



Williams Ohio Valley Midstream LLC
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275
(412) 787-7300
(412) 787-6002 fax

November 20, 2015
(Via Federal Express)

Beverly McKeone
New Source Review Program Manager
Division of Air Quality
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304-2345

Subject: Application for 45CSR13 NSR Construction Permit
Williams Ohio Valley Midstream LLC
BALL DEHYDRATION STATION
Tyler County, West Virginia

Dear Ms. McKeone:

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 New Source Review (NSR) Construction Permit for the proposed Ball Dehydration Station to be located off Highway 42/Scales Run Road near Middlebourne in Tyler County, West Virginia.

This application for 45CSR13 NSR Construction Permit has been prepared and submitted to provide for the construction and operation of the following equipment at the subject facility:

- One (1) New 55.0 MMscfd Triethylene Glycol (TEG) Dehydrator 01 comprised of:
 - One (1) Flash Tank w/ $\geq 90\%$ Off-Gas Recycle/Recompression DFT-01/1E
 - One (1) Regenerator/Still Vent w/ 95% BTEX Skid (BTEX-01) DSV-01/2E
 - One (1) 1.50 MMBtu/hr Natural Gas-Fired Reboiler RBV-01/3E
- One (1) New 1.50 MMBtu/hr BTEX Burner HTR-01/4E
- One (1) New Capstone C65 Microturbine Generator CT-01/5E
- Startup, Shutdown and Maintenance Emissions SSM/6E
- Piping and Equipment Fugitives – Gas FUG/1F

The facility qualifies as a Minor Source under Non-Attainment New Source Review (NNSR), Prevention of Significant Deterioration (PSD), and Title V Operating Permits. The facility is also an Area Source for Hazardous Air Pollutants (HAP) under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations.

Beverly McKeone
WVDEP – Division of Air Quality
November 20, 2015
Page 02 of 02

If you have any questions concerning this submittal or need additional information, please contact me at (412) 787-4259 or Danell.Zawaski@Williams.com.

Sincerely,

A handwritten signature in blue ink that reads "Danell Zawaski". The signature is fluid and cursive, with the first name "Danell" and last name "Zawaski" clearly legible.

R. Danell Zawaski, P.E.
Environmental Specialist

Enclosures:

Application for NSR Construction Permit
Attachments A through S
Check for Application Fee

**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

For the:

Williams Ohio Valley Midstream LLC

BALL DEHYDRATION STATION

Tyler County, West Virginia

Submitted to:



WEST VIRGINIA

**DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY**

Submitted by:



Williams Ohio Valley Midstream LLC

Park Place Corporate Center 2

2000 Commerce Drive

Pittsburgh, PA 15275

Prepared by:



EcoLogic Environmental Consultants, LLC

864 Windsor Court

Santa Barbara, CA 93111

November 2015

**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

Williams Ohio Valley Midstream LLC
BALL DEHYDRATION STATION
Tyler County, West Virginia

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APPLICATION FEE

**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

- **SECTION I. General**
 - **SECTION II. Additional Attachments and Supporting Documents**
 - **SECTION III. Certification of Information**
-



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** ☒ **NOT APPLICABLE**

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): WILLIAMS OHIO VALLEY MIDSTREAM LLC		2. Federal Employer ID No. (FEIN): 27-0856707	
3. Name of facility (if different from above): BALL DEHYDRATION STATION		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: PARK PLACE CORPORATE CENTER 2 2000 COMMERCE DRIVE PITTSBURGH, PA 15275		5B. Facility's present physical address: OFF HIGHWAY 42/SCALES RUN ROAD MIDDLEBOURNE, WV 26149	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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: THE WILLIAMS COMPANIES, INC.			
8. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, please explain: APPLICANT LEASES THE PROPERTY – 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.): 1389 - OIL AND GAS FIELD SERVICES, N.E.C.		10. North American Industry Classification System (NAICS) code for the facility: 213112 - SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS	
11A. DAQ Plant ID No. (existing facilities): NA		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities): NA	
12A. Directions to the facility: – For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; – For Construction or Relocation permits , please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B . FROM THE INTERSECTION OF WV ROUTE 18 AND WV ROUTE 180, TRAVEL NORTH ON WV ROUTE 180 FOR APPROXIMATELY 0.2 MILES, THEN TURN RIGHT ONTO COUNTY HWY 11/ ELK FORK ROAD. TRAVEL APPROXIMATELY 7.7 MILES, THEN TURN RIGHT ONTO COUNTY HIGHWAY 42/SCALES RUN ROAD. TRAVEL APPROXIMATELY 0.7 MILES TO THE BALL STATION ACCESS GATE WHICH WILL BE ON YOUR LEFT. FOLLOW THE ACCESS ROAD STRAIGHT UP THE HILL UNTIL YOU'VE REACHED THE SITE.			

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

12.B. New site address (if applicable): SEE ABOVE	12C. Nearest city or town: MIDDLEBOURNE	12D. County: TYLER
12.E. UTM Northing (KM): 4,372.95 KM NORTHING	12F. UTM Easting (KM): 521.09 KM EASTING	12G. UTM Zone: 17S
13. Briefly describe the proposed change(s) at the facility: THIS APPLICATION FOR 45CSR13 NSR CONSTRUCTION PERMIT HAS BEEN PREPARED AND SUBMITTED TO PROVIDE FOR THE FOLLOWING EQUIPMENT AND OPERATIONS AT THE SUBJECT FACILITY: <ul style="list-style-type: none"> • ONE (1) 55.0 MMSCFD TRIETHYLENE GLYCOL (TEG) DEHYDRATOR 01 COMPRISED OF: <ul style="list-style-type: none"> - ONE (1) FLASH TANK W/ ≥ 90% OFF-GAS RECYCLE/RECOMPRESSION DFT-01/1E - ONE (1) REGENERATOR/STILL VENT W/ 95% BTEX UNIT DSV-01/2E - ONE (1) 1.50 MMBTU/HR NATURAL GAS-FIRED REBOILER RBV-01/3E • ONE (1) 1.50 MMBTU/HR BTEX BURNER HTR-01/4E • ONE (1) 65 EKW CAPSTONE C65 MICROTURBINE GENERATOR CT-01/5E • STARTUP, SHUTDOWN AND MAINTENANCE EMISSIONS SSM/6E • PIPING AND EQUIPMENT FUGITIVES FUG/1F 		
14A. Provide the date of anticipated installation or change: 03/01/16 – If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: NA		14B. Date of anticipated Start-Up if a permit is granted: 05/01/16
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? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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 (<i>if known</i>). 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 (<i>if known</i>). 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).
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 .

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

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

☐ Bulk Liquid Transfer

☐ 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:**

- **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEETS**
- **FUGITIVE LEAK SOURCES (FUG/1F)**

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: **BTEX SKID (BTEX-01) – CONTROL FOR DSV-01/2E**

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: **NA**

☐ 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 (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: _____

Paul V. Hunter
(Please use blue ink)

DATE: _____

11/20/2015
(Please use blue ink)

35B. Printed name of signee: PAUL HUNTER	35C. Title: GENERAL MANAGER OHIO RIVER SUPPLY HUB	
35D. E-mail: PAULV.HUNTER@WILLIAMS.COM	36E. Phone: (412) 787-5561	36F. FAX: (412) 787-6002
36A. Printed name of contact person: R. DANELL ZAWASKI, P.E.	36B. Title: ENVIRONMENTAL SPECIALIST	
36C. E-mail: DANELL.ZAWASKI@WILLIAMS.COM	36D. Phone: (412) 787-4259	36E. FAX: (412) 787-6002

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

ATTACHMENT A

Business Certificate

“6. **West Virginia Business Registration.** 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.”

- **Certificate of Amendment to the Certificate of Authority**
 - From: CAIMAN EASTERN MIDSTREAM, LLC
 - To: WILLIAMS OHIO VALLEY MIDSTREAM LLC
 - Date: May 15, 2012

 - **Certificate of Authority of a Foreign Limited Liability Company**
 - To: CAIMAN EASTERN MIDSTREAM, LLC
 - Date: September 11, 2009
-



Certificate

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

the attached true and exact copy of the Articles of Amendment to the Articles of Organization of

CAIMAN EASTERN MIDSTREAM, LLC

are filed in my office, signed and verified, as required by the provisions of West Virginia Code
§31B-2-204 and conform to law. Therefore, I issue this

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

WILLIAMS OHIO VALLEY MIDSTREAM LLC



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
May 15, 2012*

Natalie E. Tennant

Secretary of State

State of West Virginia



Certificate

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

CAIMAN EASTERN MIDSTREAM, LLC

Control Number: 99GIS

a limited liability company, organized under the laws of the State of Texas
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 September 11, 2009, 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
September 11, 2009*

Natalie E. Tennant

Secretary of State

ATTACHMENT B

Map(s)

“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. Include a MAP as Attachment B.”

- **Address:**
Off Highway 42/Scales Run Road
Middlebourne, WV 26149
- **Latitude and Longitude:**
39°30'21.2" North x -80°45'16.9" West
(39.5059° North x -80.7547° West)
- **UTM:**
4,372.95 km Northing x 521.09 km Easting x Zone 17S
- **Elevation:**
~1,160'
- **Directions:**

From the intersection of WV Route 18 and WV Route 180:

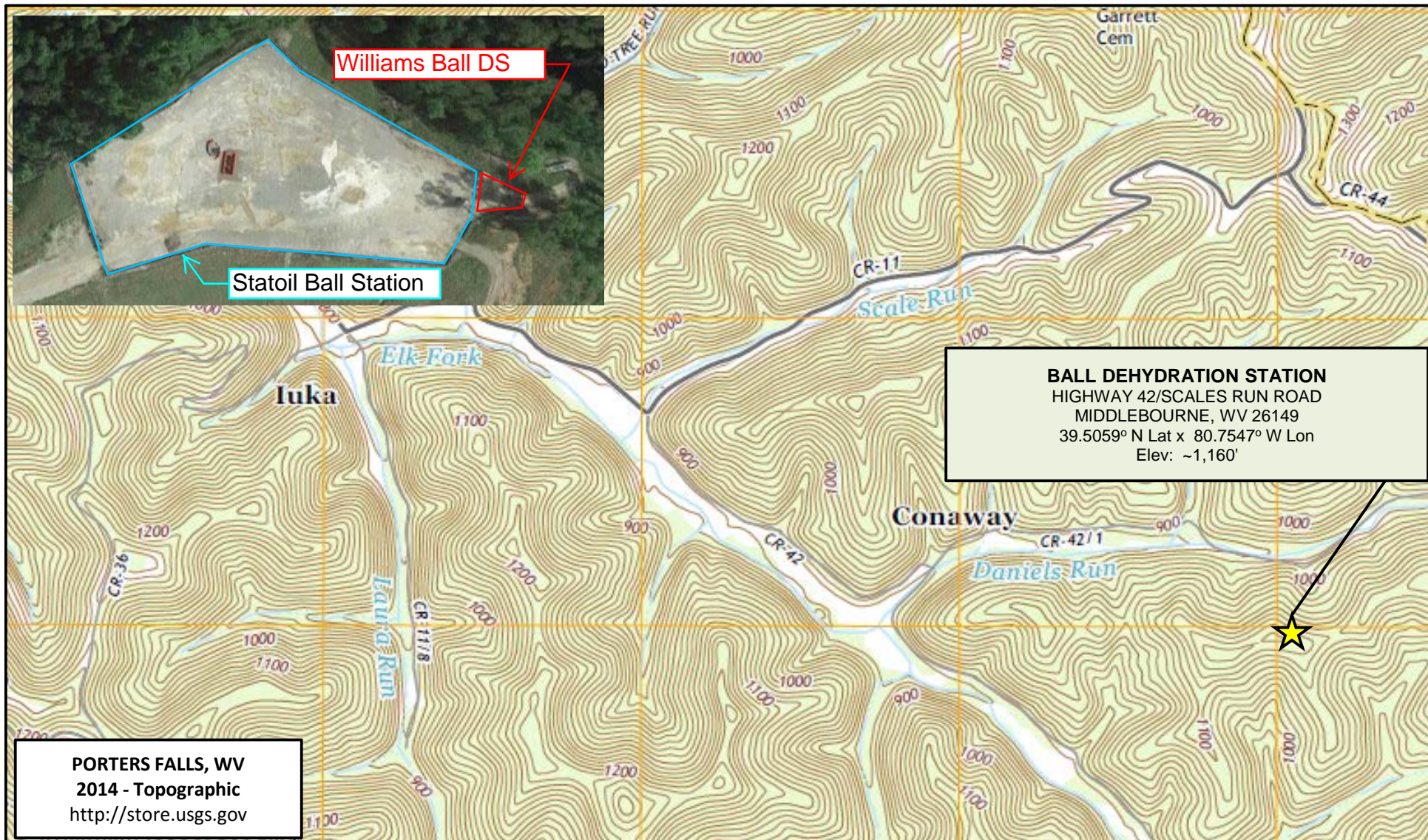
- a. Travel north on WV Route 180 for approximately 0.2 miles
 - b. Turn right onto County Hwy 11/Elk Fork Road and travel approximately 7.7 miles
 - c. Turn right onto County Highway 42/Scales Run Road and travel approximately 0.7 miles to the Ball Station access gate which will be on your left.
 - d. Follow the access road straight up the hill until you've reached the site.
-

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment Bb - Map(s)

TOPOGRAPHIC MAP



ATTACHMENT C

Installation and Start-Up Schedule

“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.”

The OVM Ball Dehydration Station is a new facility. Construction of the facility is anticipated to begin on or about March 1, 2016 with equipment startup on or about May 1, 2016.

ATTACHMENT D

Regulatory Discussion

“18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (if known). Discuss applicability and proposed demonstration(s) of compliance (if known). Provide this information as Attachment D.”

- **Regulatory Discussion**
 - A. Applicability of New Source Review (NSR) Regulations
 - B. Applicability of Federal Regulations
 - C. Applicability of Source Aggregation
 - D. Applicability of State Regulations
-

Williams Ohio Valley Midstream LLC
BALL DEHYDRATION STATION
Application for 45CSR13 NSR Construction Permit

Attachment D
REGULATORY DISCUSSION

A. Applicability of New Source Review (NSR) Regulations

The following New Source Review (NSR) regulations are potentially applicable to natural gas production facilities. Applicability to the subject facility has been determined as follows:

1. Prevention of Significant Deterioration (PSD) [Not Applicable]

This rule does not apply. The facility is a “PSD Minor Source” for each regulated pollutant, as follows:

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- VOC: PSD Synthetic Minor Source with Controlled PTE < 250 tpy
- SO₂: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- PM_{10/2.5}: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy

2. Non-Attainment New Source Review (NNSR) [Not Applicable]

This rule does not apply. The facility location is designated as either “Maintenance” or “Attainment/Unclassified” for all criteria pollutants.

3. Major Source of Hazardous Air Pollutants (HAPs) [Not Applicable]

This rule does not apply. The facility qualifies as a “HAP Area Source” as follows:

- Each HAP: HAP Area Source with Controlled Individual HAP PTE < 10 tpy
- Total HAPs: HAP Area Source with Controlled Total of All HAPs PTE < 25 tpy

4. Title V Operating Permit (TVOP) [Not Applicable]

This rule does not apply. The facility qualifies as a “Title V Minor Source” as follows:

- NOx: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- CO: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- VOC: Title V Synthetic Minor Source with Controlled PTE < 100 tpy
- SO₂: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- PM_{10/2.5}: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- Each HAP: Title V Synthetic Minor Source with Controlled PTE < 10 tpy
- Total HAPs: Title V Synthetic Minor Source with Controlled PTE < 25 tpy

B. Applicability of Federal Regulations

The following federal regulations are potentially applicable to natural gas production facilities. Applicability to the facility has been determined as follows:

1. **NSPS A, General Provisions**

40CFR§60.1-§60.19

[Not Applicable]

This rule does not apply as there are no equipment subject to NSPS regulations.

2. **NSPS Dc, Steam Generating Units**

40CFR§60.40c-§60.48c

[Not Applicable]

This rule does not apply because there is no steam generating unit at the facility with a maximum design heat input capacity ≥ 10 MMBtu/hr and ≤ 100 MMBtu/hr (§60.40c(a)).

3. **NSPS Kb, Volatile Organic Liquid Storage Vessels**

40CFR§60.110b-§60.117b

[Not Applicable]

This rule does not apply because there is no tank used to store volatile organic liquids (VOL) with a design capacity ≥ 75 m³ (19,815 gal, 471.8 bbl) (§60.110b(a)).

4. **NSPS GG, Stationary Gas Turbines**

40CFR§60.330-§60.335

[Not Applicable]

This rule does not apply because there is no stationary gas turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired (§60.330).

5. **NSPS KKK, Leaks from Natural Gas Processing Plants**

40CFR§60.630-§60.636

[Not Applicable]

This rule does not apply because the facility is not a natural gas processing plant (§60.630(b)).

6. **NSPS LLL, Onshore Natural Gas Processing: SO₂ Emissions**

40CFR§60.640-§60.648

[Not Applicable]

This rule does not apply because there is no gas sweetening operation at the facility (§60.640(a)).

7. **NSPS IIII, Compression Ignition Reciprocating Internal Combustion Engines**

40CFR§60.4200-§60.4219

[Not Applicable]

This rule does not apply because there is no stationary compression ignition engine at the facility (§60.4200(a)).

- 8. NSPS JJJJ, Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)**
40CFR§60.4230-§60.4248 [Not Applicable]
- This rule does not apply because there are no stationary spark ignition internal combustion engines at the subject facility.
- 9. NSPS KKKK, Stationary Combustion Turbines**
40CFR§60.4300-§60.4420 [Not Applicable]
- This rule does not apply because there is no stationary combustion turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the higher heating value of the fuel (§60.4305).
- 10. NSPS OOOO, Crude Oil and Natural Gas Production**
40CFR§60.5360-§60.5430 [Not Applicable]
- This rule does not apply to the pneumatic controllers because they are located between the wellhead and point of custody transfer, are not located at a natural gas processing plant, and their bleed rate is ≤ 6 scfh (§60.5365(d)(i)).
- Further, this rule does not apply because there are no reciprocating compressors or storage vessels with the potential to emit VOC ≥ 6 TPY at the subject facility.
- 11. NESHAP A, General Provisions**
40CFR§63.1-§63.16 [Applicable]
- This rule does apply to the Dehydrator (DSV-01) because it is subject to NESHAP Subpart HH. Requirements include notification and recordkeeping.
- 12. NESHAP HH, Oil and Natural Gas Production Facilities**
40CFR§63.760-§63.779 [Applicable]
- This rule does apply to the Dehydrator (DSV-01). However, because the dehydrator has a benzene PTE < 0.9 megagrams per year, it is exempt from all requirements except to maintain records of actual annual average benzene emissions to demonstrate continuing exemption status (§63.764(e)(1)).
- This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the facility is an area source of HAP emissions (§63.760(b)(2)). In no case does this rule apply to engines or turbines.
- 13. NESHAP HHH, Natural Gas Transmission and Storage Facilities**
40CFR§63.1270-§63.1289 [Not Applicable]
- This rule does not apply because the facility is not a natural gas transmission or storage facility transporting or storing natural gas prior to local distribution (§63.1270(a)).

14. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175

[Not Applicable]

This rule does not apply because the facility is not a major source of HAP emissions (§63.6080).

15. NESHAP ZZZZ, Stationary Reciprocating Internal Combustion Engines (RICE)

40CFR§63.6580-§63.6675

[Not Applicable]

This rule does not apply because there are no stationary engines at the subject facility.

16. NESHAP DDDDD, Industrial, Commercial, and Institutional Boilers and Process Heaters – Major Sources

40CFR§63.7480 – §63.7575

[Not Applicable]

This rule does not apply because the facility is not a major source of HAP emissions (§63.7485).

17. NESHAP JJJJJJ, Industrial, Commercial, and Institutional Boilers and Process Heaters – Area Sources

40CFR§63.11193 – §63.11237

[Not Applicable]

This rule does not apply because gas-fired boilers are not subject to the requirements of this subpart (§63.11195(e)). Specifically, “boiler” is defined as an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water.

18. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220

[Not Applicable]

This rule does not apply because the facility does not store more than a threshold quantity of a regulated substance in a process (§68.115).

19. Compliance Assurance Monitoring (CAM)

40CFR§64.1-§64.10

[Not Applicable]

This rule does not apply because the facility is not a major source required to obtain a 40 CFR Part 70 Operating Permit.

20. Mandatory Greenhouse Gases (GHG) Reporting

40CFR§98.1-§98.9

[Not Applicable]

This rule does not apply. The facility is not subject to a listed source category and the aggregate maximum heat input capacity is < 30 MMBtu/hr from all stationary fuel combustion sources combined (§98.2(a)).

C. Applicability of Source Aggregation

For New Source Review (NSR) and Title V permitting, the three-part regulatory criteria to determine whether emissions from two or more facilities should be aggregated and treated as a single source is whether the activities:

- i) Belong to the same industrial grouping; and
- ii) Are located on one or more contiguous or adjacent properties; and
- iii) Are under control of the same person (or persons under common control).

i) Same Industrial Grouping

The subject facility shares the same two-digit major SIC code of 13 as the upstream gas production wells and other Williams' facilities.

ii) Contiguous or Adjacent

The determination of whether two or more facilities are "contiguous" or "adjacent" is made on a case-by-case basis. This determination is proximity based, and it is important to focus on this criterion and whether two contiguous or adjacent facilities, considered as a single source, meet the common sense notion of a plant. The functional interrelationship of the two or more facilities is not a relevant inquiry in determining whether the facilities are "contiguous" or "adjacent."

Neither West Virginia nor federal regulations define the terms "contiguous" or "adjacent." It is clear, however, that the determination of whether two or more facilities are "contiguous" or "adjacent" is based on the plain meaning of the terms "adjacent" and "contiguous", which consider the physical distance between the facilities. The term contiguous is defined in the dictionary as being in actual contact; touching along a boundary or at a point. The term adjacent" is defined in the dictionary as not distant, nearby, having a common endpoint or border.

The closest Williams-owned facility to the subject facility is the Stillwagoner CRP located approximately 23 miles away. The Stillwagoner CRP does not meet the common sense definition of being "contiguous" with or "adjacent" to the subject facility.

The subject facility dehydrates gas produced from upstream production wells located in northern West Virginia. The subject facility is located on a parcel that is directly adjacent to a pre-existing compression facility operated by Statoil Onshore Properties Inc.

The location of the subject facility was chosen because of suitable characteristics for construction and operation, such as the availability of a reasonably flat grade and accessibility for large trucks and equipment. Williams' business model is to construct scalable capacity that contemplates additional production from multiple operators and the initial configuration is merely a foundation for additional opportunities in the area. The subject facility does not need to be located in the immediate vicinity of the upstream wells in order to operate properly. Had suitable land been available elsewhere, the subject facility could have been located farther from the upstream wells and could theoretically be moved farther from the wells without affecting operations. Therefore, despite the fact that the subject facility is located in close proximity to one or many upstream production sources, aggregation of the subject facility with upstream wells does not meet the common sense notion of a plant.

iii) Common Control

Williams OVM operates under its parent company The Williams Companies, Inc. (Williams) and is the sole operator of the subject facility. The closest Williams-operated facility to the subject facility is the Stillwagoner CRP, located approximately 23 miles away. The Stillwagoner CRP is not “contiguous” with or “adjacent” to the subject facility.

The production wells, including the Statoil Onshore Properties Inc. wellpad, that send natural gas to the subject facility are owned and operated by other companies, which are unaffiliated with Williams. Williams has no ownership stake in the Statoil wellpad or in any production well or company in West Virginia that may send natural gas to the subject facility.

