-98% Control	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	16.88 5.04 1.18 2.67 0.17 0.59 0.44 462.5	73.93 22.10 5.16 11.70 0.74 2.59 1.91 2026	0.34 0.10 0.024 0.053 0.003 0.012 0.009 9.51	1.48 0.44 0.10 0.23 0.015 0.052 0.038 41.66	Gas/Vapor	EE	
18E	Used for fuel in 19E	V-3220	Dehydrator Flash Gas 2	Used for Fuel in 19E	98% Combustion	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	48.87 1.31 0.094 0.12 0.004 0.009 1.08 2876	214.06 5.73 0.41 0.53 0.017 0.038 4.73 12595	0.98 0.026 0.002 0.002 0.0001 0.0002 0.022 59.74	4.28 0.11 0.0083 0.011 0.0003 0.0008 0.095 261.7	Gas/Vapor	EE	
19E	Upward Vertical Stack	F-3200	Dehydrator Reboiler 2	---	----	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.15 0.12 0.008 0.011 0.001 0.003 0.0001 176.1	0.64 0.54 0.035 0.049 0.0039 0.012 0.0005 771.2	0.15 0.12 0.008 0.011 0.001 0.003 0.0001 176.1	0.64 0.54 0.035 0.049 0.0039 0.012 0.0005 771.2	Gas/Vapor	EE	

20E	Upward Vertical Stack	TK-9000	Settler Tank	13C	VRU-98% capture	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	157.6 4.75 0.076 0.18 0.065 0.17 4.26 567	690.43 20.80 0.33 0.79 0.29 0.73 18.66 2483	3.15 0.095 1.5e-3 3.6e-3 1.3e-3 3.3e-3 8.5e-2 11.56	13.81 0.42 6.7e-3 1.6e-2 5.7e-3 1.5e-2 3.7e-1 51	Gas/Vapor	EE	
21E	Upward Vertical Stack	TK-9200	Condensate Tank 1	13C	VRU-98% capture	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	1.61 0.050 5.3e-4 1.4e-3 5.4e-4 1.3e-3 4.6e-2 0.53	7.05 0.22 0.002 0.006 0.002 0.006 0.20 2.32	0.032 0.001 1.1e-5 2.7e-5 1.1e-5 2.5e-5 9.3e-4 0.012	0.14 4.4e-3 4.7e-5 1.2e-4 4.7e-5 1.1e-4 4.1e-3 0.052	Gas/Vapor	EE	
22E	Upward Vertical Stack	TK-9210	Condensate Tank 2	13C	VRU-98% capture	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	1.61 0.050 5.3e-4 1.4e-3 5.4e-4 1.3e-3 4.6e-2 0.53	7.05 0.22 0.002 0.006 0.002 0.006 0.20 2.32	0.032 0.001 1.1e-5 2.7e-5 1.1e-5 2.5e-5 9.3e-4 0.012	0.14 4.4e-3 4.7e-5 1.2e-4 4.7e-5 1.1e-4 4.1e-3 0.052	Gas/Vapor	EE	
23E	Upward Vertical Stack	TK-9100	Produced Water Tank 1	13C	VRU-98% capture	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	6.7e-5 2.5e-7 1.5e-7 7.5e-8 8.7e-9 1.3e-8 6.4e-9 2.6e-3	2.9e-4 1.1e-6 6.5e-7 3.3e-7 3.8e-8 5.8e-8 2.8e-8 0.011	1.3e-6 5.0e-9 3.0e-9 1.5e-9 1.7e-10 2.7e-10 1.3e-10 8.6e-5	5.9e-6 2.2e-8 1.3e-8 6.6e-9 7.6e-10 1.2e-9 5.6e-10 3.8e-4	Gas/Vapor	EE	

24E	Upward Vertical Stack	TK-9110	Produced Water Tank 2	13C	VRU-98% capture	C	8,760	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	6.7e-5 2.5e-7 1.5e-7 7.5e-8 8.7e-9 1.3e-8 6.4e-9 2.6e-3	2.9e-4 1.1e-6 6.5e-7 3.3e-7 3.8e-8 5.8e-8 2.8e-8 0.011	1.3e-6 5.0e-9 3.0e-9 1.5e-9 1.7e-10 2.7e-10 1.3e-10 8.6e-5	5.9e-6 2.2e-8 1.3e-8 6.6e-9 7.6e-10 1.2e-9 5.6e-10 3.8e-4	Gas/Vapor	EE	
26E	Upward Vertical Stack	FL-1000	Flare combustion device 1	---	---	C	8,760	NOx CO VOC PM10 Total HAPs CO2e	--- --- --- --- --- ---	--- --- --- --- --- ---	0.33 1.78 1.1e-4 1.5e-4 3.7E-5 565	1.44 7.79 4.7e-4 6.5e-4 1.6e-4 2476	Gas/Vapor	EE	
27E	Upward Vertical Stack	CATHT 1	Catalytic Heater for Generator Fuel	---	---	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	0.0024 0.0020 1.3 E-4 1.8 E-4 1.4 E-5 4.4 E-5 1.8 E-6 2.82	0.010 0.0087 5.7 E-4 7.8E-4 6.2 E-5 1.9 E-4 7.7 E-6 12	0.0024 0.0020 1.3 E-4 1.8 E-4 1.4 E-5 4.4 E-5 1.8 E-6 2.82	0.010 0.0087 5.7 E-4 7.8E-4 6.2 E-5 1.9 E-4 7.7 E-6 12	Gas/Vapor	EE	
28E	Upward Vertical Stack	C-2210	Compressor engine 12	15C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	

29E	Upward Vertical Stack	C-2220	Com-pressor engine 13	16C	NSCR catalyst	C	8,760	NOx CO VOC PM10 SO2 Total HAPs Formaldehyde CO2e	50.37 47.41 1.52 0.27 0.008 0.35 0.19 2083	220.62 207.64 6.65 1.18 0.036 1.54 0.81 9125	1.26 1.19 0.24 0.27 0.008 0.18 0.019 1992	5.52 5.19 1.06 1.18 0.036 0.81 0.081 8725	Gas/Vapor	EE	
31E	Upward Vertical Stack	FUEL1	Fuel Conditi oning Heater	---	---	C	8,760	NOx CO VOC PM10 SO2 Total HAPs CO2e	0.049 0.041 0.0027 0.0037 2.9E-4 9.2E-4 58.7	0.21 0.18 0.012 0.016 0.0013 0.0040 257.1	0.049 0.041 0.0027 0.0037 2.9E-4 9.2E-4 58.7	0.21 0.18 0.012 0.016 0.0013 0.0040 257.1	Gas/Vapor	EE	
32E	Relief Vent	VENT1	Venting Episode s	---	---	Intermi ttent	Varia ble	VOC Total HAPs Benzene Toluene Ethylbenzene Xylenes n-Hexane CO2e	--- --- --- --- --- --- --- ---	22.50 0.46 0.014 0.025 0.0014 0.0035 0.42 2107	--- --- --- --- --- --- --- ---	22.50 0.46 0.014 0.025 0.0014 0.0035 0.42 2107	Gas/Vapor	EE	

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

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

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

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

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No.	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2]	Northing	Easting
1E/1C	1.1	1224	8876	156	1,025	TBD	4352.993	513.570
2E/2C	1.1	1224	8876	156	1,025	TBD	4352.984	513.568
3E/3C	1.1	1224	8876	156	1,025	TBD	4352.975	513.567
4E/4C	1.1	1224	8876	156	1,025	TBD	4352.967	513.566
5E/5C	1.1	1224	8876	156	1,025	TBD	4352.958	513.565
6E/6C	1.1	1224	8876	156	1,025	TBD	4352.949	513.563
7E/7C	1.1	1224	8876	156	1,025	TBD	4352.940	513.562
8E/8C	1.1	1224	8876	156	1,025	TBD	4352.931	513.561
9E/9C	1.1	1224	8876	156	1,025	TBD	4352.922	513.559
10E/10C	1.1	1224	8876	156	1,025	TBD	4352.913	513.558
11E/11C	1.1	1224	8876	156	1,025	TBD	4352.904	513.557
12E	TBD	535	1.3 kg/s mass flow	TBD	1,025	TBD	4352.929	513.529
13E	TBD	535	1.3 kg/s mass flow	TBD	1,025	TBD	4352.937	513.529
14E/12C/26E	5	1400	7069	6	1,025	15	4352.992	513.526
15E	Combusted in 16E		N/A	N/A	1,025	N/A	4352.951	513.532
16E	0.75	350	530	20	1,025	~18	4352.963	513.534
17E/12C/26E	5	1400	7069	6	1,025	15	4352.992	513.526
18E	Combusted in 19E		N/A	N/A	1,025	N/A	4352.975	513.537
19E	0.75	350	530	20	1,025	~18	4352.987	513.539
20E-24E/13C-14C	Emissions captured in closed loop system with VRU				1,025	N/A	4353.011	513.559
27E	0.5	200	70.7	6	1,025	5	4352.933	513.529
28E/15C	1.1	1224	8876	156	1,025	TBD	4352.895	513.555

29E/16C	1.1	1224	8876	156	1,025	TBD	4352.886	513.554
31E	3	1000	2545	6	1,025	20	4353.002	513.526
32E	Venting emissions occur at various locations across the facility							

[1] Give at operating conditions. Include inerts. [2] Release height of emissions above ground level.

Attachment K.
Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No ☒ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No ☒ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☒ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads	PM-10 PM-2.5	0.075 0.0075	0.33 0.033	0.075 0.0075	0.33 0.033	EE
Storage Pile Emissions						
Loading/Unloading Operations	VOCs Total HAPs CO2e	72.85 2.19 265	7.66 0.23 28	72.85 2.19 265	7.66 0.23 28	EE
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	VOCs Total HAPs CO2e	2.18 0.051 45.14	9.54 0.22 198	2.18 0.051 45.14	9.54 0.22 198	EE
General Clean-up VOC Emissions						
Other						

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

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

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

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

Attachment L.
Emission Unit Data Sheets

Dehydrators

West Virginia Department of Environmental Protection

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

DIVISION OF AIR QUALITY : (304) 926-0475
WEB PAGE: http:\\www.wvdep.org

Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.

Section A: Facility Description		
Affected facility actual annual average natural gas throughput (scf/day):	220,000,000	
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	195	
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	(Yes)	No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	(Yes)	No
The affected facility is: ☒ prior to a NG processing plant ☐ a NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant		
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	(Yes)	No
The affected facility exclusively processes, stores, or transfers black oil.	Yes	(No)
Initial producing gas-to-oil ratio (GOR): _____scf/bbl API gravity: _____degrees		

Section B: Dehydration Unit (if applicable) [1]			
Description: Tamela Compressor Station Dehydrators (V-3110 & V-3210)			
Date of Installation: Upon Permit Issuance	Annual Operating Hours: 8,760	Burner rating (MMbtu/hr): 1.5	
Exhaust Stack Height (ft): 18	Stack Diameter (ft): 0.75	Stack Temp. (°F): 350	
Glycol Type: ☒ TEG ☐ EG ☐ Other:			
Glycol Pump Type: ☐ Electric ☒ Gas If gas, what is the volume ratio? __0.032__ACFM/gpm			
Condenser installed? ☒ Yes ☐ No Exit Temp. 200_ °F Condenser Pressure _0__psig			
Incinerator/flare installed? ☒ Yes ☐ No Destruction Eff. __98___%			
Other controls installed? ☐ Yes ☒ No Describe:			
Wet Gas[2]: (Upstream of Contact Tower) Gas Temp.: _120_°F Gas Pressure _1,100 psig Saturated Gas? ☒ Yes ☐ No If no, water content _____ lb/MMSCF			
Dry Gas: (Downstream of Contact Tower) Gas Flowrate(MMSCFD) Actual _____ Design ___110 each ____ Water Content ___5.0____ lb/MMSCF			
Lean Glycol: Circulation rate (gpm) Actual[3] __TBD_____ Maximum[4] ___15____ Pump make/model: Kimray 45015PV			
Glycol Flash Tank (if applicable): Temp.: __80__°F Pressure __5___ psig Vented? Yes ☐ No ☒ If no, describe vapor control: Vent gas used in reboiler as fuel and as a backup would go to the VRU system via the storage tanks			
Stripping Gas (if applicable): Source of gas: Dry gas, if used Rate _9__ scfm			

Please attach the following required dehydration unit information:

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream including mole percents of C_1-C_8, benzene, ethylbenzene, toluene, xylene and n-Hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Affected facility status: (choose only one)

- ☒ Subject to Subpart HH - applies, but is exempt through < 1 tpy benzene exemption
- ☐ Subject to Subpart HHH
- ☒ Not Subject because:
  - ☒ < 10/25 TPY
  - ☐ Affected facility exclusively handles black oil
  - ☐ The facility wide actual annual average NG throughput is < 650 thousand scf/day and facility wide actual annual average hydrocarbon liquid is < 250 bpd
  - ☐ No affected source is present

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		110 MMscfd	
		Max Dry Gas Flow Rate (MMscf/day)		110	
		Design Heat Input (MMBtu/hr)		1.5	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		MS	
		Date Installed/Modified/Removed[3]		Upon Permit Issuance	
		Regenerator Still Vent APCD[4]		FL	
		Fuel HV (Btu/scf)		1213	
		H_2S Content (gr/100 scf)		0	
		Operation (hrs/yr)		8,760	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
16E	Reboiler Vent	AP	NO_X	0.15	0.64
		AP	CO	0.12	0.54
		AP	VOC	0.0081	0.035
		AP	SO_2	0.00088	0.0039
		AP	PM_{10}	0.011	0.049
14E	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	0.34	1.48
		GRI-GLYCalc™	Benzene	0.024	0.10
		GRI-GLYCalc™	Ethylbenzene	0.0034	0.015
		GRI-GLYCalc™	Toluene	0.053	0.23
		GRI-GLYCalc™	Xylenes	0.012	0.052
		GRI-GLYCalc™	n-Hexane	0.0087	0.038
15E	Flash Gas Tank Vent	GRI-GLYCalc™	VOC	0.98	4.28
		GRI-GLYCalc™	Benzene	0.0019	0.0083
		GRI-GLYCalc™	Ethylbenzene	0.00010	0.0003
		GRI-GLYCalc™	Toluene	0.0024	0.011
		GRI-GLYCalc™	Xylenes	0.00020	0.00080
		GRI-GLYCalc™	n-Hexane	0.022	0.095

General Glycol Dehydration Unit Data		Manufacturer and Model		110 MMscfd	
		Max Dry Gas Flow Rate (mmscf/day)		110	
		Design Heat Input (mmBtu/hr)		1.5	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		MS	
		Date Installed/Modified/Removed[3]		Upon Permit Issuance	
		Regenerator Still Vent APCD[4]		FL	
		Fuel HV (Btu/scf)		1213	
		H_2S Content (gr/100 scf)		0	
		Operation (hrs/yr)		8,760	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
19E	Reboiler Vent	AP	NO_X	0.15	0.64
		AP	CO	0.12	0.54
		AP	VOC	0.0081	0.035
		AP	SO_2	0.00088	0.0039
		AP	PM_{10}	0.011	0.049
17E	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	0.34	1.48
		GRI-GLYCalc™	Benzene	0.024	0.10
		GRI-GLYCalc™	Ethylbenzene	0.0034	0.015
		GRI-GLYCalc™	Toluene	0.053	0.23
		GRI-GLYCalc™	Xylenes	0.012	0.052
		GRI-GLYCalc™	n-Hexane	0.0087	0.038
18E	Flash Gas Tank Vent	GRI-GLYCalc™	VOC	0.98	4.28
		GRI-GLYCalc™	Benzene	0.0019	0.0083
		GRI-GLYCalc™	Ethylbenzene	0.00010	0.0003
		GRI-GLYCalc™	Toluene	0.0024	0.011
		GRI-GLYCalc™	Xylenes	0.00020	0.00080
		GRI-GLYCalc™	n-Hexane	0.022	0.095

1. Enter the appropriate Source Identification Numbers for the glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent. The glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a *Glycol Dehydration Unit Data Sheet* shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

2. Enter the Source Status using the following codes:

NS	Construction of New Source	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

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

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes:

NA	None	CD	Condenser
FL	Flare	CC	Condenser/Combustion Combination
TO	Thermal Oxidizer		

5. Enter the Potential Emissions Data Reference designation using the following codes:

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

6. Enter the Reboiler Vent and glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc *Aggregate Calculations Report* to this *Glycol Dehydration Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.

