Appalachia Midstream Services, LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041

February 2, 2018
(Via Federal Express)

Beverly D. 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 Permit Modification**
Appalachia Midstream Services, LLC (AMS)
Sand Hill Compressor Station (SHCS)
NSR Permit No. R13-2913B (Pending)
Plant ID No 051-00145
Marshall County, West Virginia

Dear Ms. McKeone:

Appalachia Midstream Services, LLC (AMS) is submitting one (1) original paper copy and two (2) CD-ROMs of an Application for 45CSR13 New Source Review (NSR) Permit Modification for the existing Sand Hill Compressor Station (SHCS), located on Golden Rd / McCausland Hill Rd (Approx. 2.5 miles SW of Dallas), in the Sand Hill Tax District of Marshal County, West Virginia.

This application for Permit Modification has been prepared and submitted as the previous application, and consequentially the current permit, did not include all potential emission sources at the facility.

The most significant changes to the potential to emit (PTE) are the results of:

1) The previous application did not include the Compressor Rod Packing (CRP) emissions. (**Increases the VOC point source emission estimate by 43.23 tpy.**)

2) The previous application used less conservative parameters and assumptions for estimating the Dehydrator (DHY-01 thru DHY-03) emissions. (**Increases the VOC point source emission estimate by 6.00 tpy per dehydrator and 18.01 tpy total of all three dehydrators.**)

3) The previous application used less conservative parameters and assumptions for estimating the Compressor Blowdown (CBD) and did not include the Emergency Shutdown (ESD) Testing emissions. (**Increases the VOC point source emission estimate by 13.05 tpy.**)

4) The previous application used less conservative parameters and assumptions for estimating the Piping and Equipment Leak (FUG-G, FUG-O) emissions and did not include the Engine Crankcase (ECC) emissions. (**Increases the VOC fugitive source emission estimate by 41.65 tpy.**)

These changes, and other less substantial changes, are summarized on the following page:

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Comparison: "Current" Permit (R13-2913A - 05/05/16) vs. "New" Application

Source ID	Description	Potential-to-Emit (PTE) (tpy)															
		NO_x		CO		VOC		PM		SO_2		HCHO		TOT HAPs		CO2e	
		"Current"	"New"	"Current"	"New"	"Current"	"New"	"Current"	"New"	"Current"	"New"	"Current"	"New"	"Current"	"New"	"Current"	"New"
Sand Hill Compressor Station (SHCS) - Point Sources																	
CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	6.66	6.66	5.96	5.96	3.86	4.28	0.54	0.49	0.03	0.03	0.27	0.52	1.25	0.76	6,869	8,336
CRP	Compressor Rod Packing	---	---	---	---	---	[1] 43.23	---	---	---	---	---	---	---	1.45	---	2,496
GEN	Generator - Capstone C600 Microturbine	1.09	2.10	2.70	5.78	0.07	0.57	0.22	0.20	0.11	0.02	0.02	0.04	0.03	0.06	3,859	3,534
DHY-01	Dehydrator 01 (BTEX Buster)	---	---	---	---	1.84	7.85	---	---	---	---	---	---	0.06	1.30	3.63	12.20
DHY-02	Dehydrator 02 (BTEX Buster)	---	---	---	---	1.84	[2] 7.85	---	---	---	---	---	---	0.06	1.30	3.63	12.20
DHY-03	Dehydrator 03 (BTEX Buster)	---	---	---	---	1.84	7.85	---	---	---	---	---	---	0.06	1.30	3.63	12.20
BLR-01	Reboiler 01	0.33	0.43	0.28	0.36	0.02	0.02	0.03	0.03	2E-03	3E-03	2E-04	3E-04	0.01	0.01	513	518
BLR-02	Reboiler 02	0.33	0.43	0.28	0.36	0.02	0.02	0.03	0.03	2E-03	3E-03	2E-04	3E-04	0.01	0.01	513	518
BLR-03	Reboiler 03	0.33	0.43	0.28	0.36	0.02	0.02	0.03	0.03	2E-03	3E-03	2E-04	3E-04	0.01	0.01	513	518
HTR-01	Heater-Treater Burner 01	0.17	0.21	0.14	0.18	0.01	0.01	0.01	0.02	1E-03	1E-03	1E-04	2E-04	3E-03	4E-03	256	259
HTR-02	Heater-Treater Burner 02	0.17	0.21	0.14	0.18	0.01	0.01	0.01	0.02	1E-03	1E-03	1E-04	---	3E-03	4E-03	256	259
TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)	---	---	---	---	1.53	0.17	---	---	---	---	---	---	0.08	0.05	69.13	---
WTK-01	Storage Tank W01 - Produced Water (PW)	---	---	---	---	0.90	0.03	---	---	---	---	---	---	0.05	0.01	42.54	---
WTK-02	Storage Tank W02 - Produced Water (PW)	---	---	---	---	0.90	0.03	---	---	---	---	---	---	0.05	0.01	42.54	---
TLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	---	---	---	---	8.15	8.52	---	---	---	---	---	---	0.41	2.56	61.22	---
WTLO	Truck Loading - Produced Water (PW)	---	---	---	---	0.01	0.08	---	---	---	---	---	---	6E-04	0.02	0.09	---
CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	---	---	---	---	11.88	[3] 24.94	---	---	---	---	---	---	0.24	0.84	693	1,440
	Sand Hill Compressor Station (SHCS) - Point Sources	**82.37**	**83.77**	**75.30**	**78.70**	**86.15**	**153.79**	**6.84**	**6.22**	**0.50**	**0.38**	**3.22**	**6.28**	**16.65**	**18.37**	**89,744**	**109,617**
Sand Hill Compressor Station (SHCS) - Fugitives																	
FUG-G	Piping & Equip Leaks - Gas	---	---	---	---	11.89	[4] 20.23	---	---	---	---	---	---	0.28	0.68	638	1,168
FUG-O	Piping & Equip Leaks - Light Liquid		---		---		32.68		---		---		---		1.10		---
ECC	Engine Crankcase Fugitives	---	0.21	---	1.24	---	0.63	---	0.02	---	9E-04	---	0.16	---	0.19	---	261
	Sand Hill Compressor Station (SHCS) - Fugitives	**---**	**0.21**	**---**	**1.24**	**11.89**	**53.54**	**---**	**0.02**	**---**	**9E-04**	**---**	**0.16**	**0.28**	**1.97**	**638**	**1,429**
Sand Hill Compressor Station (SHCS) - Total																	
	Sand Hill Compressor Station (SHCS) - Total	**82.37**	**83.98**	**75.30**	**79.95**	**98.04**	**207.33**	**6.84**	**6.24**	**0.50**	**0.38**	**3.22**	**6.44**	**16.93**	**20.34**	**90,382**	**111,046**

Increase/(Decrease):	**1.61**	**4.65**	**109.29**	**(0.60)**	**(0.13)**	**3.22**	**3.41**	**20,664**

The revised VOC PTE is greater than the Title V Major Source Threshold. Accordingly, Appalachia Midstream Services, LLC will prepare and submit a Title V Operating Permit application in the first quarter of 2018.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