Furthermore, neither Williams OVM, nor Williams, exercise operational control over any equipment owned or operated by any natural gas producer upstream of the subject facility. All employees at the subject facility are under the exclusive direction of Williams and are not under the control of any other entity. Similarly, Williams has no authority over employees of the production wells. These companies operate wholly independent of one another. No employees are expected to shuttle back and forth between the subject facility and any production well.

At this time, contracts are in place for the subject facility to process natural gas produced from multiple upstream production wells located throughout the region. As future commercial opportunities are identified, the subject facility will potentially receive gas from other producers. Williams will not have ownership or control of any future wellhead facilities. The producers are, and will be responsible for, any decisions to produce or shut-in wellhead facilities and have no control over the equipment installed, owned, and operated by Williams. Similarly, Williams cannot control the installation or operation of any equipment located at a well site that may be considered an air contamination source.

For the reason above, it is clear that Williams does not have common control of any production wells, including the Statoil Onshore Properties Inc. equipment.

Summary

The subject facility and the upstream production wells should not be aggregated and treated as a single source of emissions because the subject facility is not under common control with any of the upstream wells. Additionally, the subject facility and the upstream production wells, considered together, do not meet the common sense notion of a plant because the subject facility is expected to service multiple production wells and because the location of the facility was selected for reasons unrelated to the location of the production wells. Accordingly, the subject facility should not be aggregated with the upstream wells in determining major source or PSD status

D. Applicability of State Regulations

The following State regulations are potentially applicable to natural gas production facilities. Applicability to the facility has been determined as follows:

1. Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45CSR2

[Applicable]

This rule does apply, however, because the dehydrator reboiler (RBV-01) and BTEX burner (HTR-01) each have a maximum design heat input (MDHI) rating < 10 MMBtu/hr, the only requirement is to limit visible emissions to < 10% opacity during normal operations (§45-02-3.1). The reboiler and BTEX burner combust only natural gas which inherently conforms to the visible emission standards.

2. Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors

45CSR4

[Applicable]

This rule does apply and states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable. No odors have been deemed objectionable.

3. Control of Air Pollution from Combustion of Refuse

45CSR6

[Not Applicable]

This rule does not apply because there is no refuse combustion performed at the facility.

4. Prevent and Control Air Pollution from the Emission of Sulfur Oxides

45CSR10

[Not Applicable]

This rule does not apply because each “fuel burning unit” at the facility has a Maximum Design Heat Input (MDHI) rating < 10 MMBtu/hr.

5. 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

45CSR13

[Applicable]

This rule does apply. Williams OVM is applying for a 45CSR13 New Source Review Construction Permit and has published the required Class I legal advertisement notifying the public of this application to construct and operate the facility.

6. Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants

45CSR14

[Not Applicable]

The rule does not apply because the facility is not a major source of air pollutants.

- 7. Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**
45CSR16 [Not Applicable]
This rule does not apply because the facility is not subject to any New Source Performance Standard (NSPS).
- 8. Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment**
45CSR19 [Not Applicable]
This rule does not apply because the facility is a minor (or “deferred”) source of all regulated pollutants.
- 9. Requirements for Operating Permits**
45CSR30 [Not Applicable]
This rule does not apply because the facility is a minor (or “deferred”) source of all regulated pollutants.
- 10. Air Quality Management Fees Program**
45CSR22 [Applicable]
This rule does apply. It establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution.
- 11. Prevent and Control Emissions of Toxic Air Pollutants**
45CSR27 [Not Applicable]
This rule does not apply because equipment used in the production and distribution of petroleum products is exempt, provided that the product contains no more than 5% benzene by weight (§45-22-2.4).
- 12. Air Pollution Emissions Banking and Trading**
45CSR28 [Not Applicable]
This rule does not apply. The facility does not choose to participate in the voluntarily statewide air pollutant emissions trading program.
- 13. Emission Statements for VOC and NOX**
45CSR29 [Not Applicable]
This rule does not apply because the subject facility is not located in Putnam, Kanawha, Cabell, Wayne, Wood, or Greenbrier Counties (§45-29-1).
- 14. Requirements for Operating Permits**
45CSR30 [Not Applicable]
This rule does not apply because the subject facility is a non-major “deferred” source of all regulated pollutants.

Pursuant to the authority granted in West Virginia 45CSR§30-3.2 and 45CSR§30A-3.1, the DAQ is extending the deferral, which was set to expire December 15, 2000, of non-

major sources subject to West Virginia 45CSR30 (Title V Program) from the obligation to submit an operating permit application.

15. Emission Standards for Hazardous Air Pollutants (HAP)

45CSR34

[Not Applicable]

This rule does not apply because the provisions under Subpart HH of 40 CFR Part 63 which apply to non-major area sources of hazardous air pollutants are excluded.

ATTACHMENT E

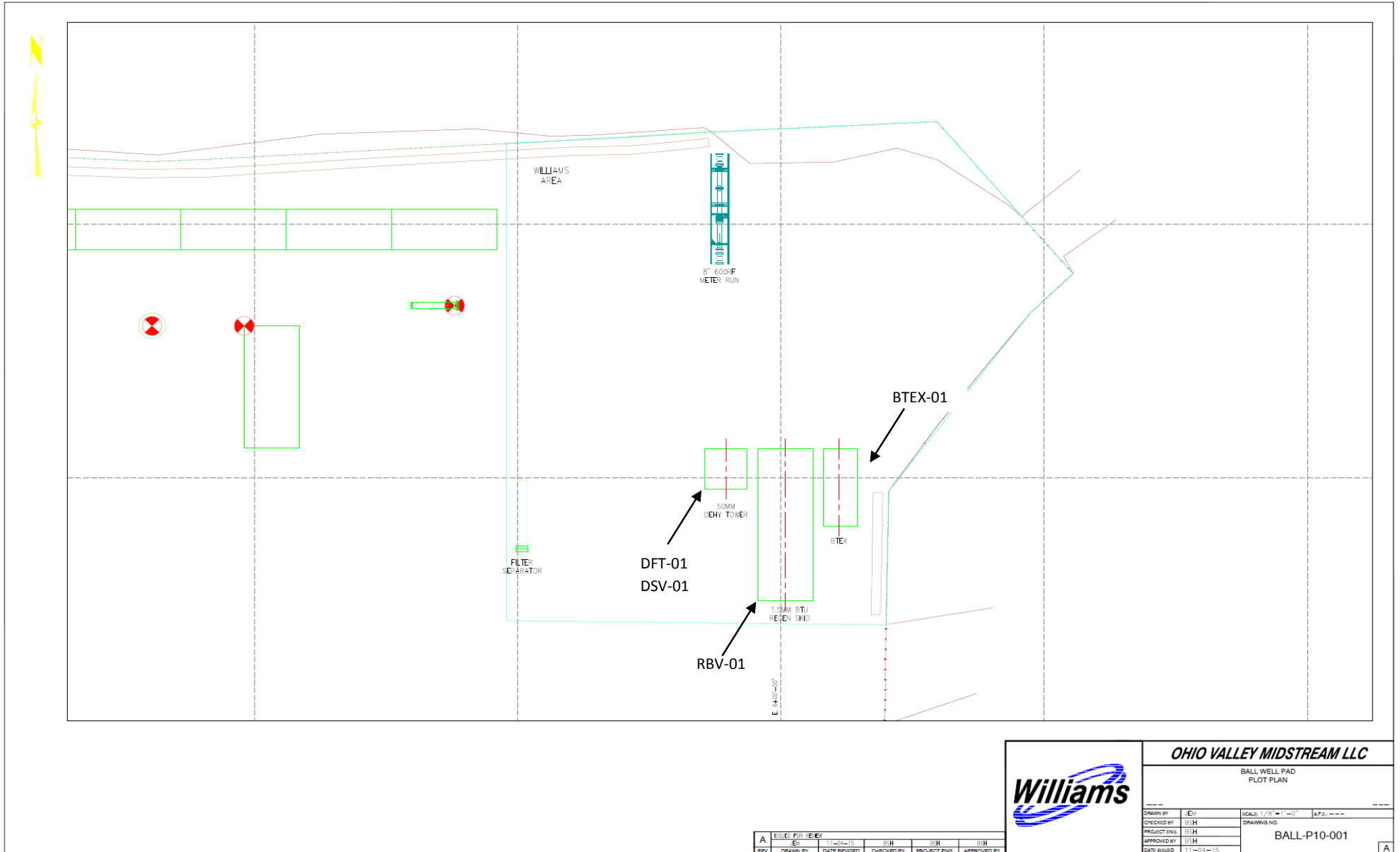
Plot Plan

“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.”

- Plot Plan –Ball Dehydration Station
-

Williams Ohio Valley Midstream LLC
BALL DEHYDRATION STATION
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Attachment E - Plot Plan(s)

PLOT PLAN



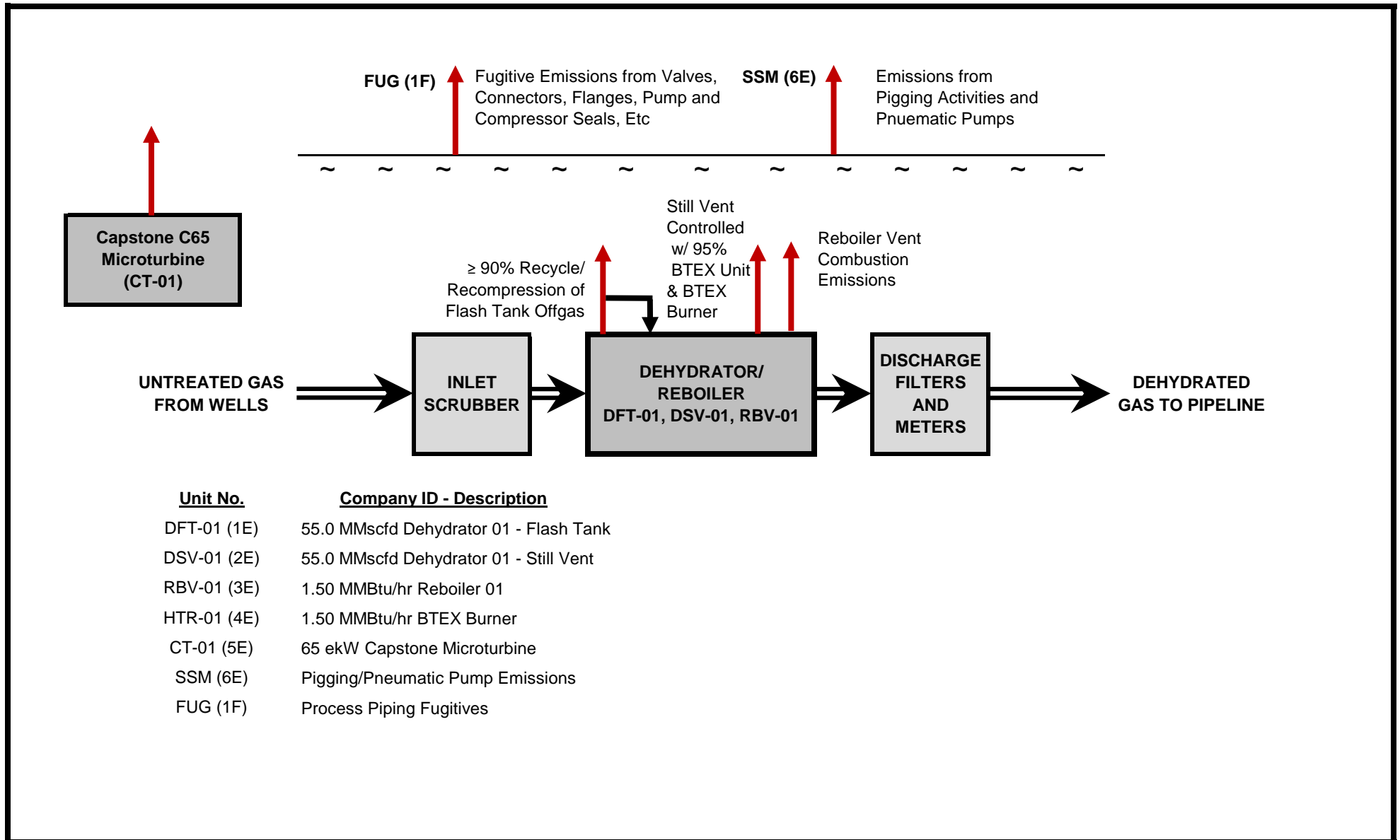
ATTACHMENT F
Detailed Process Flow Diagram(s) (PFD)

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

- Process Flow Diagram (PFD) – Ball Dehydration Station
-

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment F - Process Flow Diagram(s)**PROCESS FLOW DIAGRAM (PFD)**

ATTACHMENT G

Process Description

“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). “

- **Process Description**
 - A. Project Overview
 - B. Triethylene Glycol (TEG) Dehydrator
 - C. Triethylene Glycol (TEG) Reboiler
 - D. Microturbine
 - E. Startup, Shutdown and Maintenance Emissions
 - F. Piping and Equipment Fugitive Emissions
-

Williams Ohio Valley Midstream LLC
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Attachment G
PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC will own and operate the Ball Dehydration Station located off Highway 42/Scales Run Road, approximately 8 miles east-northeast of Middlebourne in Tyler County (See Appendix B – Site Location Maps). The facility receives natural gas from local production wells then dehydrates the gas for delivery to a gathering pipeline.

This application for 45CSR13 NSR Construction Permit has been prepared and submitted to provide for the following equipment and operations at the subject facility:

- One (1) New 55.0 MMscfd Triethylene Glycol (TEG) Dehydrator 01 comprised of:
 - One (1) Flash Tank w/ $\geq 90\%$ Off-Gas Recycle/Recompression DFT-01/1E
 - One (1) Regenerator/Still Vent w/ 95% BTEX Unit DSV-01/2E
 - One (1) 1.50 MMBtu/hr Natural Gas-Fired Reboiler RBV-01/3E
- One (1) New 1.50 MMBtu/hr BTEX Burner HTR-01/4E
- One (1) New Capstone C65 Microturbine Generator CT-01/5E
- Startup, Shutdown and Maintenance Emissions SSM/6E
- Piping and Equipment Fugitives – Gas FUG/1F

B. Dehydrator

One (1) dehydrator will be utilized at the facility. The dehydrator is comprised of a contactor/absorber tower (no vented emissions), a flash tank, and a regenerator/still.

The dehydrator is used to remove water vapor from the inlet wet gas stream to meet pipeline specifications. In the dehydration process, the wet inlet gas stream flows through an absorber tower where the gas is contacted with lean glycol. The lean glycol absorbs the water in the gas stream and becomes rich glycol, laden with water and trace amounts of hydrocarbons.

The rich glycol is then sent to the flash tank where the pressure is reduced, thus liberating the lighter hydrocarbons (primarily methane, but also significant quantities of VOCs). A minimum of 90% of the flash tank off-gas is recycled as fuel in the reboiler or recompressed.

Following the flash tank, the rich glycol is then routed to the regenerator/still where it is boiled to drive off the water vapor and any remaining hydrocarbons. Once boiled, the glycol is returned to a lean state and used again in the process.

The regenerator/still emissions (DSV-01) are controlled by a NATCO BTEX Buster (BTEX-01), including a condenser and a system to route the non-condensable emissions to the “flame zone” of the reboiler. Any vapors not burned as fuel are routed to a separate BTEX burner for an overall destruction efficiency $\geq 95\%$.

C. Reboiler

A reboiler is utilized to supply heat for the regenerator/still. The reboiler is fueled primarily by the flash tank off-gas, with supplemental natural gas as requisite.

D. Microturbine

A Capstone C65 natural gas-fueled microturbine (CT-01) will be used at the facility to generate electricity for on-site needs.

E. Maintenance Emissions

Pigging is routinely conducted to clear pipelines. Associated with pigging events is a small amount of natural gas released to atmosphere when the pig traps are opened to the atmosphere. Pneumatic pumps used to inject methanol and other chemicals into flow lines are powered by pressurized natural gas. As part of normal operation, these devices vent the natural gas to the atmosphere.

F. Piping and Equipment Fugitive Emissions

Piping and process equipment generate leaks from different component types (connectors, valves, pumps, etc.) in gas-vapor service.

ATTACHMENT H

Material Safety Data Sheets (MSDS)

(And Representative Gas Analysis)

“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.”

- **NATURAL GAS**
 - Inlet Natural Gas Analysis
 - Extended Gas Analysis Summary

 - **MATERIAL SAFETY DATA SHEETS (MSDS):**
 - Wellhead Natural Gas
 - Triethylene Glycol (TEG)
-

Williams Ohio Valley Midstream LLC (OVM)
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Attachment H - Gas Analysis

Inlet Natural Gas Analysis

Extra Stream Detail For Sales Gas

Stream			42c Gas To Pipeline				Subflow Simulation	c014 ball1
			Overall Stream					
Component	Mw	NBP F	Moles		Mass		Std Liquid	
			lbmol/hr	mole%	lb/hr	wt%	bpd	lv%
H2O	18.015		0.36	0.0147%	6.42	0.01%	0	0.00%
Nitrogen	28.013		0.81	0.0334%	22.64	0.04%	2	0.02%
CO2	44.010		3.79	0.1568%	166.95	0.31%	14	0.13%
H2S	34.076		0.00	0.0000%	0.00	0.00%	0	0.00%
Methane	16.043		1794.19	74.1457%	28784.06	54.01%	6,583	63.40%
Ethane	30.070		377.10	15.5840%	11339.48	21.28%	2,183	21.02%
Propane	44.097		142.97	5.9082%	6,304	11.83%	852	8.20%
i-Butane	58.124	11	19.91	0.8227%	1,157	2.17%	141	1.36%
n-Butane	58.124	31	42.58	1.7597%	2,475	4.64%	291	2.80%
22-Mpropane	72.151		0.36	0.0148%	26	0.05%	3	0.03%
i-Pentane	72.151	82	10.99	0.4541%	793	1.49%	87	0.84%
n-Pentane	72.151	97	11.64	0.4812%	840	1.58%	91	0.88%
22-Mbutane	86.178	122	0.34	0.0139%	29	0.05%	3	0.03%
23-Mbutane	86.178	136	0.55	0.0227%	47	0.09%	5	0.05%
2-Mpentane	86.178	140	2.96	0.1222%	255	0.48%	27	0.26%
3-Mpentane	86.178	146	1.75	0.0722%	150	0.28%	15	0.15%
n-Hexane	86.178	156	3.98	0.1647%	343.41	0.64%	35	0.34%
Mycyclopentan	84.162	161	0.333	0.0138%	28.05	0.05%	3	0.02%
Benzene	78.110	176	0.060	0.0025%	4.72	0.01%	0	0.00%
Cyclohexane	84.160	177	0.446	0.0184%	37.51	0.07%	3	0.03%
2-Mhexane	100.205	194	0.737	0.0305%	73.87	0.14%	7	0.07%
3-Mhexane	100.205	197	0.711	0.0294%	71.28	0.13%	7	0.07%
224-Mpentane	114.232	211	0.000	0.0000%	0.00	0.00%	0	0.00%
C7*	100.203	209	0.536	0.0222%	53.73	0.10%	5	0.04%
n-Heptane	100.205	209	1.020	0.0421%	102.17	0.19%	10	0.10%
Mycyclohexane	98.189	214	0.680	0.0281%	66.74	0.13%	6	0.06%
Toluene	92.141	231	0.104	0.0043%	9.62	0.02%	1	0.01%
C8*	114.230	258	0.527	0.0218%	60.24	0.11%	5	0.05%
n-Octane	114.232	258	0.192	0.0079%	21.90	0.04%	2	0.02%
E-Benzene	106.166	277	0.007	0.0003%	0.72	0.00%	0	0.00%
p-Xylene	106.166	281	0.018	0.0007%	1.91	0.00%	0	0.00%
m-Xylene	106.166	282	0.018	0.0007%	1.89	0.00%	0	0.00%
o-Xylene	106.166	292	0.008	0.0003%	0.84	0.00%	0	0.00%
C9*	128.257	303	0.090	0.0037%	11.53	0.02%	1	0.01%
n-Nonane	128.259	303	0.030	0.0012%	3.81	0.01%	0	0.00%
C10*	142.284	345	0.018	0.0008%	2.60	0.00%	0	0.00%
n-Decane	142.285	345	0.004	0.0002%	0.61	0.00%	0	0.00%
C11*	156.311	385	0.001	0.0000%	0.16	0.00%	0	0.00%
C12*	170.337	421	0.000	0.0000%	0.0406	0.00%	0	0.00%
C13*	184.364	456	0.000	0.0000%	0.0878	0.00%	0	0.00%
C14*	198.391	488	0.000	0.0000%	0.0030	0.00%	0	0.00%
C15*	212.418	519	0.000	0.0000%	0.0009	0.00%	0	0.00%
C16*	226.445	548	0.000	0.0000%	0.0002	0.00%	0	0.00%
C17*	240.471	576	0.000	0.0000%	0.0001	0.00%	0	0.00%
C18*	254.498	602	0.000	0.0000%	0.0000	0.00%	0	0.00%
C19*	268.525	627	0.000	0.0000%	0.0000	0.00%	0	0.00%
C20*	282.552	651	0.000	0.0000%	0.0000	0.00%	0	0.00%
C21*	296.579	674	0.000	0.0000%	0.0000	0.00%	0	0.00%
C22*	310.605	695	0.000	0.0000%	0.0000	0.00%	0	0.00%
C23*	324.632	716	0.000	0.0000%	0.0000	0.00%	0	0.00%
C24*	338.659	736	0.000	0.0000%	0.0000	0.00%	0	0.00%
C25*	352.686	755	0.000	0.0000%	0.0000	0.00%	0	0.00%
C26*	366.713	774	0.000	0.0000%	0.0000	0.00%	0	0.00%
C27*	380.739	792	0.000	0.0000%	0.0000	0.00%	0	0.00%
C28*	394.766	809	0.000	0.0000%	0.0000	0.00%	0	0.00%
C29*	408.793	825	0.000	0.0000%	0.0000	0.00%	0	0.00%
C30*	422.820	841	0.000	0.0000%	0.0000	0.00%	0	0.00%
Total			2419.82	100.00%	53,294	100.00%	10,384	100.00%

Williams Ohio Valley Midstream LLC (OVM)
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 Application for 45CSR13 NSR Construction Permit
Attachment H - Gas Analysis

Extended Gas Analysis Summary

Analysis for Statoil Sales Gas Dated 10/21/2015

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Water	109-86-4	H2O	18.02	0.0147	0.00015	0.0026	0.0120	6.98
Carbon Monoxide	630-08-0	CO	28.01	---	---	---	---	---
Nitrogen	7727-37-9	N2	28.01	0.0334	0.00033	0.0094	0.0425	24.66
Oxygen	7782-44-7	O2	32.00	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.09	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.1568	0.00157	0.0690	0.3134	181.87
Methane*	75-82-8	CH4	16.04	74.1457	0.74157	11.8966	54.0248	31,349.47
Ethane*	74-84-0	C2H6	30.07	15.5840	0.15586	4.6867	21.2831	12,350.14
Propane**	74-98-6	C3H8	44.10	5.9082	0.05909	2.6056	11.8328	6,866.32
i-Butane**	75-28-5	C4H10	58.12	0.8227	0.00823	0.4782	2.1718	1,260.25
n-Butane**	106-97-8	C4H10	58.12	1.7597	0.017600	1.0229	4.6453	2,695.59
Cyclopentane**	287-92-3	C5H10	70.10	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	0.4541	0.004542	0.3277	1.4880	863.48
n-Pentane**	109-66-0	C5H12	72.15	0.4812	0.004813	0.3472	1.5769	915.01
Neopentane	---	C5H12	72.15	0.0148	0.000148	0.0107	0.0485	28.14
Cyclohexane**	110-82-7	C6H12	84.16	0.0322	0.000322	0.0271	0.1231	71.42
Other Hexanes**	110-54-3	C6H14	86.18	0.2310	0.002310	0.1991	0.9041	524.65
Methylcyclohexanes**	varies	C7H14	98.19	0.0281	0.000281	0.0276	0.1253	72.72
Heptanes**	varies	C7H16	100.20	0.1242	0.001242	0.1245	0.5652	328.00
C8+ Heavies**	varies	C8+	130.00 est	0.0356	0.000356	0.0463	0.2102	121.97
Benzene***	71-43-2	C6H6	78.11	0.0025	0.000025	0.0020	0.0089	5.15
Ethylbenzene***	100-41-4	C8H10	106.17	3.0E-04	3.0E-06	0.0003	0.0014	0.84
n-Hexane***	110-54-3	C6H14	86.18	0.1647	0.001647	0.1420	0.6446	374.07
Toluene***	108-88-3	C7H8	92.14	0.0043	0.000043	0.0040	0.0180	10.44
2,2,4-Trimethylpentane**	540-84-1	C8H18	114.23	5.0E-05	5.0E-07	0.0001	0.0003	0.15
Xylenes***	1330-20-7	C8H10	106.17	1.7E-03	1.7E-05	0.0018	0.0082	4.76

Total:	99.99	1.0000	22.02	100.00	58,028
THC:	99.78	0.9980	21.94	99.63	57,814
Total CH4:	74.15	0.7416	11.90	54.02	31,349
Total VOC:	10.05	0.1005	5.36	24.32	14,115
Total HAP:	0.174	0.0017	0.15	0.68	395

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (EPA-VOC) *** = also Hazardous Air Pollutant (EPA-HAP)
 #UGC (Universal Gas Constant) = 379.482 scf/lb-mol @ 60 °F and 14.696 psia. Pound "X"/scf = M% of "X" * MW of "X" / UGC

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Assumption (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Nitrogen	7727-37-9	N2	0.0334	0.0425	24.66	0.000	0.000	0.00
Carbon Dioxide	124-38-9	CO2	0.1568	0.3134	181.87	0.188	0.376	218.25
Methane*	75-82-8	CH4	74.1457	54.0248	31,349.47	88.97	70.43	37,619.37
Ethane*	74-98-6	C2H6	15.5840	21.2831	12,350.14	0.000	0.000	0.00
VOC**	Various	C3 thru C10+	10.0506	24.3242	14,114.82	12.061	29.189	16,937.78
Benzene***	71-43-2	C6H6	0.0025	0.0089	5.15	0.0030	0.011	6.18
Ethylbenzene***	100-41-4	C8H10	0.0003	0.0014	0.84	0.0004	0.002	1.01
n-Hexane***	110-54-3	C6H14	0.1647	0.6446	374.07	0.1976	0.774	448.88
Toluene***	108-88-3	C7H8	0.0043	0.0180	10.44	0.0052	0.022	12.53
2,2,4-Trimethylpentane**	540-84-1	C8H18	0.0001	0.0003	0.15	0.0001	0.000	0.18
Xylenes***	1330-20-7	C8H10	0.0017	0.0082	4.76	0.0020	0.010	5.71
Total HAP***	Various	C6 thru C8	0.1736	0.6814	395.40	0.2083	0.818	474.48



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Version: 1.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

Synonyms: Wellhead Gas, Raw Gas, Methane, Residue Gas, Natural Gas Sweet, Marsh Gas, Fuel Gas, Petroleum Gas.