***An explanation of input parameters and examples, when using GRI-GLYCalc™ is available on our website.**

Fuel Conditioning Heater

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 31E

1. Name or type and model of proposed affected source:

   Fuel Conditioning Heater - 500,000 Btu/hr

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   Natural Gas as fuel - 490 scf/hr

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Heater is used to increase temperature of fuel before use by the compressor engines to allow more complete combustion.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   Combustion process

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas as fuel - 490 scf/hr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Same as onsite gas analysis - see Attachment N

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

500,000 Btu/hr. Natural gas.

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia

a.	NO_X	0.049	lb/hr	grains/ACF
b.	SO_2	0.00029	lb/hr	grains/ACF
c.	CO	0.041	lb/hr	grains/ACF
d.	PM_{10}	0.0037	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	0.0027	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	Total HAP (including HCHO)	0.00092	lb/hr	grains/ACF
	CO2e	58.7	lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
see Attachment O	see Attachment O
REPORTING	TESTING
see Attachment O	see Attachment O

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Storage Tanks

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Settling Tank
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-9000	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 20E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 500 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 25
10A. Maximum Liquid Height (ft) 24	10B. Average Liquid Height (ft) 12.5
11A. Maximum Vapor Space Height (ft) 1	11B. Average Vapor Space Height (ft) 12.5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 480 barrel	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
2,989,350	8,190

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 148

15. Maximum tank fill rate (gal/min): TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☒ Fixed Roof — X vertical ___ horizontal ___ flat roof ___ cone roof X dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

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

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) 12

24B. For cone roof, provide slope (ft/ft)

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

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

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit and vapors recycled back into system

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
VOC	0.0018	0.022	lb/hr	27,617	O-ProMax 4.0
Emissions are controlled values				*Annual Loss includes flash emissions	

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

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Produced Water Tank 1
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-9100	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 23E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	10B. Average Liquid Height (ft) 12.5
11A. Maximum Vapor Space Height (ft) 1	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. 380 barrel	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
344,925	945

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 22

15. Maximum tank fill rate (gal/min): TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof X dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

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

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) 12

24B. For cone roof, provide slope (ft/ft)

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

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

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit and vapors recycled back into system

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
VOC	6.7E-7	6.7E-7	lb/hr	0.012	O - ProMax 4.0
Emissions are controlled values					

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

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Produced Water Tank 2
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-9110	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 24E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	10B. Average Liquid Height (ft) 12.5
11A. Maximum Vapor Space Height (ft) 1	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. 380 barrel	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
344,925	945

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 22

15. Maximum tank fill rate (gal/min): TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof X dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

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

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) 12

24B. For cone roof, provide slope (ft/ft)

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

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

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit and vapors recycled back into system

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
VOC	6.7E-7	6.7E-7	lb/hr	0.012	O - ProMax 4.0
Emissions are controlled values					

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

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Condensate Tank 1
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-9200	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 21E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	10B. Average Liquid Height (ft) 12.5
11A. Maximum Vapor Space Height (ft) 1	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. 380 barrel	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
1,149,750	3,150

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 72

15. Maximum tank fill rate (gal/min): TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof X dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

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

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) 12

24B. For cone roof, provide slope (ft/ft)

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

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

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit and vapors recycled back into system

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
VOC	0.018	0.015	lb/hr	282.1	O - ProMax 4.0
Emissions are controlled value					

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

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Production Storage Tanks	2. Tank Name Condensate Tank 2
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-9210	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 22E
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable)	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 barrel	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 19	10B. Average Liquid Height (ft) 12.5
11A. Maximum Vapor Space Height (ft) 1	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. 380 barrel	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
1,149,750	3,150

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume): 72

15. Maximum tank fill rate (gal/min): TBD

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

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof X dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

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

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) 12

24B. For cone roof, provide slope (ft/ft)

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

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

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

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): Vapor Recovery Unit and vapors recycled back into system

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
VOC	0.018	0.015	lb/hr	282.1	O - ProMax 4.0
Emissions are controlled value					

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

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Venting Episodes

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 32E (VENT1)

1. Name or type and model of proposed affected source:

   Fugitive emissions from venting episodes such as plant shutdowns and compressor start ups/shut downs.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   - compressor blowdown - 0.010 tons VOC per event, 0.94 tons CO2e per event
   - compressor startup - 0.005 tons VOC per event, 0.44 tons CO2e per event
   - plant shutdown - 0.447 tons VOC per event, 41.81 tons CO2e per event
   - low pressure pigging venting - 0.002 tons VOC per event, 0.22 tons CO2e per event
   - high pressure pigging venting - 0.013 tons VOC per event, 1.17 tons CO2e per event

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   none

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	not a regular schedule	Days/Week	not a regular schedule	Weeks/Year	not a regular schedule

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ venting events are uncontrolled °F and psia

a.	NO_X		lb/hr	grains/ACF
b.	SO_2		lb/hr	grains/ACF
c.	CO		lb/hr	grains/ACF
d.	PM_{10}		lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	variable depending on vent type	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
see Attachment O	see Attachment O
REPORTING	TESTING
see Attachment O	see Attachment O

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

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

Bulk Loading and Fugitives

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): LDOUT1	
1. Loading Area Name: Produced Fluids Loadout	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): □ Drums □ Marine Vessels □ Rail Tank Cars X Tank Trucks	
3. Loading Rack or Transfer Point Data:	
Number of pumps	None – use truck pumps
Number of liquids loaded	Two – Condensate & Produced Water
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	Four as each tank has a connection, but not likely that there will be four at one time. TK-9000 does not have a loading connection.
4. Does ballasting of marine vessels occur at this loading area? □ Yes □ No X Does not apply	
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: N/A	
6. Are cargo vessels pressure tested for leaks at this or any other location? □ Yes X No If YES, describe:	

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	10	10	10	10
days/week	5	5	5	5
weeks/quarter	all	all	all	all

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.		N/A	N/A				
Liquid Name		Conden-sate	Produced Water				
Max. daily throughput (1000 gal/day)		6.30	1.89				
Max. annual throughput (1000 gal/yr)		2,299.5	689.85				
Loading Method [1]		SUB	SUB				
Max. Fill Rate (gal/min)		240	240				
Average Fill Time (min/loading)		45	45				
Max. Bulk Liquid Temperature (°F)		60	60				
True Vapor Pressure [2]		12.0	0.32				
Cargo Vessel Condition [3]		U	U				
Control Equipment or Method [4]		None	None				
Minimum control efficiency (%)		0	0				
Maximum Emission Rate	Loading (lb/hr)	72.76	0.092				
	Annual (lb/yr)	15231	5.8				
Estimation Method [5]		EPA	EPA				
[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill							
[2] At maximum bulk liquid temperature							

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)
[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):CA = Carbon Adsorption LOA = Lean Oil AdsorptionCO = Condensation SC = Scrubber (Absorption)CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) O = other (descibe)
[5] EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)

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

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING **see Attachment O**	RECORDKEEPING **see Attachment O**
REPORTING **see Attachment O**	TESTING **see Attachment O**

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.
REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.
TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.
10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

☐ *Emergency Vent Summary Sheet*
☒ *Leak Sources Data Sheet*
☐ *Toxicology Data Sheet*
☐ *Reactor Data Sheet*
☐ *Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
   Piping for Entire Facility. Piping not contained in equipment form.

2. Standard Industrial Classification Codes (SICs) for process(es)
   4923

3. List raw materials and ☐ attach MSDSs
   Wet Natural Gas

4. List Products and Maximum Production and ☐ attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)
Dry Natural Gas	9.17 MMscf/hour	80,300 MMscf/year
Condensate	6.25 barrels/hour	54,750 barrels/year
Produced Water	1.875 barrels/hour	16,425 barrels/year

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

   Leak Detection and Repair (LDAR) Plan per 40 CFR Part 60 Subart OOOOa is implemented.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.
   Spill Prevention, Control and Countermeasure (SPCC) plan has been developed and approved

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:

Carrier: Phone:

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used ☐

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum	24	7	52
10B. Typical	24	7	52

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

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

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
see Attachment O	**see Attachment O**
REPORTING	TESTING
see Attachment O	**see Attachment O**

MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

RECORDKEEPING. Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.

TESTING. Please describe any proposed emissions testing for this process equipment or air pollution control device.

14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

INFORMATION REQUIRED FOR CHEMICAL PROCESSES

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provided enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

Process Description

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe <u>each</u> <u>process</u> <u>step</u>. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
   a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
   b. continuous emissions (in-stack) monitoring plan
   c. ambient monitoring plan
   d. emergency response plan

Regulatory Discussion

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
  a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
  b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
  c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60 60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

Emissions Summary and Calculations

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all <u>batch</u> processes provide the following
   a. Emissions of each pollutant in pound(s) per batch, from each process step
   b. Annual emissions based on number of batches requested per year
   c. The total time for each process step and the duration of the emissions during the process step
   d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]				
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	750	TBD	1st attempt – 5 days	10,969 – EE
	Light Liquid VOC	160	TBD	1st attempt – 5 days	5,336 – EE
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC				
	Non VOC				
Open-ended Lines[12]	VOC				
	Non-VOC				
Sampling Connections[13]	VOC				
	Non-VOC				
Compressors	VOC	39	TBD	1st attempt – 5 days	1,115 – EE
	Non-VOC				
Flanges	Gas VOC	850	TBD	1st attempt – 5 days	1,077 – EE
	Light Liquid VOC	400	TBD	1st attempt – 5 days	587 – EE
	Non-VOC				
Other	VOC				
	Non-VOC				

[1 - 13] See notes on the following page.

Attachment M.
Air Pollution Control Device Sheets

Note: No permit application forms for control devices are included in this modification application as none of the control devices are being modified from the current permit.

Attachment N.
Supporting Emissions Calculations

Emission Calculations

Emissions Summary Total

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**

UNCONTROLLED POTENTIAL EMISSION SUMMARY

Source	NOx		CO		VOC		SO_2		PM-10		HAPs		Formaldehyde		CO_2e
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy
Engines															
Compressor Engine 1	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 2	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 3	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 4	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 5	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 6	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 7	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 8	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 9	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 10	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 11	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 12	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Compressor Engine 13	50.37	220.62	47.41	207.64	1.52	6.65	0.0082	0.036	0.27	1.18	0.35	1.54	0.19	0.81	9,125
Fuel Conditioning Heater	0.049	0.21	0.041	0.18	0.0027	0.012	0.00029	0.0013	0.0037	0.016	0.00092	0.0040	0.000037	0.00016	257
Turbines															
Microturbine Generator 1	0.08	0.35	0.22	0.96	0.020	0.088	0.0070	0.031	0.014	0.060	0.0021	0.0093	0.0015	0.0064	1,166
Microturbine Generator 2	0.08	0.35	0.22	0.96	0.020	0.088	0.0070	0.031	0.014	0.060	0.0021	0.0093	0.0015	0.0064	1,166
Catalytic Heater for Generator Fuel	0.0024	0.010	0.0020	0.0087	0.00013	0.00057	0.000014	0.000062	0.00018	0.00078	0.000044	0.00019	0.0000018	0.0000077	12
Dehydrator															
TEG Dehydrator 1	---	---	---	---	65.75	287.99	---	---	---	---	6.35	27.83	---	---	14,621
TEG Dehydrator 2	---	---	---	---	65.75	287.99	---	---	---	---	6.35	27.83	---	---	14,621
Reboiler 1	0.15	0.64	0.12	0.54	0.0081	0.035	0.00088	0.0039	0.011	0.049	0.0028	0.012	0.00011	0.00048	771
Reboiler 2	0.15	0.64	0.12	0.54	0.0081	0.035	0.00088	0.0039	0.011	0.049	0.0028	0.012	0.00011	0.00048	771
Combustors															
Flare and Pilot	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Hydrocarbon Loading															
Truck Loadout	---	---	---	---	72.85	7.66	---	---	---	---	2.19	0.23	---	---	28
Venting Emissions															
Venting Emissions	---	---	---	---	---	22.50	---	---	---	---	---	0.46	---	---	2,107
Fugitive Emissions															
Component Leak Emissions	---	---	---	---	2.18	9.54	---	---	---	---	0.051	0.22	---	---	198
Haul Road Dust Emissions	---	---	---	---	---	---	---	---	0.075	0.33	---	---	---	---	---
Storage Tanks															
Produced Water Tanks	---	---	---	---	1.34E-04	5.86E-04	---	---	---	---	5.04E-07	2.21E-06	---	---	0.023
Settler Tank	---	---	---	---	157.63	690.43	---	---	---	---	4.75	20.80	---	---	2,483
Condensate Tanks	---	---	---	---	3.22	14.11	---	---	---	---	0.10	0.44	---	---	4.6
Total Facility PTE =	**655.32**	**2,870.30**	**617.03**	**2,702.58**	**387.18**	**1,406.95**	**0.12**	**0.54**	**3.64**	**15.95**	**24.36**	**97.87**	**2.41**	**10.56**	**156,834**

Emissions Summary Total

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**

CONTROLLED POTENTIAL EMISSION SUMMARY

Source	NOx		CO		VOC		SO_2		PM-10		HAPs		Formaldehyde		CO_2e
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy
Engines															
Compressor Engine 1	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 2	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 3	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 4	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 5	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 6	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 7	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 8	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 9	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 10	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 11	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 12	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Compressor Engine 13	1.26	5.52	1.19	5.19	0.24	1.06	0.0082	0.036	0.27	1.18	0.18	0.81	0.019	0.081	8,725
Fuel Conditioning Heater	0.049	0.21	0.041	0.18	0.0027	0.012	0.00029	0.0013	0.0037	0.016	0.00092	0.0040	0.000037	0.00016	257
Turbines															
Microturbine Generator 1	0.08	0.35	0.22	0.96	0.020	0.088	0.0070	0.031	0.014	0.060	0.0021	0.0093	0.0015	0.0064	1,166
Microturbine Generator 2	0.08	0.35	0.22	0.96	0.020	0.088	0.0070	0.031	0.014	0.060	0.0021	0.0093	0.0015	0.0064	1,166
Catalytic Heater for Generator Fuel	0.0024	0.010	0.0020	0.0087	0.00013	0.00057	0.000014	0.000062	0.00018	0.00078	0.000044	0.00019	0.0000018	0.0000077	12
Dehydrator															
TEG Dehydrator 1	---	---	---	---	1.31	5.76	---	---	---	---	0.13	0.56	---	---	303
TEG Dehydrator 2	---	---	---	---	1.31	5.76	---	---	---	---	0.13	0.56	---	---	303
Reboiler 1	0.15	0.64	0.12	0.54	0.0081	0.035	0.00088	0.0039	0.011	0.049	0.0028	0.012	0.00011	0.00048	771
Reboiler 2	0.15	0.64	0.12	0.54	0.0081	0.035	0.00088	0.0039	0.011	0.049	0.0028	0.012	0.00011	0.00048	771
Combustors															
Flare and Pilot	0.33	1.44	1.78	7.79	0.00011	0.00047	0.000012	0.000051	0.00015	0.00065	0.000037	0.00016	---	---	2,476
Hydrocarbon Loading															
Truck Loadout	---	---	---	---	72.85	7.66	---	---	---	---	2.19	0.23	---	---	28
Venting Emissions															
Venting Emissions	---	---	---	---	---	22.50	---	---	---	---	---	0.46	---	---	2107
Fugitive Emissions															
Component Leak Emissions	---	---	---	---	2.18	9.54	---	---	---	---	0.051	0.22	---	---	198
Haul Road Dust Emissions	---	---	---	---	---	---	---	---	0.08	0.33	---	---	---	---	---
Storage Tanks															
Produced Water Tanks	---	---	---	---	2.68E-06	1.17E-05	---	---	---	---	1.01E-08	4.42E-08	---	---	0.00075
Settler Tank	---	---	---	---	3.15	13.81	---	---	---	---	0.095	0.42	---	---	51
Condensate Tanks	---	---	---	---	0.064	0.28	---	---	---	---	0.00200	0.0088	---	---	0.10
Total Facility PTE =	**17.20**	**75.35**	**17.92**	**78.47**	**84.09**	**79.41**	**0.12**	**0.54**	**3.64**	**15.95**	**4.95**	**13.03**	**0.24**	**1.07**	**123,033**