EMISSIONS SUMMARY

Facility-Wide Emissions Summary [Tons per Year]			
Criteria Pollutants	**Potential Emissions (Including Fugitives)**		
	R13-2913A	**CHANGE**	**R13-2913B (Proposed)**
Nitrogen Oxides (NOX)	82.37	1.61	83.98
Carbon Monoxide (CO)	75.30	4.65	79.95
Volatile Organic Compounds (VOC)	98.04	109.29	207.33
Particulate Matter (PM10/2.5)	6.84	(0.60)	6.24
Sulfur Dioxide (SO2)	0.50	(0.13)	0.38
Hazardous Air Pollutants	**Potential Emissions (Including Fugitives)**		
	R13-2913A	**CHANGE**	**R13-2913B (Proposed)**
Acetaldehyde	5.45	(4.20)	1.25
Acrolein	3.35	(2.58)	0.77
Benzene	0.38	0.91	1.29
Butadiene, 1,3-	---	0.04	0.04
Ethylbenzene	0.08	0.38	0.46
Formaldehyde (HCHO)	3.22	3.22	6.44
n-Hexane	2.15	4.28	6.43
Methanol (MeOH)	1.63	(1.26)	0.37
Polycyclic Organic Matter (POM)	---	0.05	0.05
Toluene	0.33	1.44	1.78
2,2,4-Trimethylpentane (TMP)	---	0.47	0.47
Xylenes	0.34	0.60	0.94
Other/Trace HAP*	---	0.05	0.05
Total Hazardous Air Pollutants (HAPs)	16.93	3.41	20.34
Other Regulated Pollutants (Other than Criteria and HAP)	**Potential Emissions (Including Fugitives)**		
	R13-2913A	**CHANGE**	**R13-2913B (Proposed)**
Carbon Dioxide (CO_2)	88,256	(927)	87,330
Methane (CH_4)	83.18	862	946
Nitrous Oxide (N_2O)	0.16	0.10	0.26
CO_2 equivalent (CO_2e)	90,382	20,664	111,046

*Other/Trace HAPs include: Carbon Tetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

This application is prepared and submitted to request modifications to the facility's potential-to-emit (PTE). Although these modifications are significant, the only physical or operational changes proposed are:

- Remove the requirements to control the Produced Water (PW) Storage Tank (WTK-01 and WTK-02) and the Produced Water (PW) Truck Load-Out (WTLO) emissions. (The combined uncontrolled VOC emissions from WTK and WTLO operations is estimated at 0.14 tpy.)

Proposed modifications to current permit (R13-2913A) are provided in Attachment L – Emission Unit Data Sheet(s).

If you have any questions concerning this submittal, or need additional information, please contact me by telephone at (304) 843-3125 or by e-mail at Dave.Morris@Williams.com.

Sincerely,

David Morris
Environmental Specialist

Enclosures:
Application for NSR Permit Modification
Attachments A thru S
Supplements S1 thru S4
Check for Application Fee

Application for
45CSR13 New Source Review
Permit Modification (NSR)

For the:

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Plant ID No. 051-00145

Marshall County, West Virginia

Submitted to:

West Virginia
Department of Environmental Protection
Division of Air Quality

Submitted by:

Appalachia Midstream Services, LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041-2352

Prepared by:

EcoLogic Environmental Consultants, LLC
864 Windsor Court
Santa Barbara, CA 93111-1037

February 2018

Application for
45CSR13 New Source Review
Permit Modification (NSR)

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Plant ID No. 051-00145
Marshall County, West Virginia

Table of Contents

Application for
45CSR15 New Source Review
Permit Modification (NSR)

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

NTAL 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):*
Appalachia Midstream Services, LLC (AMS)

2. Federal Employer ID No. ***(FEIN):***
2 6 – 3 6 7 8 9 7 2

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

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

5A. Applicant's mailing address:
100 Teletech Drive, Suite 2
Moundsville, WV 26041

5B. Facility's present physical address:
9628 Bethany Pike
Bethany, Brooke County, WV 26032

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**
– If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
– If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: **The Williams Companies, Inc.**

8. Does the applicant own, lease, have an option to buy, or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
– If **YES,** please explain: **Applicant owns the Buffalo Compressor Station (BCS).**
– If **NO,** you are not eligible for a permit for this source.

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

10. North American Industry Classification System **(NAICS)** code for the facility:
213112–Support Activities for Oil and Gas Operations

11A. DAQ Plant ID No. (existing facilities):
0 5 1 – 0 0 1 4 5

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities):
R13-2913A - Issued 05/05/16

12A. Directions to the facility:

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

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

From Dallas, WV:
1) Head south on Number 2 Ridge Rd ~2.3 mi;
2) Turn right onto Golden Rd / McCausland Hill Rd ~1.4 mi;
3) Destination is on the right.

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): **Golden Rd / McCausland Hill Rd**	12C. Nearest city or town: **Dallas**	12D. County: **Marshall**
12.E. UTM Northing (KM): **4,426.495 km Northing**	12F. UTM Easting (KM): **537.897km Easting**	12G. UTM Zone: **17T**

13. Briefly describe the proposed change(s) at the facility:

This application is prepared and submitted to request modifications to the facility's potential-to-emit (PTE). Although these modifications are significant, the only physical or operational changes proposed are:

•• Remove the requirements to control the Produced Water (PW) Storage Tank (WTK-01 and WTK 02) and the Produced Water (PW) Truck Load-Out (WTLO) emissions. (The combined uncontrolled VOC emissions from WTK and WTLO operations is estimated at 0.14 tpy.)

14A. Provide the date of anticipated installation or change: – 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: **NA**

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

23. Provide a **Process Description** as **Attachment G**.
– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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 Operations (Lf)**	☐ Haul Road Emissions	☐ Quarry
☒ **Chemical Processes (Lg)**	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ **Storage Tanks (Le)**
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ **General Emission Unit, specify:**

- **Natural Gas Compressor/Generator Engine Data Sheet (La)**
- **Natural Gas Glycol Dehydration Unit Data Sheet (Lb, Lc)**
- **Fired Boiler/Line Heater Data Sheet (Ld)**

(*) Leak Source Data Sheet Only

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 (CarbCan)**	☒ **Condenser (BTEX Buster)**	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☒ **Other Collectors, specify:**

- **Oxidation Catalyst (OxCat)**
- **Vapor Recovery Unit (VRU)**

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: _____ DATE: _____

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

35B. Printed name of signee: **Paul V. Hunter**	35C. Title: **Vice President**	
35D. E-mail: **PaulV.Hunter@Williams.com**	36E. Phone: **(412) 787-5561**	36F. FAX: **(412) 787-6002**
36A. Printed name of contact person: **David Morris**	36B. Title: **Environmental Specialist**	
36C. E-mail: **Dave.Morris@Wiliams.com**	36D. Phone: **(304) 834-3125**	36E. FAX: **---**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

- **Business Registration Certificate**
  To: Appalachia Midstream Services, LLC
  Date: 06/30/10

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:

APPALACHIA MIDSTREAM SERVICES, L.L.C.
900 PENNSYLVANIA AVE
CHARLESTON, WV 25302-3548

BUSINESS REGISTRATION ACCOUNT NUMBER: **2222-3681**

This certificate is issued on: **06/30/2010**

This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with W.Va. Code § 11-12.

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

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

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them. CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

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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."