Intended Use of the Product

Use of the Substance/Mixture: Fuel.

Name, Address, and Telephone of the Responsible Party

Company

Williams, Inc.

One Williams Center

Tulsa, OK 74172, US

T 800-688-7507

enterprise@williams.com

Emergency Telephone Number

Emergency number : 800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

Classification (GHS-US)

Simple Asphy

Flam. Gas 1 H220

Compressed gas H280

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US)



Signal Word (GHS-US)

: Danger

Hazard Statements (GHS-US)

: H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation

Precautionary Statements (GHS-US)

: P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P403 - Store in a well-ventilated place.
P410+P403 - Protect from sunlight. Store in a well-ventilated place.

Other Hazards

Other Hazards Not Contributing to the Classification: Contains hydrogen sulfide. Hydrogen sulfide is a highly flammable, explosive gas under certain conditions, is a toxic gas, and may be fatal. Gas can accumulate in the headspace of closed containers, use caution when opening sealed containers. Heating the product or containers can cause thermal decomposition of the product and release hydrogen sulfide. Exposure may aggravate those with pre existing eye, skin, or respiratory conditions.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product identifier	% (w/w)	Classification (GHS-US)
Methane	(CAS No) 74-82-8	> 75	Simple Asphy

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			Flam. Gas 1, H220 Liquefied gas, H280
Ethane	(CAS No) 74-84-0	< 20	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Propane	(CAS No) 74-98-6	< 10	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Carbon dioxide	(CAS No) 124-38-9	< 10	Simple Asphy Compressed gas, H280
Butane	(CAS No) 106-97-8	< 5	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Nitrogen	(CAS No) 7727-37-9	< 5	Simple Asphy Compressed gas, H280
Hydrogen sulfide	(CAS No) 7783-06-4	<= 0.0004	Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 2 (Inhalation:gas), H330 Aquatic Acute 1, H400

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.

Inhalation: When symptoms occur: go into open air and ventilate suspected area. Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER/doctor/physician if you feel unwell

Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation persists. Thaw frosted parts with lukewarm water. Do not rub affected area.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists

Ingestion: Rinse mouth. Do NOT induce vomiting. Get immediate medical attention.

Most Important Symptoms and Effects Both Acute and Delayed

General: May cause frostbite on contact with the liquid. Butane is an asphyxiant. Lack of oxygen can be fatal

Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness

Skin Contact: Contact with the liquid may cause cold burns/frostbite

Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns

Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Chronic Symptoms: Contains a small amount of Hydrogen Sulfide, symptoms of overexposure are headaches, dizziness, nausea, coughing, respiratory irritation, eye irritation, skin irritation, pain in the nose, and loss of consciousness. Heating of the product may release higher amounts of Hydrogen Sulfide (H₂S).

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Foam, dry chemical, carbon dioxide, water spray, fog

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire

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Special Hazards Arising From the Substance or Mixture

Fire Hazard: Extremely flammable gas

Explosion Hazard: May form flammable/explosive vapor-air mixture. Heating may cause an explosion. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity: Hazardous reactions will not occur under normal conditions.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire

Firefighting Instructions: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leaking gas fire, eliminate all ignition sources if safe to do so. Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Carbon oxides (CO, CO₂). Hydrocarbon, sulfur dioxide (SO₂), and Hydrogen sulfide (H₂S) fatal and irritating gases

Other information: Do not allow run-off from fire fighting to enter drains or water courses

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Use special care to avoid static electric charges. Eliminate every possible source of ignition. Keep away from heat/sparks/open flames/hot surfaces - No smoking. Avoid breathing (dust, vapor, mist, gas). Use only outdoors or in a well-ventilated area. Ruptured cylinders may rocket. Do not allow product to spread into the environment

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment

Methods and Material for Containment and Cleaning Up

For Containment: Notify authorities if liquid enters sewers or public waters. Use only non-sparking tools

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. Isolate area until gas has dispersed. Use water spray to disperse vapors. For water based spills contact appropriate authorities and abide by local regulations for hydrocarbon spills into waterways. Contact competent authorities after a spill

Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Additional Hazards When Processed: Handle empty containers with care because residual vapors are flammable. Extremely flammable gas. Do not pressurize, cut, or weld containers. Do not puncture or incinerate container. Liquid gas can cause frost-type burns. If stored under heat for extended periods or significantly agitated, this material might evolve or release hydrogen sulfide, a toxic, flammable gas, which can raise and widen this material's actual flammability limits and significantly lower its auto-ignition temperature. Hydrogen sulfide can be fatal.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product

Technical Measures: Proper grounding procedures to avoid static electricity should be followed. Comply with applicable regulations.

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Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep in fireproof place. Store in a well-ventilated place. Keep container tightly closed. Keep/Store away from extremely high or low temperatures, ignition sources, direct sunlight, incompatible materials. Store in original container.

Incompatible Materials: strong acids, Strong bases, Strong oxidizers, chlorine, Halogenated compounds

Conditions for Safe Storage, Including Any Incompatibilities Not available

Specific End Use(s)

Fuel.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Hydrogen sulfide (7783-06-4)		
USA ACGIH	ACGIH TWA (ppm)	1 ppm
USA ACGIH	ACGIH STEL (ppm)	5 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	20 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m ³)	15 mg/m ³
USA NIOSH	NIOSH REL (ceiling) (ppm)	10 ppm
USA IDLH	US IDLH (ppm)	100 ppm
Alberta	OEL Ceiling (mg/m ³)	21 mg/m ³
Alberta	OEL Ceiling (ppm)	15 ppm
Alberta	OEL TWA (mg/m ³)	14 mg/m ³
Alberta	OEL TWA (ppm)	10 ppm
British Columbia	OEL Ceiling (ppm)	10 ppm
Manitoba	OEL STEL (ppm)	5 ppm
Manitoba	OEL TWA (ppm)	1 ppm
New Brunswick	OEL STEL (mg/m ³)	21 mg/m ³
New Brunswick	OEL STEL (ppm)	15 ppm
New Brunswick	OEL TWA (mg/m ³)	14 mg/m ³
New Brunswick	OEL TWA (ppm)	10 ppm
Newfoundland & Labrador	OEL STEL (ppm)	5 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1 ppm
Nova Scotia	OEL STEL (ppm)	5 ppm
Nova Scotia	OEL TWA (ppm)	1 ppm
Nunavut	OEL Ceiling (mg/m ³)	28 mg/m ³
Nunavut	OEL Ceiling (ppm)	20 ppm
Nunavut	OEL STEL (mg/m ³)	21 mg/m ³
Nunavut	OEL STEL (ppm)	15 ppm
Nunavut	OEL TWA (mg/m ³)	14 mg/m ³
Nunavut	OEL TWA (ppm)	10 ppm
Northwest Territories	OEL Ceiling (mg/m ³)	28 mg/m ³
Northwest Territories	OEL Ceiling (ppm)	20 ppm
Northwest Territories	OEL STEL (mg/m ³)	21 mg/m ³
Northwest Territories	OEL STEL (ppm)	15 ppm
Northwest Territories	OEL TWA (mg/m ³)	14 mg/m ³
Northwest Territories	OEL TWA (ppm)	10 ppm
Ontario	OEL STEL (ppm)	15 ppm
Ontario	OEL TWA (ppm)	10 ppm
Prince Edward Island	OEL STEL (ppm)	5 ppm
Prince Edward Island	OEL TWA (ppm)	1 ppm
Québec	VECD (mg/m ³)	21 mg/m ³
Québec	VECD (ppm)	15 ppm

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Québec	VEMP (mg/m ³)	14 mg/m ³
Québec	VEMP (ppm)	10 ppm
Saskatchewan	OEL STEL (ppm)	15 ppm
Saskatchewan	OEL TWA (ppm)	10 ppm
Yukon	OEL STEL (mg/m ³)	27 mg/m ³
Yukon	OEL STEL (ppm)	15 ppm
Yukon	OEL TWA (mg/m ³)	15 mg/m ³
Yukon	OEL TWA (ppm)	10 ppm

Propane (74-98-6)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	1800 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1800 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	1000 ppm
USA IDLH	US IDLH (ppm)	2100 ppm (10% LEL)
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1800 mg/m ³
Québec	VEMP (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Butane (106-97-8)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1900 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	800 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL STEL (ppm)	750 ppm
British Columbia	OEL TWA (ppm)	600 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
New Brunswick	OEL TWA (mg/m ³)	1900 mg/m ³
New Brunswick	OEL TWA (ppm)	800 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Nunavut	OEL STEL (mg/m ³)	2576 mg/m ³
Nunavut	OEL STEL (ppm)	1000 ppm
Nunavut	OEL TWA (mg/m ³)	1901 mg/m ³
Nunavut	OEL TWA (ppm)	800 ppm
Northwest Territories	OEL STEL (mg/m ³)	2576 mg/m ³
Northwest Territories	OEL STEL (ppm)	1000 ppm
Northwest Territories	OEL TWA (mg/m ³)	1901 mg/m ³
Northwest Territories	OEL TWA (ppm)	800 ppm
Ontario	OEL TWA (ppm)	800 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1900 mg/m ³

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Québec	VEMP (ppm)	800 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Yukon	OEL STEL (mg/m ³)	1600 mg/m ³
Yukon	OEL STEL (ppm)	750 ppm
Yukon	OEL TWA (mg/m ³)	1400 mg/m ³
Yukon	OEL TWA (ppm)	600 ppm
Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	9000 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	9000 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m ³)	54000 mg/m ³
USA NIOSH	NIOSH REL (STEL) (ppm)	30000 ppm
USA IDLH	US IDLH (ppm)	40000 ppm
Alberta	OEL STEL (mg/m ³)	54000 mg/m ³
Alberta	OEL STEL (ppm)	30000 ppm
Alberta	OEL TWA (mg/m ³)	9000 mg/m ³
Alberta	OEL TWA (ppm)	5000 ppm
British Columbia	OEL STEL (ppm)	15000 ppm
British Columbia	OEL TWA (ppm)	5000 ppm
Manitoba	OEL STEL (ppm)	30000 ppm
Manitoba	OEL TWA (ppm)	5000 ppm
New Brunswick	OEL STEL (mg/m ³)	54000 mg/m ³
New Brunswick	OEL STEL (ppm)	30000 ppm
New Brunswick	OEL TWA (mg/m ³)	9000 mg/m ³
New Brunswick	OEL TWA (ppm)	5000 ppm
Newfoundland & Labrador	OEL STEL (ppm)	30000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	5000 ppm
Nova Scotia	OEL STEL (ppm)	30000 ppm
Nova Scotia	OEL TWA (ppm)	5000 ppm
Nunavut	OEL STEL (mg/m ³)	27000 mg/m ³
Nunavut	OEL STEL (ppm)	15000 ppm
Nunavut	OEL TWA (mg/m ³)	9000 mg/m ³
Nunavut	OEL TWA (ppm)	5000 ppm
Northwest Territories	OEL STEL (mg/m ³)	27000 mg/m ³
Northwest Territories	OEL STEL (ppm)	15000 ppm
Northwest Territories	OEL TWA (mg/m ³)	9000 mg/m ³
Northwest Territories	OEL TWA (ppm)	5000 ppm
Ontario	OEL STEL (ppm)	30000 ppm
Ontario	OEL TWA (ppm)	5000 ppm
Prince Edward Island	OEL STEL (ppm)	30000 ppm
Prince Edward Island	OEL TWA (ppm)	5000 ppm
Québec	VECD (mg/m ³)	54000 mg/m ³
Québec	VECD (ppm)	30000 ppm
Québec	VEMP (mg/m ³)	9000 mg/m ³
Québec	VEMP (ppm)	5000 ppm
Saskatchewan	OEL STEL (ppm)	30000 ppm

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Saskatchewan	OEL TWA (ppm)	5000 ppm
Yukon	OEL STEL (mg/m ³)	27000 mg/m ³
Yukon	OEL STEL (ppm)	15000 ppm
Yukon	OEL TWA (mg/m ³)	9000 mg/m ³
Yukon	OEL TWA (ppm)	5000 ppm

Nitrogen (7727-37-9)

Methane (74-82-8)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Ethane (74-84-0)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Exposure Controls

Appropriate Engineering Controls: Gas detectors should be used when flammable gases/vapours may be released. Ensure adequate ventilation, especially in confined areas. Proper grounding procedures to avoid static electricity should be followed. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment

Personal Protective Equipment: Protective goggles. Protective clothing. Respiratory protection of the dependent type. Insulated gloves



Materials for Protective Clothing: Chemically resistant materials and fabrics. Wear fire/flammable resistant/retardant clothing

Hand Protection: Wear chemically resistant protective gloves. Insulated gloves

Eye Protection: Chemical goggles or face shield.

Skin and Body Protection: Not available

Respiratory Protection: Use a NIOSH-approved self-contained breathing apparatus whenever exposure may exceed established Occupational Exposure Limits.

Thermal Hazard Protection: Wear suitable protective clothing.

Other Information: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State : Gas

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Appearance	: Clear, Colorless gas
Odor	: Contains Ethyl Mercaptan for leak detection, which has a skunk-like odor, odorless.
Odor Threshold	: Not available
pH	: Not available
Relative Evaporation Rate (butylacetate=1)	: Not available
Melting Point	: Not available
Freezing Point	: Not available
Boiling Point	: -157 °C (-250.6°F)
Flash Point	: -187 °C (-304.6°F)
Auto-ignition Temperature	: > 288 °C (>550.4°F)
Decomposition Temperature	: Not available
Flammability (solid, gas)	: Extremely flammable gas
Lower Flammable Limit	: 3 %
Upper Flammable Limit	: 17 %
Vapor Pressure	: 40 mm Hg @25°C (77°F)
Relative Vapor Density at 20 °C	: 0.6
Relative Density	: Not available
Specific Gravity	: Not available
Solubility	: Not available
Log Pow	: Not available
Log Kow	: Not available
Viscosity, Kinematic	: Not available
Viscosity, Dynamic	: Not available
Explosion Data – Sensitivity to Mechanical Impact	: Not available
Explosion Data – Sensitivity to Static Discharge	: Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

Chemical Stability: Extremely flammable gas. Stable at standard temperature and pressure.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Direct sunlight. Extremely high or low temperatures. Open flame. Overheating. Heat. Sparks. Incompatible materials. Avoid ignition sources

Incompatible Materials: Strong acids. Strong bases. Strong oxidizers. Halogenated compounds. Chlorine

Hazardous Decomposition Products: Carbon oxides (CO, CO₂). hydrocarbons. Sulfur dioxide and hydrogen sulfide are fatal and irritating gases.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity : Not classified

LD50 and LC50 Data Not available

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

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Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness.

Symptoms/Injuries After Skin Contact: Contact with the liquid may cause cold burns/frostbite.

Symptoms/Injuries After Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns.

Symptoms/Injuries After Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data

Hydrogen sulfide (7783-06-4)	
LC50 Inhalation Rat (mg/l)	0.99 mg/l (Exposure time: 1 h)
ATE (gases)	100.000 ppmV/4h
Propane (74-98-6)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Butane (106-97-8)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Ethane (74-84-0)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Wellhead Natural Gas (CAS Mixture)	
LC50 Fish 1	0.002 mg/l (Exposure time: 96 h - Species: Coregonus clupeaformis)
Hydrogen sulfide (7783-06-4)	
LC50 Fish 1	0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 Daphnia 1	0.022 mg/l (Exposure time: 96 h - Species: Gammarus pseudolimnaeus)
LC 50 Fish 2	0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not established.
Hydrogen sulfide (7783-06-4)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	0.45 (at 25 °C)
Propane (74-98-6)	
Log Pow	2.3
Butane (106-97-8)	
Log Pow	2.89
Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83
Ethane (74-84-0)	
Log Pow	<= 2.8

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Mobility in Soil Not available

Other Adverse Effects

Other adverse effects: Can cause frost damage to vegetation. Has photochemical ozone creation potential.

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

Additional Information: Handle empty containers with care because residual vapors are flammable. Empty gas cylinders should be returned to the vendor for recycling or refilling.

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

DOT Proper Shipping Name : Natural gas, compressed
(with high methane content)

Hazard Labels (DOT) : 2.1 - Flammable gases



DOT Packaging Exceptions (49 CFR 173.xxx) : 306

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302

DOT Packaging Bulk (49 CFR 173.xxx) : 302

Additional Information

Emergency Response Guide (ERG) Number : 115

Transport by sea

DOT Vessel Stowage Location : E - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length, but is prohibited from carriage on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

Air transport

DOT Quantity Limitations Passenger Aircraft/Rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo Aircraft Only (49 CFR 175.75) : 150 kg

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard
Hydrogen sulfide (7783-06-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on SARA Section 302 (Specific toxic chemical listings)	
Listed on SARA Section 313 (Specific toxic chemical listings)	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 313 - Emission Reporting	1.0 %

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Propane (74-98-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Butane (106-97-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Methane (74-82-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Ethane (74-84-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

US State Regulations

Hydrogen sulfide (7783-06-4)
<p>U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Acute</p> <p>U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Chronic</p> <p>U.S. - California - Toxic Air Contaminant List (AB 1807, AB 2728)</p> <p>U.S. - Colorado - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues</p> <p>U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)</p> <p>U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)</p> <p>U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities</p> <p>U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities</p> <p>U.S. - Delaware - Accidental Release Prevention Regulations - Toxic Endpoints</p> <p>U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities</p> <p>U.S. - Hawaii - Occupational Exposure Limits - STELs</p> <p>U.S. - Hawaii - Occupational Exposure Limits - TWAs</p> <p>U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations</p> <p>U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)</p> <p>U.S. - Idaho - Occupational Exposure Limits - Acceptable Maximum Peak Above the Ceiling Concentration for an 8-Hour Shift</p> <p>U.S. - Idaho - Occupational Exposure Limits - Ceilings</p> <p>U.S. - Idaho - Occupational Exposure Limits - TWAs</p> <p>U.S. - Louisiana - Reportable Quantity List for Pollutants</p> <p>U.S. - Maine - Air Pollutants - Hazardous Air Pollutants</p> <p>U.S. - Massachusetts - Allowable Ambient Limits (AALs)</p> <p>U.S. - Massachusetts - Allowable Threshold Concentrations (ATCs)</p> <p>U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1</p> <p>U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2</p> <p>U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity</p> <p>U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1</p> <p>U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2</p> <p>U.S. - Massachusetts - Right To Know List</p> <p>U.S. - Massachusetts - Threshold Effects Exposure Limits (TELEs)</p> <p>U.S. - Michigan - Occupational Exposure Limits - STELs</p> <p>U.S. - Michigan - Occupational Exposure Limits - TWAs</p> <p>U.S. - Michigan - Polluting Materials List</p> <p>U.S. - Michigan - Process Safety Management Highly Hazardous Chemicals</p> <p>U.S. - Minnesota - Chemicals of High Concern</p> <p>U.S. - Minnesota - Hazardous Substance List</p> <p>U.S. - Minnesota - Permissible Exposure Limits - STELs</p> <p>U.S. - Minnesota - Permissible Exposure Limits - TWAs</p>

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U.S. - Montana - Ambient Air Quality Standards
 U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
 U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - New Mexico - Air Quality - Ambient Air Quality Standards
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances
 U.S. - North Carolina - Control of Toxic Air Pollutants
 U.S. - North Dakota - Ambient Air Quality Standards - Maximum Permissible Concentrations
 U.S. - North Dakota - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Ohio - Extremely Hazardous Substances - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - Ceilings
 U.S. - Oregon - Permissible Exposure Limits - STELs
 U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 1-Hour
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 24-Hour
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - Annual
 U.S. - South Carolina - Toxic Air Pollutants - Maximum Allowable Concentrations
 U.S. - South Carolina - Toxic Air Pollutants - Pollutant Categories
 U.S. - Tennessee - Occupational Exposure Limits - STELs
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Drinking Water Standards - Secondary Constituent Levels (SCLs)
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Hazardous Waste - Hazardous Constituents
 U.S. - Vermont - Permissible Exposure Limits - STELs
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Virginia - Water Quality Standards - Chronic Freshwater Aquatic Life
 U.S. - Virginia - Water Quality Standards - Chronic Saltwater Aquatic Life
 U.S. - Washington - Dangerous Waste - Dangerous Waste Constituents List
 U.S. - Washington - Dangerous Waste - Discarded Chemical Products List
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 25 Feet to Less Than 40 Feet
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 40 Feet to Less Than 75 Feet
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 75 Feet or Greater
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights Less Than 25 Feet
 U.S. - Wyoming - Process Safety Management - Highly Hazardous Chemicals
 U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Fresh Water
 U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Marine Water

Propane (74-98-6)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities

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U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Idaho - Occupational Exposure Limits - TWAs
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs

Butane (106-97-8)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Maine - Chemicals of High Concern
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Chemicals of High Concern
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List

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U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs

Carbon dioxide (124-38-9)

U.S. - Hawaii - Occupational Exposure Limits - STELs
 U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Idaho - Occupational Exposure Limits - TWAs
 U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
 U.S. - Michigan - Occupational Exposure Limits - STELs
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - STELs
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Tennessee - Occupational Exposure Limits - STELs
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - STELs
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs

Nitrogen (7727-37-9)

U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Right To Know List
 U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Methane (74-82-8)

U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
 U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements

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U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Excluded Volatile Organic Compounds
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCEA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

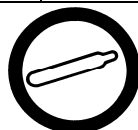
Ethane (74-84-0)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
 U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Excluded Volatile Organic Compounds
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCEA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Canadian Regulations

Wellhead Natural Gas

WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas
----------------------	--



Hydrogen sulfide (7783-06-4)

Listed on the Canadian DSL (Domestic Substances List) inventory.
 Listed on the Canadian Ingredient Disclosure List

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WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects
----------------------	---

Propane (74-98-6)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Butane (106-97-8)

Listed on the Canadian DSL (Domestic Substances List) inventory.