HAP Emissions Summary Total

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**

CONTROLLED POTENTIAL EMISSION SUMMARY

Source	Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Engines										
Compressor Engine 1	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 2	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 3	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 4	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 5	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 6	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 7	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 8	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 9	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 10	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 11	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012	---	---
Compressor Engine 12	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012		
Compressor Engine 13	0.022	0.096	0.0078	0.034	0.00035	0.0015	0.0027	0.012		
Fuel Conditioning Heater	---	---	---	---	---	---	---	---	---	---
Turbines										
Microturbine Generator 1	0.000025	0.00011	0.00027	0.0012	0.00007	0.00029	0.00013	0.0006	---	---
Microturbine Generator 2	0.000025	0.00011	0.00027	0.0012	0.00007	0.00029	0.00013	0.0006	---	---
Catalytic Heater for Generator Fuel	---	---	---	---	---	---	---	---	---	---
Dehydrator										
TEG Dehydrator 1	0.025	0.11	0.056	0.24	0.0035	0.015	0.012	0.053	0.030	0.13
TEG Dehydrator 2	0.025	0.11	0.056	0.24	0.0035	0.015	0.012	0.053	0.030	0.13
Reboiler 1	---	---	---	---	---	---	---	---	---	---
Reboiler 2	---	---	---	---	---	---	---	---	---	---
Combustors										
Flare and Pilot	---	---	---	---	---	---	---	---	---	---
Hydrocarbon Loading										
Truck Loadout	0.035	0.0037	0.084	0.0088	0.030	0.0032	0.077	0.0081	1.97	0.21
Venting Emissions										
Venting Emissions	---	0.014	---	0.025	---	0.0014	---	0.0035	---	0.42
Fugitive Emissions										
Component Leak Emissions	0.0013	0.0055	0.0025	0.011	0.00037	0.0016	0.00095	0.0042	0.046	0.20
Haul Road Dust Emissions	---	---	---	---	---	---	---	---	---	---
Storage Tanks										
Produced Water Tanks	5.94E-09	2.60E-08	3.01E-09	1.32E-08	3.47E-10	1.52E-09	5.30E-10	2.32E-09	2.56E-10	1.12E-09
Settler Tank	1.52E-03	6.66E-03	3.62E-03	1.59E-02	1.30E-03	5.70E-03	3.34E-03	1.46E-02	8.52E-02	3.73E-01
Condensate Tanks	2.13E-05	9.32E-05	5.48E-05	2.40E-04	2.16E-05	9.44E-05	5.03E-05	2.20E-04	1.85E-03	8.12E-03
Total Facility PTE =	**0.37**	**1.51**	**0.30**	**0.99**	**0.043**	**0.062**	**0.14**	**0.29**	**2.16**	**1.48**

Compressor Engine Emission Calculations

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Compressor Engines**

Source Information-Per Engine

Emission Unit ID:	C-2100 - C-2220	
Engine Make/Model	Waukesha 7044 GSI	
Service	Compression	
Controls - Y or N / Type	Y	NSCR/AFRC
Site Horsepower Rating[1]	1,680	hp
Fuel Consumption (BSFC)[1]	8,289	Btu/(hp-hr)
Heat Rating[2]	13.93	MMBtu/hr
Fuel Consumption[2,3]	107.75	MMscf/yr
Fuel Consumption[1]	12,300	scf/hr
Fuel Heating Value[1]	1,130	Btu/scf
Operating Hours	8,760	hrs/yr

Notes:

1. Values from Waukesha specification sheet
2. Calculated values
3. Annual fuel consumption is 100% of maximum fuel consumption at 100% load.

Potential Emissions per Engine

	Uncontrolled					***Controlled***					
Pollutant	**Emission Factor**		**Estimated Emissions[2]**			**Emission Factor**		**Estimated Emissions[2]**			**Source of Emissions Factors**
	(lb/MMBtu)	**(g/bhp-hr)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	**(lb/MMBtu)**	**(g/bhp-hr)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	
NOx[1,4]	---	13.6	50.37	---	220.62	---	0.34	1.26	---	5.52	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
CO[1,4]	---	12.8	47.41	---	207.64	---	0.32	1.19	---	5.19	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
VOC[1,4]	---	0.41	1.52	---	6.65	---	0.066	0.24	---	1.06	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
SO_2	5.88E-04	---	0.0082	---	0.036	5.88E-04	---	0.0082	---	0.036	AP-42, Chapter 3.2, Table 3.2-3
$PM_{2.5}/PM_{10}$	1.94E-02	---	0.27	---	1.18	1.94E-02	---	0.27	---	1.18	AP-42, Chapter 3.2, Table 3.2-3
Total PM	1.94E-02	---	0.27	---	1.18	1.94E-02	---	0.27	---	1.18	AP-42, Chapter 3.2, Table 3.2-3
1,1,2,2-Tetrachloroethane	2.53E-05	---	0.00035	3.09	0.0015	2.53E-05	---	0.00035	3.09	0.0015	AP-42, Chapter 3.2, Table 3.2-3
1,3-Butadiene	6.63E-04	---	0.0092	80.88	0.040	6.63E-04	---	0.0092	80.88	0.040	AP-42, Chapter 3.2, Table 3.2-3
Acetaldehyde	2.79E-03	---	0.039	340.3	0.17	2.79E-03	---	0.039	340.3	0.17	AP-42, Chapter 3.2, Table 3.2-3
Acrolein	2.63E-03	---	0.037	320.8	0.16	2.63E-03	---	0.037	320.8	0.16	AP-42, Chapter 3.2, Table 3.2-3
Benzene	1.58E-03	---	0.022	192.7	0.096	1.58E-03	---	0.022	192.7	0.096	AP-42, Chapter 3.2, Table 3.2-3
Ethylbenzene	2.48E-05	---	0.00035	3.03	0.0015	2.48E-05	---	0.00035	3.03	0.0015	AP-42, Chapter 3.2, Table 3.2-3
Formaldehyde[1,4]	---	0.05	0.19	1,622	0.81	---	0.01	0.019	162.2	0.081	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
Methanol	3.06E-03	---	0.043	373.3	0.19	3.06E-03	---	0.043	373.3	0.19	AP-42, Chapter 3.2, Table 3.2-3
Methylene Chloride	4.12E-05	---	0.00057	5.03	0.0025	4.12E-05	---	0.00057	5.03	0.0025	AP-42, Chapter 3.2, Table 3.2-3
PAH	1.41E-04	---	0.0020	17.20	0.0086	1.41E-04	---	0.0020	17.20	0.0086	AP-42, Chapter 3.2, Table 3.2-3
Toluene	5.58E-04	---	0.0078	68.07	0.034	5.58E-04	---	0.0078	68.07	0.034	AP-42, Chapter 3.2, Table 3.2-3
Xylenes	1.95E-04	---	0.0027	23.79	0.012	1.95E-04	---	0.0027	23.79	0.012	AP-42, Chapter 3.2, Table 3.2-3
Other HAPs[2]	2.10E-04	---	0.0029	25.59	0.013	2.10E-04	---	0.0029	25.59	0.013	AP-42, Chapter 3.2, Table 3.2-3
Total HAPS			0.35	3,076	1.54			0.18	1,616	0.81	
Pollutant	**Emission Factor**		**Estimated Emissions[2]**			**Emission Factor**		**Estimated Emissions[2]**			**Source of Emissions Factors**
	(kg/MMBtu)	**(g/bhp-hr)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	**(kg/MMBtu)**	**(g/bhp-hr)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	
CO_2[1]	---	527	1,952	---	8,549	---	527	1,952	---	8,549	Manufacturer's Specs
CH_4[1,4]	---	1.41	5.22	---	22.87	---	0.42	1.57	---	6.86	Manufacturer's Specs - uncontrolled, Catalyst Specs - controlled
N_2O	0.0001	---	0.0031	---	0.013	0.0001	---	0.0031	---	0.013	40 CFR Part 98, Subpart C, Table C-2
CO_2e[2]	---	---	2,083	---	9,125	---	---	1,992	---	8,725	40 CFR Part 98, Subpart A, Table A-1, effective January 2014

Notes:

4. Due to variable load conditions, the catalyst efficiency may vary. The catalyst efficiencies used in the emissions are typical based on expected operating conditions. The catalyst specification sheet shows typical destruction efficiencies that were used in the calculations. The emission factors shown on the catalyst specification sheet are not site specific, so those will vary; however the efficiencies will be the same.

Example Calculations

lb/hr = (g/hp-hr) * (hp) * (1 lb/453.6 g) or (lb/MMBtu) * (MMBtu/hr)

tpy = (lb/hr) * (8,760 hrs/yr) / (2,000 lb/ton)

Natural Gas Fueled Fuel Conditioning Heater Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Location:	**Doddridge County, West Virginia**
Source Description:	**Fuel Conditioning Heater**

Source Information

Emission Unit ID:	FUEL1	
Source Description:	Fuel Conditioning Heater	
Hours of Operation	8,760	hr/yr
Design Heat Rate	0.50	MMBtu/hr
Fuel Heat Value	1,020	Btu/scf
Fuel Use	4.29	MMscf/yr

Emission Calculations per Heater

Pollutant	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
NO_X	100	0.049	0.21	AP-42 Ch. 1.4 Table 1.4-1
CO	84	0.041	0.18	AP-42 Ch. 1.4 Table 1.4-1
VOC	5.5	0.0027	0.012	AP-42 Ch. 1.4 Table 1.4-2
PM_{10}	7.6	0.0037	0.016	AP-42 Ch. 1.4 Table 1.4-2
SO_2	0.6	0.00029	0.0013	AP-42 Ch. 1.4 Table 1.4-2
Formaldehyde	0.075	0.000037	0.00016	AP-42 Ch. 1.4 Table 1.4-3
Total HAPs (including HCHO)[1]	1.9	0.00092	0.0040	AP-42 Ch. 1.4 Table 1.4-3
Pollutant	**Emission Factor (kg/MMBtu)**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor Source**
Carbon Dioxide	53.06	58.63	256.8	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.0011	0.0048	40 CFR Part 98, Subpart C, Table C-2
Nitrous Oxide	0.0001	0.00011	0.00048	40 CFR Part 98, Subpart C, Table C-2
CO_2e	----	58.69	257.1	40 CFR Part 98, Subpart A, Table A-1

1. Only those HAP pollutants above detection thresholds were included.

Sample Calculations:

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MMBtu/hr)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{Heater Efficiency}}$$

$$\text{Emissions (tons/yr)} = \frac{\text{Emission Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)}}{\text{2,000 (lbs/ton)}}$$

Microturbine Generator Emission Calculations

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Microturbine Generators**

Source Information

Emission Unit ID:	G-8000 & G-8100	
Make/Model	Capstone C200 Standard	
Microturbine Rating[2]	200	kWe
Number of Microturbines[2]	2	units
Net Heat Rate	10,300	Btu/kWhe
Heat Input [1]	2.06	MMBtu/hr
Operating Hours[2]	8,760	hrs/yr

Notes:

1) Calculated

2) There will be two (2) generators onsite each rated at 200 kWe. Only 200 kWe will be operational at any time while the other 200 kWe unit will be on standby for the full year. Individual units may switch between primary and standby status depending on their need for maintenance. Emissions were calculated based on both units (400 kWe total) operating at full load for 8,760 hours per year, so as to be conservative.

Potential Emissions per Generator

	Uncontrolled					***Controlled***					
Pollutant	**Emission Factor**		**Estimated Emissions[1]**			**Emission Factor**		**Estimated Emissions[1]**			**Source of Emissions Factors**
	(lb/MMBtu)	**(lb/MWhe)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	**(lb/MMBtu)**	**(lb/MWhe)**	**(lb/hr)**	**(lb/yr)**	**(tpy)**	
NOx	---	0.40	0.080	---	0.35	---	0.40	0.080	---	0.35	Manufacturer Specifications
CO	---	1.10	0.22	---	0.96	---	1.10	0.22	---	0.96	Manufacturer Specifications
VOC	---	0.10	0.020	---	0.088	---	0.10	0.020	---	0.088	Manufacturer Specifications
SO_2	3.40E-03	---	0.0070	---	0.031	3.40E-03	---	0.0070	---	0.031	AP-42, Chapter 3.1, Table 3.1-2a
$PM_{2.5}/PM_{10}$	6.60E-03	---	0.014	---	0.060	6.60E-03	---	0.014	---	0.060	AP-42, Chapter 3.1, Table 3.1-2a
1,3-Butadiene	4.30E-07	---	8.86E-07	0.0078	3.88E-06	4.30E-07	---	8.86E-07	0.0078	3.88E-06	AP-42, Chapter 3.1, Table 3.1-3
Acetaldehyde	4.00E-05	---	8.24E-05	0.72	3.61E-04	4.00E-05	---	8.24E-05	0.72	3.61E-04	AP-42, Chapter 3.1, Table 3.1-3
Acrolein	6.40E-06	---	1.32E-05	0.12	5.77E-05	6.40E-06	---	1.32E-05	0.12	5.77E-05	AP-42, Chapter 3.1, Table 3.1-3
Benzene	1.20E-05	---	2.47E-05	0.22	1.08E-04	1.20E-05	---	2.47E-05	0.22	1.08E-04	AP-42, Chapter 3.1, Table 3.1-3
Ethylbenzene	3.20E-05	---	6.59E-05	0.58	2.89E-04	3.20E-05	---	6.59E-05	0.58	2.89E-04	AP-42, Chapter 3.1, Table 3.1-3
Formaldehyde	7.10E-04	---	1.46E-03	12.81	6.41E-03	7.10E-04	---	1.46E-03	12.81	6.41E-03	AP-42, Chapter 3.1, Table 3.1-3
Naphthalene	1.30E-06	---	2.68E-06	0.023	1.17E-05	1.30E-06	---	2.68E-06	0.023	1.17E-05	AP-42, Chapter 3.1, Table 3.1-3
PAH	2.20E-06	---	4.53E-06	0.040	1.99E-05	2.20E-06	---	4.53E-06	0.040	1.99E-05	AP-42, Chapter 3.1, Table 3.1-3
Propylene Oxide	2.90E-05	---	5.97E-05	0.52	2.62E-04	2.90E-05	---	5.97E-05	0.52	2.62E-04	AP-42, Chapter 3.1, Table 3.1-3
Toluene	1.30E-04	---	2.68E-04	2.35	1.17E-03	1.30E-04	---	2.68E-04	2.35	1.17E-03	AP-42, Chapter 3.1, Table 3.1-3
Xylenes	6.40E-05	---	1.32E-04	1.15	5.77E-04	6.40E-05	---	1.32E-04	1.15	5.77E-04	AP-42, Chapter 3.1, Table 3.1-3
Total HAPS			0.0021	18.54	0.0093			0.0021	18.54	0.0093	
Pollutant	**Emission Factor**		**Estimated Emissions[1]**			**Emission Factor**		**Estimated Emissions[1]**			**Source of Emissions Factors**
	(kg/MMBtu)	**(lb/MWhe)**	**(lb/hr)**		**(tpy)**	**(kg/MMBtu)**	**(lb/MWhe)**	**(lb/hr)**		**(tpy)**	
CO_2	---	1,330	266.0	---	1,165	---	1,330	266.0	---	1,165	Manufacturer Specifications
CH_4	0.001	---	0.0046	---	0.020	0.001	---	0.0046	---	0.020	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	---	0.00046	---	0.0020	0.0001	---	0.00046	---	0.0020	40 CFR Part 98, Subpart C, Table C-2
CO_2e	---	---	266.2	---	1,166	---	---	266.2	---	1,166	40 CFR Part 98, Subpart A, Table A-1, effective January 2014

Example Calculations

lb/hr = (lb/Mwhe) * kWe * (1 MWe/1000 kWe) or (lb/MMBtu) * (MMBtu/hr) or (kg/MMBtu) * (MMBtu/hr) * (2.21 lb/kg)

tpy = (lb/hr) * (hr/yr) * (ton/2000 lb)

Natural Gas Fueled Catalytic Heater Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Location:	**Doddridge County, West Virginia**
Source Description:	**Catalytic Heater for Generator Fuel**