- **Location:**
  Sand Hill Compressor Station (SHCS)
  Golden Rd / McCausland Hill Rd
  (Approximately 2.5 miles SW of Dallas)
  Dallas, Marshal County, County, WV 26036

- **Latitude and Longitude:**
  Lat: 39°59'16.0"N x Lon: -80°33'22.0"W
  Lat: 39.9878°N x Lon: -80.5561°W

- **UTM:**
  537.897 km E x 4,426.495 km N x 17T

- **Elevation:**
  ~1,175'

- **USGS:**
  2016 USGS US Topo 7.5 - minute map for MAJORSVILLE, WV-PA

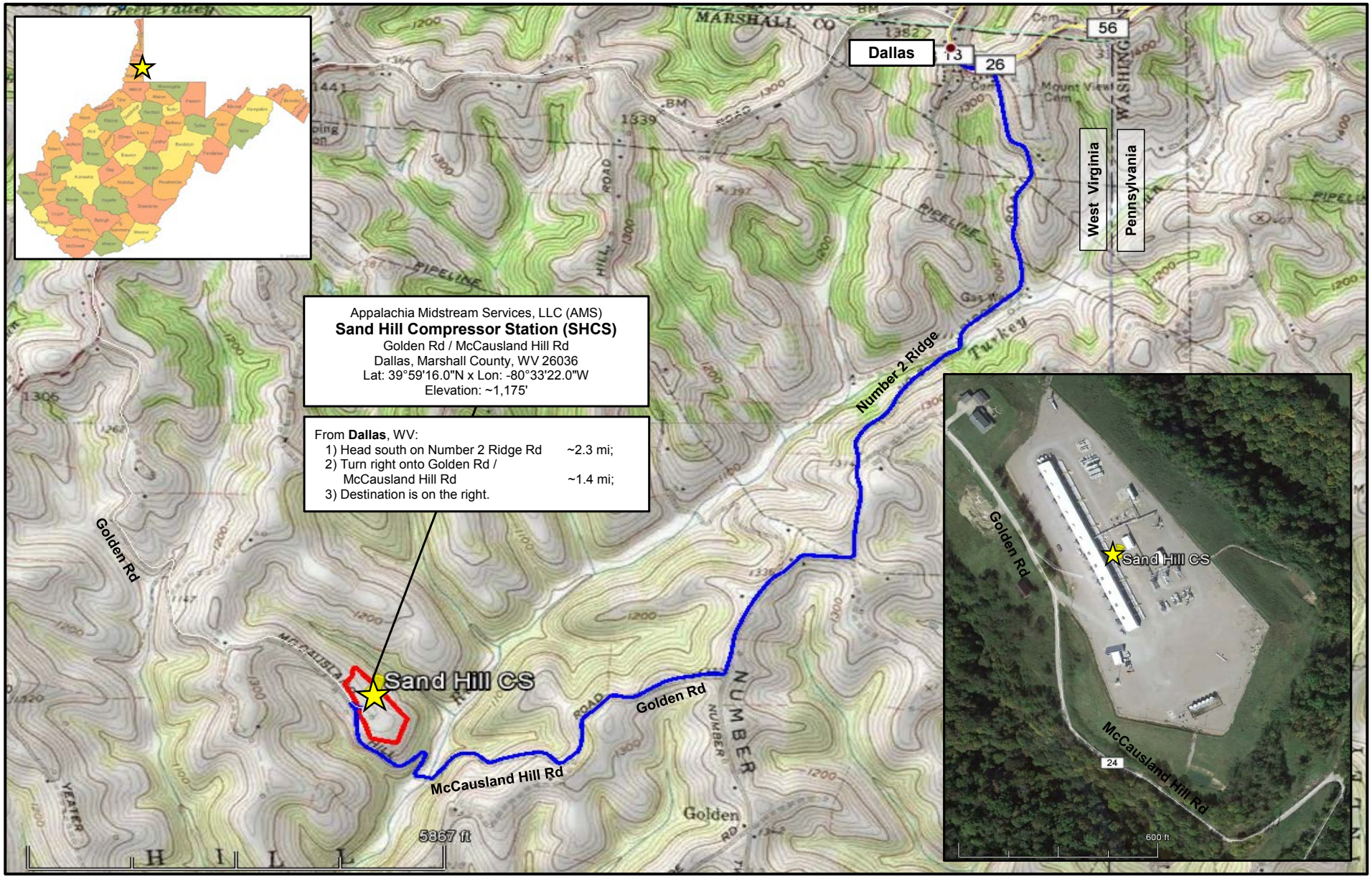
- **Directions:**
  From Dallas, WV:
  1) Head south on Number 2 Ridge Rd ~2.3 mi;
  2) Turn right onto Golden Rd / McCausland Hill Rd ~1.4 mi;
  3) Destination is on the right.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source Review Permit Amenedment (NSR)

Attachment B - Location Map / 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."

This application is prepared and submitted to request modifications to the facility's potential-to-emit (PTE). Although these modifications are significant, the only physical or operational changes proposed are to remove the requirements to control the Produced Water Storage Tank (WTK-01 and WTK-02) and Produced Water Truck Load-Out (WTLO) emissions. (Combined uncontrolled VOC emissions from WTK and WTLO sources is estimated at 0.14 tpy.)

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

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 compressor stations. Applicability to the subject facility has been determined as follows:

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

This rule does not apply to the subject facility because the total PTE for the entire facility qualifies as a "PSD Minor Source" for each regulated pollutant; as follows:

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Synthetic Minor Source with 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
- PM10/2.5: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy

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

This rule does not apply to the subject facility. The operations are in the Brooke County, WV, which is currently classified as Attainment, Unclassified, or Maintenance for all national ambient air quality standards (NAAQS).

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

This rule does not apply to the subject facility because the entire 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) [Applicable]

This rule does apply because the potential to emit VOC is above than the Title V Major Source threshold of 100 tpy.

B. Applicability of Federal Regulations

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

1. NSPS A, General Provisions

40CFR§60.1-§60.19 [Applicable]

This rule does apply to all sources subject to an NSPS (unless a specific provision is excluded within the source NSPS). Requirements include notification (§60.7); monitoring (§60.7); recordkeeping (§60.11); and reporting (§60.18)

2. NSPS A, Control Devices - Flares

40CFR§60.18(b) [Not Applicable]

This rule does not apply because there is no flare at the subject facility.

3. NSPS D (also Da, Db, and Dc), Steam Generating Units

40CFR§60.40-§60.48 [Not Applicable]

These rules do not apply because there is no steam generating unit (including line heaters) at the subject facility with a maximum design heat input capacity ≥ 10 MMBtu/hr and ≤ 100 MMBtu/hr (§60.40c(a)).

4. NSPS K (also Ka and Kb), Volatile Organic Liquid Storage Vessels

40CFR§60.40-§60.48 [Not Applicable]

This rule does not apply because there is no tank with capacity ≥ 75 m3 (471.7 bbl or 19,813 gal) that is used to store volatile organic liquids (VOL) at the subject facility (§60.110(a)).

5. 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 subject 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).

6. NSPS KKK, Leaks from Natural Gas Processing Plants

40CFR§60.630-§60.636 [Not Applicable]

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

7. 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 subject facility (§60.640(a)).

8. 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 subject facility (§60.4200(a)).

9. NSPS JJJJ, Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)
40CFR§60.4230-§60.4248 [Applicable]

This rule does apply to the 1,380 bhp Caterpillar G3516B compressor engines (CE-01 thru CE-12) because each engine has a power rating greater than 500 HP and each engine was manufactured on or after 07/01/07 (§60.4230(a)(4)(i)).

Requirements include NOx, CO and VOC emission limits (§60.4233(e-f)); operating limits (§60.4243); performance testing (§60.4244); and notification and recordkeeping (§60.4245).

10. NSPS KKKK, Stationary Combustion Turbines
40CFR§60.4300-§60.4420 [Not Applicable]

This rule does not apply because there is no stationary gas turbine at the subject facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the higher heating value of the fuel fired. (§60.4305(a)).

11. NSPS OOOO, Crude Oil and Natural Gas Production
40CFR§60.5360-§60.5430 [Applicable]

This rule does apply to each reciprocating compressor driven by a CAT G3516B engine (CE-01 thru CE-12) because the subject facility is identified within the natural gas production segment and the compressors commenced construction after 08/23/11 (§60.5360 and §60.5365(c)).

Requirements include replacing rod packing systems on a specified schedule (§60.5385(a)) and notification, monitoring, recordkeeping and reporting (§60.5410(c), §60.5415(c), §60.5420(b)(1) and §60.5420(b)(4)).