Listed on the Canadian Ingredient Disclosure List

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Carbon dioxide (124-38-9)

Listed on the Canadian DSL (Domestic Substances List) inventory.

Listed on the Canadian Ingredient Disclosure List

WHMIS Classification	Class A - Compressed Gas
----------------------	--------------------------

Nitrogen (7727-37-9)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas
----------------------	--------------------------

Methane (74-82-8)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Ethane (74-84-0)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION

Revision date : 10/02/2013

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200

GHS Full Text Phrases:

Acute Tox. 2 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 2
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Compressed gas	Gases under pressure Compressed gas
Flam. Gas 1	Flammable gases Category 1
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H330	Fatal if inhaled
H400	Very toxic to aquatic life

Party Responsible for the Preparation of This Document

Wellhead Natural Gas

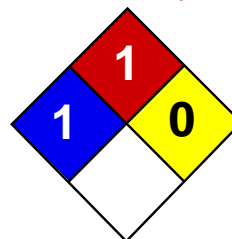
Safety Data Sheet

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Williams, Inc.
One Williams Center
Tulsa, OK 74172, US
800-688-7507

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

North America GHS US 2012 & WHMIS



Health	1
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet

Triethylene glycol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Triethylene glycol

Catalog Codes: SLT2644

CAS#: 112-27-6

RTECS: YE4550000

TSCA: TSCA 8(b) inventory: Triethylene glycol

CI#: Not available.

Synonym: 2,2'-[1,2-Ethanediy]bis(oxy)]bisethanol

Chemical Formula: C₆H₁₄O₄

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Triethylene glycol	112-27-6	100

Toxicological Data on Ingredients: Triethylene glycol: ORAL (LD50): Acute: 17000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of ingestion. Slightly hazardous in case of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:

Very hazardous in case of eye contact (irritant). Slightly hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact: No known effect on skin contact, rinse with water for a few minutes.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 371°C (699.8°F)

Flash Points: CLOSED CUP: 177°C (350.6°F). OPEN CUP: 165.5°C (329.9°F).

Flammable Limits: LOWER: 0.9% UPPER: 9.2%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes. If ingested, seek medical advice immediately and show the container or the label.

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Hygroscopic liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 150.18 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 285°C (545°F)

Melting Point: -5°C (23°F)

Critical Temperature: Not available.

Specific Gravity: 1.1274 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 5.17 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 17000 mg/kg [Rat].

Chronic Effects on Humans: The substance is toxic to kidneys, the nervous system.

Other Toxic Effects on Humans:

Very hazardous in case of ingestion. Slightly hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Triethylene glycol TSCA 8(b) inventory: Triethylene glycol

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:**WHMIS (Canada):** Not controlled under WHMIS (Canada).**DSCL (EEC):** R41- Risk of serious damage to eyes.**HMIS (U.S.A.):****Health Hazard:** 1**Fire Hazard:** 1**Reactivity:** 0**Personal Protection:** j**National Fire Protection Association (U.S.A.):****Health:** 1**Flammability:** 1**Reactivity:** 0**Specific hazard:****Protective Equipment:**

Not applicable. Lab coat. Not applicable. Splash goggles.

Section 16: Other Information**References:** Not available.**Other Special Considerations:** Not available.**Created:** 10/10/2005 08:31 PM**Last Updated:** 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

ATTACHMENT I

Emission Units Table

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

- **Emissions Unit Table**
-

ATTACHMENT J

Emission Points Data Summary Sheet

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

- **Table 1 – Emissions Data**
 - 55.0 MMscfd Dehydrator Flash Tank 01
 - 55.0 MMscfd Dehydrator Still Vent (Regenerator) 01
 - 1.50 MMBtu/hr Dehydrator Reboiler 01
 - 1.50 MMBtu/hr BTEX Burner
 - Capstone C65 Microturbine
 - Startup, Shutdown and Maintenance Emissions
 - FACILITY-WIDE SUMMARY
 - **Table 2 – Release Parameter Data**
-

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet**Dehydrator Flash Tank 01****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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
DFT-01 (1E)	Upward Vertical	DFT-01 (1E)	DFT-01 (1E)	na	na	C	8,760	NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	13.38	58.60	13.38	58.60	Gas	GLYCalc	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.01	0.06	0.01	0.06	Gas	GLYCalc	
								Ethylbenzene	1.1E-03	4.6E-03	1.1E-03	4.6E-03	Gas	GLYCalc	
								HCHO	---	---	---	---	Gas	GLYCalc	
								n-Hexane	0.43	1.89	0.43	1.89	Gas	GLYCalc	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.02	0.09	0.02	0.09	Gas	GLYCalc	
								2,2,4-TMP	1.2E-04	6.0E-04	1.2E-04	6.0E-04	Gas	GLYCalc	
								Xylenes	5.2E-03	0.02	5.2E-03	0.02	Gas	GLYCalc	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.47	2.06	0.47	2.06	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	20.35	89.13	20.35	89.13	Gas	GLYCalc	
								N2O	---	---	---	---	Gas	---	
								CO2e	509	2,228	509	2,228	Gas	Wgt Sum	
								55.0 MMscfd Dehydrator Flash Tank 01 (w/ ≥ 90% Off-Gas Recycle/Recompression)							

Continued ...

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Attachment J - Emission Points Data Summary Sheet**Dehydrator Still Vent 01****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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
DSV-01 (2E)	Upward Vertical	55.0 MMscfd Dehydrator Still Vent (Regenerator) 01 (w/ ≥ 95% BTEX Skid)						NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	53.98	236.45	2.70	11.82	Gas	GLYCalc	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	2.52	11.05	0.13	0.55	Gas	GLYCalc	
								Ethylbenzene	0.70	3.06	0.03	0.15	Gas	GLYCalc	
								HCHO	---	---	---	---	Gas	GLYCalc	
								n-Hexane	2.44	10.69	1.2E-01	0.53	Gas	GLYCalc	
								Methanol	---	---	---	---	Gas	---	
								Toluene	6.92	30.31	0.35	1.52	Gas	GLYCalc	
								2,2,4-TMP	8.4E-04	3.7E-03	4.2E-05	1.9E-04	Gas	GLYCalc	
								Xylenes	5.14	22.52	0.26	1.13	Gas	GLYCalc	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	17.73	77.64	0.89	3.88	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	1.59	6.99	0.08	0.35	Gas	GLYCalc	
								N2O	---	---	---	---	Gas	---	
								CO2e	40	175	2	9	Gas	Wgt Sum	

Continued ...

BALL DEHYDRATION STATION

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Attachment J - Emission Points Data Summary Sheet**Dehydrator Reboiler 01****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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RBV-01 (3E)	Upward Vertical	RBV-01 (3E)	RBV-01 (3E)	na	na	C	8,760	NOX	0.15	0.64	0.15	0.64	Gas	AP-42	
								CO	0.12	0.54	0.12	0.54	Gas	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas	AP-42	
								SO2	8.8E-04	0.00	8.8E-04	0.00	Gas	AP-42	
								PM10/2.5	0.01	0.05	0.01	0.05	Solid/Gas	AP-42	
								Benzene	3.1E-06	1.4E-05	3.1E-06	1.4E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								HCHO	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	AP-42	
								n-Hexane	2.6E-03	0.01	2.6E-03	0.01	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
								Toluene	5.0E-06	2.2E-05	5.0E-06	2.2E-05	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	2.8E-06	1.2E-05	2.8E-06	1.2E-05	Gas	AP-42	
								Total HAP	2.8E-03	0.01	2.8E-03	0.01	Gas	Sum	
								CO2	176.47	772.94	176.47	772.94	Gas	AP-42	
								CH4	3.4E-03	0.01	3.4E-03	0.01	Gas	AP-42	
								N2O	3.2E-03	0.01	3.2E-03	0.01	Gas	AP-42	
								CO2e	178	778	178	778	Gas	Wgt Sum	

Continued ...

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet**Dehydrator Reboiler 01****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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
HTR-01 (4E)	Upward Vertical	HTR-01 (4E)	HTR-01 (4E)	na	na	C	8,760	NOX	0.15	0.64	0.15	0.64	Gas	AP-42	
								CO	0.12	0.54	0.12	0.54	Gas	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas	AP-42	
								SO ₂	8.8E-04	3.9E-03	8.8E-04	3.9E-03	Gas	AP-42	
								PM _{10/2.5}	0.01	0.05	0.01	0.05	Solid/Gas	AP-42	
								Benzene	3.1E-06	1.4E-05	3.1E-06	1.4E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								HCHO	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	AP-42	
								n-Hexane	2.6E-03	0.01	2.6E-03	0.01	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
								Toluene	5.0E-06	2.2E-05	5.0E-06	2.2E-05	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	2.8E-06	1.2E-05	2.8E-06	1.2E-05	Gas	AP-42	
								Total HAP	2.8E-03	0.01	2.8E-03	0.01	Gas	Sum	
								CO ₂	176	773	176	773	Gas	AP-42	
								CH ₄	3.4E-03	0.01	3.4E-03	0.01	Gas	AP-42	
								N ₂ O	3.2E-03	0.01	3.2E-03	0.01	Gas	AP-42	
								CO ₂ e	178	778	178	778	Gas	Wgt Sum	

Continued ...

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Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet**Dehydrator Reboiler 01****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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
CT-01 (5E)	Upward Vertical	CT-01 (5E)	CT-01 (5E)	na	na	C	8,760	NOX	0.06	0.26	0.06	0.26	Gas	AP-42	
								CO	0.16	0.71	0.16	0.71	Gas	AP-42	
								VOC	0.01	0.03	0.01	0.03	Gas	AP-42	
								SO2	2.9E-03	0.01	2.9E-03	0.01	Gas	AP-42	
								PM10/2.5	5.6E-03	0.02	5.6E-03	0.02	Solid/Gas	AP-42	
								Benzene	1.0E-05	4.4E-05	1.0E-05	4.4E-05	Gas	AP-42	
								Ethylbenzene	2.7E-05	1.2E-04	2.7E-05	1.2E-04	Gas	AP-42	
								HCHO	6.0E-04	2.6E-03	6.0E-04	2.6E-03	Gas	AP-42	
								n-Hexane	---	---	---	---	Gas	---	
								Methanol	---	---	---	---	Gas	---	
								Toluene	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	5.4E-05	2.4E-04	5.4E-05	2.4E-04	Gas	AP-42	
								Other HAP	5.0E-05	2.2E-04	5.0E-05	2.2E-04	Gas	AP-42	
								Total HAP	8.5E-04	3.7E-03	8.5E-04	3.7E-03	Gas	Sum	
								CO2	98	431	98	431	Gas	AP-42	
								CH4	7.2E-03	0.03	7.2E-03	0.03	Gas	AP-42	
								N2O	2.5E-03	0.01	2.5E-03	0.01	Gas	AP-42	
								CO2e	99	435	99	435	Gas	Wgt Sum	

Continued ...

BALL DEHYDRATION STATION

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Attachment J - Emission Points Data Summary Sheet**Pigging / Pneumatic Pumps****Table 1: Emissions Data**

Table 1: Emissions Data															
Emission Point ID No. <i>(Must match Emission Units Table & Plot Plan)</i>	Emission Point Type ¹	Emission Unit Vented Through This Point <i>(Must match Emission Units Table & Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table & Plot Plan)</i>		Vent Time for Emission Unit <i>(Chemical processes only)</i>		All Regulated Pollutants - Chemical Name/CAS ³ <i>(Speciate VOCs & HAPS)</i>	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used ⁶	Emission Concentration ⁷ <i>(ppmv or mg/m³)</i>
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
SSM (6E)							8,760	NOX	---	---	---	---	Gas	---	
	Startup, Shutdown and Maintenance Emissions														
	Upward Vertical	SSM (6E)	SSM (6E)	na	na	I		Benzene	---	0.04	---	0.04	Gas	EE	
								Ethylbenzene	---	0.04	---	0.04	Gas	EE	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	---	0.04	---	0.04	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
								Toluene	---	0.04	---	0.04	Gas	EE	
								2,2,4-TMP	---	0.04	---	0.04	Gas	EE	
								Xylenes	---	0.04	---	0.04	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	0.26	---	0.26	Gas	EE	
								CO2	---	0.12	---	0.12	Gas	EE	
								CH4	---	20.66	---	20.66	Gas	EE	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	517	---	517	Gas	Wgt Sum	

Continued ...

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet**FACILITY-WIDE SUMMARY****Table 1: Emissions Data - Continued**

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 ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
na	na	na	na	na	na	C	8,760	NOX	0.35	1.55	0.35	1.55	Gas	Sum	
								CO	0.41	1.79	0.41	1.79	Gas	Sum	
								Point - VOC	67.39	304.45	16.10	79.83	Gas	Sum	
								Fugitive - VOC	1.04	4.55	1.04	4.55	Gas	Sum	
								Total - VOC	68.43	309	17.14	84.38	Gas	Sum	
								SO2	4.6E-03	0.02	4.6E-03	0.02	Gas	Sum	
								PM10/2.5	0.03	0.12	0.03	0.12	Solid/Gas	Sum	
								Benzene	2.54	11.17	0.14	0.67	Gas	Sum	
								Ethylbenzene	0.70	3.13	0.04	0.22	Gas	Sum	
								HCHO	8.2E-04	3.6E-03	8.2E-04	3.6E-03	Gas	Sum	
								n-Hexane	2.88	12.67	0.56	2.51	Gas	Sum	
								Methanol	0.00	0.00	0.00	0.00	Gas	---	
								Toluene	6.95	30.47	0.37	1.67	Gas	Sum	
								2,2,4-TMP	5.8E-03	0.07	5.0E-03	0.07	Gas	Sum	
								Xylenes	5.15	22.61	0.27	1.21	Gas	Sum	
								Other HAP	5.6E-05	2.4E-04	5.6E-05	2.4E-04	Gas	Sum	
								Total HAP	18.23	80.12	1.39	6.36	Gas	Sum	
								CO2	451	1,977	451	1,977	Gas	Sum	
								CH4	24.47	128	22.95	121	Gas	Sum	
								N2O	0.01	0.04	0.01	0.04	Gas	Sum	
								CO2e	1,066	5,185	1,028	5,019	Gas	Sum	

Continued ...

Williams Ohio Valley Midstream LLC (OVM)
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Attachment J - Emission Points Data Summary Sheet

Table 1 Notes

Criteria Pollutants	
Pollutant	CAS
NO2	10102-44-0
CO	630-08-0
VOC	varies
Propane	74-98-6
i-Butane	75-28-5
n-Butane	106-97-8
SO2	7446-09-5
PM10/2.5	varies

Hazardous Air Pollutants (HAPs)	
Pollutant	CAS
Benzene	71-43-2
Ethylbenzene	100-41-4
Formaldehyde	50-00-0
n-Hexane	110-54-3
Methanol	67-56-1
Toluene	108-88-3
2,2,4-TMP	540-84-1
Xylenes	1330-20-7
Other HAP	varies
Total HAP	na

Greenhouse Gas (GHG) Pollutants	
Pollutant	CAS
CO2	124-38-9
CH4	74-82-8
N2O	10024-97-2
CO2e	na

Table 1: Notes

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, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.
- 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/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

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

- **Application Forms Checklist**
 - **Fugitive Emissions Summary**
 - **Leak Source Data Sheet**
-

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment K - Fugitive Emissions**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 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?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then 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.)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then 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."	

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment K - Fugitive Emissions**FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued**

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 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.

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS ¹	Maximum Potential Pre-Controlled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	---	---	---	---	---
Unpaved Haul Roads	na	---	---	---	---	---
Storage Pile Emissions	na	---	---	---	---	---
Loading/Unloading Operations	na	---	---	---	---	---
Wastewater Treatment	na	---	---	---	---	---
Equipment Leaks (FUG (1F))	VOC	1.04	4.55	1.04	4.55	AP-42
	Benzene	4.9E-03	0.02	4.9E-03	0.02	AP-42
	Ethylbenzene	4.9E-03	0.02	4.9E-03	0.02	AP-42
	n-Hexane	4.9E-03	0.02	4.9E-03	0.02	AP-42
	Toluene	4.9E-03	0.02	4.9E-03	0.02	AP-42
	2,2,4-TMP	4.9E-03	0.02	4.9E-03	0.02	AP-42
	Xylenes	4.9E-03	0.02	4.9E-03	0.02	AP-42
	Total HAP	0.03	0.13	0.03	0.13	Sum
	CO2	0.01	0.06	0.01	0.06	AP-42
	CH4	2.51	10.99	2.51	10.99	AP-42
	N2O	---	---	---	---	---
	CO2e	63	275	63	275	Wgt Sum
General Clean-up VOC Emissions	na	---	---	---	---	---
Other	na	---	---	---	---	---

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

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

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

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Attachment K - Fugitive Emissions

DESCRIPTION OF FUGITIVE EMISSIONS

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				
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves ¹¹	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Open Ended Lines ¹²	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Sampling Connections ¹³	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Compressors	Gas VOC				
	Non-VOC				
Flanges / Connectors	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Other*	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
				TOTAL (lb/yr)	9,110
				TOTAL (tpy)	4.55

**This Facility is NOT Subject to
 Leak Detection and Repair (LDAR) Regulations.
 Please Reference the
 Fugitive Emissions Summary Data Sheet .**

*Other components include compressor seals, relief valves, diaphragms, drains, meters, etc.

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Attachment K
DESCRIPTION OF FUGITIVE EMISSIONS - Continued

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in visual or soap-bubble leak detection ppm. Do not include monitoring by methods. "M/Q(M)/Q/SA/A/0" means the time period between inspections as follows:
Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category valves, gas service: 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EPA - emission factors established by EPA (cite document used);
EE - engineering estimate; 0 - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count seal-less pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR. 51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C. then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, SO, etc. DO NOT LIST H, H₂O, N, O, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

ATTACHMENT L

Emissions Unit Data Sheet(s)

“28. Fill out the **Emissions Unit Data Sheet(s)** as Attachment L.”

- **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**
 - Glycol Dehydration Unit 01 – 55.0 MMscfd GRI-GLYCalc
 - Data Sheet
 - 40 CFR Part 63; Subpart HH & HHH Registration Form
 - **CAPSTONE C65 MICROTURBINE DATA SHEET**
 - **STORAGE TANK DATA SHEET**
-

BALL DEHYDRATION STATION

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Attachment L - Emission Unit Data Sheet**NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**

General Glycol Dehydration Unit Data		Manufacturer and Model		tbd	
		Max Dry Gas Flow Rate (MMscf/day)		55.0	
		Design Heat Input (MMBtu/hr) - HHV		1.50	
		Design Type (DEG or TEG)		TEG	
		Source Status ²		NS	
		Date Installed/Modified/Removed ³		tbd	
		Regenerator Still Vent APCD ⁴		CC	
		Fuel HV (Btu/scf) - HHV		1,020	
		H ₂ S Content (gr/100 scf)		0.2	
		Operation (hrs/yr)		8,760	
Source ID # ¹	Vent	Reference ⁵	PTE ⁶	lbs/hr	tons/yr
DEHY-01 (1E/2E)	Dehydrator 01 [Flash Tank (DFT-01) and Still Vent (Regenerator) (DSV-01)]	GRI-GLYCalc	VOC	16.08	70.43
		GRI-GLYCalc	Benzene	0.14	0.61
		GRI-GLYCalc	Ethylbenzene	0.04	0.16
		GRI-GLYCalc	n-Hexane	0.55	2.43
		GRI-GLYCalc	Toluene	0.37	1.60
		GRI-GLYCalc	2,2,4-TMP	1.6E-04	7.9E-04
		GRI-GLYCalc	Xylenes	0.26	1.15
		Sum	Tot HAP	1.36	5.95
		GRI-GLYCalc	CH ₄	20.43	89.47
		Weighted Sum	CO _{2e}	511	2,237
Source ID # ¹	Vent	Reference ⁵	PTE ⁶	lbs/hr	tons/yr
RBV-01 (3E)	Reboiler 01	AP	NOX	0.15	0.64
		AP	CO	0.12	0.54
		AP	VOC	8.3E-03	0.04
		AP	SO ₂	8.8E-04	3.9E-03
		AP	PM _{10/2.5}	0.01	0.05
		AP	Benzene	3.1E-06	1.4E-05
		AP	HCHO	1.1E-04	4.8E-04
		AP	n-Hexane	2.6E-03	0.01
		AP	Toluene	5.0E-06	2.19E-05
		AP	Other HAP	2.8E-06	1.22E-05
		Sum	Total HAP	2.8E-03	0.01
		AP	CO ₂	176.47	772.94
		AP	CH ₄	3.4E-03	0.01
		AP	N ₂ O	3.2E-03	0.01
		Weighted Sum	CO _{2e}	178	778

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment L - Emission Unit Data Sheet

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET
(Continued)

Notes to **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**

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-GLYCalcTM
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-GLYCalcTM (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-GLYCalcTM 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-GLYCalcTM is available on our website.**

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment L**40 CFR Part 63; Subpart HH & HHH Registration Form**

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):	55.0 MM	
Affected facility actual annual average hydrocarbon liquid throughput (bbl/day):	na	
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> 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.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
The affected facility is:	<input checked="" type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> NG processing plant <input type="checkbox"/> 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).	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): na scf/bbl API gravity: na degrees	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Section B: Dehydration Unit (if applicable) ¹			
Description: 55.0 MMscfd - TEG Dehy 01 (DFT-01 (1E) and DSV-01 (2E))			
Date of Installation: tbd	Annual Operating Hours: 8,760	Burner rating (MMBtu/hr): 1.50	
Exhaust Stack Height (ft): 10.0	Stack Diameter (ft): 0.8	Stack Temp. (oF): 212	
Glycol Type:	<input checked="" type="checkbox"/> TEG <input type="checkbox"/> EG <input type="checkbox"/> Other: na		
Glycol Pump Type:	<input type="checkbox"/> Elect <input checked="" type="checkbox"/> Gas	If Gas, what is the volume ratio?: 0.08 acfm/gpm	
Condenser installed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Exit Temp: 150 oF	Condenser Pressure: 14 psia
Incinerator/flare installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Destruction Eff.: na	
Other controls installed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Describe: Still vent non-condensables not burned in reboiler are burned in BTEX burner	
Wet Gas ² : (Upstream of Contact Tower)	Gas Temperature: 80 oF	Gas Pressure: 800 psig	
	Saturated Gas?: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If no, water content?: na	
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate: Actual: 55.0 MMscfd	Design: 55.0 MMscfd	
	Water Content: 7.0 lb/MMscf		
Lean Glycol:	Circulation Rate: Actual ³ : 15.0 gpm	Max ⁴ : 15.0 gpm	
	Pump make/model: 2xKimray 45015PV		
Glycol Flash Tank (if applicable):	Temp: 90 oF	Pressure: 45 psig	Vented: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If no, describe vapor control: At least 90% of flash tank vapors are recycled for use as reboiler fuel or recompressed.		
Stripping Gas (if applicable):	Source of Gas: na	Rate: na	

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment L**40 CFR Part 63; Subpart HH & HHH Registration Form - DSV-01 - Cont****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 percent of C1-C8, 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

- ☒ Subject to Subpart HH -- However, EXEMPT because the facility is an area source of HAP emissions and the actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere is < 0.90 megagram per year (1.0 tpy); see 40CFR§63.764(e)(1)(ii).