Source Information

Emission Unit ID:	CATHT1	
Source Description:	Generator Fuel Heater	
Hours of Operation	8,760	hr/yr
Design Heat Rate	0.024	MMBtu/hr
Fuel Heat Value	1,020	Btu/scf
Fuel Use	0.21	MMscf/yr

Emission Calculations per Heater

Pollutant	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
NO_X	100	0.0024	0.010	AP-42 Ch. 1.4 Table 1.4-1
CO	84	0.0020	0.0087	AP-42 Ch. 1.4 Table 1.4-1
VOC	5.5	0.00013	0.00057	AP-42 Ch. 1.4 Table 1.4-2
PM_{10}	7.6	0.00018	0.00078	AP-42 Ch. 1.4 Table 1.4-2
SO_2	0.6	0.000014	0.000062	AP-42 Ch. 1.4 Table 1.4-2
Formaldehyde	0.075	0.0000018	0.0000077	AP-42 Ch. 1.4 Table 1.4-3
Total HAPs (including HCHO)[1]	1.9	0.000044	0.00019	AP-42 Ch. 1.4 Table 1.4-3
Pollutant	**Emission Factor (kg/MMBtu)**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor Source**
Carbon Dioxide	53.06	2.81	12.3	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.000053	0.00023	40 CFR Part 98, Subpart C, Table C-2
Nitrous Oxide	0.0001	0.0000053	0.000023	40 CFR Part 98, Subpart C, Table C-2
CO_2e	----	2.82	12.3	40 CFR Part 98, Subpart A, Table A-1

1. Only those HAP pollutants above detection thresholds were included.

Sample Calculations:

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MMBtu/hr)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{Heater Efficiency}}$$

$$\text{Emissions (tons/yr)} = \frac{\text{Emission Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)}}{\text{2,000 (lbs/ton)}}$$

Dehydrator Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Dehydrator Units**

Potential Emissions per Dehydrator

Pollutant	Emission Unit ID: V-3110/V-3210 Dehydrator Still Vent		Emission Unit ID: V-3120/V-3220 Flash Tank Gas	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Uncontrolled Emissions [1]				
VOC	16.88	73.93	48.87	214.06
Total HAPs	5.04	22.10	1.31	5.73
Benzene	1.18	5.16	0.094	0.41
Toluene	2.67	11.70	0.12	0.53
Ethylbenzene	0.17	0.74	0.0039	0.017
Xylenes	0.59	2.59	0.0087	0.038
n-Hexane	0.44	1.91	1.08	4.73
Methane	18.49	80.98	114.94	503.42
Carbon Dioxide	0.27	1.17	2.27	9.94
CO_2e	462.5	2,026	2,876	12,595
Controlled Emissions [2,3]				
VOC	0.34	1.48	0.98	4.28
Total HAPs	0.10	0.44	0.026	0.11
Benzene	0.024	0.10	0.0019	0.0083
Toluene	0.053	0.23	0.0024	0.011
Ethylbenzene	0.0034	0.015	0.00010	0.00030
Xylenes	0.012	0.052	0.00020	0.00080
n-Hexane	0.0087	0.038	0.022	0.095
Methane	0.37	1.62	2.30	10.07
Carbon Dioxide	0.27	1.17	2.27	9.94
CO_2e	9.51	41.66	59.74	261.7

Pollutant	Dehydrator Emission Totals	
	(lb/hr)	(tpy)
Uncontrolled Emissions [1]		
VOC	65.75	288.0
Total HAPs	6.35	27.83
Benzene	1.27	5.58
Toluene	2.79	12.23
Ethylbenzene	0.17	0.76
Xylenes	0.60	2.63
n-Hexane	1.51	6.63
Methane	133.4	584.4
Carbon Dioxide	2.54	11.11
CO_2e	3,338	14,621
Controlled Emissions [2,3]		
VOC	1.31	5.76
Total HAPs	0.13	0.56
Benzene	0.025	0.11
Toluene	0.056	0.24
Ethylbenzene	0.0035	0.015
Xylenes	0.012	0.053
n-Hexane	0.030	0.13
Methane	2.67	11.69
Carbon Dioxide	2.54	11.11
CO_2e	69.25	303.3

[1]Output from GRI-GLYCalc 4.0 for both the still vent and flash tank gas emissions

[2]Controlled emissions assume that the glycol still vent is equipped with a condenser and is controlled by a combustor with 98% control efficiency.

[3]Flash tank gas is used in the reboiler as the primary fuel source. However, in the case that gas cannot be used in the reboiler, the gas is sent to the primary/backup VRU system via the storage tanks for 98% control.

Natural Gas Fueled Dehydrator Reboiler Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Location:	**Doddridge County, West Virginia**
Source Description:	**Dehydrator Reboilers**

Source Information

Emission Unit ID:	F-3100 & F-3200	
Source Description:	Dehydrator Reboiler	
Hours of Operation	8,760	hr/yr
Design Heat Rate	1.5	MMBtu/hr
Fuel Heat Value	1,020	Btu/scf
Fuel Use	12.9	MMscf/yr

Emission Calculations per Reboiler

Pollutant	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
NO_X	100	0.15	0.64	AP-42 Ch. 1.4 Table 1.4-1
CO	84	0.12	0.54	AP-42 Ch. 1.4 Table 1.4-1
VOC	5.5	0.0081	0.035	AP-42 Ch. 1.4 Table 1.4-2
PM_{10}	7.6	0.011	0.049	AP-42 Ch. 1.4 Table 1.4-2
SO_2	0.6	0.00088	0.0039	AP-42 Ch. 1.4 Table 1.4-2
Formaldehyde	0.075	0.00011	0.00048	AP-42 Ch. 1.4 Table 1.4-3
Total HAPs (including HCHO)	1.9	0.0028	0.012	AP-42 Ch. 1.4 Table 1.4-3
Pollutant	**Emission Factor (kg/MMBtu)**	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor Source**
Carbon Dioxide	53.06	175.9	770.4	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.0033	0.015	40 CFR Part 98, Subpart C, Table C-2
Nitrous Oxide	0.0001	0.00033	0.0015	40 CFR Part 98, Subpart C, Table C-2
CO_2e	----	176.1	771.2	40 CFR Part 98, Subpart A, Table A-1

Sample Calculations:

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MMBtu/hr)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{Heater Efficiency}}$$

$$\text{Emissions (tons/yr)} = \frac{\text{Emission Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)}}{\text{2,000 (lbs/ton)}}$$

Flare Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Flare for Dehydrator Still Vent Gas**
Emission Unit ID:	**FL-1000**

Combusted Gas Emissions

Flare Heat Input :	4.80	MMBtu/hr
Hours of Operation:	8,760	hr/yr

Pollutant	Emission Factor[1] (lb/MMBtu)	Emissions (lbs/hr)	Emissions (tons/yr)
Particulate Matter ($PM/PM_{10}/PM_{2.5}$)	N/A - Smokeless Design		
Nitrogen Oxides (NO_x)	0.068	0.33	1.43
Carbon Monoxide (CO)	0.37	1.78	7.78

[1] Emission Factors from Table 13.5-1 of AP-42 Section 13.5 (Sept 1991)

Pilot Emissions

Pilot Heating Value:	1,214	Btu/scf
Hours of Operation:	8,760	hr/yr
Total Pilot Natural Gas Usage:	1.64E-05	MMscf/hr

Pollutant	Emission Factor (lb/MMscf)	Emissions (lbs/hr)	Emissions (tons/yr)
Particulate Matter ($PM/PM_{10}/PM_{2.5}$)[2]	7.6	1.48E-04	6.50E-04
Nitrogen Oxides (NOx)	100	1.95E-03	8.55E-03
Sulfur Dioxide (SO_2)[2]	0.6	1.17E-05	5.13E-05
Carbon Monoxide (CO)[2]	84	1.64E-03	7.18E-03
Volatile Organic Compounds (VOC)[2]	5.5	1.07E-04	4.70E-04
Total HAPs[2,3]	1.88	3.67E-05	1.61E-04

[2] Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98).

[3] Sum of Emissions Factors published for pollutants classified as "HAPS" under AP-42 Table 1.4-3.

Total Flare Emissions

Pollutant	Potential Emission Rate (lbs/hr)	Potential Emission Rate (tons/year)
Particulate Matter ($PM/PM_{10}/PM_{2.5}$)	1.48E-04	6.50E-04
Nitrogen Oxides (NOx)	0.33	1.44
Sulfur Dioxide (SO_2)	1.17E-05	5.13E-05
Carbon Monoxide (CO)	1.78	7.79
Volatile Organic Compounds (VOC)	1.07E-04	4.70E-04
Total HAPs	3.67E-05	1.61E-04

Greenhouse Gas Emissions

Pollutant	Emission Factor (kg/MMBtu)	Emissions (lb/hr)	Emissions (tpy)	Emission Factor Source
Carbon Dioxide	53.06	565.2	2,476	40 CFR Part 98, Subpart C, Table C-1
Methane	0.001	0.011	0.047	40 CFR Part 98, Subpart C, Table C-2
Nitrogen Dioxide	0.0001	0.0011	0.0047	40 CFR Part 98, Subpart C, Table C-2
CO_2e	----	565.2	2,476	40 CFR Part 98, Subpart A, Table A-1

Truck Loading Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Production Liquids Truck Loadout**
Emission Unit ID:	**LDOUT1**

AP - 42, Chapter 5.2 $L_L = 12.46 \times S \times P \times M / T$

L_L = Loading Loss Emission Factor (lbs VOC/1000 gal loaded)
- S = Saturation Factor
- P = True Vapor Pressure of the Loaded Liquid (psia)
- M = Vapor Molecular Weight of the Loaded Liquid (lbs/lbmol)
- T = Temperature of Loaded Liquid (ºR)

VOC Emissions (tpy) = $\dfrac{L_L \text{ (lbs VOC/1000 gal)} * 42 \text{ gal/bbl} * 365 \text{ days/year} * \text{production (bbl/day)}}{1000 \text{ gal} * 2000 \text{ lbs/ton}}$

								Uncontrolled						
Source	**S[1]**	**P (psia)[2]**	**M[3]**	**T (ºF)[4]**	**T (ºR)**	**L_L (lb/1000 gal)**	**Production (bbl/day)**	**VOC (tpy)**	**Benzene (tpy)[5]**	**Toluene (tpy)[5]**	**E-Benzene (tpy)[5]**	**Xylene (tpy)[5]**	**n-Hexane (tpy)[5]**	**CO_2e (tpy)[5]**
Condensate	0.6	12.0	38.6	60	519.67	6.66	150	7.66	0.0037	0.0088	0.0032	0.0081	0.21	27.86
Produced Water	0.6	0.32	18.2	60	519.67	0.0084	45	0.0029	1.41E-06	3.35E-06	1.20E-06	3.09E-06	7.86E-05	0.011

Notes:
1. Saturation factor from AP-42, Table 5.2-1 (Submerged loading (bottom loading): dedicated normal service)
2. True vapor pressure for condensate and produced water is from the ProMax 4.0 model output
3. Molecular weight of the liquid vapor for condensate is from the ProMax 4.0 model output and the molecular weight of the liquid vapor for produced water is derived from the produced water working and breathing emissions.
4. Temperature is the liquid bulk temperature used in the ProMax 4.0 model
5. HAPs and CO_2e emissions are calculated using the flash gas vapor weight percents from the ProMax 4.0 output.

Assume 1 truck loaded per hour, 260 bbl truck, for short term emissions

								Uncontrolled						
Source	**S[1]**	**P (psia)[2]**	**M[3]**	**T (ºF)[4]**	**T (ºR)**	**L_L (lb/1000 gal)**	**Loading (bbl/hr)**	**VOC (lb/hr)**	**Benzene (lb/hr)[5]**	**Toluene (lb/hr)[5]**	**E-Benzene (lb/hr)[5]**	**Xylene (lb/hr)[5]**	**n-Hexane (lb/hr)[5]**	**CO_2e (lb/hr)[5]**
Condensate	0.6	12.0	38.6	60	519.67	6.66	260	72.76	0.035	0.084	0.030	0.077	1.96	264.6
Produced Water	0.6	0.32	18.2	60	519.67	0.0084	260	0.092	4.46E-05	1.06E-04	3.81E-05	9.79E-05	2.49E-03	0.33

Storage Tank Flashing Emissions Calculated by ProMax Simulation

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Settling Tank**
Emission Unit ID:	**TK-9000**

Settling Tank Flashing Emissions

Component	Uncontrolled Flashing Emissions [1] (lb/hr)	Uncontrolled Flashing Emissions (tons/yr)	Controlled Flashing Emissions [2,3] (lb/hr)	Controlled Flashing Emissions [2,3] (tons/yr)
Methane	22.64	99.18	0.45	1.98
Ethane	47.59	208.43	0.95	4.17
Propane	59.22	259.38	1.18	5.19
i-Butane	15.70	68.74	0.31	1.37
n-Butane	36.40	159.44	0.73	3.19
i-Pentane	13.51	59.18	0.27	1.18
n-Pentane	13.68	59.92	0.27	1.20
2-Methylpentane (Hexanes)	6.70	29.33	0.13	0.59
n-Heptane	3.98	17.45	0.080	0.35
n-Octane	1.51	6.62	0.030	0.13
n-Nonane	0.21	0.92	0.0042	0.018
Decanes+	0.078	0.34	0.0016	0.0069
Benzene	0.075	0.33	0.0015	0.0066
Toluene	0.18	0.79	0.0036	0.016
Ethylbenzene	0.064	0.28	0.0013	0.0056
o-Xylene	0.17	0.72	0.0033	0.014
n-Hexane	4.20	18.41	0.084	0.37
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00
Water	1.86	8.14	1.86	8.14
Nitrogen	0.087	0.38	0.087	0.38
Carbon Dioxide	0.23	1.00	0.23	1.00
VOC Subtotal	155.68	681.86	3.11	13.64
HAP Subtotal	4.69	20.53	0.094	0.41
CO_2e Subtotal	566.33	2,480.5	11.55	50.59
Total	228.08	998.99	6.69	29.30

Notes:

1. Flashing emissions calculated by ProMax 4.0. Flash gas is "Flash Gas" of the associated ProMax simulation. Flashing only occurs in the settling tank as all pressurized fluids flow into the settling tank and then separate out at atmospheric conditions to the condensate and produced water tanks.

2. Tanks are controlled by a VRU with assumed 98% capture efficiency; but will likely be higher as vapors are recycled back into the system.

3. VRU-100 is the primary VRU to collect storage tank vapors and VRU-200 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown.