This rule does not apply to the stabilized condensate (SC) storage tanks (TK-01 thru TK-08) nor to the produced water (PW) storage tanks (WTK-01 and WTK-02) because each tank does not have the potential to emit VOC ≥ 6 TPY. Note, however, there is a requirement to document that the VOC PTE is < 6 tpy per tank (§60.5420).

This rule does not apply to the pneumatic controllers because they are compressed air driven, else they have a bleed rate ≤ 6 scfh, are located between the wellhead and point of custody transfer, and are not located at a natural gas processing plant (§60.5365(d)(1)).

12. NSPS OOOOa, Crude Oil and Natural Gas Production
40CFR§60.5360a-§60.5430a [Not Applicable]

This rule does not apply because the subject facility was constructed prior to September 18, 2015 (§60.5360a

13. NESHAP Part 61 - Designated Source Standards

40CFR§61.01-§61.359 [Not Applicable]

This rule does not apply because the subject facility is not a NESHAP Designated Facility (or Source).

Specifically, NESHAP J - Equipment Leaks (Fugitive Emission Sources) of Benzene and NESHAP V - Equipment Leaks (Fugitive Emission Sources) do not apply because all the fluids (liquid or gas) at the subject facility are < 10 wt% volatile hazardous air pollutant (VHAP) ((§61.111 and §61.241).

14. NESHAP A (Part 63 (aka, MACT)) - General Provisions

40CFR§63.1-§63.16 [Applicable]

This rule does apply because the dehydrators (DHY-01 thru DHY-03) are subject NESHAP HH–Oil and Natural Gas Production Facilities and the compressor engines (CE-01 thru CE-12) are subject to NESHAP ZZZZ– Reciprocating Internal Combustion Engines (RICE).

15. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779 [Applicable/Exempt]

This rule does apply; however, because the subject facility is an area source of HAP emissions, and the actual average emissions of benzene from each glycol dehydration unit process vent to the atmosphere is < 0.90 megagram per year (1.0 tpy), the dehydration units (DHY-01 thru DHY-03) are exempt. The only requirement is to maintain records of the actual average benzene emissions per year (§63.774(d)(1)(i).

This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the subject facility is an area source of HAP emissions (§63.760(b)(2)).

16. NESHAP HHH, Natural Gas Transmission and Storage Facilities

40CFR§63.1270-§63.1289 [Not Applicable]

This rule does not apply because the subject facility is not a natural gas transmission or storage facility transporting or storing natural gas prior to local distribution (§63.1270(a)).

17. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175 [Not Applicable]

This rule does not apply because subject facility is not a major source of HAP emissions (§63.6085).

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

40CFR§63.6580-§63.6675 [Applicable]

This rule does apply to the 1,380 bhp CAT G3516B Compressor Engines (CE-01 thru CE-12). However, because each engine is "new"; i.e., commenced construction or reconstruction on or after 06/12/06 (§63.6590(a)(2)(iii)); the only requirement is compliance with §60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines.

19. 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 subject facility is an area source of HAP emissions (§63.7485).

20. 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 all boilers (BLR-01 thru BLR-03) and heaters (HTR-01 and HTR-02) at the subject facility are gas-fired (§63.11195(e)).

21. Compliance Assurance Monitoring (CAM)

40CFR§64.1-§64.10 [Applicable/Deferred]

This rule does apply to the dehydrators (DHY-01 thru DHY-03) because they are:

a) Pollutant-specific emission units (PSEUs) at a major source that is required to obtain a Title V operating permit;
b) Subject to an emissions limitation or standard;
c) Use a control device to achieve compliance with any such emission limitation or standard; and
d) The potential pre-control emissions of the applicable regulated air pollutant are ≥ 100% of the amount required to be classified as a major source (§64.2).

Note: Only large PSEUs (i.e., PSEUs with potential post-control device emissions of an applicable regulated air pollutant that are ≥ Major Source Threshold Levels) need to submit a CAM plan with the initial TVOP application. At the subject facility, the post-control emissions are < Major Source Threshold Levels (§64.5(b)).

22. Chemical Accident Prevention Provisions (Risk Management Plan (RMP))

40CFR§68.1-§68.220 [Not Applicable]

This rule does not apply because the subject facility does not store more than a threshold quantity of a regulated substance in a process. Specifically, "Prior to entry into a natural gas processing plant or a petroleum refining process unit, regulated substances in naturally occurring hydrocarbon mixtures need not be considered when determining whether more than a threshold quantity is present at a stationary source" (§68.115(b)(2)(iii)).

23. Mandatory Greenhouse Gases (GHG) Reporting
40CFR§98.1-§98.9 [Applicable]

This rule does apply because:

a) The facility is not a listed source category;
b) The aggregate max heat input capacity of stationary fuel combustion units at the facility is ≥ 30 MMBtu/hr;
c) The CO2e emissions from all stationary sources combined within the hydrocarbon basin as defined in 40 CFR Part 98 is ≥ 25,000 metric ton/yr (§98.2(a)(3)).

Requirements include monitoring, recordkeeping, and annual reporting of GHG from stationary fuel combustion sources only (§98.2(a)(3)).

C. Applicability of Source Aggregation

The operations of the subject facility have not been aggregated with any other gas production, midstream service facilities, or transportation operations because there are no oil and gas facilities or operations "contiguous and adjacent" to the subject facility. Furthermore, there are no related facilities or operations that meet the common-sense notion of a plant and/or are under common control.

D. Applicability of State Regulations

The following state regulations are potentially applicable to natural gas compressor stations. Applicability to the subject facility has been determined as follows:

1. Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers
§45CSR2 [Not Applicable]

This rule does not apply because there is no indirect heat exchanger at the subject facility with input capacity ≥ 10 MMBtu/hr.

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.

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 subject facility.

4. **Prevent and Control Air Pollution from the Emission of Sulfur Oxides**
   45CSR10 [Applicable]

   This rule does apply and limits the discharge of SO2 to 3.1 lb/hr per million Btu of total design heat input (§45-10-3.1.d).

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 because the increase in VOC emissions is > 6 lb/hr and 10 tpy.

   Regulation 45CSR13 is applicable to new sources or modifications that result in an emission increase of:

   - 6 lb/hr and 10 tons/yr of any regulated pollutant, or
   - 144 lb/day of any regulated pollutant, or
   - 2 lb/hr or 5 tons/yr of HAPs.

   Appalachia Midstream Services, LLC (AMS) is applying for a 45CSR13 New Source Review Permit Modification and has published the required Class I legal advertisement notifying the public of this application and paid the appropriate application fee.

6. **Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants for Prevention of Significant Deterioration**
   45CSR14 [Not Applicable]

   The rule does not apply because the subject facility is neither a new PSD major source of pollutants nor is the proposed facility a modification to an existing PSD major source.

7. **Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**
   45CSR16 [Applicable]

   The rule does apply to this source by reference to §40CFR60 Subparts JJJJ and OOOO. The subject facility is subject to the notification, testing, monitoring, recordkeeping and reporting requirements of these Subparts.

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. The subject facility location is designated as “Attainment/ Unclassified” for all criteria pollutants.

9. **Regulation of Volatile Organic Compounds (VOC)**
   45CSR21 [Not Applicable]

   This rule does not apply because the subject facility is not located in Putnam County, Kanawha County, Cabell County, Wayne County, or Wood County

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 (Best Available Control Technology (BAT))

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 (§45-27-2.4).

12. Air Pollution Emissions Banking and Trading

45CSR28 [Not Applicable]

This rule does not apply. Appalachia Midstream Services, LLC (AMS) 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 subject facility is not located in Putnam, Kanawha, Cabell, Wayne, Wood, or Greenbrier Counties (§45-29-1).