Affected facility status: _____
(choose only one)

- ☐ Subject to Subpart HHH

☐ Not Subject
Because:

- ☐ < 10/25 TPY
- ☐ Affected facility exclusively handles black oil.
- ☐ 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.

C65 MicroTurbine Oil & Gas



33% smaller than equivalent generators. Offers ultra-low emissions and reliable electrical generation from raw natural gas.

- UL Class 1, Division 2 or ATEX Class 1, Zone 2 certification available
- Patented air bearing – no lubricating oil or coolant
- One moving part – minimal maintenance and downtime
- Ultra-low emissions
- Immediate service available worldwide
- Remote monitoring and diagnostic capabilities
- Multiple units easily synchronized
- Electrical protective relays mean no external switchgear required
- Small, modular design allows for easy, low-cost installation
- Reliable – tens of millions of run hours and counting
- Optional High Humidity protection available



C65 MicroTurbine



Offshore Hazardous Area

Electrical Performance⁽¹⁾

Electrical Power Output	65kW
Voltage	400–480 VAC
Electrical Service	3-Phase, 4 wire
Frequency	10–60 Hz
Maximum Output Current	100A, stand alone operation ⁽²⁾
Electrical Efficiency LHV	29%

Fuel/Engine Characteristics⁽¹⁾

	Non-Hazardous Area Config.	Hazardous Area Config.
Natural / Wellhead Gas HHV	30.7–47.5 MJ/m ³ (825–1,275 BTU/scf)	30.7–47.5 MJ/m ³ (825–1,275 BTU/scf)
Inlet Pressure	517–552 kPa gauge (75–80 psig)	517–552 kPa gauge (75–80 psig)
Fuel Flow HHV	888 MJ/hr (842,000 BTU/hr)	920 MJ/hr (872,000 BTU/hr)
Net Heat Rate LHV	12.4 MJ/kWh (11,800 BTU/kWh)	12.9 MJ/kWh (12,200 BTU/kWh)

Exhaust Characteristics⁽¹⁾

	High Pressure Natural Gas	Hazardous Area Config.
NOx Emissions @ 15% O ₂ ⁽³⁾	< 9 ppmvd (18 mg/m ³)	< 9 ppmvd (18 mg/m ³)
NOx / Electrical Output ⁽³⁾	0.16 g/bhp-hr (0.46 lb/MWhe)	0.16 g/bhp-hr (0.46 lb/MWhe)
Exhaust Gas Flow	0.49 kg/s (1.08 lbm/s)	0.50 kg/s (1.09 lbm/s)
Exhaust Gas Temperature	309°C (588°F)	325°C (617°F)

Reliable power when and where you need it. Clean and simple.

Dimensions & Weight⁽⁴⁾

	High Pressure Natural Gas	Hazardous Area Config.
Width x Depth x Height	0.76 x 1.9 x 1.9 m (30 x 77 x 76 in)	0.87 x 3.2 x 2.3 m (35 x 128 x 90 in)
Weight	1121 kg (2,471 lb)	1666 kg (3,672 lb)

Minimum Clearance Requirements⁽⁵⁾

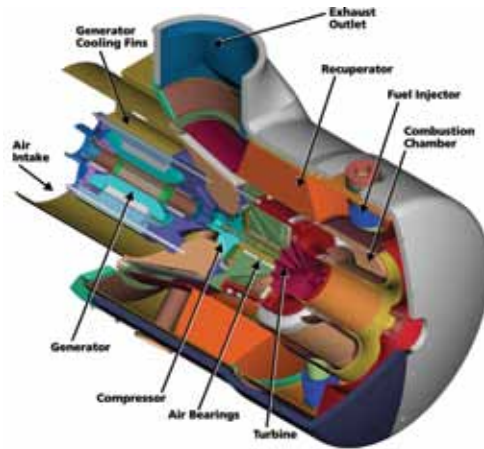
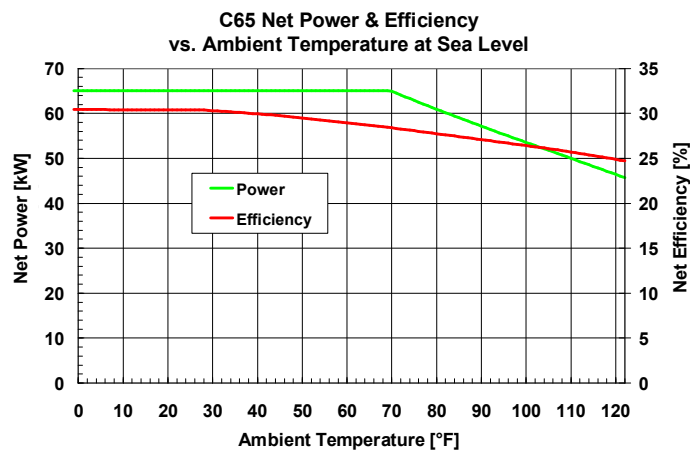
	High Pressure Natural Gas	Hazardous Area Config.
Vertical Clearance	0.61 m (24 in)	0.61 m (24 in)
Horizontal Clearance		
Left & Right	0.76 m (30 in)	1.3 m (50 in)
Front ⁽⁶⁾	1.7 m (65 in)	1.8 m (72 in)
Rear	0.91 m (36 in)	0.91 m (36 in)

Sound Levels

	High Pressure Natural Gas	Hazardous Area Config.
Acoustic Emissions at Full Load Power		
Nominal at 10 m (33 ft)	70 dBA	70 dBA

Certifications

- Hazardous Area configurations certified to UL 2200 and NFPA 496
- Hazardous Area configurations certified for hazardous locations (UL file E240758) for standard natural gas
- Models available with optional equipment for CE Marking
- Hazardous Area configurations available with ATEX



(1) Nominal full power performance at ISO conditions: 59°F, 14.696 psia, 60% RH
 (2) With linear load
 (3) Exhaust emissions for standard natural gas at 39.4 MJ/Nm³ (1,000 BTU/scf) (HHV)
 (4) Approximate dimensions and weights
 (5) Clearance requirements may increase due to local code considerations
 (6) Battery Removal clearance
 Specifications are not warranted and are subject to change without notice.





Technical Reference

Capstone MicroTurbine™ Systems Emissions

Summary

Capstone MicroTurbine™ systems are inherently clean and can meet some of the strictest emissions standards in the world. This technical reference is to provide customers with information that may be requested by local air permitting organizations or to compare air quality impacts of different technologies for a specific project. The preferred units of measure are “output based”; meaning that the quantity of a particular exhaust emission is reported relative to the useable output of the microturbine – typically in pounds per megawatt hour for electrical generating equipment. This technical reference also provides volumetric measurements in parts per million and milligrams per normal cubic meter. A conversion between several common units is also provided.

Maximum Exhaust Emissions at ISO Conditions

Table 1 below summarizes the exhaust emissions at full power and ISO conditions for different Capstone microturbine models. Note that the fuel can have a significant impact on certain emissions. For example landfill and digester gas can be made up of a wide variety of fuel elements and impurities, and typically contains some percentage of carbon dioxide (CO₂). This CO₂ dilutes the fuel, makes complete combustion more difficult, and results in higher carbon monoxide emissions (CO) than for pipeline-quality natural gas.

Table 1. Emission for Different Capstone Microturbine Models in [lb/MWhe]

Model	Fuel	NOx	CO	VOC ⁽⁵⁾
C30 NG	Natural Gas ⁽¹⁾	0.64	1.8	0.23
CR30 MBTU	Landfill Gas ⁽²⁾	0.64	22.0	1.00
CR30 MBTU	Digester Gas ⁽³⁾	0.64	11.0	1.00
C30 Liquid	Diesel #2 ⁽⁴⁾	2.60	0.41	0.23
C65 NG Standard	Natural Gas ⁽¹⁾	0.46	1.25	0.10
C65 NG Low NOx	Natural Gas ⁽¹⁾	0.17	1.30	0.10
C65 NG CARB	Natural Gas ⁽¹⁾	0.17	0.24	0.05
CR65 Landfill	Landfill Gas ⁽²⁾	0.46	4.0	0.10
CR65 Digester	Digester Gas ⁽³⁾	0.46	4.0	0.10
C200 NG	Natural Gas ⁽¹⁾	0.40	1.10	0.10
C200 NG CARB	Natural Gas ⁽¹⁾	0.14	0.20	0.04
CR200 Digester	Digester Gas ⁽³⁾	0.40	3.6	0.10

Notes:

- (1) Emissions for standard natural gas at 1,000 BTU/scf (HHV) or 39.4 MJ/m³ (HHV)
- (2) Emissions for surrogate gas containing 42% natural gas, 39% CO₂, and 19% Nitrogen
- (3) Emissions for surrogate gas containing 63% natural gas and 37% CO₂
- (4) Emissions for Diesel #2 according to ASTM D975-07b
- (5) Expressed as Methane

ATTACHMENT M
Air Pollution Control Device Sheet(s)

“29. Fill out the **Air Pollution Control Device Sheet(s)** as Attachment M.”

- **Air Pollution Control Device Sheet (Condenser)**
 - **NATCO 95% BTEX Skid – Condenser for Dehydrator Still Vent 01 (DSV-01)**
-

Williams Ohio Valley Midstream LLC
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Attachment M
AIR POLLUTION CONTROL DEVICE SHEET
 (Condenser System)

Control Device ID No. (must match Emission Units Table): **BTEX-01**

Equipment Information and Filter Characteristics

1. Manufacturer: NATCO Model No.	2. Method: <div style="display: flex; flex-direction: column; gap: 5px;"> <input type="checkbox"/> Pressure condensation <input checked="" type="checkbox"/> Temperature condensation <input type="checkbox"/> Surface <input type="checkbox"/> Contact <input type="checkbox"/> Other, specify </div>
3. Control Device Name: BTEX BUSTER (Controls DSV-01/2E)	
4. Provide diagram of condenser:	
5. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
6. Heat exchanger area: ft³	7. Reported removal efficiency: 95%
8. Coolant Used: AIR	9. Refrigeration capacity: Ref. tons
10. Composition of coolant:	11. Internal operating temperature: °F
12. Specific heat of coolant: <div style="text-align: right;">BTU/lb.°F, at 77°F</div>	13. Temperature of condensation: °F
Average Operation:	Maximum Operation:
14. Coolant Temperature: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Inlet: °F </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Outlet: °F </div>	15. Coolant Temperature: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Inlet: °F </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Outlet: °F </div>
16. Gas Temperature: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Inlet: °F </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Outlet: °F </div>	17. Gas Temperature: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Inlet: °F </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Outlet: °F </div>
18. Gas flow rate: ft³/min	19. Gas flow rate: ft³/min
20. Coolant flow rate per condenser: Type: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Water: gal/min </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Air: ft³/min </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Other: lb/hour </div>	21. Coolant flow rate per condenser: Type: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Water: gal/min </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Air: ft³/min </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> Other: lb/hour </div>
22. Efficiency of condenser: %	23. Efficiency of condenser: %
24. Condenser surface area: ft²	25. Condenser surface area: ft²

26.	Pollutant	Guaranteed Minimum Control Efficiency %	Concentration ppmv	Specific Heat BTU/lb-mol °F	Heat of Vaporation BTU/lb-mol
A	VOC	95%			
B					
C					
D					
E					
F					
G					
Total Concentration in ppmv					

Emission Gas (Vapor) Stream

27. Before Condenser	28. After Condenser
Inlet vapor flow rate: ft ³ /min	Inlet vapor flow rate: ft ³ /min
Influent vapor temperature: °F	Influent vapor temperature: °F
Effluent vapor temperature: °F	Effluent vapor temperature: °F

29.	Pollutant	INLET			OUTLET	
		Vapor Pressure	Condensation Temperature	Rate lb/hr	Rate lb/hr	Condensation Temperature
A						
B						
C						
D						
E						
F						
G						

Total of the POLLUTANT lb/hr

30. Moisture content: %

31. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

32. Describe the collection material disposal system:

33. Have you included **Condenser Control Device** in the Emissions Points Data Summary Sheet?

34. 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:

REPORTING:

TESTING:

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 or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

35. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

NA

36. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

95%

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

NATCO BTEX BUSTER

Removes 99.7%* of BTEX and VOC emissions from glycol reconcentrator emissions

The Simple and Cost-effective Answer to Your Emission Compliance Problems

Cameron's NATCO® BTEX BUSTER® provides a removal efficiency greater than 99.7%*, helps recover and collect saleable liquid hydrocarbons and prevents the loss of expensive fuel gas from glycol reconcentrator vent emissions.

The unit is designed using the Environmental Protection Agency-approved Gri-Glycalc computer simulation program with a flash-gas separator in the glycol regeneration process. Under common operating conditions, BTEX (benzene, toluene, ethylbenzene and xylene), as well as other volatile organic compounds (VOCs), are emitted into the atmosphere during the glycol regeneration process. The rates usually are proportional to the glycol circulation rate.

The NATCO BTEX BUSTER captures those hydrocarbon emissions.

Performance

- The cost-effective system is designed to assist operators in reducing BTEX and VOC emissions below the accepted levels and complies with federal and state environmental regulations.
- Economics of the NATCO BTEX BUSTER show that it can pay for itself by recovering saleable hydrocarbon liquids and fuel gas. By condensing troublesome glycol reconcentrator vapors and routing flash gas back to the reconcentrator fuel gas inlet for burning, the unit reduces emissions during glycol plant dehydration processing.
- The NATCO BTEX BUSTER incorporates field-proven burner accessories to help prevent sooting and backpressure on your regeneration system.
- The NATCO BTEX BUSTER also features a design to eliminate potential freeze-up problems when operating in severe cold climates.
- Cameron offers the NATCO BTEX BUSTER in standard sizes to accommodate most customer needs. Our units are backed by Cameron's replacement parts, technical assistance and service available 24 hours a day.



The NATCO BTEX BUSTER cold-weather design eliminates freezing problems associated with cold climates.

How It Works

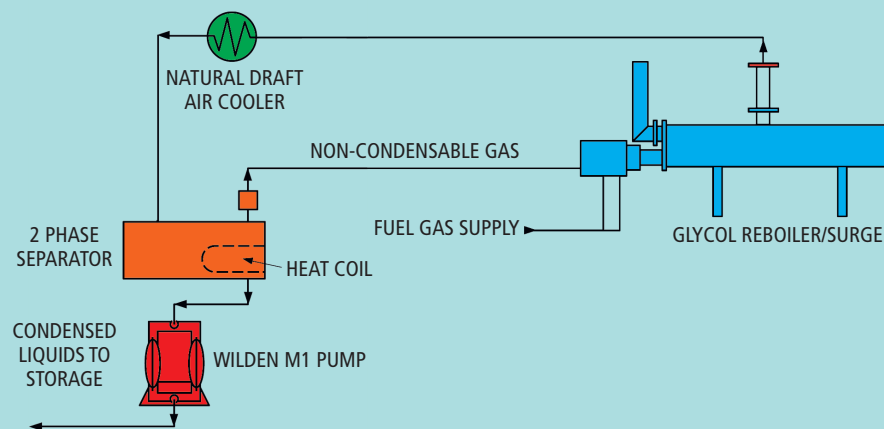
The NATCO BTEX BUSTER is a relatively simple process that is designed to maintain greater than 99.7%* removal of BTEX and VOC emissions.

The vapors emitted from the glycol still column are cooled in the natural draft air cooler to temperatures below 120° F (49° C).

The condensed liquids are collected in a small two-phase separator and pumped to customer storage. Non-condensable gases from the separator are piped through an in-line flash arrestor and then burned in the glycol reboiler firebox to achieve an overall minimum destruction efficiency of 99.7%* plus.

Features	Benefits
Ideal for Remote Locations	Natural draft self-regulating system does not require any moving pieces of equipment.
Environmentally Correct	Meets Federal Regulation 40 CFR part 63 and meets or exceeds most stringent state regulations LAC 111.2116 and LAC 33:111 chapter 51.
Efficient	Removal efficiency is greater than 99.7%*.
Reduces Operating Costs	Reduces fuel gas consumption and recovers saleable liquid hydrocarbons.
Safe	Features an in-line flash arrestor, high-level switch, pressure safety valve and gas shut-down valves.
Designed for the Oil Field	Includes field-proven burner products, and the pneumatic pump handles aromatic hydrocarbons.
Designed for Cold Weather	Cold-weather design eliminates freezing problems associated with cold climates.
Cameron's Services	Includes experienced staff and worldwide locations, 24 hours a day.

NATCO BTEX BUSTER SKID UNIT



Built-in Safety Features

The NATCO BTEX BUSTER is engineered with proper controls for safe operation and long in-service life. These include an in-line flash arrestor, separator high-level switch, pressure safety valve and gas shut-down valves for high reboiler bath temperatures. It also incorporates field-proven burner accessories that help to prevent typical sooting and backpressures on your regeneration system.

Field-proven, the NATCO BTEX BUSTER now is available through our sales and service locations worldwide.

Standard BTEX Size (1)	Reconcentrator Duty Btu/hr	Glycol Pump gal/hr	Max Capacity water/day (2)	Non-condensable vapor/day (3)	Cooler Duty Btu/hr (3)
150	75,000	40	273	7	30,000
150	150,000	40	273	10	30,000
250	250,000	90	1216	27	51,000
375	375,000	210	1807	45	76,000
550	550,000	210	2650	60	112,000
750	750,000	450	3615	100	152,000

(1) Standard BTEX

Performance of unit is based on a non-condensable vapor HHV greater than 400 Btu/cf and less than 1800 Btu/cf and a glycol circulation rate of no more than 3 gal/lb of water removed.

(2) Maximum Capacity of Water/day

Represents the maximum capacity of water in pounds per day for each of Cameron's standard reboiler size based on a glycol circulation rate of 2 gallons of glycol per pound of water removed.

(3) Non-condensable Vapor/day

Maximum non-condensable vapor rate was calculated with the Gri-Glycalc computer simulation program with a flash-gas separator used in the glycol regeneration process and a BTEX concentration in the inlet gas stream of no more than 700 ppm.

Using adiabatic combustion calculations, a minimum of 99.7%* of these non-condensable vapors are destroyed.

(4) Cooler Duty Btu/hr

Cooler duty was calculated based on a prevailing windspeed of 3 mph and a maximum ambient temperature of 100° F (38° C).

Note: Cameron is not responsible for the disposal of any condensed liquids associated with its BTEX BUSTER units.

* Certain gas streams contain more BTEX and VOCs than represented by Gri-Glycalc. Consult with Cameron's engineers for system evaluation, equipment sizing and application to ensure conversion efficiency.

LOCATIONS

United States of America
11210 Equity Dr., Suite 100
Houston, TX 77041
USA
Tel 713.849.7500

Marcellus/Utica
Laceyville 570.869.3104
Nitro 304.755.9400

Midcontinent
Oklahoma City 405.677.8827

Rockies
Casper 307.234.7183
Bloomfield 505.634.1400
Grand Junction 970.243.3600
Vernal 435.789.1796
Williston 701.774.5500

Texas
Caldwell 979.272.7101
Corpus Christi 361.289.0488
Godley 817.389.2676
Longview 903.759.2738
Odessa 432.530.3600

Canada
Leduc 780.986.9803

ATTACHMENT N

Supporting Emissions Calculations

“30. Provide all **Supporting Emissions Calculations** as Attachment N.”

- **Emission Summary Spreadsheets**
 - Controlled Emissions – Criteria Pollutants
 - Controlled Emissions – Hazardous Air Pollutants (HAP)
 - Greenhouse Gas (GHG) Emissions
 - PRE-Controlled Emissions – Criteria Pollutants
 - PRE-Controlled Emissions – Hazardous Air Pollutants (HAP)
 - **Unit-Specific Emission Spreadsheets**
 - Dehydrator 01 (Still Vent and Flash Tank) – 55.0 MMscfd
 - Dehydrator 01 (Summary) – 55.0 MMscfd
 - Reboiler 01 – 1.50 MMBtu/hr
 - BTEX Burner – 1.50 MMBtu/hr
 - Microturbine 01 – 65 ekW
 - Startup, Shutdown and Maintenance Emissions
 - **Fugitive Emissions**
 - Piping and Equipment Fugitives - Gas
 - **AP-42 and GHG Emission Factors**
 - **GRI-GLYCalc Model Runs**
 - Dehydrator 01 (Still Vent and Flash Tank) – 55.0 MMscfd
-

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Attachment N - Supporting Emissions Calculations
Controlled Emissions - Criteria Pollutants

Unit ID	Point ID	Control ID	Description	Design Capacity	NOx		CO		VOC		SOx		PM10/2.5	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
DFT-01	1E	na	Flash Tank 01	55.0 MMscfd	---	---	---	---	13.38	58.60	---	---	---	---
DSV-01	2E	BTEX-01	Still Vent (Regenerator) 01		---	---	---	---	2.70	11.82	---	---	---	---
RBV-01	3E	na	Reboiler 01	1.50 MMBtu/hr	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05
HTR-01	4E	na	BTEX Burner	1.50 MMBtu/hr	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05
CT-01	5E	na	Capstone C65 Microturbine	65.0 kW	0.06	0.26	0.16	0.71	0.01	0.03	2.9E-03	0.01	0.01	0.02
SSM	6E	na	Startup, Shutdown and Maintenance	na	---	---	---	---	---	9.30	---	---	---	---
TOTAL POINT SOURCE PTE:					0.35	1.55	0.41	1.79	16.10	79.83	4.6E-03	2.0E-02	0.03	0.12
WV-DEP Permit Threshold:					6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy
Title V Permit Threshold:					---	100	---	100	---	100	---	100	---	100

FUG	1F	na	Process Piping Fugitives - Gas	920 fittings	---	---	---	---	1.04	4.55	---	---	---	---
TOTAL FUGITIVE SOURCE PTE:					---	---	---	---	1.04	4.55	---	---	---	---

TOTAL PTE:					0.35	1.55	0.41	1.79	17.14	84.38	4.6E-03	2.0E-02	0.03	0.12
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- Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 4 - Fugitive criteria pollutant emissions for dehydration stations are not considered in major source determinations (45CSR30 Section 2.26.b.)