Storage Tank Working and Breathing Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Condensate, Settling, and Produced Water Tanks**
Emission Unit ID:	**TK-9000, TK-9100, TK-9110, TK-9200, TK-9210**

TANK DESCRIPTION	Uncontrolled VOC Emissions[1] (tons/yr)	Uncontrolled Benzene Emissions[1] (tons/yr)	Uncontrolled Toluene Emissions[1] (tons/yr)	Uncontrolled Ethylbenzene Emissions[1] (tons/yr)	Uncontrolled Xylene Emissions[1] (tons/yr)	Uncontrolled n-Hexane Emissions[1] (tons/yr)	Uncontrolled CH_4 Emissions[1] (tons/yr)	Uncontrolled CO_2e Emissions (tons/yr)
400 bbl Hydrocarbon Storage Tank (TK-9200)	7.05	0.0023	0.0060	0.0024	0.0055	0.20	0.093	2.32
400 bbl Hydrocarbon Storage Tank (TK-9210)	7.05	0.0023	0.0060	0.0024	0.0055	0.20	0.093	2.32
500 bbl Settling Tank (TK-9000)	8.57	0.0028	0.0073	0.0029	0.0067	0.25	0.11	2.82
400 bbl Produced Water Storage Tank[2] (TK-9100)	2.93E-04	6.50E-07	3.30E-07	3.80E-08	5.80E-08	2.80E-08	4.50E-04	1.14E-02
400 bbl Produced Water Storage Tank[2] (TK-9210)	2.93E-04	6.50E-07	3.30E-07	3.80E-08	5.80E-08	2.80E-08	4.50E-04	1.14E-02
TOTAL	**22.68**	**0.0075**	**0.019**	**0.0076**	**0.018**	**0.65**	**0.30**	**7.49**

TANK DESCRIPTION	Controlled VOC Emissions[3,4] (tons/yr)	Controlled Benzene Emissions[3,4] (tons/yr)	Controlled Toluene Emissions[3,4] (tons/yr)	Controlled Ethylbenzene Emissions[3,4] (tons/yr)	Controlled Xylene Emissions[3,4] (tons/yr)	Controlled n-Hexane Emissions[3,4] (tons/yr)	Controlled CH_4 Emissions[3,4] (tons/yr)	Controlled CO_2e Emissions[3,4] (tons/yr)
400 bbl Hydrocarbon Storage Tank (TK-9200)	0.14	4.66E-05	1.20E-04	4.72E-05	1.10E-04	4.06E-03	1.85E-03	5.19E-02
400 bbl Hydrocarbon Storage Tank (TK-9210)	0.14	4.66E-05	1.20E-04	4.72E-05	1.10E-04	4.06E-03	1.85E-03	5.19E-02
500 bbl Settling Tank (TK-9000)	0.17	5.66E-05	1.46E-04	5.74E-05	1.34E-04	4.93E-03	2.25E-03	6.31E-02
400 bbl Produced Water Storage Tank[2] (TK-9100)	5.86E-06	1.30E-08	6.60E-09	7.60E-10	1.16E-09	5.60E-10	9.00E-06	3.75E-04
400 bbl Produced Water Storage Tank[2] (TK-9210)	5.86E-06	1.30E-08	6.60E-09	7.60E-10	1.16E-09	5.60E-10	9.00E-06	3.75E-04
TOTAL	**0.45**	**1.50E-04**	**3.86E-04**	**1.52E-04**	**3.54E-04**	**1.31E-02**	**0.0060**	**0.17**

Notes:

1. ProMax 4.0 used to calculated working and breathing emissions.
2. Produced water assumed to have no more than 10% hydrocarbon liquid.
3. Tanks are controlled by a VRU with assumed 98% capture efficiency; but will likely be higher as vapors are recycled back into the system.
4. VRU-100 is the primary VRU to collect storage tank vapors and VRU-200 is the backup VRU in times when the primary VRU is undergoing maintenance or shutdown.

Emissions From Venting Episodes

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Emissions-Venting Episodes**
Emission Unit ID:	**VENT1**

VOC Venting Emissions						
Type of Event[1]	**Number Of Events (event/yr)**	**Amount Vented per Event (scf/event)**	**Molecular Weight of Vented Gas (lb/lb-mol)**	**Total Emissions (ton/yr)**	**VOC Weight Fraction[4]**	**VOC Emissions (ton/yr)**
Compressor Blowdown[2]	936	2,236	20.43	56.35	0.17	9.35
Compressor Startup	936	1,050	20.43	26.46	0.17	4.39
Plant Shutdown	2	100,000	20.43	5.38	0.17	0.89
Low Pressure Pig Venting[3]	593	516	20.43	8.23	0.17	1.37
High Pressure Pig Venting[3]	520	2,801	20.43	39.21	0.17	6.50
Total Emissions (tons/yr)						**22.50**

HAPs Venting Emissions										
Type of Event[1]	**Benzene Weight Fraction[4]**	**Benzene Emissions (tpy)**	**Toluene Weight Fraction[4]**	**Toluene Emissions (tpy)**	**Ethylbenzene Weight Fraction[4]**	**Ethylbenzene Emissions (tpy)**	**Xylene Weight Fraction[4]**	**Xylene Emissions (tpy)**	**n-Hexane Weight Fraction[4]**	**n-Hexane Emissions (tpy)**
Compressor Blowdown[2]	1.03E-04	0.0058	1.85E-04	0.010	1.04E-05	0.00059	2.60E-05	0.0015	3.09E-03	0.17
Compressor Startup	1.03E-04	0.0027	1.85E-04	0.0049	1.04E-05	0.00027	2.60E-05	0.00069	3.09E-03	0.082
Plant Shutdown	1.03E-04	0.00056	1.85E-04	0.0010	1.04E-05	0.000056	2.60E-05	0.00014	3.09E-03	0.017
Low Pressure Pig Venting[3]	1.03E-04	0.00085	1.85E-04	0.0015	1.04E-05	0.000086	2.60E-05	0.00021	3.09E-03	0.025
High Pressure Pig Venting[3]	1.03E-04	0.0040	1.85E-04	0.0072	1.04E-05	0.00041	2.60E-05	0.0010	3.09E-03	0.12
Total Emissions (tons/yr)		**0.014**		**0.025**		**0.0014**		**0.0035**		**0.42**

GHG Venting Emissions								
Type of Event[1]	**Number Of Events (event/yr)**	**Amount Vented per Event (scf/event)**	**Molecular Weight of Vented Gas (lb/lb-mol)**	**CH_4 Weight Fraction[4]**	**CO_2 Weight Fraction[4]**	**CH_4 Emissions (ton/yr)**	**CO_2 Emissions (ton/yr)**	**CO_2e Emissions (tpy)**
Compressor Blowdown[2]	936	2,236	20.43	0.62	0.0040	35.00	0.22	875.28
Compressor Startup	936	1,050	20.43	0.62	0.0040	16.43	0.11	410.95
Plant Shutdown	2	100,000	20.43	0.62	0.0040	3.34	0.021	83.63
Low Pressure Pig Venting[3]	593	516	20.43	0.62	0.0040	5.11	0.033	127.90
High Pressure Pig Venting[3]	520	2,801	20.43	0.62	0.0040	24.36	0.16	609.03
Total Emissions (tons/yr)						**84.25**	**0.54**	**2,106.8**

1) Estimated number of events and venting per event from engineering. Compressor blowdowns are calculated to be 120.4 lb/event.

2) Total number of compressor blowdowns based on 18 blowdowns per week.

3) Total number of pigging events based on expected operations.

4) Weight fractions are from a gas analysis from a nearby, representative compressor station.

Component Fugitive Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Fugitive Emissions - Component Leaks**

VOC Fugitive Emissions

Equipment Type and Service	Number of Units [1]	Hours of Operation (hours/yr)	THC Emission Factor[2] (kg/hr-unit)	VOC Weight Fraction[3]	THC Emissions (tpy)	VOC Emissions (tpy)
Flanges - Gas Service	850	8,760	3.90E-04	0.17	3.21	0.54
Valves - Gas Service	750	8,760	4.50E-03	0.17	32.67	5.48
Compressor Seals Gas Service	39	8,760	8.80E-03	0.17	3.32	0.56
Flanges - Liquid Service	400	8,760	1.10E-04	0.69	0.43	0.29
Valves - Liquid Service	160	8,760	2.50E-03	0.69	3.87	2.67
Total Emissions (tons/yr)					**43.50**	**9.54**

HAPs Fugitive Emissions

Equipment Type and Service	Benzene Weight Fraction[3]	Benzene Emissions (tpy)	Toluene Weight Fraction[2]	Toluene Emissions (tpy)	Ethylbenzene Weight Fraction[2]	Ethylbenzene Emissions (tpy)	Xylene Weight Fraction[2]	Xylene Emissions (tpy)	n-Hexane Weight Fraction[2]	n-Hexane Emissions (tpy)
Flanges - Gas Service	1.04E-04	0.00034	1.87E-04	0.00060	1.05E-05	0.000034	2.63E-05	0.000084	3.13E-03	0.010
Valves - Gas Service	1.04E-04	0.0034	1.87E-04	0.0061	1.05E-05	0.00034	2.63E-05	0.00086	3.13E-03	0.10
Compressor Seals Gas Service	1.04E-04	0.00035	1.87E-04	0.00062	1.05E-05	0.000035	2.63E-05	0.000087	3.13E-03	0.010
Flanges - Liquid Service	3.34E-04	0.00014	7.94E-04	0.00034	2.85E-04	0.00012	7.33E-04	0.00031	1.86E-02	0.0079
Valves - Liquid Service	3.34E-04	0.0013	7.94E-04	0.0031	2.85E-04	0.0011	7.33E-04	0.0028	1.86E-02	0.072
Total Emissions (tons/yr)		**0.0055**		**0.011**		**0.0016**		**0.0042**		**0.20**

1) Component counts from Engineering Lists.

2) API average emission factors are for oil and gas production operations - Table 2.4, EPA Protocol for Equipment Leak Emission Estimates - 1995.

3) Gas weight fractions from a representative gas analysis and liquid weight fractions from a ProMax 4.0 model run.

GHG Fugitive Emissions

Equipment Type	Number of Units [1]	Hours of Operation (hours/yr)	Emission Factor[2] (scf/hr-unit)	CH_4 Concentration[3]	CO_2 Concentration[3]	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (tpy)
Flanges	1,250	8,760	0.003	0.98	0.011	0.68	0.021	16.97
Valves - Gas Service	750	8,760	0.027	0.98	0.011	3.66	0.11	91.63
Valves - Liquid Service	160	8,760	0.050	0.98	0.011	1.45	0.045	36.20
Compressor Seals	39	8,760	0.300	0.98	0.011	2.11	0.065	52.94
Total Emissions (tons/yr)						**7.90**	**0.24**	**197.73**

1) Component counts from Engineering Lists.

2) Emission factors from 40 CFR Part 98 Subpart W, Table W1-A.

3) CH_4 and CO_2 concentrations as defined in 40 CFR Part 98.233(r)

Fugitive Dust Emissions

Company:	**Antero Midstream LLC**
Facility Name:	**Tamela Compressor Station**
Facility Location:	**Doddridge County, West Virginia**
Source Description:	**Fugitive Dust Emissions**

Gravel Access Road	Loaded Truck Weight[1]	Trips per year[2]	Trips per day[2]	Distance per round trip (truck in and out)[3]		VMT per year[4]
	tons			feet	miles	miles
Condensate Tank Truck	40.00	365	1.0	4,020	0.76	278
Produced Water Tank Truck	40.00	365	1.0	4,020	0.76	278

Equation Parameter	PM-10/PM2.5	PM-Total
E, annual size-specific emission factor for PM_{10} & $PM_{2.5}$ (upaved industrial roads) extrapolated for natural mitigation[6]	**see table below**	**see table below**
k, Particle size multiplier for particle size range (PM_{10}), (lb/VMT) (Source: AP-42 Table 13.2.2-2)	**1.5**	**4.9**
k, Particle size multiplier for particle size range ($PM_{2.5}$), (lb/VMT) (Source: AP-42 Table 13.2.2-2)	**0.15**	
s, surface material silt content, (%) (Source: AP-42 Table 13.2.2-1)	**4.8**	**4.8**
W, mean weight (tons) of the vehicles traveling the road	**40.00**	**40.00**
a, constant for PM_{10} and $PM_{2.5}$ on industrial roads (Source: AP-42 Table 13.2.2-2)	**0.9**	**0.7**
b, constant for PM_{10} and $PM_{2.5}$ on industrial roads (Source: AP-42 Table 13.2.2-2)	**0.45**	**0.45**
P, number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, based on AP-42 Figure 13.2.2-1.	**160**	**160**

$$E = \left[k \left(\frac{s}{12} \right)^{a} \times \left(\frac{W}{3} \right)^{b} \right] \times (365 - P/365)$$

Source of Equation: AP-42 Section 13.2.2

PM_{10} Emissions

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr)[4]	Annual Uncontrolled PM_{10} Emissions (tpy)
1.18	555.80	0.33

$PM_{2.5}$ Emissions (tons/yr)

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr)[4]	Annual Uncontrolled $PM_{2.5}$ Emissions (tpy)
0.12	555.80	0.033

PM- Total Emissions (tons/yr)

Emission Factor (lb/VMT)	Vehicle miles traveled (VMT/yr)[4]	Annual Uncontrolled PM-Total Emissions (tpy)
4.65	555.80	1.29

Table Notes:

1. Loaded truck weight is based on typical weight limit for highway vehicles.
2. Based on production, it's assumed a maximum of one condensate truck (260 bbl truck) and one produced water truck (260 bbl truck) will be onsite per day.
3. Distance per round trip is based on the site layout. The one way distance is measured as 2,010 feet for the gravel access road.
4. VMT/yr = Trips/yr x Roundtrip Distance
5. Hourly emissions determined from tons per year calculation using 2,000 lb/ton and 8,760 hours per year.

Facility Gas Analysis

	MOL %	MW	Component Weight lb/lb-mol	Wt. Fraction
Methane	79.12	16.04	12.69	0.62
Ethane	13.66	30.07	4.11	0.20
Propane	4.13	44.10	1.82	0.089
i-Butane	0.52	58.12	0.30	0.015
n-Butane	0.96	58.12	0.56	0.027
i-Pentane	0.27	72.15	0.20	0.010
n-Pentane	0.24	72.15	0.17	0.0084
Hexanes	0.13	106.72	0.14	0.0067
Heptanes	0.094	100.20	0.094	0.0046
Octanes	0.023	114.23	0.026	0.0013
Nonanes	0.0052	128.26	0.0067	0.00033
Decanes+	0.00030	142.29	0.00043	0.000021
n-Hexane	0.073	86.18	0.063	0.0031
Benzene	0.0027	78.11	0.0021	0.00010
Toluene	0.0041	92.14	0.0038	0.00018
Ethylbenzene	0.00020	106.17	0.00021	0.000010
Xylenes	0.00050	106.16	0.00053	0.000026
Nitrogen	0.54	28.01	0.15	0.0074
Carbon Dioxide	0.18	44.01	0.081	0.0040
Oxygen	0.029	32.01	0.0092	0.00045
Totals	100.0		20.43	1.00

Heating Value (Btu/scf)	1,213.6
Molecular weight	20.43
VOC weight fraction	0.17
Methane weight fraction	0.62
THC weight fraction	0.99
VOC of THC wt fraction	0.17
Methane of THC wt fraction	0.63
Benzene of THC wt fraction	0.00010
Toluene of THC wt fraction	0.00019
E-benzene of THC wt fraction	0.000011
Xylene of THC wt fraction	0.000026
n-Hexane of THC wt fraction	0.0031

1. Gas analysis is a representative sample from a nearby compressor station.

Facility Tank Vent Gas Analysis

	MOL %	MW	Component Weight lb/lb-mol	Wt. Fraction
Methane	23.89	16.04	3.83	0.10
Ethane	26.79	30.07	8.05	0.21
Propane	22.73	44.10	10.02	0.26
i-Butane	4.57	58.12	2.66	0.069
n-Butane	10.60	58.12	6.16	0.16
i-Pentane	3.17	72.15	2.29	0.059
n-Pentane	3.21	72.15	2.32	0.060
Hexanes	1.32	86.18	1.13	0.029
Heptanes	0.67	100.20	0.67	0.017
Octanes	0.22	114.23	0.26	0.0066
Nonanes	0.028	128.26	0.036	0.00092
Decanes+	0.0087	151.80	0.013	0.00034
n-Hexane	0.83	86.18	0.71	0.018
Benzene	0.016	78.11	0.013	0.00033
Toluene	0.033	92.14	0.030	0.00079
Ethylbenzene	0.010	106.17	0.011	0.00028
Xylenes	0.026	106.17	0.028	0.00073
Nitrogen	0.053	28.01	0.015	0.00038
Carbon Dioxide	0.088	44.01	0.039	0.0010
Water	1.75	18.02	0.31	0.0081
Totals	100.00		38.60	1.00

Molecular weight	38.60
VOC weight fraction	0.68
CH4 weight fraction	0.10
THC weight fraction	0.99
VOC of THC wt fraction	0.69
CH4 of THC wt fraction	0.10
Benzene of THC wt fraction	0.00033
Toluene of THC wt fraction	0.00079
E-benzene of THC wt fraction	0.00029
Xylene of THC wt fraction	0.00073
n-Hexane of THC wt fraction	0.019

1. Tank vent gas analysis retrieved from "Flash Gas" stream from ProMax 4.0 simulation.

GlyCalc

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Tamela Compressor Station
File Name: Z:\20171806 - Antero WV CS Permit Mods\Tamela CS\Attachment N\GLYCalc\Tamela CS 110MMscfd.ddf
Date: June 11, 2017

DESCRIPTION:

Description: One (1) 110 MMSCFD TEG dehydration unit
Kimray 45015PV glycol pump

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 120.00 deg. F
Pressure: 1200.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1844
Nitrogen	0.5688
Methane	79.1226
Ethane	13.6626
Propane	4.1333
Isobutane	0.5231
n-Butane	0.9624
Isopentane	0.2739
n-Pentane	0.2370
n-Hexane	0.0733
Other Hexanes	0.1284
Heptanes	0.0941
Benzene	0.0027
Toluene	0.0041
Ethylbenzene	0.0002
Xylenes	0.0005
C8+ Heavies	0.0290

DRY GAS:

Flow Rate: 110.0 MMSCF/day
Water Content: 5.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 15.0 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.032 acfm gas/gpm glycol

FLASH TANK:

Flash Control:	Combustion device
Flash Control Efficiency:	98.00 %
Temperature:	80.0 deg. F
Pressure:	5.0 psig

STRIPPING GAS:

Source of Gas:	Dry Gas
Gas Flow Rate:	9.000 scfm

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device:	Condenser
Temperature:	200.0 deg. F
Pressure:	14.7 psia
Control Device:	Combustion Device
Destruction Efficiency:	98.0 %
Excess Oxygen:	0.0 %
Ambient Air Temperature:	0.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Tamela Compressor Station
File Name: Z:\20171806 - Antero WV CS Permit Mods\Tamela CS\Attachment N\GLYCalc\Tamela CS 110MMscfd.ddf
Date: June 11, 2017

DESCRIPTION:

Description: One (1) 110 MMSCFD TEG dehydration unit
Kimray 45015PV glycol pump

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.3698	8.874	1.6196
Ethane	0.1317	3.161	0.5769
Propane	0.0719	1.724	0.3147
Isobutane	0.0147	0.352	0.0643
n-Butane	0.0331	0.795	0.1451
Isopentane	0.0124	0.297	0.0542
n-Pentane	0.0134	0.321	0.0585
n-Hexane	0.0087	0.209	0.0382
Other Hexanes	0.0111	0.267	0.0488
Heptanes	0.0274	0.658	0.1201
Benzene	0.0235	0.565	0.1031
Toluene	0.0534	1.281	0.2338
Ethylbenzene	0.0034	0.081	0.0148
Xylenes	0.0118	0.283	0.0517
C8+ Heavies	0.0527	1.266	0.2310
Total Emissions	0.8390	20.135	3.6747
Total Hydrocarbon Emissions	0.8390	20.135	3.6747
Total VOC Emissions	0.3375	8.100	1.4782
Total HAP Emissions	0.1008	2.420	0.4416
Total BTEX Emissions	0.0921	2.210	0.4034

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	18.4890	443.736	80.9818
Ethane	6.5854	158.049	28.8440
Propane	3.5928	86.227	15.7365
Isobutane	0.7343	17.622	3.2161
n-Butane	1.6563	39.750	7.2544
Isopentane	0.6183	14.839	2.7081
n-Pentane	0.6682	16.038	2.9269
n-Hexane	0.4358	10.459	1.9088
Other Hexanes	0.5568	13.362	2.4386
Heptanes	1.3708	32.899	6.0041
Benzene	1.1786	28.285	5.1621
Toluene	2.6713	64.111	11.7003
Ethylbenzene	0.1687	4.048	0.7388

Xylenes	0.5906	14.175	2.5869
C8+ Heavies	2.6367	63.281	11.5488
Total Emissions	41.9534	1006.882	183.7560
Total Hydrocarbon Emissions	41.9534	1006.882	183.7560
Total VOC Emissions	16.8790	405.097	73.9302
Total HAP Emissions	5.0449	121.079	22.0969
Total BTEX Emissions	4.6091	110.620	20.1881

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.2987	55.169	10.0684
Ethane	0.9921	23.811	4.3455
Propane	0.4949	11.877	2.1675
Isobutane	0.0877	2.104	0.3841
n-Butane	0.1796	4.311	0.7868
Isopentane	0.0573	1.374	0.2508
n-Pentane	0.0547	1.313	0.2396
n-Hexane	0.0216	0.518	0.0945
Other Hexanes	0.0351	0.842	0.1536
Heptanes	0.0332	0.796	0.1453
Benzene	0.0019	0.045	0.0083
Toluene	0.0024	0.059	0.0107
Ethylbenzene	0.0001	0.002	0.0003
Xylenes	0.0002	0.004	0.0008
C8+ Heavies	0.0089	0.214	0.0390
Total Emissions	4.2683	102.439	18.6951
Total Hydrocarbon Emissions	4.2683	102.439	18.6951
Total VOC Emissions	0.9774	23.459	4.2812
Total HAP Emissions	0.0262	0.628	0.1146
Total BTEX Emissions	0.0046	0.110	0.0201

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	114.9363	2758.472	503.4212
Ethane	49.6061	1190.546	217.2746
Propane	24.7431	593.835	108.3749
Isobutane	4.3841	105.219	19.2025
n-Butane	8.9817	215.561	39.3399
Isopentane	2.8626	68.701	12.5380
n-Pentane	2.7353	65.648	11.9808
n-Hexane	1.0789	25.894	4.7256
Other Hexanes	1.7535	42.084	7.6804
Heptanes	1.6584	39.801	7.2636
Benzene	0.0944	2.264	0.4133
Toluene	0.1220	2.928	0.5344
Ethylbenzene	0.0039	0.094	0.0171
Xylenes	0.0087	0.210	0.0383
C8+ Heavies	0.4455	10.692	1.9513
Total Emissions	213.4146	5121.951	934.7560
Total Hydrocarbon Emissions	213.4146	5121.951	934.7560
Total VOC Emissions	48.8722	1172.933	214.0602
Total HAP Emissions	1.3079	31.391	5.7288
Total BTEX Emissions	0.2290	5.497	1.0031

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.6685	64.044	11.6880
Ethane	1.1238	26.972	4.9224
Propane	0.5667	13.601	2.4822
Isobutane	0.1024	2.457	0.4484
n-Butane	0.2128	5.106	0.9319
Isopentane	0.0696	1.671	0.3049
n-Pentane	0.0681	1.634	0.2982
n-Hexane	0.0303	0.727	0.1327
Other Hexanes	0.0462	1.109	0.2024
Heptanes	0.0606	1.454	0.2654
Benzene	0.0254	0.610	0.1114
Toluene	0.0558	1.340	0.2445
Ethylbenzene	0.0034	0.083	0.0151
Xylenes	0.0120	0.287	0.0525
C8+ Heavies	0.0616	1.479	0.2700
Total Emissions	5.1073	122.574	22.3698
Total Hydrocarbon Emissions	5.1073	122.574	22.3698
Total VOC Emissions	1.3149	31.559	5.7594
Total HAP Emissions	0.1270	3.047	0.5562
Total BTEX Emissions	0.0967	2.320	0.4235

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	584.4030	11.6880	98.00
Ethane	246.1186	4.9224	98.00
Propane	124.1113	2.4822	98.00
Isobutane	22.4186	0.4484	98.00
n-Butane	46.5943	0.9319	98.00
Isopentane	15.2461	0.3049	98.00
n-Pentane	14.9077	0.2982	98.00
n-Hexane	6.6344	0.1327	98.00
Other Hexanes	10.1190	0.2024	98.00
Heptanes	13.2677	0.2654	98.00
Benzene	5.5753	0.1114	98.00
Toluene	12.2348	0.2445	98.00
Ethylbenzene	0.7559	0.0151	98.00
Xylenes	2.6252	0.0525	98.00
C8+ Heavies	13.5001	0.2700	98.00
Total Emissions	1118.5120	22.3698	98.00
Total Hydrocarbon Emissions	1118.5120	22.3698	98.00
Total VOC Emissions	287.9904	5.7594	98.00
Total HAP Emissions	27.8256	0.5562	98.00
Total BTEX Emissions	21.1912	0.4235	98.00

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	200.00 deg. F
Condenser Pressure:	14.70 psia
Condenser Duty:	2.29e-001 MM BTU/hr
Produced Water:	19.33 bbls/day
Ambient Temperature:	0.00 deg. F
Excess Oxygen:	0.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	2.29e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
Ethylbenzene	2.00%	98.00%
Xylenes	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

Calculated Absorber Stages:	1.68
Specified Dry Gas Dew Point:	5.00 lbs. H2O/MMSCF
Temperature:	120.0 deg. F
Pressure:	1200.0 psig
Dry Gas Flow Rate:	110.0000 MMSCF/day
Glycol Losses with Dry Gas:	8.4326 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	89.60 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	2.32 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.57%	94.43%
Carbon Dioxide	99.81%	0.19%
Nitrogen	99.98%	0.02%
Methane	99.98%	0.02%
Ethane	99.96%	0.04%
Propane	99.94%	0.06%
Isobutane	99.93%	0.07%
n-Butane	99.91%	0.09%
Isopentane	99.92%	0.08%
n-Pentane	99.91%	0.09%
n-Hexane	99.87%	0.13%
Other Hexanes	99.90%	0.10%
Heptanes	99.80%	0.20%
Benzene	95.07%	4.93%
Toluene	93.95%	6.05%

Ethylbenzene	93.34%	6.66%
Xylenes	90.72%	9.28%
C8+ Heavies	99.55%	0.45%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 80.0 deg. F
Flash Pressure: 5.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.88%	0.12%
Carbon Dioxide	6.23%	93.77%
Nitrogen	0.34%	99.66%
Methane	0.37%	99.63%
Ethane	1.47%	98.53%
Propane	3.88%	96.12%
Isobutane	6.44%	93.56%
n-Butane	8.75%	91.25%
Isopentane	10.79%	89.21%
n-Pentane	13.72%	86.28%
n-Hexane	24.54%	75.46%
Other Hexanes	19.07%	80.93%
Heptanes	42.94%	57.06%
Benzene	92.94%	7.06%
Toluene	95.97%	4.03%
Ethylbenzene	97.96%	2.04%
Xylenes	98.73%	1.27%
C8+ Heavies	86.81%	13.19%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 9.0000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	24.60%	75.40%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.62%	97.38%
n-Pentane	2.26%	97.74%
n-Hexane	1.40%	98.60%
Other Hexanes	3.35%	96.65%
Heptanes	0.90%	99.10%
Benzene	5.32%	94.68%
Toluene	8.17%	91.83%
Ethylbenzene	10.55%	89.45%
Xylenes	13.05%	86.95%

C8+ Heavies	12.44%	87.56%

STREAM REPORTS:

WET GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 4.59e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.89e-001	4.12e+002
Carbon Dioxide	1.84e-001	9.81e+002
Nitrogen	5.68e-001	1.92e+003
Methane	7.90e+001	1.53e+005
Ethane	1.36e+001	4.96e+004
Propane	4.13e+000	2.20e+004
Isobutane	5.22e-001	3.67e+003
n-Butane	9.61e-001	6.76e+003
Isopentane	2.73e-001	2.39e+003
n-Pentane	2.37e-001	2.07e+003
n-Hexane	7.32e-002	7.63e+002
Other Hexanes	1.28e-001	1.34e+003
Heptanes	9.39e-002	1.14e+003
Benzene	2.69e-003	2.55e+001
Toluene	4.09e-003	4.56e+001
Ethylbenzene	2.00e-004	2.57e+000
Xylenes	4.99e-004	6.41e+000
C8+ Heavies	2.89e-002	5.97e+002
Total Components	100.00	2.47e+005

DRY GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 4.58e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.05e-002	2.29e+001
Carbon Dioxide	1.84e-001	9.79e+002
Nitrogen	5.69e-001	1.92e+003
Methane	7.91e+001	1.53e+005
Ethane	1.37e+001	4.96e+004
Propane	4.13e+000	2.20e+004
Isobutane	5.23e-001	3.67e+003
n-Butane	9.62e-001	6.75e+003
Isopentane	2.74e-001	2.39e+003
n-Pentane	2.37e-001	2.06e+003
n-Hexane	7.32e-002	7.62e+002
Other Hexanes	1.28e-001	1.34e+003
Heptanes	9.39e-002	1.14e+003
Benzene	2.57e-003	2.42e+001
Toluene	3.85e-003	4.29e+001

Ethylbenzene	1.87e-004	2.39e+000
Xylenes	4.54e-004	5.82e+000
C8+ Heavies	2.89e-002	5.94e+002
Total Components	100.00	2.47e+005

LEAN GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.32e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	2.18e-012	1.84e-010
Nitrogen	4.56e-013	3.85e-011
Methane	1.03e-017	8.69e-016
Ethane	1.19e-007	1.01e-005
Propane	6.21e-009	5.25e-007
Isobutane	9.03e-010	7.63e-008
n-Butane	1.73e-009	1.46e-007
Isopentane	1.07e-004	9.08e-003
n-Pentane	1.16e-004	9.82e-003
n-Hexane	5.83e-005	4.92e-003
Other Hexanes	1.64e-004	1.39e-002
Heptanes	1.33e-004	1.12e-002
Benzene	7.82e-004	6.61e-002
Toluene	2.81e-003	2.37e-001
Ethylbenzene	2.35e-004	1.99e-002
Xylenes	1.05e-003	8.85e-002
C8+ Heavies	4.32e-003	3.65e-001
Total Components	100.00	8.44e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1214.70 psia
Flow Rate: 1.63e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.18e+001	8.31e+003
Water	5.69e+000	5.16e+002
Carbon Dioxide	2.67e-002	2.42e+000
Nitrogen	1.67e-002	1.51e+000
Methane	1.27e+000	1.15e+002
Ethane	5.56e-001	5.03e+001
Propane	2.84e-001	2.57e+001
Isobutane	5.17e-002	4.69e+000
n-Butane	1.09e-001	9.84e+000
Isopentane	3.54e-002	3.21e+000
n-Pentane	3.50e-002	3.17e+000
n-Hexane	1.58e-002	1.43e+000
Other Hexanes	2.39e-002	2.17e+000
Heptanes	3.21e-002	2.91e+000
Benzene	1.48e-002	1.34e+000

Toluene	3.34e-002	3.03e+000
Ethylbenzene	2.12e-003	1.92e-001
Xylenes	7.59e-003	6.87e-001
C8+ Heavies	3.73e-002	3.38e+000
Total Components	100.00	9.06e+003

FLASH TANK OFF GAS STREAM

Temperature: 80.00 deg. F
Pressure: 19.70 psia
Flow Rate: 3.75e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.40e-001	6.05e-001
Carbon Dioxide	5.21e-001	2.27e+000
Nitrogen	5.43e-001	1.50e+000
Methane	7.25e+001	1.15e+002
Ethane	1.67e+001	4.96e+001
Propane	5.68e+000	2.47e+001
Isobutane	7.64e-001	4.38e+000
n-Butane	1.56e+000	8.98e+000
Isopentane	4.02e-001	2.86e+000
n-Pentane	3.84e-001	2.74e+000
n-Hexane	1.27e-001	1.08e+000
Other Hexanes	2.06e-001	1.75e+000
Heptanes	1.68e-001	1.66e+000
Benzene	1.22e-002	9.44e-002
Toluene	1.34e-002	1.22e-001
Ethylbenzene	3.73e-004	3.91e-003
Xylenes	8.34e-004	8.75e-003
C8+ Heavies	2.65e-002	4.45e-001
Total Components	100.00	2.18e+002

FLASH TANK GLYCOL STREAM

Temperature: 80.00 deg. F
Flow Rate: 1.58e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.40e+001	8.31e+003
Water	5.83e+000	5.15e+002
Carbon Dioxide	1.70e-003	1.50e-001
Nitrogen	5.83e-005	5.15e-003
Methane	4.84e-003	4.28e-001
Ethane	8.38e-003	7.40e-001
Propane	1.13e-002	1.00e+000
Isobutane	3.41e-003	3.02e-001
n-Butane	9.74e-003	8.61e-001
Isopentane	3.92e-003	3.46e-001
n-Pentane	4.92e-003	4.35e-001
n-Hexane	3.97e-003	3.51e-001
Other Hexanes	4.68e-003	4.13e-001
Heptanes	1.41e-002	1.25e+000
Benzene	1.40e-002	1.24e+000

Toluene	3.28e-002	2.90e+000
Ethylbenzene	2.13e-003	1.88e-001
Xylenes	7.68e-003	6.78e-001
C8+ Heavies	3.32e-002	2.93e+000
Total Components	100.00	8.84e+003