14. Requirements for Operating Permits

45CSR30 [Applicable]

This rule does apply because the potential to emit VOC is above than the Title V Major Source threshold of 100 tpy (§45-30-4.1.a.2).

15. Emission Standards for Hazardous Air Pollutants (HAP)

45CSR34 [Applicable]

This rule does apply because it incorporates by reference the federal air toxic regulations under the NESHAP program (40CFR61 and 40CFR63).

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."

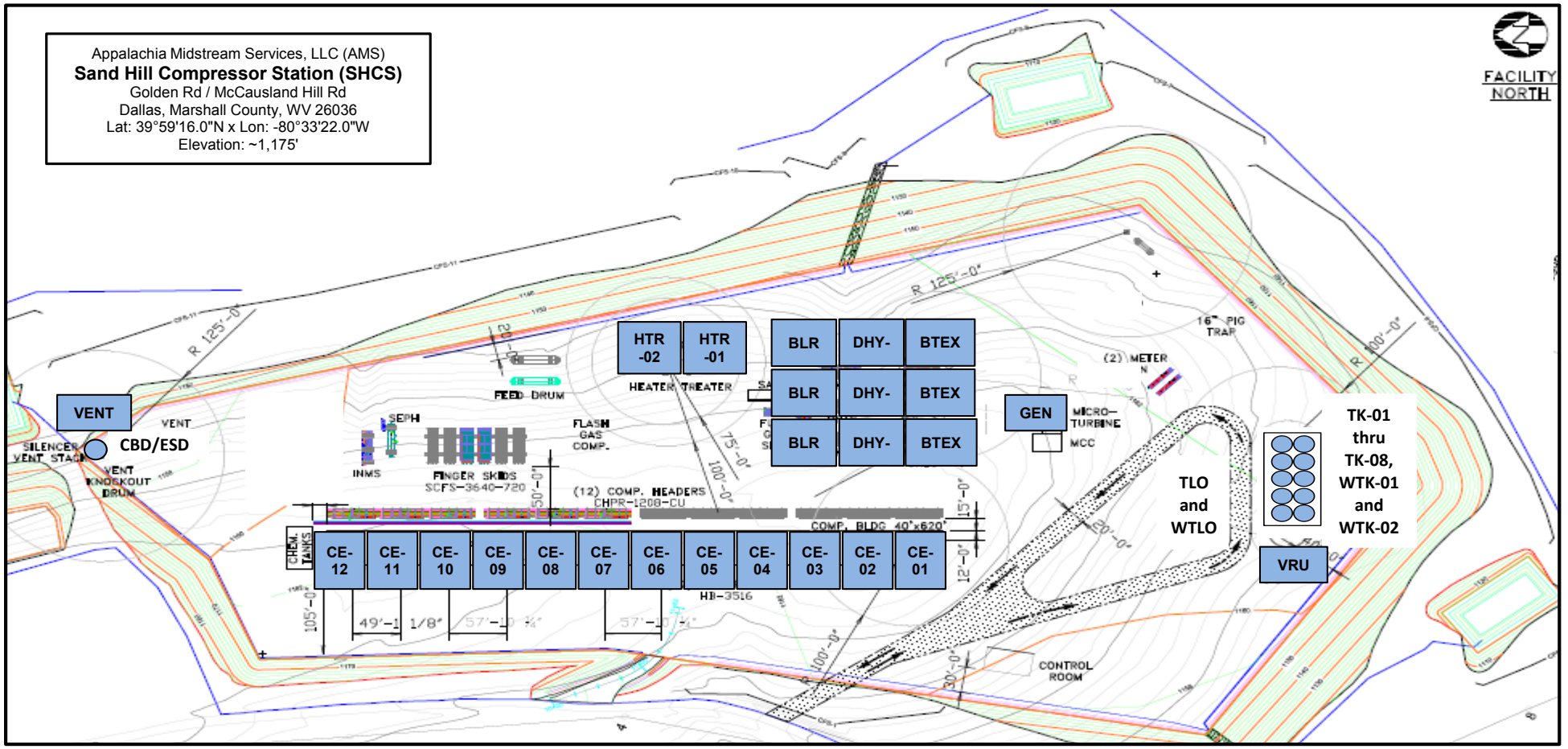
- **Plot Plan – Sand Hill Compressor Station (SHCS)**

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source Review Permit Amenedment (NSR)

Attachment E - Plot Plan



Unit No.	Company ID - Description	Unit No.	Company ID - Description
CE-01 thru CE-12	1,380 bhp CAT G3516B Compressor Engines	VRU	Vapor Recovery Unit
GEN	805 bhp Capstone C600 Microturbine Generator	WTK-01 and WTK-02	400 bbl Produced Water (PW) - Storage Tanks
CRP	Compressor Rod-Packing	TLO	Stabilized Condensate (SC) - Truck Load-Out
DHY-01 thru DHY-03	55.0 MMscfd Dehydrators	CARB-CAN	Carbon Canisters
BTEX-01 thru BTEX-03	Condensers (BTEX Busters)	WTLO	Produced Water (PW) - Truck Load-Out
BLR-01 thru BLR-03	1.00 MMBtu/hr Reboilers	CBD/ESD	Compressor Blowdown / Emergency Shutdown
HTR-01 and HTR-02	0.50 MMBtu/hr Heater Treater Burners	FUG-G and FUG-O	Process Piping and Equipment Leaks
TK-01 thru TK-08	400 bbl Stabilized Condensate (SC) - Tanks	ECC	Engine Crankcase

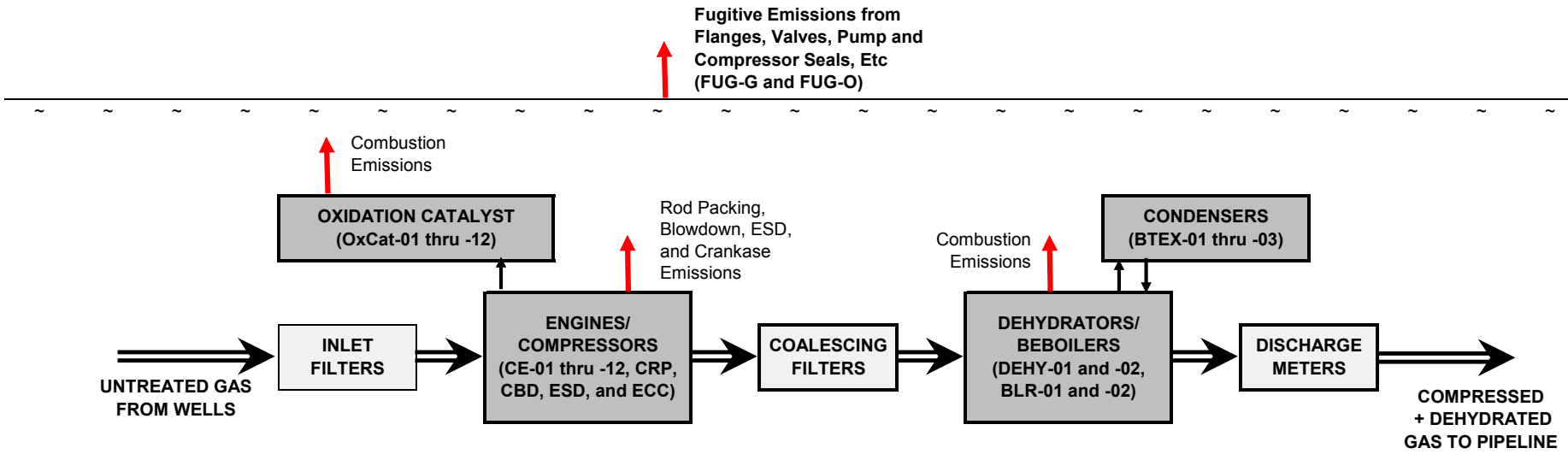
Attachment F

Process Flow Diagram(s) (PFD)