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Attachment N - Supporting Emissions Calculations

Controlled Emissions - Hazardous Air Pollutants (HAP)

Unit ID	Point ID	Benzene		Ethylbenzene		Formaldehyde		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
DFT-01	1E	0.01	0.06	1.1E-03	0.00	---	---	0.43	1.89	---	---	0.02	0.09	1.2E-04	6.0E-04	5.2E-03	0.02	---	---	0.47	2.06
DSV-01	2E	0.13	0.55	0.03	0.15	---	---	1.2E-01	0.53	---	---	0.35	1.52	4.2E-05	1.9E-04	0.26	1.13	---	---	0.89	3.88
RBV-01	3E	3.1E-06	1.4E-05	---	---	1.1E-04	4.8E-04	2.6E-03	0.01	---	---	5.0E-06	2.2E-05	---	---	---	---	2.8E-06	1.2E-05	2.8E-03	0.01
HTR-01	4E	3.1E-06	1.4E-05	---	---	1.1E-04	4.8E-04	2.6E-03	0.01	---	---	5.0E-06	2.2E-05	---	---	---	---	2.8E-06	1.2E-05	2.8E-03	0.01
CT-01	5E	1.0E-05	4.4E-05	2.7E-05	1.2E-04	6.0E-04	2.6E-03	---	---	---	---	1.1E-04	4.8E-04	---	---	5.4E-05	2.4E-04	5.0E-05	2.2E-04	8.5E-04	3.7E-03
SSM	6E	---	0.04	---	0.04	---	---	---	0.04	---	---	---	0.04	---	0.04	---	0.04	---	---	---	0.26
FUG	1F	4.9E-03	0.02	4.9E-03	0.02	---	---	4.9E-03	0.02	---	---	4.9E-03	0.02	4.9E-03	0.02	4.9E-03	0.02	---	---	0.03	0.13

TOTAL PTE:	0.14	0.67	0.04	0.22	8.2E-04	3.6E-03	0.56	2.51	---	---	0.37	1.67	5.0E-03	0.07	0.27	1.21	5.6E-05	2.4E-04	1.39	6.36	
WV-DEP:	2 lb/hr	<u>OR</u>	0.5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	25	

Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.

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Attachment N - Supporting Emissions Calculations

Greenhouse Gas (GHG) Emissions

Unit ID	Point ID	Control ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation	kg/MMBtu: 53.06 GWP: 1 CO2 CO2e tpy tpy	kg/MMBtu: 1.00E-03 GWP: 25 CH4 CO2e tpy tpy	kg/MMBtu: 1.00E-04 GWP: 298 N2O CO2e tpy tpy	TOTAL CO2e tpy	
DFT-01	1E	na	Flash Tank 01	---	8,760	---	---	89.13 2,228	---	2,228
DSV-01	2E	BTEX-01	Still Vent (Regenerator) 01	---	8,760	---	---	0.35 8.73	---	9
RBV-01	3E	na	Reboiler 01	1.50	8,760	772.94 772.94	0.01 0.37	0.01 4.22	778	
HTR-01	4E	na	BTEX Burner	1.50	8,760	772.94 772.94	0.01 0.37	0.01 4.22	778	
CT-01	5E	na	Capstone C65 Microturbine	0.84	8,760	431.41 431.41	0.03 0.79	0.01 3.30	435	
SSM	6E	na	Startup, Shutdown and Maintenance	---	8,760	0.12 0.12	20.66 516.44	---	517	
FUG	1F	na	Process Piping Fugitives - Gas	---	8,760	0.06 0.06	10.99 274.78	---	275	

TOTAL FACILITY-WIDE PTE:	1,977		121		0.04		5,019
WV-DEP Threshold: (na	- OR -	na	- OR -	na) - AND -	na
Title V Permit Threshold:	na		na		na		na

- Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
 2 - Dehydrator CH4 emissions are based on "Worst Case" GRI-GLYCalc Model Output.
 3 - Fugitive CH4 emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.
 4 - All other GHG emissions are based on default values in 40CFR98, Subpart C, Table C-1.
 5 - CO2e is aggregated Greenhouse Gas (GHG), comprised of carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), as adjusted for Global Warming Potential (GWP).
6 - WV-DEP and Title V Permit Major Source Thresholds are applicable only if other regulated air pollutants exceed the corresponding Thresholds.

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Attachment N - Supporting Emissions Calculations

PRE-Controlled Emissions - Criteria Pollutants

Unit ID	Point ID	Control ID	Description	Design Capacity	NOx		CO		VOC		SOx		PM10/2.5	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
DFT-01	1E	na	Flash Tank 01	55.0 MMscfd	---	---	---	---	13.38	58.60	---	---	---	---
DSV-01	2E	BTEX-01	Still Vent (Regenerator) 01		---	---	---	---	53.98	236.45	---	---	---	---
RBV-01	3E	na	Reboiler 01	1.50 MMBtu/hr	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05
HTR-01	4E	na	BTEX Burner	1.50 MMBtu/hr	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05
CT-01	5E	na	Capstone C65 Microturbine	65.0 kW	0.06	0.26	0.16	0.71	0.01	0.03	2.9E-03	0.01	5.6E-03	0.02
SSM	6E	na	Startup, Shutdown and Maintenance	na	---	---	---	---	---	9.30	---	---	---	---
TOTAL POINT SOURCE PTE:					0.35	1.55	0.41	1.79	67.39	304.45	4.6E-03	0.02	0.03	0.12
WV-DEP Permit Threshold:					6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy	6 lb/hr	<u>AND</u> 10 tpy
Title V Permit Threshold:					---	100	---	100	---	100	---	100	---	100

FUG	1F	na	Process Piping Fugitives - Gas	920 fittings	---	---	---	---	1.04	4.55	---	---	---	---
TOTAL FUGITIVE SOURCE PTE:					---	---	---	---	1.04	4.55	---	---	---	---

TOTAL PTE:					0.35	1.55	0.41	1.79	68.43	309.01	4.6E-03	0.02	0.03	0.12
-------------------	--	--	--	--	-------------	-------------	-------------	-------------	--------------	---------------	----------------	-------------	-------------	-------------

- Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 4 - Fugitive criteria pollutant emissions for dehydration stations are not considered in major source determinations (45CSR30 Section 2.26.b.)

Williams Ohio Valley Midstream LLC (OVM)
BALL DEHYDRATION STATION
 Application for 45CSR13 NSR Construction Permit
Attachment N - Supporting Emissions Calculations

PRE-Controlled Emissions - Hazardous Air Pollutants (HAP)

Unit ID	Point ID	Benzene		Ethylbenzene		HCHO (HAP)		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
DFT-01	1E	0.01	0.06	1.1E-03	0.00	---	---	0.43	1.89	---	---	0.02	0.09	1.2E-04	6.0E-04	5.2E-03	0.02	---	---	0.47	2.06
DSV-01	2E	2.52	11.05	0.70	3.06	---	---	2.44	10.69	---	---	6.92	30.31	8.4E-04	3.7E-03	5.14	22.52	---	---	17.73	77.64
RBV-01	3E	3.1E-06	1.4E-05	---	---	1.1E-04	4.8E-04	2.6E-03	0.01	---	---	5.0E-06	2.2E-05	---	---	---	---	2.8E-06	1.2E-05	2.8E-03	0.01
HTR-01	4E	3.1E-06	1.4E-05	---	---	1.1E-04	4.8E-04	2.6E-03	0.01	---	---	5.0E-06	2.2E-05	---	---	---	---	2.8E-06	1.2E-05	2.8E-03	0.01
CT-01	5E	1.0E-05	4.4E-05	2.7E-05	1.2E-04	6.0E-04	2.6E-03	---	---	---	---	1.1E-04	4.8E-04	---	---	5.4E-05	2.4E-04	5.0E-05	2.2E-04	8.5E-04	3.7E-03
SSM	6E	---	0.04	---	0.04	---	---	---	0.04	---	---	---	0.04	---	0.04	---	0.04	---	---	---	0.26
FUG	1F	4.9E-03	2.1E-02	4.9E-03	2.1E-02	---	---	4.9E-03	2.1E-02	---	---	4.9E-03	2.1E-02	4.9E-03	2.1E-02	4.9E-03	2.1E-02	---	---	2.9E-02	1.3E-01

TOTAL PTE:	2.54	11.17	0.70	3.13	8.2E-04	3.6E-03	2.88	12.67	---	---	6.95	30.47	5.8E-03	0.07	5.15	22.61	5.6E-05	2.4E-04	18.23	80.12	
WV-DEP:	2 lb/hr	<u>OR</u>	0.5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy	2 lb/hr	<u>OR</u>	5 tpy
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	10	---	25	

Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations**Dehydrator 01 (Flash Tank and Still Vent) – 55.0 MMscfd**

Unit ID	Description	Capacity	Reference	Pollutant	GRI-GLYCalc Estimated Pre-Controlled Emissions		120% Worst-Case Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
					lb/hr	tpy	lb/hr	tpy		lb/hr	tpy
DFT-01 (1E)	Dehy 01 (DFT-01) Flash Tank (At least 90% of Flash Tank Offgas is Recycled/Recompressed)	Flow Rate 55.0 MMscfd 8,760 hr/yr	GRI-GLYCalc 4.0	VOC	11.15	48.84	13.38	58.60	---	13.38	58.60
			GRI-GLYCalc 4.0	Benzene	0.01	0.05	0.01	0.06	---	0.01	0.06
			GRI-GLYCalc 4.0	Ethylbenzene	9.0E-04	0.00	0.00	0.00	---	1.1E-03	0.00
			GRI-GLYCalc 4.0	n-Hexane	0.36	1.58	0.43	1.89	---	0.43	1.89
			GRI-GLYCalc 4.0	Toluene	0.02	0.07	0.02	0.09	---	0.02	0.09
			GRI-GLYCalc 4.0	2,2,4-TMP	1.0E-04	5.0E-04	1.2E-04	6.0E-04	---	1.2E-04	6.0E-04
			GRI-GLYCalc 4.0	Xylenes	0.00	0.02	0.01	0.02	---	5.2E-03	0.02
			GRI-GLYCalc 4.0	Tot HAP	0.39	1.72	0.47	2.06	---	0.47	2.06
			GRI-GLYCalc 4.0	CH ₄	16.96	74.27	20.35	89.13	---	20.35	89.13
			40CFR98 - Table A-1	CO ₂ e	424	1,857	509	2,228	---	509	2,228
DSV-01 (2E)	Dehy 01 (DSV-01) Still Vent (aka Regenerator) (Controlled w/ NATCO 95% BTEX Skid)	Flow Rate 55.0 MMscfd 8,760 hr/yr	GRI-GLYCalc 4.0	VOC	44.99	197.04	53.98	236.45	95.0%	2.70	11.82
			GRI-GLYCalc 4.0	Benzene	2.10	9.21	2.52	11.05	95.0%	0.13	0.55
			GRI-GLYCalc 4.0	Ethylbenzene	0.58	2.55	0.70	3.06	95.0%	0.03	0.15
			GRI-GLYCalc 4.0	n-Hexane	2.03	8.91	2.44	10.69	95.0%	0.12	0.53
			GRI-GLYCalc 4.0	Toluene	5.77	25.26	6.92	30.31	95.0%	0.35	1.52
			GRI-GLYCalc 4.0	2,2,4-TMP	7.0E-04	3.1E-03	8.4E-04	3.7E-03	95.0%	4.2E-05	1.9E-04
			GRI-GLYCalc 4.0	Xylenes	4.28	18.77	5.14	22.52	95.0%	0.26	1.1259
			GRI-GLYCalc 4.0	Tot HAP	14.77	64.70	17.73	77.64	95.0%	0.89	3.88
			GRI-GLYCalc 4.0	CH ₄	1.33	5.82	1.59	6.99	95.0%	0.08	0.35
			40CFR98 - Table A-1	CO ₂ e	33	146	40	175	95.0%	2	9
DEHY 01 (Sum of DSV and DFT)	Dehy 02 (Total) Total Dehydrator Emissions	Flow Rate 55.0 MMscfd 8,760 hr/yr	GRI-GLYCalc 4.0	VOC	56.14	245.88	67.36	295.05	76.1%	16.08	70.43
			GRI-GLYCalc 4.0	Benzene	2.11	9.26	2.54	11.11	94.5%	0.14	0.61
			GRI-GLYCalc 4.0	Ethylbenzene	0.58	2.55	0.70	3.06	94.9%	0.04	0.16
			GRI-GLYCalc 4.0	n-Hexane	2.39	10.49	2.87	12.59	80.7%	0.55	2.43
			GRI-GLYCalc 4.0	Toluene	5.78	25.33	6.94	30.40	94.7%	0.37	1.60
			GRI-GLYCalc 4.0	2,2,4-TMP	8.0E-04	0.00	9.6E-04	0.00	81.8%	1.6E-04	0.00
			GRI-GLYCalc 4.0	Xylenes	4.29	18.78	5.15	22.54	94.9%	0.26	1.15
			GRI-GLYCalc 4.0	Tot HAP	15.16	66.42	18.20	79.70	92.5%	1.36	5.95
			GRI-GLYCalc 4.0	CH ₄	18.29	80.09	21.94	96.11	6.9%	20.43	89.47
			40CFR98 - Table A-1	CO ₂ e	457	2,002	549	2,403	6.9%	511	2,237

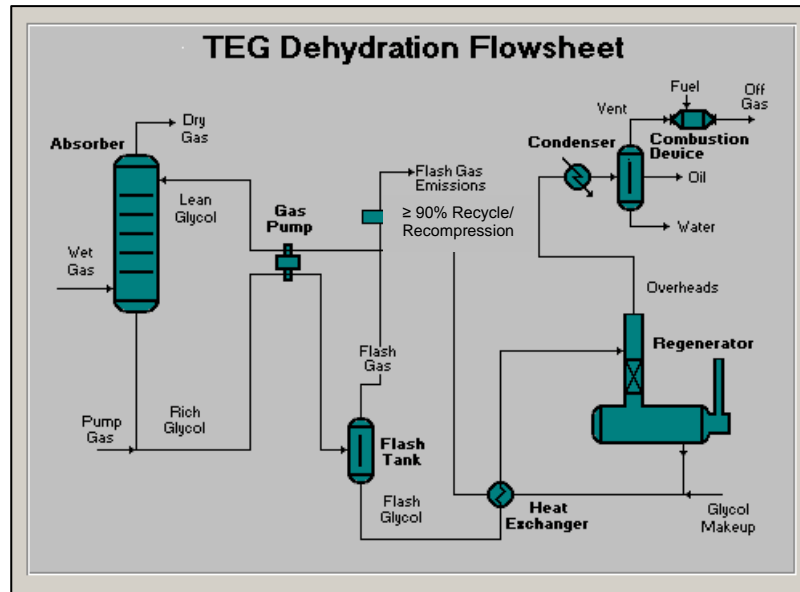
- Notes:
- 1 - Used GRI-GLYCalc V4.0 to calculate combined regenerator vent/flash gas emissions.
 - 2 - Total HAP includes n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), and other components.
 - 3 - A 20% contingency has been added to the GRI-GLYCalc results to account for potential future changes in gas quality.

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations**Dehydrator 01 (Summary) – 55.0 MMscfd**

Unit ID	Description	Reference	Pollutant	GRI-GLYCalc Results		W/ 20% Margin		Control Eff	Controlled Emissions	
				lb/hr	tpy	lb/hr	tpy	%	lb/hr	tpy
DEHY-01 (1E/2E)	Dehydrator 01 Sum of Flash Tank and Still Vent - (At least 90% of Flash Tank Offgas Recycled/Recompressed and Still Vent Controlled w/ NATCO 95% BTEX Skid) 55.0 MMscfd 8,760 Hr/yr 20,075 MMscf/yr 2.29 MMscf/hr NESHAP HH - Exempt	---	NOX	---	---	---	---	---	---	---
		---	CO	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	VOC	56.14	245.88	67.36	295.05	76.1%	16.08	70.43
		---	SO2	---	---	---	---	---	---	---
		---	PM10/2.5	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Benzene	2.11	9.26	2.54	11.11	94.5%	0.14	0.61
		GRI-GLYCalc 4.0	Ethylbenzene	0.58	2.55	0.70	3.06	94.9%	0.04	0.16
		---	HCHO	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	n-Hexane	2.39	10.49	2.87	12.59	80.7%	0.55	2.43
		---	Methanol	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Toluene	5.78	25.33	6.94	30.40	94.7%	0.37	1.60
		GRI-GLYCalc 4.0	2,2,4-TMP	8.0E-04	0.00	9.6E-04	0.00	81.8%	1.6E-04	7.9E-04
		GRI-GLYCalc 4.0	Xylenes	4.29	18.78	5.15	22.54	94.9%	0.26	1.15
		---	Other HAP	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Total HAP	15.16	66.42	18.20	79.70	92.5%	1.36	5.95
		---	CO2	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	CH4	18.29	80.09	22	96	6.9%	20	89
		---	N2O	---	---	---	---	---	---	---
		40CFR98 - Table A-1	CO2e	457	2,002	549	2,403	6.9%	511	2,237



***Dehydrator Operating Parameters**
 (See Attachments L - GRI-GLYCalc Model and H - Extended Gas Analysis)

Dry Gas Flow Rate:	55.0 MMscfd	Extended Gas Analysis:	10/21/15
Wet Gas Temperature:	80 oF	Flash Tank Temperature:	90 oF
Wet Gas Pressure:	800 psig	Flash Tank Pressure:	45 psig
Wet Gas Water Content:	Saturated	Flash Tank Off-Gas:	≥ 90% Recyc/Recomp
Dry Gas Water Content:	7.0 lb H2O/MMscf	Stripping Gas:	na
Lean Glycol Water Content:	1.5 wt% H2O	Stripping Gas Flow Rate:	na
Glycol Pump Type:	Gas Injection	Regen Overhead Control:	95% BTEX Skid
Glycol Pump Model:	2xKimray 45015 PV	Condenser Temperature:	150 oF
Lean Glycol Circulation Rate:	15.00 gpm	Condenser Pressure:	14 psia

Additional GRI-GLYCalc 4.0 Model Results:

Flash Tank Off-Gas Flow:	5,820 scfh	Wet Gas Water Content:	0.079 Vol%
Regen Overhead Stream:	2,030 scfh	Dry Gas Water Content:	0.003 Vol%
Lean Glycol Recirc Ratio:	10.8 gal/lb-H2O	Rich Glycol Water Content:	2.350 wt%

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Attachment N - Supporting Emissions Calculations

Reboiler 01 – 1.50 MMBtu/hr

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Controlled		Control %	Controlled	
				lb/MMscf	lb/MMBtu	lb/hr	tpy		lb/hr	tpy
RBV-1 (3E)	Reboiler 01	EPA AP-42 Table 1.4-2	NOX	100.00	0.10	0.15	0.64	na	0.15	0.64
		EPA AP-42 Table 1.4-2	CO	84.00	0.08	0.12	0.54	na	0.12	0.54
		EPA AP-42 Table 1.4-2	VOC	5.68	0.01	0.01	0.04	na	0.01	0.04
		EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	8.8E-04	3.9E-03	na	8.8E-04	3.9E-03
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.01	0.05	na	0.01	0.05
	1.50 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	3.1E-06	1.4E-05	na	3.1E-06	1.4E-05
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.35E-05	1.1E-04	4.8E-04	na	1.1E-04	4.8E-04
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	2.6E-03	0.01	na	2.6E-03	0.01
		EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	---	---
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	5.0E-06	2.2E-05	---	5.0E-06	2.2E-05
		EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	na	---	---
		EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.86E-06	2.8E-06	1.2E-05	na	2.8E-06	1.2E-05
		EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	2.8E-03	0.01	na	2.8E-03	0.01
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-2	CO2	120,000	117.65	176.47	772.94	na	176.47	772.94
		EPA AP-42 Table 1.4-2	CH4	2.30	2.3E-03	3.4E-03	0.01	na	3.4E-03	0.01
		EPA AP-42 Table 1.4-2	N2O	2.20	2.2E-03	3.2E-03	0.01	na	3.2E-03	0.01
		40CFR98 - Table A-1	CO2e	120,713	118	178	778	na	178	778
	1,471 scf/hr									
	35.29 Mscfd									
	12.88 MMscf/yr									

- Notes:
- 1 - The combustion emission factors are based on a default fuel heat content of 1,020 Btu/scf (HHV).
 - 2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 - 3 - Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), acetaldehyde, acrolein, and methanol.

Williams Ohio Valley Midstream LLC (OVM)
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Attachment N - Supporting Emissions Calculations

BTEX Burner – 1.50 MMBtu/hr

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Controlled		Control %	Controlled	
				lb/MMscf	lb/MMBtu	lb/hr	tpy		lb/hr	tpy
HTR-1 (4E)	BTEX Burner	EPA AP-42 Table 1.4-2	NOX	100.00	0.10	0.15	0.64	na	0.15	0.64
		EPA AP-42 Table 1.4-2	CO	84.00	0.08	0.12	0.54	na	0.12	0.54
		EPA AP-42 Table 1.4-2	VOC	5.68	0.01	0.01	0.04	na	0.01	0.04
		EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	8.8E-04	3.9E-03	na	8.8E-04	3.9E-03
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.01	0.05	na	0.01	0.05
	1.50 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	3.1E-06	1.4E-05	na	3.1E-06	1.4E-05
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.35E-05	1.1E-04	4.8E-04	na	1.1E-04	4.8E-04
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	2.6E-03	0.01	na	2.6E-03	0.01
		EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	---	---
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	5.0E-06	2.2E-05	---	5.0E-06	2.2E-05
		EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	na	---	---
		EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.86E-06	2.8E-06	1.2E-05	na	2.8E-06	1.2E-05
		EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	2.8E-03	0.01	na	2.8E-03	0.01
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-2	CO2	120,000	117.65	176.47	772.94	na	176.47	772.94
		EPA AP-42 Table 1.4-2	CH4	2.30	2.3E-03	3.4E-03	0.01	na	3.4E-03	0.01
		EPA AP-42 Table 1.4-2	N2O	2.20	2.2E-03	3.2E-03	0.01	na	3.2E-03	0.01
		40CFR98 - Table A-1	CO2e	120,713	118	178	778	na	178	778
	1,471 scf/hr									
	35.29 Mscfd									
	12.88 MMscf/yr									

- Notes:
- 1 - The combustion emission factors are based on a default fuel heat content of 1,020 Btu/scf (HHV).
 - 2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 - 3 - Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), acetaldehyde, acrolein, and methanol.