FLASH GAS EMISSIONS

Flow Rate: 1.40e+004 scfh
Control Method: Combustion Device
Control Efficiency: 98.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.25e+001	4.16e+002
Carbon Dioxide	3.68e+001	5.98e+002
Nitrogen	1.45e-001	1.50e+000
Methane	3.88e-001	2.30e+000
Ethane	8.93e-002	9.92e-001
Propane	3.04e-002	4.95e-001
Isobutane	4.08e-003	8.77e-002
n-Butane	8.36e-003	1.80e-001
Isopentane	2.15e-003	5.73e-002
n-Pentane	2.05e-003	5.47e-002
n-Hexane	6.78e-004	2.16e-002
Other Hexanes	1.10e-003	3.51e-002
Heptanes	8.96e-004	3.32e-002
Benzene	6.54e-005	1.89e-003
Toluene	7.17e-005	2.44e-003
Ethylbenzene	2.00e-006	7.83e-005
Xylenes	4.46e-006	1.75e-004
C8+ Heavies	1.42e-004	8.91e-003
Total Components	100.00	1.02e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.79e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.30e+001	3.88e+002
Carbon Dioxide	2.60e-002	2.66e-001
Nitrogen	3.57e-002	2.32e-001
Methane	4.97e+000	1.85e+001
Ethane	9.45e-001	6.59e+000
Propane	3.52e-001	3.59e+000
Isobutane	5.45e-002	7.34e-001
n-Butane	1.23e-001	1.66e+000
Isopentane	3.70e-002	6.18e-001
n-Pentane	4.00e-002	6.68e-001
n-Hexane	2.18e-002	4.36e-001
Other Hexanes	2.79e-002	5.57e-001
Heptanes	5.90e-002	1.37e+000
Benzene	6.51e-002	1.18e+000
Toluene	1.25e-001	2.67e+000

Component	Conc. (wt%)	Loading (lb/hr)
Ethylbenzene	6.85e-003	1.69e-001
Xylenes	2.40e-002	5.91e-001
C8+ Heavies	6.68e-002	2.64e+000
Total Components	100.00	4.31e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 200.00 deg. F
Flow Rate: 5.64e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.82e+002	999981.
Carbon Dioxide	4.11e-005	1.16e-004	0.
Nitrogen	1.63e-006	4.59e-006	0.
Methane	2.06e-004	5.81e-004	2.
Ethane	7.71e-005	2.18e-004	1.
Propane	5.65e-005	1.59e-004	1.
Isobutane	5.91e-006	1.67e-005	0.
n-Butane	1.62e-005	4.57e-005	0.
Isopentane	3.91e-006	1.10e-005	0.
n-Pentane	4.35e-006	1.23e-005	0.
n-Hexane	2.09e-006	5.90e-006	0.
Other Hexanes	2.28e-006	6.42e-006	0.
Heptanes	3.50e-006	9.87e-006	0.
Benzene	4.72e-004	1.33e-003	5.
Toluene	7.80e-004	2.20e-003	8.
Ethylbenzene	3.36e-005	9.47e-005	0.
Xylenes	1.50e-004	4.24e-004	2.
C8+ Heavies	7.36e-007	2.08e-006	0.
Total Components	100.00	2.82e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 200.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

CONDENSER VENT STREAM

Temperature: 200.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.85e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.85e+001	1.06e+002
Carbon Dioxide	8.03e-002	2.66e-001
Nitrogen	1.10e-001	2.32e-001
Methane	1.53e+001	1.85e+001
Ethane	2.91e+000	6.59e+000
Propane	1.08e+000	3.59e+000
Isobutane	1.68e-001	7.34e-001
n-Butane	3.79e-001	1.66e+000
Isopentane	1.14e-001	6.18e-001
n-Pentane	1.23e-001	6.68e-001

n-Hexane	6.73e-002	4.36e-001
Other Hexanes	8.60e-002	5.57e-001
Heptanes	1.82e-001	1.37e+000
Benzene	2.01e-001	1.18e+000
Toluene	3.86e-001	2.67e+000
Ethylbenzene	2.11e-002	1.69e-001
Xylenes	7.40e-002	5.90e-001
C8+ Heavies	2.06e-001	2.64e+000
Total Components	100.00	1.49e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.22e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	7.19e+001	3.70e-001
Ethane	1.37e+001	1.32e-001
Propane	5.08e+000	7.19e-002
Isobutane	7.88e-001	1.47e-002
n-Butane	1.78e+000	3.31e-002
Isopentane	5.34e-001	1.24e-002
n-Pentane	5.77e-001	1.34e-002
n-Hexane	3.15e-001	8.72e-003
Other Hexanes	4.03e-001	1.11e-002
Heptanes	8.53e-001	2.74e-002
Benzene	9.40e-001	2.35e-002
Toluene	1.81e+000	5.34e-002
Ethylbenzene	9.90e-002	3.37e-003
Xylenes	3.47e-001	1.18e-002
C8+ Heavies	9.65e-001	5.27e-002
Total Components	100.00	8.39e-001

ProMax 4.0

Bryan Research & Engineering, Inc.

ProMax® 4.0

Simulation Report

Project: Tamela CS.pmx

Licensed to Kleinfelder, Inc. and Affiliates

Client Name: Antero Midstream LLC
Location: Tamela CS
Job:

ProMax Filename: W:\20171806 - Antero WV CS Permit Mods\Tamela CS\Attachment N\ProMax\Tamela CS.pmx
ProMax Version: 4.0.16071.0
Simulation Initiated: 6/9/2017 12:00:32 PM

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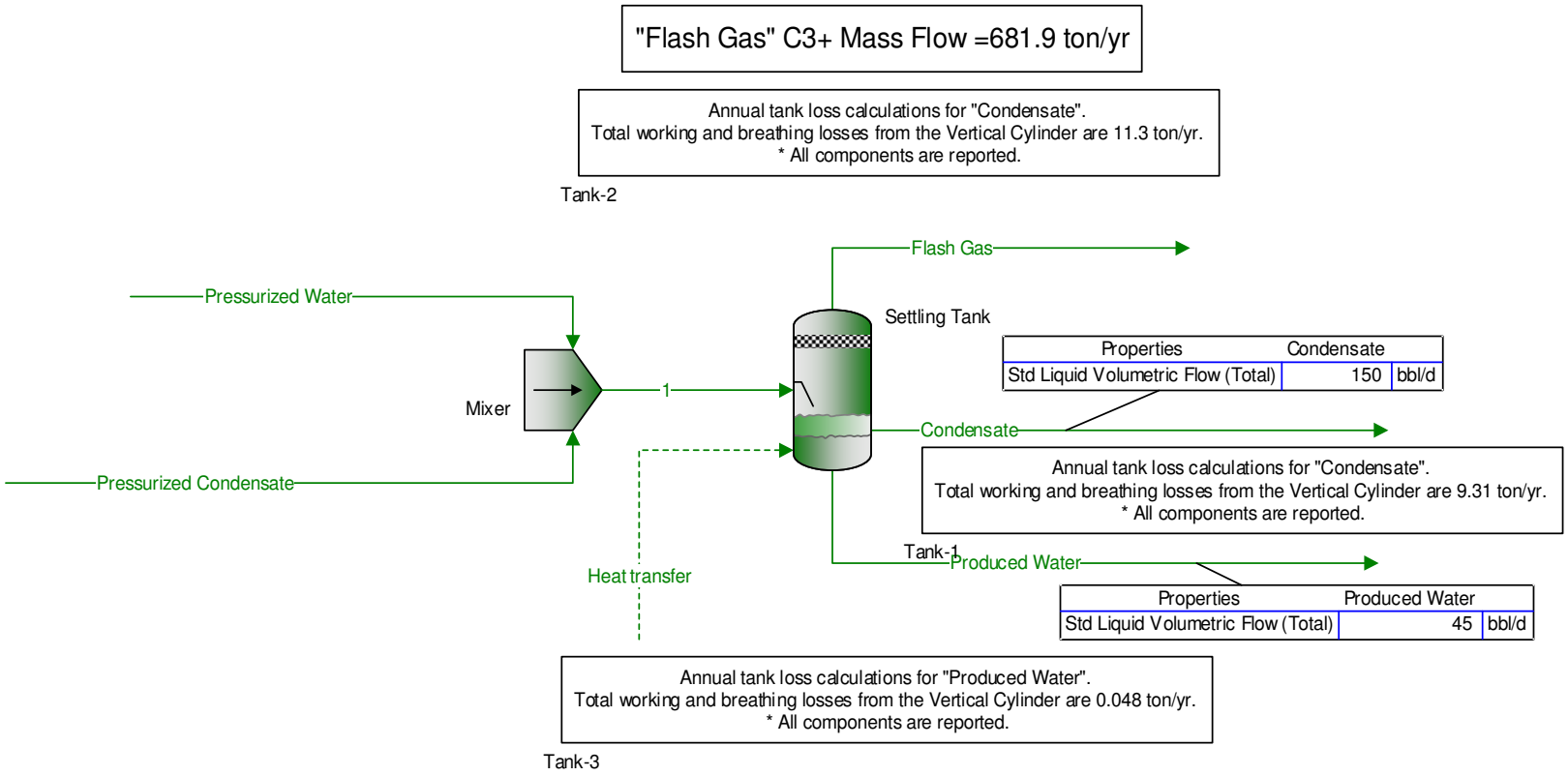
Report Navigator can be activated via the ProMax Navigator Toolbar.
An asterisk (*), throughout the report, denotes a user specified value.
A question mark (?) after a value, throughout the report, denotes an extrapolated or approximate value.


"Flash Gas" C3+ Mass Flow =681.9 ton/yr
Annual tank loss calculations for "Condensate".
Total working and breathing losses from the Vertical Cylinder are 11.3 ton/yr.
* All components are reported.
Tank-2
Flash Gas
Pressurized Water
Settling Tank
Properties Condensate
Std Liquid Volumetric Flow (Total) 150 bbl/d
Mixer
1
Condensate
Pressurized Condensate
Annual tank loss calculations for "Condensate".
Total working and breathing losses from the Vertical Cylinder are 9.31 ton/yr.
* All components are reported.
Tank-1
Produced Water
Heat transfer
Properties Produced Water
Std Liquid Volumetric Flow (Total) 45 bbl/d
Annual tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.048 ton/yr.
* All components are reported.
Tank-3

Process Streams		Condensate	Flash Gas	Pressurized Condensate	Pressurized Water	Produced Water	1
Composition	**Status:**	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	**From Block:**	Settling Tank	Settling Tank	--	--	Settling Tank	Mixer
	To Block:	--	--	Mixer	Mixer	--	Settling Tank
Mole Fraction		%	%	%	%	%	%
Methane		0.126679	23.8901	6.88593*	0.688599*	0.000645889	2.49580
Ethane		0.975487	26.7851	8.32192*	0.832199*	0.00116388	3.01628
Propane		3.18548	22.7297	8.76091*	0.876099*	0.000704951	3.17539
i-Butane		1.70931	4.57043	2.53197*	0.253200*	0.000109358	0.917714
n-Butane		5.91966	10.6003	7.28193*	0.728199*	0.000298918	2.63933
i-Pentane		4.66063	3.16963	4.26096*	0.426100*	6.79978E-05	1.54438
n-Pentane		6.47908	3.20928	5.58294*	0.558299*	2.36968E-05	2.02354
n-Hexane		6.22925	0.825469	4.72495*	0.472500*	4.33783E-06	1.71256
n-Heptane		17.3780	0.672921	12.7179*	1.27180*	2.78217E-06	4.60959
n-Octane		19.7775	0.224015	14.3199*	1.43200*	3.68502E-07	5.19023
n-Nonane		8.49169	0.0277677	6.12894*	0.612899*	5.87557E-08	2.22143
Benzene		0.127935	0.0163426	0.0969990*	0.00969999*	7.55420E-05	0.0351573
Toluene		0.968923	0.0329458	0.707993*	0.0707999*	0.000113099	0.256612
Ethylbenzene		0.987772	0.0102723	0.714993*	0.0714999*	3.35689E-05	0.259149
Nitrogen		8.04022E-05	0.0525408	0.0149999*	0.00150000*	6.92813E-07	0.00543669
p-Xylene		2.57673	0.0263870	1.86498*	0.186500*	5.78723E-05	0.675962
2,2,4-Trimethylpentane		0	0	0*	0*	0	0
2-Methylpentane		6.79210	1.31519	5.26995*	0.526999*	1.44154E-05	1.91009
Carbon Dioxide		0.00140623	0.0875491	0.0259997*	0.00260000*	5.15036E-05	0.00942360
Water		0.0398452	1.74517	0*	89.9999*	99.9966	63.7550
Decanes+		13.5725	0.00874867	9.78590*	0.978599*	3.94007E-07	3.54690
Mass Fraction		%	%	%	%	%	%
Methane		0.0199838	9.92822	1.31213*	0.448462*	0.000575135	0.953307
Ethane		0.288433	20.8639	2.97227*	1.01586*	0.00194253	2.15945
Propane		1.38125	25.9639	4.58870*	1.56833*	0.00172542	3.33384
i-Butane		0.976940	6.88146	1.74802*	0.597438*	0.000352802	1.26999
n-Butane		3.38332	15.9604	5.02728*	1.71823*	0.000964350	3.65248
i-Pentane		3.30657	5.92406	3.65158*	1.24804*	0.000272310	2.65299
n-Pentane		4.59670	5.99816	4.78450*	1.63525*	9.48986E-05	3.47609
n-Hexane		5.27865	1.84275	4.83643*	1.65300*	2.07490E-05	3.51382
n-Heptane		17.1230	1.74671	15.1368*	5.17347*	1.54739E-05	10.9974
n-Octane		22.2152	0.662878	19.4293*	6.64056*	2.33644E-06	14.1160
n-Nonane		10.7096	0.0922564	9.33694*	3.19118*	4.18278E-07	6.78358
Benzene		0.0982678	0.0330688	0.0899972*	0.0307593*	0.000327526	0.0653858
Toluene		0.877877	0.0786363	0.774844*	0.264826*	0.000578414	0.562949
Ethylbenzene		1.03120	0.0282508	0.901629*	0.308159*	0.000197815	0.655062
Nitrogen		2.21481E-05	0.0381280	0.00499111*	0.00170586*	1.07727E-06	0.00362620
p-Xylene		2.69001	0.0725692	2.35180*	0.803799*	0.000341030	1.70866
2,2,4-Trimethylpentane		0	0	0*	0*	0	0
2-Methylpentane		5.75560	2.93598	5.39429*	1.84366*	6.89523E-05	3.91912
Carbon Dioxide		0.000608567	0.0998112	0.0135913*	0.00464523*	0.000125813	0.00987449
Water		0.00705864	0.814444	0*	65.8220*	99.9924	27.3468
Decanes+		20.2598	0.0344029	17.6448*	6.03065*	3.31983E-06	12.8195
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Methane		0.304368	22.6442	18.4664*	4.48596*	0.00377577	22.9524
Ethane		4.39305	47.5862	41.8303*	10.1617*	0.0127527	51.9920
Propane		21.0375	59.2184	64.5793*	15.6880*	0.0113274	80.2672
i-Butane		14.8795	15.6952	24.6008*	5.97618*	0.00231615	30.5770
n-Butane		51.5304	36.4023	70.7517*	17.1874*	0.00633098	87.9391
i-Pentane		50.3615	13.5116	51.3907*	12.4841*	0.00178772	63.8748
n-Pentane		70.0112	13.6806	67.3350*	16.3574*	0.000623011	83.6924
n-Hexane		80.3977	4.20292	68.0658*	16.5349*	0.000136217	84.6007
n-Heptane		260.795	3.98389	213.029*	51.7503*	0.000101586	264.779
n-Octane		338.353	1.51189	273.440*	66.4255*	1.53388E-05	339.865
n-Nonane		163.115	0.210418	131.404*	31.9214*	2.74601E-06	163.325
Benzene		1.49669	0.0754232	1.26658*	0.307685*	0.00215022	1.57427
Toluene		13.3707	0.179353	10.9048*	2.64906*	0.00379730	13.5539
Ethylbenzene		15.7059	0.0644342	12.6891*	3.08251*	0.00129866	15.7716
Nitrogen		0.000337333	0.0869620	0.0702427*	0.0170638*	7.07227E-06	0.0873064
p-Xylene		40.9708	0.165515	33.0982*	8.04040*	0.00223887	41.1386
2,2,4-Trimethylpentane		0	0	0*	0*	0	0
2-Methylpentane		87.6621	6.69637	75.9168*	18.4421*	0.000452673	94.3589
Carbon Dioxide		0.00926892	0.227649	0.191277*	0.0464662*	0.000825962	0.237744
Water		0.107508	1.85758	0*	658.417*	656.452	658.417
Decanes+		308.571	0.0784660	248.325*	60.3246*	2.17948E-05	308.650