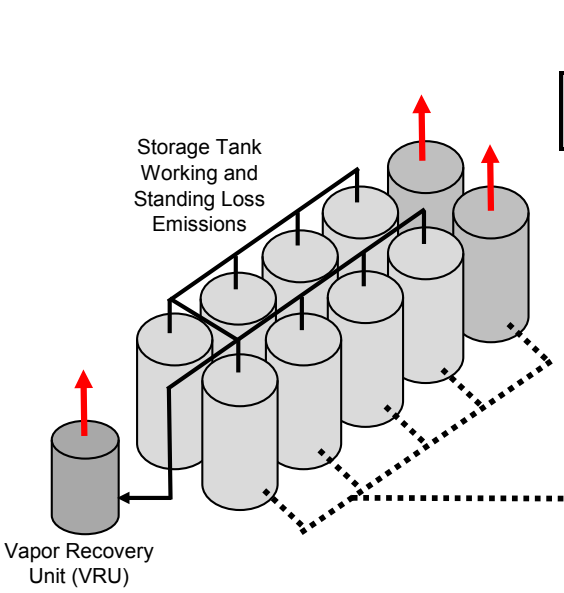
"22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as Attachment F."

- **Process Flow Diagram (PFD) – Sand Hill Compressor Station (SHCS)**

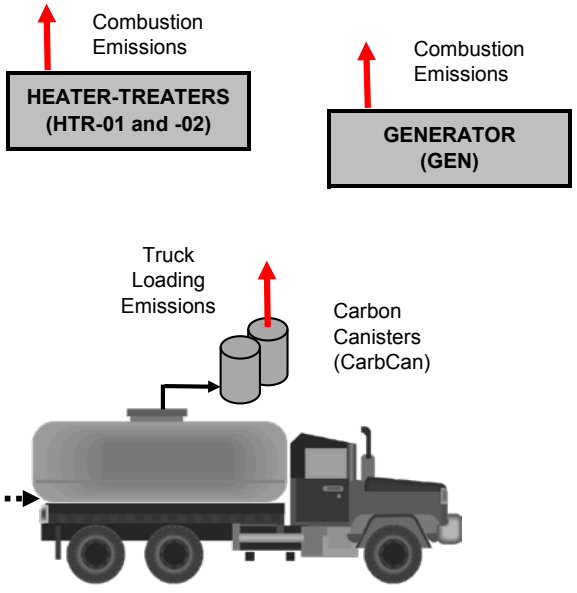
Attachment F - Process Flow Diagram (PFD)



Unit No.	Company ID - Description
CE-01 thru CE-12	1,380 bhp CAT G3516B Compressor Engines
CRP	Compressor Rod-Packing
GEN	805 bhp Capstone C600 Microturbine Generator
DHY-01 thru DHY-03	55.0 MMscfd Dehydrators
BTEX-01 thru BTEX-03	Condensers (BTEX Busters)
BLR-01 thru BLR-03	1.00 MMBtu/hr Reboilers
HTR-01 and HTR-02	0.50 MMBtu/hr Heater Treater Burners
TK-01 thru TK-08	400 bbl Stabilized Condensate (SC) - Tanks
VRU	Vapor Recovery Unit
WTK-01 and WTK-02	400 bbl Produced Water (PW) - Storage Tanks
TLO	Stabilized Condensate (SC) - Truck Load-Out
CARB-CAN	Carbon Canisters
WTLO	Produced Water (PW) - Truck Load-Out
CBD/ESD	Compressor Blowdown / Emergency Shutdown
FUG-G and FUG-O	Process Piping and Equipment Leaks
ECC	Engine Crankcase



Stabilized Condensate and Produced Water Storage Tanks (TK-01 thru -08 (VRU)) (WTK-01 and -02)



Stabilized Condensate (SC) and Produced Water (PW) Truck Loading (TLO (CarbCan) and WTLO)

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 – Sand Hill Compressor Station (SHCS)**

Attachment G

Process Description

The natural gas inlet stream from surrounding area wells enters the facility at low pressure through a two-phase low-pressure inlet separator that gravity separates the inlet stream into two streams: gas and hydrocarbon/water liquids. Low-pressure inlet gas is compressed via three-stage reciprocating compressors with inter-stage cooling. Discharge from the compressors passes through filter/coalescer-separators to remove any condensed or entrained liquids present.

After the inlet gas passes through compressors, it goes through the dehydration process before exiting the facility via a sales pipeline. A portion of the discharge gas is removed prior to outlet metering for use as fuel gas.

Triethylene glycol (TEG) dehydration units are used to remove water from the gas. The units are comprised of both a glycol contactor skid and a glycol regeneration skid. In the dehydration process, gas passes through a contactor vessel where water is absorbed by the glycol. The "rich" glycol containing water goes to the glycol reboiler where heat is used to remove the water and regenerate the glycol. The heat is supplied by a natural gas-fired reboiler that exhausts to the atmosphere.

Flash tank off-gases from the glycol regeneration skid are routed to the reboiler to be burned as fuel (100% recycle). Overhead still column emissions from the glycol regeneration skid are controlled by an air-cooled condenser. The non-condensables from the still column overheads are also routed to the reboiler and burned with 95% destruction efficiency.

The TEG reboilers are equipped with a burner management system to ensure a constant flame for combustion of the vapors. Any excess vapors not burned as fuel is recycled or recompressed for 100% control efficiency.

After dehydration, fuel gas is pulled from the discharge side of the process. A fuel gas skid (not an emission source) reduces the pressure of a portion of the discharge gas to a pressure suitable for use by fuel-burning equipment.

Inlet liquids will flow from the two-phase low-pressure inlet separator to a heater-treater feed drum, a three-phase low pressure separator. Heavy liquids (water) will be separated and sent to atmospheric produced water storage tanks. Produced water will be transported off site via truck. Liquid hydrocarbons (condensate) will flow from the feed drum to the heater treater.

Any vapors evolved from the liquid to the feed drum will be routed to the electric-driven flash gas compressor and recycled to the two-phase low-pressure inlet separator. After stabilization, condensate will be sent to atmospheric condensate storage tanks. The stabilized condensate storage tanks include vapor recovery unit (VRU) which operates at a minimum of 95% control efficiency.

Produced water and stabilized condensate will be transported off site via truck. Vapors evolved from truck loading stabilized condensate are routed to carbon canisters for VOC recovery with 70% collection effectiveness and 95% control efficiency (66.5% combined).

The facility has several liquid recycle streams to reduce emissions. All high-pressure liquids are cascaded to lower pressure separators to capture gases evolved as a result of pressure reduction. All liquids formed by gas cooling in the inter-stage coolers of the three-stage reciprocating compressors are cascaded to lower pressure scrubbers on the compressor skid.

The facility also has several gas recycle streams. All condensate storage tank emissions are controlled 95% by vapor recovery compression. The vapor recovery compressors discharge in the flash gas compressor. The flash gas compressor compresses these gases and discharge into the two-phase low-pressure inlet separator. Overhead gases from the heater-treater feed drum and heater treater are routed to the flash gas compressor and recycled to the two-phase low-pressure inlet separator.

The generator provides electric power to the vapor recovery and flash gas compressors, electric glycol pumps, and other electrical equipment. Fugitive emissions from component leaks will also occur.