BALL DEHYDRATION STATION

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Attachment N - Supporting Emissions Calculations**Capstone C65 Microturbine Generator (65 kWe)**

Unit	Description	Reference	Pollutant	Emission Factor		Pre-Control		Control Efficiency	Controlled	
				lb/MMBtu	lb/MWhe	lb/hr	tpy		lb/hr	tpy
CT-01 (5E)	Capstone Turbine Corporation	Vendor	NOx	---	0.46	0.06	0.26	---	0.06	0.26
		Vendor	CO	---	1.25	0.16	0.71	---	0.16	0.71
	C65 Microturbine	EPA AP-42 Table 3.1-2a	THC	0.01	---	9.3E-03	0.04	---	9.3E-03	0.04
		EPA AP-42 Table 3.1-2a	NMHC	2.4E-03	---	2.0E-03	8.9E-03	---	2.0E-03	8.9E-03
	65 kWe	Vendor	NMNEHC	---	0.10	0.01	0.03	---	0.01	0.03
		Vendor	VOC	---	0.10	0.01	0.03	---	0.01	0.03
	8,760 hr/yr	EPA AP-42 Table 3.1-2a	SOx	3.4E-03	---	2.9E-03	0.01	---	2.9E-03	0.01
		EPA AP-42 Table 3.1-2a	PM10/2.5	0.01	---	5.6E-03	0.02	---	5.6E-03	0.02
	920 Btu/scf (LHV)	EPA AP-42 Table 3.1-3	Benzene	1.2E-05	---	1.0E-05	4.4E-05	---	1.0E-05	4.4E-05
	1,020 Btu/scf (HHV)	EPA AP-42 Table 3.1-3	Ethylbenzene	3.2E-05	---	2.7E-05	1.2E-04	---	2.7E-05	1.2E-04
	11,684 Btu/kW-hr (LHV)	EPA AP-42 Table 3.1-3	Formaldehyde	7.1E-04	---	6.0E-04	2.6E-03	---	6.0E-04	2.6E-03
		EPA AP-42 Table 3.1-3	n-Hexane	---	---	---	---	---	---	---
	12,954 Btu/kW-hr (HHV)	EPA AP-42 Table 3.1-3	Methanol	---	---	---	---	---	---	---
	0.76 MMBtu/hr (LHV)	EPA AP-42 Table 3.1-3	Toluene	1.3E-04	---	1.1E-04	4.8E-04	---	1.1E-04	4.8E-04
	0.84 MMBtu/hr (HHV)	EPA AP-42 Table 3.1-3	2,2,4-TMP	---	---	---	---	---	---	---
	6,652.79 MMBtu/yr (LHV)	EPA AP-42 Table 3.1-3	Xylenes	6.4E-05	---	5.4E-05	2.4E-04	---	5.4E-05	2.4E-04
	825.49 scf/hr (LHV)	EPA AP-42 Table 3.1-3	Other HAP	6.0E-05	---	5.0E-05	2.2E-04	---	5.0E-05	2.2E-04
		SUM	Total HAP	1.0E-03	---	8.5E-04	3.7E-03	---	8.5E-04	0.0037
	0.02 MMscf/day (LHV)	EPA AP-42 Table 3.1-2a	CO2	117	---	98	431	---	98	431
	0.14 MMscf/wk (LHV)	EPA AP-42 Table 3.1-2a	CH4	0.01	---	0.01	0.03	---	7.2E-03	0.03
	7.23 MMscf/yr (LHV)	EPA AP-42 Table 3.1-2a	N2O	3.0E-03	---	0.00	0.01	---	2.5E-03	0.01
		40CFR98 Table C-1	CO2e	118	---	99	435	---	99	435

Notes: 1 - Turbine generator is assumed to operate at 100% of rated load for 8,760 hrs/yr.

2 - The fuel heating value is based on 920 Btu/scf (LHV).

3 - Total PM is Filterable and Condensable Particulate Matter; including PM10 and PM2.5

4 - HCHO is Formaldehyde; Total HAP include HCHO, 1,3-Butadiene, Acetaldehyde, Acrolein, BTEX (Benzene, Toluene, Ethylbenzene, Xylene), Naphthalene, PAH and propylene oxide.

5 - A 100 percent contingency has been added to the NOx and CO mass emission rates to account for higher emissions at lower loads.

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations**Startup, Shutdown and Maintenance Emissions (SSM)**

Unit ID	Description	No of Units	a. Vented Gas Volume		b. Blowdown (BD) Gas Volume		Frequency of Occurrence	
			scf/hr/unit	scf/yr/unit	scf/SSM	scf/Event	Events/unit/wk	Events/unit/yr
SSM (6E)	Pigging	1	na	na	na	3,061	1	52
	Pneumatic Pumps	4	13.30	116,508	na	na	na	na
	Pneumatic Controllers	4	13.50	118,260	na	na	na	na

Unit ID	Description	Total Gas Vented	VOC	Hex,BTEX,TMP	Total HAP	CO2	CH4	CO2e
		MMscf/yr	16,938 lb/MMscf tpy	79.08 lb/MMscf tpy	474.48 lb/MMscf tpy	218 lb/MMscf tpy	37,619 lb/MMscf tpy	940,702 lb/MMscf tpy
SSM (6E)	Pigging	0.16	1.35	6.3E-03	0.04	0.02	3	75
	Pneumatic Pumps	0.47	3.95	0.02	0.11	0.05	9	219
	Pneumatic Controllers	0.47	4.01	0.02	0.11	0.05	9	222

9.30	0.04	0.26	0.12	21	517
-------------	-------------	-------------	-------------	-----------	------------

Notes: 1 - SSM Emissions include gas vented to the atmosphere from pigging events.

2 - To be conservative, the following gas characteristics were assumed:

Pollutant	Representative Gas Analysis	Worst-Case Assumption
CO2	182 lb/MMscf	218 lb/MMscf
CH4	31,349 lb/MMscf	37,619 lb/MMscf
VOC	14,115 lb/MMscf	16,938 lb/MMscf
n-Hex, BTEX, 2,2,4-TMP (ea)	Varies lb/MMscf	79.08 lb/MMscf
Total HAP	395.40 lb/MMscf	474.48 lb/MMscf

3 - This estimate of SSM emissions is sufficient to account for other infrequent and (often) de-minimis emissions from various activities at the facility that are not necessarily associated with pigging events.

4 - Pigging calculations based on 52 events per year and 3,061 scf/event (assuming 50 scf of gas blowdown at 900 psig).

5 - It is conservatively assumed that each pneumatic pump vents gas to the atmosphere for 8,760 hours per year.

6 - The pneumatic pump and pneumatic controller vented gas volumes are from Table W-1A to Subpart W of Part 98—Default Whole Gas Emission Factors for Onshore Petroleum and Natural Gas Production.

BALL DEHYDRATION STATION

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations**Piping and Equipment Fugitives**

Unit ID	Description	Component (Unit) Type (Gas)	Unit Count	THC Factor lb/hr/Unit	Hydrocarbons (THC)		VOC 29.19 Wgt%		n-Hex,BTEX,TMP 1.4E-01 Wgt%		Total HAP 0.82 Wgt%		CO2 0.38 Wgt%		CH4 70.43 Wgt%		CO2e GWP = 25	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG (1F)	Process Piping Fugitives (Gas)	Valves	300	0.00992	2.98	13.04	0.87	3.81	4.1E-03	0.02	2.4E-02	0.11	0.01	0.05	2.10	9.18	52	230
		Pump Seals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	10	0.01940	0.19	0.85	0.06	0.25	2.6E-04	1.2E-03	1.6E-03	6.9E-03	7.3E-04	0.00	0.14	0.60	3	15
		Connectors	400	0.00044	0.18	0.77	0.05	0.23	2.4E-04	1.1E-03	1.4E-03	6.3E-03	6.6E-04	2.9E-03	0.12	0.54	3	14
		Flanges	200	0.00086	0.17	0.75	0.05	0.22	2.3E-04	1.0E-03	1.4E-03	6.2E-03	6.5E-04	2.8E-03	0.12	0.53	3	13
		Open-ended	10	0.00441	0.04	0.19	0.01	0.06	6.0E-05	2.6E-04	3.6E-04	1.6E-03	1.7E-04	7.3E-04	0.03	0.14	1	3
			920		3.56	15.60	1.04	4.55	4.9E-03	0.02	0.03	0.13	0.01	0.06	2.51	10.99	63	275

Notes: 1 - Assumed 8,760 hours per year of fugitive emissions.

2 - Gas emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995.

TABLE 2.4 O&G PROD (AVE)	Gas	
	kg/hr	lb/hr
Valves	4.50E-03	0.00992
Pump Seals	na	na
Others	8.80E-03	0.01940
Connectors	2.00E-04	0.00044
Flanges	3.90E-04	0.00086
Open-Ended Lines	2.00E-03	0.00441

3 - "Other" components include compressor seals, relief valves, diaphragms, drains, meters, etc.

4 - To be conservative, the following gas characteristics were assumed:

Pollutant	Gas	
	Analysis	Estimated
Carbon Dioxide	0.31 Wgt%	0.38 Wgt%
Methane	54.02 Wgt%	70.43 Wgt%
VOC	24.32 Wgt%	29.19 Wgt%
n-Hex, BTEX, TMP-ea	1.1E-01 Wgt%	1.4E-01 Wgt%
Total HAP	0.68 Wgt%	0.82 Wgt%

5 - Unit counts are based on engineering estimates.

Potentially Applicable
AP-42 and GHG EMISSION FACTORS
(Preferentially use test data or vendor data where available)

Pollutant		GAS-FIRED ENGINE			GAS-FIRED TURBINE		
		AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00			AP-42 Table 3.1-1; 3.1-2a; 3.1-3 04/00		
		2SLB lb/MMBtu	4SLB lb/MMBtu	4SRB lb/MMBtu	Uncontrolled lb/MMBtu	Water Injection lb/MMBtu	Lean Pre-Mix# lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	3.17E+00	4.08E+00	2.21E+00	3.20E-01	1.30E-01	9.90E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC-CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC-C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	3.40E-03	3.40E-03	3.40E-03
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	Methanol (MeOH)	2.48E-03	2.50E-03	3.06E-03	---	---	---
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	TMP, 2,2,4- (i-Octane)	8.46E-04	2.50E-04	---	---	---	---
	Xylenes	2.68E-04	1.84E-04	1.95E-04	6.40E-05	6.40E-05	6.40E-05
GHG	Other HAPs	1.72E-02	1.44E-02	6.36E-03	1.06E-04	1.06E-04	1.06E-04
	CO2**** (GWP=1)	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.60E-03	8.60E-03	8.60E-03
	N2O (GWP=298)	2.20E-04	2.20E-04	2.20E-04	3.00E-03	3.00E-03	3.00E-03
		1.53E+02	1.48E+02	1.23E+02	1.18E+02	1.18E+02	1.18E+02

(#Lean Pre-Mix - aka: Dry Low Emissions (DLE or DLN) and SoLoNOx)

Pollutant		GAS-FIRED EXTERNAL COMBUSTION			FLARE	DIESEL ENGINE
		AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			13.5-1 04/15	3.3-1; 3.3-2 10/96
		Uncontrolled lb/MMBtu	LoNOx Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	Combustion lb/MMBtu	Uncontrolled lb/MMBtu
CRITERIA	NOX	9.80E-02	4.90E-02	3.14E-02	6.80E-02	4.41E+00
	CO	8.24E-02	8.24E-02	8.24E-02	3.10E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	≥98%	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	Destruction and Removal Efficiency	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03		3.50E-01
	VOC (NMNEHC+HCHO)	5.56E-03	5.56E-03	5.56E-03		3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	7.45E-03	3.10E-01
HAPs	Benzene	2.06E-06	2.06E-06	2.06E-06		9.33E-04
	Ethylbenzene	---	---	---		---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05		1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03	≥98%	---
	Methanol (MeOH)	---	---	---	Destruction and Removal Efficiency	---
	Toluene	3.33E-06	3.33E-06	3.33E-06		4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---		---
	Xylenes	---	---	---		2.85E-04
GHG	Other HAPs	1.86E-06	1.86E-06	1.86E-06		1.05E-03
	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.64E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03	98% DRE	6.61E-03
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	2.16E-03	1.32E-03
		1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.65E+02

40 CFR 98 - DEFAULT EMISSION FACTORS				
Fuel Type	Table C-1 to Subpart C of Part 98		Table C-2 to Subpart C of Part 98	
	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu
Fuel Oil No. 2 (Diesel)	0.138 MMBtu/gal	163.05	6.61E-03	1.32E-03
Propane	0.091 MMBtu/gal	138.60	6.61E-03	1.32E-03
Natural Gas	1,026 Btu/scf	116.98	2.20E-03	2.20E-04

Global Warming Potential (100 Yr) (GWP)		
Table A-1 to Subpart A of Part 98		
CO2	CH4*	N2O#
1.00	25.00	298.00

#Revised by EPA on 11/29/13

*Converted Ext Comb Emission Factors to lb/MMBtu by dividing lb/MMscf by AP-42 default HHV of 1,020 Btu/scf.

**Converted GHG Emission Factors to lb/MMBtu by multiplying kg/MMBtu by 2.2046 lb/kg.

***Assumes 100% conversion of fuel sulfur to SOX (2,000 gr/MMscf).

****Assumes 99.5% conversion of fuel carbon to CO2 for natural gas.

Conversion Factors

<http://www.onlineconversion.com/>

1.0 lb	=	453.592 g
1.0 kg	=	2.205 lb
1.0 hp	=	2,544.433 Btu/hr
1.0 hp	=	745.700 Watt
1.0 kW	=	3,412.142 Btu/hr
1.0 kW-hr	=	1.340 hp-hr
1.0 cf	=	7.481 gal
1.0 gal H2O	=	8.338 lb
1.0 cf H2O	=	62.371 gal
1.0 m	=	3.281 ft
1.0 km	=	0.621 mi
1.0 acre	=	43,560.174 ft2
1.0 °F	=	(°C*9/5)+32
1.0 °R	=	°F+459.67
1.0 %	=	10,000 ppm
UGC (stp)	=	379.48 scf/lb-mol

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Ball Station - 55 MMscfd Dehy - BTEX Control Still Vent

File Name: C:\projects2\wfs\OVM\Ball\00 - Att-Nb - Ball DS - NSR - 55 MMscfd Dehy-01 - 11.03.14.ddf

Date: November 18, 2015

DESCRIPTION:

Description: Ext Gas Analysis for Statoil sales gas dated 10-21-15. Inlet gas temp = 80F, pressure = 800 psig. 2xKimray 45015 PV (15 gpm) glycol pumps. Still vent offgas stream controlled by BTEX unit/burner. 90% of Flash tank offgas recycled.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 80.00 deg. F
 Pressure: 800.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1568
Nitrogen	0.0334
Methane	74.1457
Ethane	15.5840
Propane	5.9082
Isobutane	0.8227
n-Butane	1.7597
Isopentane	0.4541
n-Pentane	0.4812
n-Hexane	0.1647
Cyclohexane	0.0322
Other Hexanes	0.2310
Heptanes	0.1242
Methylcyclohexane	0.0281
2,2,4-Trimethylpentane	0.0000
Benzene	0.0025
Toluene	0.0043
Ethylbenzene	0.0003
Xylenes	0.0017
C8+ Heavies	0.0356

DRY GAS:

Flow Rate: 55.0 MMSCF/day
 Water Content: 7.0 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: 0.080 acfm gas/gpm glycol

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 90.00 %
Temperature: 90.0 deg. F
Pressure: 45.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 5.0 %
Ambient Air Temperature: 50.0 deg. F

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: Ball Station - 55 MMscfd Dehy - BTEX Control Still Vent

File Name: C:\projects2\wfs\OVM\Ball\00 - Att-Nb - Ball DS - NSR - 55 MMscfd Dehy-01 - 11.03.14.ddf

Date: November 18, 2015

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0664	1.595	0.2910
Ethane	0.1300	3.121	0.5696
Propane	0.1838	4.410	0.8049
Isobutane	0.0614	1.473	0.2689
n-Butane	0.1980	4.751	0.8671
Isopentane	0.0750	1.799	0.3283
n-Pentane	0.1130	2.712	0.4949
n-Hexane	0.1017	2.442	0.4456
Cyclohexane	0.1322	3.173	0.5790
Other Hexanes	0.0966	2.318	0.4230
Heptanes	0.2166	5.199	0.9488
Methylcyclohexane	0.1552	3.725	0.6799
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.1051	2.523	0.4605
Toluene	0.2884	6.921	1.2631
Ethylbenzene	0.0291	0.698	0.1275
Xylenes	0.2142	5.141	0.9383
C8+ Heavies	0.2790	6.696	1.2220
Total Emissions	2.4458	58.699	10.7125
Total Hydrocarbon Emissions	2.4458	58.699	10.7125
Total VOC Emissions	2.2493	53.983	9.8519
Total HAP Emissions	0.7386	17.726	3.2350
Total BTEX Emissions	0.6368	15.284	2.7893

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.3290	31.895	5.8209
Ethane	2.6007	62.417	11.3912
Propane	3.6753	88.208	16.0979
Isobutane	1.2277	29.465	5.3774
n-Butane	3.9592	95.020	17.3412
Isopentane	1.4992	35.982	6.5666
n-Pentane	2.2600	54.239	9.8987
n-Hexane	2.0346	48.830	8.9115
Cyclohexane	2.6439	63.455	11.5805
Other Hexanes	1.9316	46.359	8.4605
Heptanes	4.3325	103.981	18.9765
Methylcyclohexane	3.1045	74.509	13.5978
2,2,4-Trimethylpentane	0.0007	0.017	0.0031
Benzene	2.1026	50.463	9.2095
Toluene	5.7674	138.418	25.2614
Ethylbenzene	0.5820	13.969	2.5493
Xylenes	4.2844	102.827	18.7658
C8+ Heavies	5.5801	133.922	24.4407

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Total Emissions	48.9157	1173.976	214.2506
Total Hydrocarbon Emissions	48.9157	1173.976	214.2506
Total VOC Emissions	44.9860	1079.664	197.0386
Total HAP Emissions	14.7718	354.524	64.7006
Total BTEX Emissions	12.7365	305.677	55.7860

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	16.9569	406.966	74.2712
Ethane	8.0090	192.216	35.0795
Propane	4.9192	118.062	21.5463
Isobutane	0.9762	23.428	4.2756
n-Butane	2.2953	55.086	10.0532
Isopentane	0.7028	16.867	3.0782
n-Pentane	0.8136	19.525	3.5634
n-Hexane	0.3600	8.641	1.5770
Cyclohexane	0.1130	2.712	0.4950
Other Hexanes	0.4707	11.298	2.0619
Heptanes	0.3292	7.901	1.4419
Methylcyclohexane	0.0949	2.278	0.4158
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0106	0.255	0.0465
Toluene	0.0166	0.400	0.0729
Ethylbenzene	0.0009	0.021	0.0038
Xylenes	0.0043	0.103	0.0188
C8+ Heavies	0.0425	1.021	0.1863
Total Emissions	36.1159	866.781	158.1875
Total Hydrocarbon Emissions	36.1159	866.781	158.1875
Total VOC Emissions	11.1500	267.599	48.8369
Total HAP Emissions	0.3926	9.422	1.7195
Total BTEX Emissions	0.0324	0.778	0.1420

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	169.5690	4069.655	742.7120
Ethane	80.0901	1922.162	350.7945
Propane	49.1924	1180.617	215.4626
Isobutane	9.7616	234.278	42.7558
n-Butane	22.9525	550.861	100.5321
Isopentane	7.0278	168.668	30.7819
n-Pentane	8.1355	195.252	35.6335
n-Hexane	3.6005	86.411	15.7701
Cyclohexane	1.1300	27.121	4.9495
Other Hexanes	4.7075	112.980	20.6188
Heptanes	3.2920	79.007	14.4188
Methylcyclohexane	0.9492	22.782	4.1577
2,2,4-Trimethylpentane	0.0012	0.028	0.0051
Benzene	0.1062	2.548	0.4651
Toluene	0.1665	3.996	0.7292
Ethylbenzene	0.0087	0.208	0.0380
Xylenes	0.0429	1.029	0.1878
C8+ Heavies	0.4253	10.207	1.8628

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Total Emissions	361.1587	8667.809	1581.8751
Total Hydrocarbon Emissions	361.1587	8667.809	1581.8751
Total VOC Emissions	111.4997	2675.992	488.3686
Total HAP Emissions	3.9258	94.220	17.1952
Total BTEX Emissions	0.3242	7.781	1.4200

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	17.0233	408.560	74.5622
Ethane	8.1390	195.337	35.6490
Propane	5.1030	122.472	22.3512
Isobutane	1.0375	24.901	4.5445
n-Butane	2.4932	59.837	10.9203
Isopentane	0.7777	18.666	3.4065
n-Pentane	0.9265	22.237	4.0583
n-Hexane	0.4618	11.083	2.0226
Cyclohexane	0.2452	5.885	1.0740
Other Hexanes	0.5673	13.616	2.4849
Heptanes	0.5458	13.100	2.3907
Methylcyclohexane	0.2502	6.004	1.0957
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.1157	2.778	0.5070
Toluene	0.3050	7.320	1.3360
Ethylbenzene	0.0300	0.719	0.1313
Xylenes	0.2185	5.244	0.9571
C8+ Heavies	0.3215	7.717	1.4083
Total Emissions	38.5617	925.480	168.9000
Total Hydrocarbon Emissions	38.5617	925.480	168.9000
Total VOC Emissions	13.3993	321.582	58.6888
Total HAP Emissions	1.1312	27.148	4.9545
Total BTEX Emissions	0.6692	16.062	2.9313

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Ball Station - 55 MMscfd Dehy - BTEX Control Still Vent

File Name: C:\projects2\wfs\OVM\Ball\00 - Att-Nb - Ball DS - NSR - 55 MMscfd Dehy-01 - 11.03.14.ddf

Date: November 18, 2015

DESCRIPTION:

Description: Ext Gas Analysis for Statoil sales gas dated 10-21-15. Inlet gas temp = 80F, pressure = 800 psig. 2xKimray 45015 PV (15 gpm) glycol pumps. Still vent offgas stream controlled by BTEX unit/burner. 90% of Flash tank offgas recycled.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0664	1.595	0.2910
Ethane	0.1300	3.121	0.5696
Propane	0.1838	4.410	0.8049
Isobutane	0.0614	1.473	0.2689
n-Butane	0.1980	4.751	0.8671
Isopentane	0.0750	1.799	0.3283
n-Pentane	0.1130	2.712	0.4949
n-Hexane	0.1017	2.442	0.4456
Cyclohexane	0.1322	3.173	0.5790
Other Hexanes	0.0966	2.318	0.4230
Heptanes	0.2166	5.199	0.9488
Methylcyclohexane	0.1552	3.725	0.6799
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.1051	2.523	0.4605
Toluene	0.2884	6.921	1.2631
Ethylbenzene	0.0291	0.698	0.1275
Xylenes	0.2142	5.141	0.9383
C8+ Heavies	0.2790	6.696	1.2220
Total Emissions	2.4458	58.699	10.7125
Total Hydrocarbon Emissions	2.4458	58.699	10.7125
Total VOC Emissions	2.2493	53.983	9.8519
Total HAP Emissions	0.7386	17.726	3.2350
Total BTEX Emissions	0.6368	15.284	2.7893

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.3290	31.895	5.8209
Ethane	2.6007	62.417	11.3912
Propane	3.6753	88.208	16.0979
Isobutane	1.2277	29.465	5.3774
n-Butane	3.9592	95.020	17.3412

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Isopentane	1.4992	35.982	6.5666
n-Pentane	2.2600	54.239	9.8987
n-Hexane	2.0346	48.830	8.9115
Cyclohexane	2.6439	63.455	11.5805
Other Hexanes	1.9316	46.359	8.4605
Heptanes	4.3325	103.981	18.9765
Methylcyclohexane	3.1045	74.509	13.5978
2,2,4-Trimethylpentane	0.0007	0.017	0.0031
Benzene	2.1026	50.463	9.2095
Toluene	5.7674	138.418	25.2614
Ethylbenzene	0.5820	13.969	2.5493
Xylenes	4.2844	102.827	18.7658
C8+ Heavies	5.5801	133.922	24.4407
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Total Emissions	48.9157	1173.976	214.2506
Total Hydrocarbon Emissions	48.9157	1173.976	214.2506
Total VOC Emissions	44.9860	1079.664	197.0386
Total HAP Emissions	14.7718	354.524	64.7006
Total BTEX Emissions	12.7365	305.677	55.7860

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	16.9569	406.966	74.2712
Ethane	8.0090	192.216	35.0795
Propane	4.9192	118.062	21.5463
Isobutane	0.9762	23.428	4.2756
n-Butane	2.2953	55.086	10.0532
Isopentane	0.7028	16.867	3.0782
n-Pentane	0.8136	19.525	3.5634
n-Hexane	0.3600	8.641	1.5770
Cyclohexane	0.1130	2.712	0.4950
Other Hexanes	0.4707	11.298	2.0619
Heptanes	0.3292	7.901	1.4419
Methylcyclohexane	0.0949	2.278	0.4158
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0106	0.255	0.0465
Toluene	0.0166	0.400	0.0729
Ethylbenzene	0.0009	0.021	0.0038
Xylenes	0.0043	0.103	0.0188
C8+ Heavies	0.0425	1.021	0.1863
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Total Emissions	36.1159	866.781	158.1875
Total Hydrocarbon Emissions	36.1159	866.781	158.1875
Total VOC Emissions	11.1500	267.599	48.8369
Total HAP Emissions	0.3926	9.422	1.7195
Total BTEX Emissions	0.0324	0.778	0.1420