Process Streams		Condensate	Flash Gas	Pressurized Condensate	Pressurized Water	Produced Water	1
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	Settling Tank	Settling Tank	--	--	Settling Tank	Mixer
	To Block:	--	--	Mixer	Mixer	--	Settling Tank
Property	**Units**						
Temperature	°F	60	60*	120*	120*	60	119.732
Pressure	psig	0	0*	300*	300*	0	300
Mole Fraction Vapor	%	0	100	0.992109	0.0705114	0	0.353642
Mole Fraction Light Liquid	%	100	0	99.0079	9.91117	100	35.9262
Mole Fraction Heavy Liquid	%	0	0	0	90.0183	0	63.7202
Molecular Weight	lb/lbmol	101.694	38.6028	84.1890	24.6327	18.0160	41.9999
Mass Density	lb/ft^3	43.8125	0.103141	37.0269	50.7782	62.3675	41.6361
Molar Flow	lbmol/h	14.9770	5.90837	16.7166	40.6086	36.4399	57.3252
Mass Flow	lb/h	1523.07	228.079	1407.36	1000.30	656.502	2407.66
Vapor Volumetric Flow	ft^3/h	34.7634	2211.34	38.0090	19.6994	10.5263	57.8261
Liquid Volumetric Flow	gpm	4.33414	275.700	4.73878	2.45603	1.31238	7.20949
Std Vapor Volumetric Flow	MMSCFD	0.136405	0.0538111	0.152249	0.369847	0.331880	0.522096
Std Liquid Volumetric Flow	sgpm	4.37500	0.973487	4.30015*	2.36084*	1.31250	6.66099
Compressibility		0.00611652	0.986268	0.115023	0.0245404	0.000761215	0.0510536
Specific Gravity		0.702473	1.33285			0.999976	
API Gravity		69.9314				10.0034	
Enthalpy	Btu/h	-1.37828E+06	-264006	-1.29407E+06	-4.77721E+06	-4.48884E+06	-6.07128E+06
Mass Enthalpy	Btu/lb	-904.934	-1157.52	-919.505	-4775.78	-6837.51	-2521.66
Mass Cp	Btu/(lb*°F)	0.499940	0.409391	0.554457	0.835410	0.983096	0.671001
Ideal Gas CpCv Ratio		1.05481	1.14491	1.06024	1.22511	1.32631	1.12523
Dynamic Viscosity	cP	0.461549	0.00856267			1.13433	
Kinematic Viscosity	cSt	0.657656	5.18273			1.13543	
Thermal Conductivity	Btu/(h*ft*°F)	0.0708891	0.0114601			0.342241	
Net Ideal Gas Heating Value	Btu/ft^3	5142.72	2017.35	4280.80	428.084	0.0698165	1551.57
Net Liquid Heating Value	Btu/lb	19032.3	19682.5	19139.6	5843.99	-1058.22	13615.7
Gross Ideal Gas Heating Value	Btu/ft^3	5534.79	2197.37	4614.35	506.718	50.3840	1704.54
Gross Liquid Heating Value	Btu/lb	20495.3	21452.2	20643.1	7055.40	1.58105	14997.9

Settling Tank W&B Inputs

Process Stream	Condensate	
Tank Geometry	Vertical Cylinder	
Shell Length	25	ft
Shell Diameter	12	ft
Number of Storage Tanks Employed	1	
Location	Charleston, WV	
Time Frame	Year	
Net Throughput	195	bbl/day
Report Components	All	
Set Bulk Temperature to Stream Temperature?	TRUE	
Use AP42 Raoult's Vapor Pressure?	TRUE	
Maximum Fraction Fill of Tank	90	%
Average Fraction Fill of Tank	50	%
Material Category	Light Organics	
Tank Color	Dark Green	
Shell Paint Condition	Good	
Operating Pressure	0	psig
Breather Vent Pressure	0.03	psig
Breather Vacuum Pressure	-0.03	psig
Roof Type	Dome	
Radius of Domed Roof	6	ft
Roof Color	Dark Green	
Roof Paint Condition	Good	

ProMax AP-42 Emissions Report
Annual Emissions
Settling Tank

Components	Working Losses (ton/yr)	Breathing Losses (ton/yr)	Total Losses (ton/yr)
Mixture	6.218	5.086	11.3
Methane	0.06192	0.05065	0.1126
Ethane	1.439	1.177	2.616
Propane	1.769	1.447	3.215
i-Butane	0.4678	0.3826	0.8504
n-Butane	1.118	0.9147	2.033
i-Pentane	0.4044	0.3308	0.7352
n-Pentane	0.4151	0.3395	0.7546
n-Hexane	0.1356	0.1109	0.2465
n-Heptane	0.1268	0.1037	0.2305
n-Octane	0.04868	0.03982	0.0885
n-Nonane	0.006964	0.005696	0.01266
Benzene	0.001555	0.001272	0.002828
Toluene	0.004006	0.003277	0.007284
Ethylbenzene	0.001579	0.001292	0.002871
Nitrogen	2.13E-05	1.75E-05	3.88E-05
p-Xylene	0.003683	0.003013	0.006696
2,2,4-Trimethylpentane	0	0	0
2-Methylpentane	0.2086	0.1707	0.3793
Carbon Dioxide	0.003735	0.003055	0.00679
Water	1.87E-05	1.53E-05	3.40E-05
Decanes+	0.00211	0.001726	0.003836

Condensate Tank Inputs

Process Stream	Condensate	
Tank Geometry	Vertical Cylinder	
Shell Length	20	ft
Shell Diameter	12	ft
Number of Storage Tanks Employed	1	
Location	Charleston, WV	
Time Frame	Year	
Net Throughput	75	bbl/day
Report Components	All	
Set Bulk Temperature to Stream Temperature?	TRUE	
Use AP42 Raoult's Vapor Pressure?	TRUE	
Maximum Fraction Fill of Tank	90	%
Average Fraction Fill of Tank	50	%
Material Category	Light Organics	
Tank Color	Dark Green	
Shell Paint Condition	Good	
Operating Pressure	0	psig
Breather Vent Pressure	0.03	psig
Breather Vacuum Pressure	-0.03	psig
Roof Type	Dome	
Radius of Domed Roof	6	ft
Roof Color	Dark Green	
Roof Paint Condition	Good	

ProMax AP-42 Emissions Report
Annual Emissions
Single Condensate Tank

Components	Working Losses (ton/yr)	Breathing Losses (ton/yr)	Total Losses (ton/yr)
Mixture	4.22	5.09	9.31
Methane	0.042	0.0507	0.0927
Ethane	0.977	1.18	2.15
Propane	1.2	1.45	2.65
i-Butane	0.318	0.383	0.7
n-Butane	0.759	0.915	1.67
i-Pentane	0.275	0.331	0.605
n-Pentane	0.282	0.34	0.621
n-Hexane	0.0921	0.111	0.203
n-Heptane	0.0861	0.104	0.19
n-Octane	0.0331	0.0398	0.0729
n-Nonane	0.00473	0.0057	0.0104
Benzene	0.00106	0.00127	0.00233
Toluene	0.00272	0.00328	0.006
Ethylbenzene	0.00107	0.00129	0.00236
Nitrogen	1.45E-05	1.75E-05	3.19E-05
p-Xylene	0.0025	0.00301	0.00551
2,2,4-Trimethylpentane	0	0	0
2-Methylpentane	0.142	0.171	0.312
Carbon Dioxide	0.00254	0.00306	0.00559
Water	1.27E-05	1.53E-05	2.80E-05
Decanes+	0.00143	0.00173	0.00316

Produced Water Tank Inputs

Process Stream	Condensate	
Tank Geometry	Vertical Cylinder	
Shell Length	20	ft
Shell Diameter	12	ft
Number of Storage Tanks Employed	1	
Location	Charleston, WV	
Time Frame	Year	
Net Throughput	22.5	bbl/day
Report Components	All	
Set Bulk Temperature to Stream Temperature?	TRUE	
Use AP42 Raoult's Vapor Pressure?	TRUE	
Maximum Fraction Fill of Tank	90	%
Average Fraction Fill of Tank	50	%
Material Category	Light Organics	
Tank Color	Dark Green	
Shell Paint Condition	Good	
Operating Pressure	0	psig
Breather Vent Pressure	0.03	psig
Breather Vacuum Pressure	-0.03	psig
Roof Type	Dome	
Radius of Domed Roof	6	ft
Roof Color	Dark Green	
Roof Paint Condition	Good	

ProMax AP-42 Emissions Report
Annual Emissions
Single Produced Water Tank

Components	Working Losses (ton/yr)	Breathing Losses (ton/yr)	Total Losses (ton/yr)
Mixture	0.024	0.023	0.048
Methane	0.00023	0.00022	0.00045
Ethane	0.00065	0.00063	0.0013
Propane	0.00012	0.00012	0.00024
i-Butane	8.20E-06	7.90E-06	1.60E-05
n-Butane	1.60E-05	1.60E-05	3.20E-05
i-Pentane	1.60E-06	1.50E-06	3.10E-06
n-Pentane	2.80E-07	2.70E-07	5.60E-07
n-Hexane	1.40E-08	1.40E-08	2.80E-08
n-Heptane	2.50E-09	2.50E-09	5.00E-09
n-Octane	6.00E-11	5.80E-11	1.20E-10
n-Nonane	3.20E-12	3.10E-12	6.40E-12
Benzene	3.30E-07	3.20E-07	6.50E-07
Toluene	1.70E-07	1.60E-07	3.30E-07
Ethylbenzene	1.90E-08	1.90E-08	3.80E-08
Nitrogen	2.60E-07	2.50E-07	5.10E-07
p-Xylene	3.00E-08	2.90E-08	5.80E-08
2,2,4-Trimethylpentane	0	0	0
2-Methylpentane	9.50E-08	9.10E-08	1.90E-07
Carbon Dioxide	7.40E-05	7.10E-05	0.00015
Water	0.023	0.022	0.045
Decanes+	1.80E-11	1.80E-11	3.60E-11

Attachment O.
Monitoring, Recordkeeping, Reporting, and Testing Plans

Monitoring, Recordkeeping, Reporting, and Testing Plans

The following is a summary of the methods to comply with the requirements of West Virginia Division of Air Quality (WVDAQ) 45CSR13 rules and regulations for the Tamela Compressor Station, including federal and state regulatory requirements.

1. Summary of Key Operational Throughput Limits

a. Maximum dry gas throughput into each Dehydrators: 110 MMscf/day or 40,150 MMscf/year.

b. Maximum liquids loaded out: 2,989,350 gallons per year.

2. Operational Requirements

a. Compressor engines will operate with the catalytic converter in place at all times and will be fueled by natural gas only.

b. Catalysts installed on all compressor engines will be operated per manufacturer instructions.

c. Reciprocating compressor rod packing will be replaced within 36 months of last packing/startup or within 26,000 operating hours, whichever comes first.

d. Microturbines will be fueled by natural gas only.

e. Each Dehydrators Reboiler will operate at no more than 1.5 MMBtu/hr and fueled only by natural gas or off-gases from the dehydrator flash tanks.

f. No fuel-burning unit of any kind will have opacity greater than 10 percent based on a six minute block average observation.

g. The dehydrator flare capacity will not exceed 4.80 MMBtu/hr, will achieve 98 percent destruction efficiency, will operate at all times that gas is vented to it, will have a flame present at all times, and will have no visible emissions other than for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

h. The flare will be operated per manufacturer instructions.

i. Produced water, Condensate, and Settling storage tanks potential emissions will be routed to the VRU with recovery greater than 98 percent at all times.

j. Storage tanks will be covered and routed to a closed vent system with no detectable emissions.

k. Liquid loadout trucks will use the submerged-fill method.

l. Dehydrator still vents will be controlled by the flare.

m. Dehydrator flash tank vent gas is to be used in the reboiler as fuel or routed to the VRU system.

3. Monitoring

a. Non-certified engines will be stack tested within 1 year of startup and every 8,760 hours of operation thereafter.

b. Catalyst inlet temperature will be monitored.

c. Compressor run time or number of months since compressor rod repacking will be monitored or tracked.

d. Rolling 12-month average dry gas throughput for the dehydrators will be monitored.

e. Initial Method 22 observation of the reboiler exhaust, fuel conditioning heater exhaust, and flare will be conducted for a minimum of 2 hours.

f. Monthly Method 22 observations of the reboiler exhaust, fuel conditioning heater exhaust, and flare will be conducted for a minimum of 10 minutes each.

g. Monthly olfactory, visual, and auditory inspections will be conducted of the tanks closed vent and control system (flare) for leaks or defects that could result in emissions. Leaks will be repaired as soon as practicable (no later than 5 days for first attempt).

h. The presence of flare flame will continuously be monitored.

i. Monthly and rolling twelve-month average amount of liquids loaded out will be monitored.

4. Recordkeeping

a. Records will be kept on-site for a minimum of 2 years, and in company records (on or off-site) for a minimum of 5 years.

b. Records of inspection, observations, preventive maintenance, malfunctions, and shutdowns of all onsite equipment will be kept.

c. Records of the date, time, duration of each time that a flame is not present at the flare and startup, shutdown, malfunctions of the flare will be kept.

d. Records of engine maintenance and engine run time will be kept.

e. Records of catalyst inlet temperature will be kept.

f. Records of the actual annual average natural gas throughput in the dehydrators will be kept.

5. Notifications and Reports

a. WVDAQ will be notified within 30 calendar days of commencement of construction.

b. WVDAQ will be notified within 30 calendar days of startup.

c. Upon startup, a Certificate to Operate (CTO) application will be filed and fees to WVDAQ will be paid for the period from startup to the following June 30 and then annually renew the CTO and pay fees. CTO will be maintained on-site.

d. An annual report of compliance with 40 CFR 60 Subpart OOOOa for applicable affected facilities will be submitted within 90 days after one year of operations startup.

e. For stack testing, a protocol will be filed at least 30 days prior to test and WVDAQ and EPA will be notified of the test at least 15 days prior to test. Results will be reported within 60 days of the test.

f. If operations are suspended for 60 days or more, WVDAQ will be notified within 2 weeks after the 60th day.

Attachment P.
Public Notice

AIR QUALITY PERMIT NOTICE
Notice of Application – Tamela Compressor Station

Notice is given that Antero Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 Construction Permit Modification for a Natural Gas Compressor Station located northwest of Long Run near West Union, in Doddridge County, West Virginia. The latitude and longitude coordinates are: 39.32611N, 80.84278W.

The applicant estimates the change in potential to discharge of the following Regulated Air Pollutants will be:

Pollutant	Change in Potential Emissions (tons/yr)
Nitrogen Oxides (NOx)	-0.11
Carbon Monoxide (CO)	-0.09
Volatile Organic Compounds (VOC)	24.49
Particulate Matter less than 10 µm (PM_{10})	-0.01
Particulate Matter less than 2.5 µm ($PM_{2.5}$)	0.00
Sulfur Dioxide (SO_2)	0.00
Formaldehyde	0.00
Total HAPs	0.02
Carbon Dioxide equivalent (CO_2e)	1,715

Note that a negative change reflects a decrease in potential emissions.

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

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

Dated the 11th day of July 2017.

By: Antero Midstream LLC
Barry Schatz
Senior Environmental and Regulatory Manager
1615 Wynkoop Street
Denver, CO 80202

Attachment R.
Authority/Delegation of Authority

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: August 5 , 2015

ATTN.: Director

Corporation's / other business entity's Federal Employer I.D. Number 46-5517375

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) Luz Slauter and 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.

Ward McNeilly, Vice President - Vice President Reserves Planning & Midstream

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

Antero Midstream LLC
Name of Corporation or business entity