Please note that the compressor station will have two primary suction pressure operating points, 125 psig and 50 psig. The expected discharge pressure range is 900 – 1,200 psig. The facility initially operates at 125 psig suction pressure and will continue to do so until such time that field production volumes decline. At that time, the suction pressure will be lowered to 50 psig, resulting in a diminished facility capacity.

Attachment H

Safety Data Sheets (SDS)
(And Representative Gas Analysis)

"24. Provide **Safety Data Sheets (SDS)** for all materials processed, used or produced as Attachment H. For chemical processes, provide a SDS for each compound emitted to the air."

- **SAFETY DATA SHEETS (SDS):**

  Williams Safety Data Sheets (SDS) provide detailed information needed to use the products in a safe and environmentally acceptable manner and meet local, state and federal requirements.

  Copies of SDS can be accessed at: http://co.williams.com/safety/safety-data-sheets/

  - Butane, Normal
  - Carbon Dioxide
  - Crude Butadiene
  - Debutanized Aromatic Concentrate
  - Demethanized-Mix Y Grade
  - Ethane/Propane Mix
  - Ethane Purity
  - Ethylene
  - Isobutane
  - Liquid Natural Gas LNG
  - Mixed Butane
  - Natural Gas Condensate Sour
  - Natural Gas Condensate Sweet
  - Natural Gas Liquids NGL
  - Natural Gas
  - Natural Gasoline
  - Propane
  - Propylene Polymer Grade
  - Reclaimed Methanol
  - Rich Water
  - Wellhead Natural Gas

Attachment I

Emission Units Table

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

- **Emission Unit Table – Sand Hill Compressor Station (SHCS)**

Attachment I

EMISSION UNITS TABLE

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

Emission Unit ID[1]	Emission Point ID[2]	Source ID	Emission Unit Description	Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
EUCE-1	EPCE-1	CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-01
EUCE-2	EPCE-2	CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-02
EUCE-3	EPCE-3	CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-03
EUCE-4	EPCE-4	CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-04
EUCE-5	EPCE-5	CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-05
EUCE-6	EPCE-6	CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-06
EUCE-7	EPCE-7	CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-07
EUCE-8	EPCE-8	CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-08
EUCE-9	EPCE-9	CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-09
EUCE-10	EPCE-10	CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-10
EUCE-11	EPCE-11	CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-11
EUCE-12	EPCE-12	CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	'12/'18	1,380 bhp	Modified	OxCat-12
EUCRP	EPCRP	CRP	Compressor Rod Packing	'12/'18	12 Units	Modified	---
EUGEN-1	EPGEN-1	GEN	Generator - Capstone C600 Microturbine	'12/'18	805 bhp	Modified	---
EUDHY-1	EPSTL-1	DHY-01	Dehydrator 01 (BTEX Buster)	'12/'18	55.0 MMscfd	Modified	BTEX-01
EUDHY-2	EPSTL-2	DHY-02	Dehydrator 02 (BTEX Buster)	'12/'18	55.0 MMscfd	Modified	BTEX-02
EUDHY-3	EPSTL-3	DHY-03	Dehydrator 03 (BTEX Buster)	'12/'18	55.0 MMscfd	Modified	BTEX-03
EURBL-1	EPRBL-1	BLR-01	Reboiler 01	'12/'18	1.00 MMBtu/hr	Modified	---
EURBL-2	EPRBL-2	BLR-02	Reboiler 02	'12/'18	1.00 MMBtu/hr	Modified	---
EURBL-3	EPRBL-3	BLR-03	Reboiler 03	'12/'18	1.00 MMBtu/hr	Modified	---
EUHT-1	EPHT-1	HTR-01	Heater-Treater Burner 01	'12/'18	0.50 MMBtu/hr	Modified	---
EUHT-2	EPHT-2	HTR-02	Heater-Treater Burner 02	'12/'18	0.50 MMBtu/hr	Modified	---
EUTK-1	EPTK-1	TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-2	EPTK-2	TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-3	EPTK-3	TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-4	EPTK-4	TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-5	EPTK-5	TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-6	EPTK-6	TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-7	EPTK-7	TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUTK-8	EPTK-8	TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)	'12/'18	400 bbl	Modified	VRU
EUWTK-9	EPWTK-9	WTK-01	Storage Tank W01 - Produced Water (PW)	'12/'18	400 bbl	Modified	---
EUWTK-10	EPWTK-10	WTK-02	Storage Tank W02 - Produced Water (PW)	'12/'18	400 bbl	Modified	---
EULOAD-1	EPLOAD-1	TLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	'12/'18	9,965 Mgal/yr	Modified	CarbCan
EULOAD-2	EPLOAD-2	WTLO	Truck Loading - Produced Water (PW)	'12/'18	1,533 Mgal/yr	Modified	---
EUBD	EPBD	CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	'12/'18	1,249 events/yr	Modified	---
EUFUG	EPFUG	FUG-G	Piping & Equip Leaks - Gas	'12/'18	7,472 Units	Modified	---
		FUG-O	Piping & Equip Leaks - Light Liquid	'12/'18	3,407 Units	Modified	
EUECC	EPECC	ECC	Engine Crankcase Fugitives	'12/'18	17,365 bhp	Modified	---

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

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**
  - Compressor Engines – 1,380 bhp CAT G3516B (CE-01 thru CE-12)
  - Microturbine Generator – 805 bhp Capstone C600 (GEN)
  - Compressor Rod Packing (CRP)
  - Emergency Shutdown Testing (ESD)
  - Dehydrators – 55.0 MMscfd (DHY-01 thru DHY-03)
  - Reboilers – 1.00 MMscfd (BLR-01 thru BLR-03)
  - Heater Treater – 0.50 MMBtu/hr (HTR-01 and HTR-02)
  - Stabilized Condensate (SC) – 400 bbl Storage tanks (TK-01 thru TK-08)
  - Produced Water (PW) – Storage Tanks (WTK-01 and WTK-02)
  - Stabilized Condensate (SC) – Truck Loading (TLO)
  - Produced Water (PW) Truck Loading (WTLO)
  - Pigging Operations (PIG)
  - PLANT-WIDE SUMMARY – w/o Fugitives
  - PLANT-WIDE SUMMARY – with Fugitives
- **Table 2 – Release Parameter Data**