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	169.5690	4069.655	742.7120
Ethane	80.0901	1922.162	350.7945
Propane	49.1924	1180.617	215.4626
Isobutane	9.7616	234.278	42.7558
n-Butane	22.9525	550.861	100.5321

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Isopentane	7.0278	168.668	30.7819
n-Pentane	8.1355	195.252	35.6335
n-Hexane	3.6005	86.411	15.7701
Cyclohexane	1.1300	27.121	4.9495
Other Hexanes	4.7075	112.980	20.6188
Heptanes	3.2920	79.007	14.4188
Methylcyclohexane	0.9492	22.782	4.1577
2,2,4-Trimethylpentane	0.0012	0.028	0.0051
Benzene	0.1062	2.548	0.4651
Toluene	0.1665	3.996	0.7292
Ethylbenzene	0.0087	0.208	0.0380
Xylenes	0.0429	1.029	0.1878
C8+ Heavies	0.4253	10.207	1.8628

Total Emissions	361.1587	8667.809	1581.8751

Total Hydrocarbon Emissions	361.1587	8667.809	1581.8751
Total VOC Emissions	111.4997	2675.992	488.3686
Total HAP Emissions	3.9258	94.220	17.1952
Total BTEX Emissions	0.3242	7.781	1.4200

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr

Methane	17.0233	408.560	74.5622
Ethane	8.1390	195.337	35.6490
Propane	5.1030	122.472	22.3512
Isobutane	1.0375	24.901	4.5445
n-Butane	2.4932	59.837	10.9203
Isopentane	0.7777	18.666	3.4065
n-Pentane	0.9265	22.237	4.0583
n-Hexane	0.4618	11.083	2.0226
Cyclohexane	0.2452	5.885	1.0740
Other Hexanes	0.5673	13.616	2.4849
Heptanes	0.5458	13.100	2.3907
Methylcyclohexane	0.2502	6.004	1.0957
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.1157	2.778	0.5070
Toluene	0.3050	7.320	1.3360
Ethylbenzene	0.0300	0.719	0.1313
Xylenes	0.2185	5.244	0.9571
C8+ Heavies	0.3215	7.717	1.4083

Total Emissions	38.5617	925.480	168.9000

Total Hydrocarbon Emissions	38.5617	925.480	168.9000
Total VOC Emissions	13.3993	321.582	58.6888
Total HAP Emissions	1.1312	27.148	4.9545
Total BTEX Emissions	0.6692	16.062	2.9313

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction

Methane	748.5329	74.5622	90.04
Ethane	362.1857	35.6490	90.16
Propane	231.5605	22.3512	90.35

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Isobutane	48.1332	4.5445	90.56
n-Butane	117.8733	10.9203	90.74
Isopentane	37.3485	3.4065	90.88
n-Pentane	45.5322	4.0583	91.09
n-Hexane	24.6816	2.0226	91.81
Cyclohexane	16.5300	1.0740	93.50
Other Hexanes	29.0793	2.4849	91.45
Heptanes	33.3953	2.3907	92.84
Methylcyclohexane	17.7555	1.0957	93.83
2,2,4-Trimethylpentane	0.0082	0.0007	91.92
Benzene	9.6746	0.5070	94.76
Toluene	25.9906	1.3360	94.86
Ethylbenzene	2.5873	0.1313	94.93
Xylenes	18.9536	0.9571	94.95
C8+ Heavies	26.3035	1.4083	94.65

Total Emissions	1796.1257	168.9000	90.60

Total Hydrocarbon Emissions	1796.1257	168.9000	90.60
Total VOC Emissions	685.4072	58.6888	91.44
Total HAP Emissions	81.8958	4.9545	93.95
Total BTEX Emissions	57.2060	2.9313	94.88

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 50.00 deg. F
 Excess Oxygen: 5.00 %
 Combustion Efficiency: 95.00 %
 Supplemental Fuel Requirement: 2.27e-001 MM BTU/hr

Component	Emitted	Destroyed

Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	5.00%	95.00%
Isobutane	5.00%	95.00%
n-Butane	5.00%	95.00%
Isopentane	5.00%	95.00%
n-Pentane	5.00%	95.00%
n-Hexane	5.00%	95.00%
Cyclohexane	5.00%	95.00%
Other Hexanes	5.00%	95.00%
Heptanes	5.00%	95.00%
Methylcyclohexane	5.00%	95.00%
2,2,4-Trimethylpentane	5.00%	95.00%
Benzene	5.00%	95.00%
Toluene	5.00%	95.00%
Ethylbenzene	5.00%	95.00%
Xylenes	5.00%	95.00%
C8+ Heavies	5.00%	95.00%

ABSORBER

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

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 1.47 lbs. H2O/MMSCF

Temperature: 80.0 deg. F
 Pressure: 800.0 psig
 Dry Gas Flow Rate: 55.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.4571 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 37.71 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 10.83 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.91%	96.09%
Carbon Dioxide	99.62%	0.38%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.92%	0.08%
Propane	99.88%	0.12%
Isobutane	99.83%	0.17%
n-Butane	99.78%	0.22%
Isopentane	99.78%	0.22%
n-Pentane	99.72%	0.28%
n-Hexane	99.55%	0.45%
Cyclohexane	97.91%	2.09%
Other Hexanes	99.66%	0.34%
Heptanes	99.20%	0.80%
Methylcyclohexane	97.78%	2.22%
2,2,4-Trimethylpentane	99.67%	0.33%
Benzene	81.50%	18.50%
Toluene	75.43%	24.57%
Ethylbenzene	69.53%	30.47%
Xylenes	60.54%	39.46%
C8+ Heavies	98.57%	1.43%

FLASH TANK

Flash Control: Combustion device
 Flash Control Efficiency: 90.00 %
 Flash Temperature: 90.0 deg. F
 Flash Pressure: 45.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.92%	0.08%
Carbon Dioxide	10.99%	89.01%
Nitrogen	0.75%	99.25%
Methane	0.78%	99.22%
Ethane	3.15%	96.85%
Propane	6.95%	93.05%
Isobutane	11.17%	88.83%
n-Butane	14.71%	85.29%
Isopentane	17.79%	82.21%
n-Pentane	21.96%	78.04%

n-Hexane	36.32%	63.68%
Cyclohexane	70.93%	29.07%
Other Hexanes	29.53%	70.47%
Heptanes	56.99%	43.01%
Methylcyclohexane	77.44%	22.56%
2,2,4-Trimethylpentane	38.92%	61.08%
Benzene	95.43%	4.57%
Toluene	97.41%	2.59%
Ethylbenzene	98.68%	1.32%
Xylenes	99.14%	0.86%
C8+ Heavies	93.67%	6.33%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	60.36%	39.64%
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	1.43%	98.57%
n-Pentane	1.31%	98.69%
n-Hexane	0.93%	99.07%
Cyclohexane	4.11%	95.89%
Other Hexanes	2.10%	97.90%
Heptanes	0.69%	99.31%
Methylcyclohexane	4.73%	95.27%
2,2,4-Trimethylpentane	2.36%	97.64%
Benzene	5.18%	94.82%
Toluene	8.05%	91.95%
Ethylbenzene	10.48%	89.52%
Xylenes	12.96%	87.04%
C8+ Heavies	11.35%	88.65%

STREAM REPORTS:

WET GAS STREAM

Temperature: 80.00 deg. F
Pressure: 814.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.94e-002	8.65e+001
Carbon Dioxide	1.57e-001	4.17e+002

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Nitrogen	3.34e-002	5.65e+001
Methane	7.41e+001	7.19e+004
Ethane	1.56e+001	2.83e+004
Propane	5.91e+000	1.57e+004
Isobutane	8.22e-001	2.89e+003
n-Butane	1.76e+000	6.18e+003
Isopentane	4.54e-001	1.98e+003
n-Pentane	4.81e-001	2.10e+003
n-Hexane	1.65e-001	8.58e+002
Cyclohexane	3.22e-002	1.64e+002
Other Hexanes	2.31e-001	1.20e+003
Heptanes	1.24e-001	7.52e+002
Methylcyclohexane	2.81e-002	1.67e+002
2,2,4-Trimethylpentane	5.00e-005	3.45e-001
Benzene	2.50e-003	1.18e+001
Toluene	4.30e-003	2.39e+001
Ethylbenzene	3.00e-004	1.93e+000
Xylenes	1.70e-003	1.09e+001
C8+ Heavies	3.56e-002	3.67e+002

Total Components	100.00	1.33e+005

DRY GAS STREAM

Temperature: 80.00 deg. F
 Pressure: 814.70 psia
 Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	3.11e-003	3.38e+000
Carbon Dioxide	1.56e-001	4.16e+002
Nitrogen	3.34e-002	5.65e+001
Methane	7.42e+001	7.19e+004
Ethane	1.56e+001	2.83e+004
Propane	5.91e+000	1.57e+004
Isobutane	8.22e-001	2.89e+003
n-Butane	1.76e+000	6.17e+003
Isopentane	4.53e-001	1.98e+003
n-Pentane	4.80e-001	2.09e+003
n-Hexane	1.64e-001	8.54e+002
Cyclohexane	3.16e-002	1.60e+002
Other Hexanes	2.30e-001	1.20e+003
Heptanes	1.23e-001	7.46e+002
Methylcyclohexane	2.75e-002	1.63e+002
2,2,4-Trimethylpentane	4.99e-005	3.44e-001
Benzene	2.04e-003	9.62e+000
Toluene	3.25e-003	1.81e+001
Ethylbenzene	2.09e-004	1.34e+000
Xylenes	1.03e-003	6.61e+000
C8+ Heavies	3.51e-002	3.61e+002

Total Components	100.00	1.33e+005

LEAN GLYCOL STREAM

Temperature: 80.00 deg. F

Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.85e+001	8.31e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	1.88e-012	1.59e-010
Nitrogen	2.05e-014	1.73e-012
Methane	7.55e-018	6.37e-016
Ethane	1.28e-007	1.08e-005
Propane	9.44e-009	7.97e-007
Isobutane	1.73e-009	1.46e-007
n-Butane	4.07e-009	3.43e-007
Isopentane	2.58e-004	2.18e-002
n-Pentane	3.55e-004	2.99e-002
n-Hexane	2.27e-004	1.92e-002
Cyclohexane	1.34e-003	1.13e-001
Other Hexanes	4.90e-004	4.14e-002
Heptanes	3.59e-004	3.03e-002
Methylcyclohexane	1.83e-003	1.54e-001
2,2,4-Trimethylpentane	2.06e-007	1.74e-005
Benzene	1.36e-003	1.15e-001
Toluene	5.98e-003	5.05e-001
Ethylbenzene	8.07e-004	6.81e-002
Xylenes	7.56e-003	6.38e-001
C8+ Heavies	8.46e-003	7.14e-001
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Total Components	100.00	8.44e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 80.00 deg. F
 Pressure: 814.70 psia
 Flow Rate: 1.61e+001 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.30e+001	8.31e+003
Water	2.35e+000	2.10e+002
Carbon Dioxide	2.77e-002	2.47e+000
Nitrogen	1.53e-003	1.37e-001
Methane	1.91e+000	1.71e+002
Ethane	9.25e-001	8.27e+001
Propane	5.92e-001	5.29e+001
Isobutane	1.23e-001	1.10e+001
n-Butane	3.01e-001	2.69e+001
Isopentane	9.57e-002	8.55e+000
n-Pentane	1.17e-001	1.04e+001
n-Hexane	6.33e-002	5.65e+000
Cyclohexane	4.35e-002	3.89e+000
Other Hexanes	7.47e-002	6.68e+000
Heptanes	8.56e-002	7.65e+000
Methylcyclohexane	4.71e-002	4.21e+000
2,2,4-Trimethylpentane	2.11e-005	1.89e-003
Benzene	2.60e-002	2.32e+000
Toluene	7.20e-002	6.44e+000
Ethylbenzene	7.37e-003	6.59e-001

Xylenes	5.56e-002	4.97e+000
C8+ Heavies	7.52e-002	6.72e+000

Total Components	100.00	8.94e+003

FLASH TANK OFF GAS STREAM

Temperature: 90.00 deg. F
 Pressure: 59.70 psia
 Flow Rate: 5.82e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	6.37e-002	1.76e-001
Carbon Dioxide	3.26e-001	2.20e+000
Nitrogen	3.16e-002	1.36e-001
Methane	6.89e+001	1.70e+002
Ethane	1.74e+001	8.01e+001
Propane	7.27e+000	4.92e+001
Isobutane	1.09e+000	9.76e+000
n-Butane	2.57e+000	2.30e+001
Isopentane	6.35e-001	7.03e+000
n-Pentane	7.35e-001	8.14e+000
n-Hexane	2.72e-001	3.60e+000
Cyclohexane	8.75e-002	1.13e+000
Other Hexanes	3.56e-001	4.71e+000
Heptanes	2.14e-001	3.29e+000
Methylcyclohexane	6.30e-002	9.49e-001
2,2,4-Trimethylpentane	6.58e-005	1.15e-003
Benzene	8.86e-003	1.06e-001
Toluene	1.18e-002	1.66e-001
Ethylbenzene	5.32e-004	8.67e-003
Xylenes	2.63e-003	4.29e-002
C8+ Heavies	1.63e-002	4.25e-001

Total Components	100.00	3.64e+002

FLASH TANK GLYCOL STREAM

Temperature: 90.00 deg. F
 Flow Rate: 1.53e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.70e+001	8.31e+003
Water	2.45e+000	2.10e+002
Carbon Dioxide	3.17e-003	2.72e-001
Nitrogen	1.20e-005	1.03e-003
Methane	1.55e-002	1.33e+000
Ethane	3.03e-002	2.60e+000
Propane	4.29e-002	3.68e+000
Isobutane	1.43e-002	1.23e+000
n-Butane	4.62e-002	3.96e+000
Isopentane	1.77e-002	1.52e+000
n-Pentane	2.67e-002	2.29e+000
n-Hexane	2.40e-002	2.05e+000
Cyclohexane	3.22e-002	2.76e+000
Other Hexanes	2.30e-002	1.97e+000

Heptanes	5.09e-002	4.36e+000
Methylcyclohexane	3.80e-002	3.26e+000
2,2,4-Trimethylpentane	8.57e-006	7.35e-004
Benzene	2.59e-002	2.22e+000
Toluene	7.32e-002	6.27e+000
Ethylbenzene	7.58e-003	6.50e-001
Xylenes	5.74e-002	4.92e+000
C8+ Heavies	7.34e-002	6.29e+000

Total Components	100.00	8.57e+003

FLASH GAS EMISSIONS

Flow Rate: 2.19e+004 scfh
Control Method: Combustion Device
Control Efficiency: 90.00

Component	Conc. (vol%)	Loading (lb/hr)

Water	6.05e+001	6.29e+002
Carbon Dioxide	3.68e+001	9.35e+002
Nitrogen	8.40e-003	1.36e-001
Methane	1.83e+000	1.70e+001
Ethane	4.61e-001	8.01e+000
Propane	1.93e-001	4.92e+000
Isobutane	2.91e-002	9.76e-001
n-Butane	6.84e-002	2.30e+000
Isopentane	1.69e-002	7.03e-001
n-Pentane	1.95e-002	8.14e-001
n-Hexane	7.24e-003	3.60e-001
Cyclohexane	2.33e-003	1.13e-001
Other Hexanes	9.46e-003	4.71e-001
Heptanes	5.69e-003	3.29e-001
Methylcyclohexane	1.67e-003	9.49e-002
2,2,4-Trimethylpentane	1.75e-006	1.15e-004
Benzene	2.36e-004	1.06e-002
Toluene	3.13e-004	1.66e-002
Ethylbenzene	1.41e-005	8.67e-004
Xylenes	7.00e-005	4.29e-003
C8+ Heavies	4.33e-004	4.25e-002

Total Components	100.00	1.60e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.03e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	8.65e+001	8.32e+001
Carbon Dioxide	1.16e-001	2.72e-001
Nitrogen	6.91e-004	1.03e-003
Methane	1.55e+000	1.33e+000
Ethane	1.62e+000	2.60e+000
Propane	1.56e+000	3.68e+000

Isobutane	3.96e-001	1.23e+000
n-Butane	1.28e+000	3.96e+000
Isopentane	3.89e-001	1.50e+000
n-Pentane	5.87e-001	2.26e+000
n-Hexane	4.42e-001	2.03e+000
Cyclohexane	5.89e-001	2.64e+000
Other Hexanes	4.20e-001	1.93e+000
Heptanes	8.10e-001	4.33e+000
Methylcyclohexane	5.92e-001	3.10e+000
2,2,4-Trimethylpentane	1.18e-004	7.17e-004
Benzene	5.04e-001	2.10e+000
Toluene	1.17e+000	5.77e+000
Ethylbenzene	1.03e-001	5.82e-001
Xylenes	7.56e-001	4.28e+000
C8+ Heavies	6.14e-001	5.58e+000

Total Components	100.00	1.32e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.36e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Methane	1.16e+001	6.64e-002
Ethane	1.21e+001	1.30e-001
Propane	1.17e+001	1.84e-001
Isobutane	2.96e+000	6.14e-002
n-Butane	9.53e+000	1.98e-001
Isopentane	2.91e+000	7.50e-002
n-Pentane	4.38e+000	1.13e-001
n-Hexane	3.30e+000	1.02e-001
Cyclohexane	4.40e+000	1.32e-001
Other Hexanes	3.14e+000	9.66e-002
Heptanes	6.05e+000	2.17e-001
Methylcyclohexane	4.43e+000	1.55e-001
2,2,4-Trimethylpentane	8.79e-004	3.59e-005
Benzene	3.77e+000	1.05e-001
Toluene	8.76e+000	2.88e-001
Ethylbenzene	7.67e-001	2.91e-002
Xylenes	5.65e+000	2.14e-001
C8+ Heavies	4.59e+000	2.79e-001

Total Components	100.00	2.45e+000

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

“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.”

- **Monitoring/Recordkeeping/Reporting/Testing Plans**
-

Williams Ohio Valley Midstream LLC
BALL DEHYDRATION STATION
Application for 45CSR13 NSR Construction Permit

Attachment O
MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

Williams Ohio Valley Midstream LLC proposes the following monitoring, recordkeeping, testing and reporting requirements at the subject facility:

A. Monitoring

1. Monitor and record quantity of natural gas treated in the dehydrator.
2. Monitor inlet gas characteristics with annual sample collection and extended gas analysis.
3. Monitor dehydrator operating parameters, such as temperatures, pressures, and flow rates, as requisite to determine actual and potential emissions.

B. Recordkeeping

1. Maintain records of the amount of natural gas treated in the dehydrator.
2. Maintain records demonstrating the actual annual average benzene emissions are less than one ton per year.
3. Maintain a record of all potential to emit (PTE) calculations for the entire facility. These records shall include the dehydration unit and ancillary equipment.
4. The records shall be maintained on site or in a readily available off-site location for a period of five (5) years.

C. Reporting

1. Report any deviations from the allowable emissions limitations, including visible emissions.
2. Any and all application forms, reports, or compliance certifications required by this Permit shall be certified by a responsible official.

D. Testing

Not Applicable (except for annual extended gas analysis described above).

ATTACHMENT P

Public Notice

“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.”

The applicant shall cause such legal advertisement to appear a minimum of one (1) day in the newspaper most commonly read in the area where the facility exists or will be constructed. The notice must be published no earlier than five (5) working days of receipt by this office of your application. The original affidavit of publication must be received by this office no later than the last day of the public comment period.

Types and amounts of pollutants discharged must include all regulated pollutants (PM, PM10, VOC, SO2, Xylene, etc.) and their potential to emit or the permit level being sought in units of tons per year (including fugitive emissions).

-
- Legal Advertisement (as shown) will be placed in a newspaper of general circulation in the area where the source is located (See 45CSR§13-8.3 thru 45CSR§13-8.5).
 - An Affidavit of Publication shall be submitted immediately upon receipt.
-

Williams Ohio Valley Midstream LLC (OVM)
BALL DEHYDRATION STATION
Application for 45CSR13 NSR Construction Permit

Attachment P - Public Notice

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Construction Permit for a new Dehydration Station to be located off Highway 42/Scales Run Road near Middlebourne in Tyler County, West Virginia.

The latitude and longitude coordinates are 39.5059° North and 80.7547° West.

The applicant estimates the potential to discharge regulated air pollutants will be as follows:

1.55 tons of nitrogen oxides per year
1.79 tons of carbon monoxide per year
84.38 tons of volatile organic compounds per year
0.020 tons of sulfur dioxide per year
0.12 tons of particulate matter per year
6.36 tons of total hazardous air pollutants per year
5,019 tons of carbon dioxide equivalent per year

Startup of the facility is anticipated on or about May 1, 2016.

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

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

Dated this the _____ day of _____ 2015.

By: Williams Ohio Valley Midstream LLC
Paul Hunter
General Manager Ohio River Supply Hub
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

ATTACHMENT Q
Business Confidential Claims
(NOT APPLICABLE)

also

ATTACHMENT R
Authority Forms
(NOT APPLICABLE)

also

ATTACHMENT S
Title V Permit Revision Information
(NOT APPLICABLE)

APPLICATION FEE

Include a check payable to WVDEP – Division of Air Quality.

- As per WV Rule 22 (45CSR22) filed on May 6, 1991, a **minimum fee of \$1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
 - **Additional charges** may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:
 - NSPS Requirements: \$1,000 Not Applicable
 - **NESHAP Requirements: \$2,500 (HH-Dehydrator)**
 - New Major Source: \$10,000 Not Applicable
 - Major Modifications: \$5,000 Not Applicable
 - Total application fee is **\$3,500** [= \$1,000 minimum fee + \$2,500 additional charges]
-

******* End of Application for 45CSR13 NSR Construction Permit ******

ORIGIN ID: OLLA (412) 787-4197
 DANIEL ZAWASKI
 WILLIAMS
 2000 COMMERCE DRIVE
 PARK PLACE 2
 PITTSBURGH, PA 15275
 UNITED STATES US

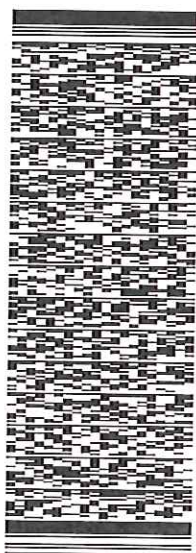
SHIP DATE: 20NOV15
 ACTWGT: 1.00 LB
 CAD: 104269589/NET3670

BILL SENDER

TO BEVERLY MCKEONE
 WV DIV OF AIR QUALITY PERMITTING
 601 57TH STREET, SE

CHARLESTON WV 25304

(304) 926-0499 X 1260 REF: 6000006200060034.6228.8325
 INV. PO. DEPT.



#153915931001uz

539J23F56/31D0

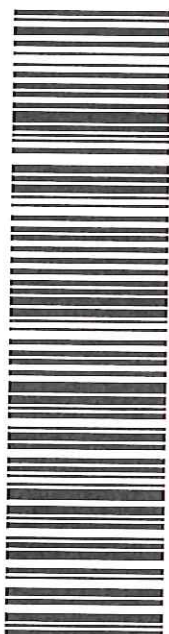
TRK# 7750 3281 5442
 0201

TUE - 24 NOV 4:30P

** 2DAY **

SH CRWA

25304
 WV-US HTS



After printing this label:

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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