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	1.52	6.66	1.52	6.66	Gas	Vendor	
	Compressor Engine 01 thru 12 1,380 bhp CAT G3516B (w/ OxCat) (Each)							CO	9.07	39.71	1.36	5.96	Gas	Vendor	
								NMNEHC	3.29	14.39	0.82	3.60	Gas	Vendor	
								VOC	4.62	20.25	0.98	4.28	Gas	Vendor	
								PM10/2.5	0.11	0.49	0.11	0.49	S/L/G	AP-42	
								SO2	0.01	0.03	0.01	0.03	Gas	AP-42	
								Acetaldehyde	0.09	0.41	0.02	0.10	Gas	AP-42	
								Acrolein	0.06	0.25	0.01	0.06	Gas	AP-42	
EPCE-1		EUCE-1	CE-01	OxCat-01				Benzene	5E-03	0.02	1E-03	5E-03	Gas	AP-42	
EPCE-2		EUCE-2	CE-02	OxCat-02				Butadiene	3E-03	0.01	7E-04	3E-03	Gas	AP-42	
EPCE-3		EUCE-3	CE-03	OxCat-03				Ethylbenzene	4E-04	2E-03	1E-04	5E-04	Gas	AP-42	
EPCE-4		EUCE-4	CE-04	OxCat-04				HCHO	1.19	5.20	0.12	0.52	Gas	Vendor	
EPCE-5		EUCE-5	CE-05	OxCat-05				n-Hexane	0.01	0.05	3E-03	0.01	Gas	AP-42	
EPCE-6	Upward	EUCE-6	CE-06	OxCat-06	OxCat	C	8,760	Methanol	0.03	0.12	0.01	0.03	Gas	AP-42	
EPCE-7	Vertical	EUCE-7	CE-07	OxCat-07				POM	4E-03	0.02	1E-03	4E-03	Gas	AP-42	
EPCE-8	Stack	EUCE-8	CE-08	OxCat-08	(Each)	(Each)	(Each)	Toluene	5E-03	0.02	1E-03	5E-03	Gas	AP-42	
EPCE-9		EUCE-9	CE-09	OxCat-09				2,2,4-TMP	3E-03	0.01	7E-04	3E-03	Gas	AP-42	
EPCE-10	(Each)	EUCE-10	CE-10	OxCat-10				Xylenes	2E-03	0.01	5E-04	2E-03	Gas	AP-42	
EPCE-11		EUCE-11	CE-11	OxCat-11				Other HAP	4E-03	0.02	9E-04	4E-03	Gas	AP-42	
EPCE-12		EUCE-12	CE-12	OxCat-12				Total HAP	1.40	6.15	0.17	0.76	Gas	Sum	
								CO2	1,552	6,796	1,552	6,796	Gas	Vendor	
								CH4	14.04	61.49	14.04	61.49	Gas	Vendor	
								N2O	2E-03	0.01	2E-03	0.01	Gas	CFR98	
(Each)		(Each)	(Each)	(Each)				CO2e	1,903	8,336	1,903	8,336	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmvd 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			
								NOX	0.48	2.10	0.48	2.10	Gas	Vendor	
	Generator Turbine 805 bhp Capstone C600							CO	1.32	5.78	1.32	5.78	Gas	Vendor	
								NMNEHC	0.12	0.53	0.12	0.53	Gas	Vendor	
								VOC	0.13	0.57	0.13	0.57	Gas	Vendor	
								PM10/2.5	0.05	0.20	0.05	0.20	S/L/G	AP-42	
								SO2	0.00	0.02	0.00	0.02	Gas	AP-42	
								Acetaldehyde	5E-04	2E-03	5E-04	2E-03	Gas	AP-42	
								Acrolein	9E-05	4E-04	9E-05	4E-04	Gas	AP-42	
								Benzene	2E-04	7E-04	2E-04	7E-04	Gas	AP-42	
								Butadiene	6E-06	3E-05	6E-06	3E-05	Gas	AP-42	
								Ethylbenzene	4E-04	2E-03	4E-04	2E-03	Gas	AP-42	
								HCHO	0.01	0.04	0.01	0.04	Gas	AP-42	
								n-Hexane	---	---	---	---	Gas	AP-42	
EPGEN-01	Upward Vertical Stack	EUGEN-01	GEN	na	na	C	8,760	Methanol	---	---	---	---	Gas	AP-42	
								POM	4E-04	0.00	4E-04	2E-03	Gas	AP-42	
								Toluene	2E-03	0.01	2E-03	8E-03	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	9E-04	4E-03	9E-04	4E-03	Gas	AP-42	
								Other HAP	4E-04	2E-03	4E-04	2E-03	Gas	AP-42	
								Total HAP	0.01	0.06	0.01	0.06	Gas	Sum	
								CO2	798	3,494	798	3,494	Gas	Vendor	
								CH4	0.12	0.52	0.12	0.52	Gas	AP-42	
								N2O	0.02	0.09	0.02	0.09	Gas	AP-42	
								CO2e	807	3,534	807	3,534	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								NMNEHC	0.82	3.60	0.82	3.60	Gas	---	
								VOC	0.82	3.60	0.82	3.60	Gas	Vendor	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
EPCRP-1 EPCRP-2 EPCRP-3 EPCRP-4 EPCRP-5 EPCRP-6 EPCRP-7 EPCRP-8 EPCRP-9 EPCRP-10 EPCRP-11 EPCRP-12 (Each)	Upward Vertical Stack	EUCRP-1 EUCRP-2 EUCRP-3 EUCRP-4 EUCRP-5 EUCRP-6 EUCRP-7 EUCRP-8 EUCRP-9 EUCRP-10 EUCRP-11 EUCRP-12 (Each)	CRP-01 CRP-02 CRP-03 CRP-04 CRP-05 CRP-06 CRP-07 CRP-08 CRP-09 CRP-10 CRP-11 CRP-12 (Each)	na	na	C (Each)	8,760 (Each)	Benzene	1E-03	0.01	1E-03	0.01	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	1E-03	0.01	1E-03	0.01	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	0.02	0.09	0.02	0.09	Gas	MB	
								Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	1E-03	0.01	1E-03	0.01	Gas	MB	
								2,2,4-TMP	1E-03	0.01	1E-03	0.01	Gas	MB	
								Xylenes	1E-03	0.01	1E-03	0.01	Gas	MB	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.03	0.12	0.03	0.12	Gas	Sum	
								CO2	0.01	0.04	0.01	0.04	Gas	MB	
								CH4	1.90	8.32	1.90	8.32	Gas	MB	
								N2O	---	---	---	---	Gas	---	
								CO2e	47.48	208	47.48	208	Gas	Sum	

Compressor Rod Packing 01 thru 12 (Each)

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								NMNEHC	28.31	1.47	28.31	1.47	Gas	MB	
								VOC	28.31	1.47	28.31	1.47	Gas	MB	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.05	2E-03	0.05	2E-03	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	0.05	2E-03	0.05	2E-03	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	0.71	0.04	0.71	0.04	Gas	MB	
								Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	0.05	2E-03	0.05	2E-03	Gas	MB	
								2,2,4-TMP	0.05	2E-03	0.05	2E-03	Gas	MB	
								Xylenes	0.05	2E-03	0.05	2E-03	Gas	MB	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.95	0.05	0.95	0.05	Gas	Sum	
								CO2	0.29	0.01	0.29	0.01	Gas	MB	
								CH4	65.36	3.40	65.36	3.40	Gas	MD	
								N2O	---	---	---	---	Gas	---	
								CO2e	1,634	84.98	1,634	84.98	Gas	Sum	
	Compressor Blowdown (CBD) (Each)														
EPCBD-1 EPCBD-2 EPCBD-3 EPCBD-4 EPCBD-5 EPCBD-6 EPCBD-7 EPCBD-8 EPCBD-9 EPCBD-10 EPCBD-11 EPCBD-12 (Each)	Upward Vertical Stack	EUCBD-1 EUCBD-2 EUCBD-3 EUCBD-4 EUCBD-5 EUCBD-6 EUCBD-7 EUCBD-8 EUCBD-9 EUCBD-10 EUCBD-11 EUCBD-12 (Each)	CBD-01 CBD-02 CBD-03 CBD-04 CBD-05 CBD-06 CBD-07 CBD-08 CBD-09 CBD-10 CBD-11 CBD-12 (Each)	na	na	C (Each)	8,760 (Each)								

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
		Emergency Shutdown (ESD) Testing (Subset of Compressor Bowdown (CBD))						NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								NMNEHC	---	7.27	---	7.27	Gas	MB	
								VOC	---	7.27	---	7.27	Gas	MB	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	---	0.01	---	0.01	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	---	0.01	---	0.01	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
ESD (Subset of CBD)	Upward Vertical Stack	ESD (Subset of CBD)	ESD (Subset of CBD)	na	na	1 event/yr	na	n-Hexane	---	0.18	---	0.18	Gas	MB	
								Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	---	0.01	---	0.01	Gas	MB	
								2,2,4-TMP	---	0.01	---	0.01	Gas	MB	
								Xylenes	---	0.01	---	0.01	Gas	MB	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	0.24	---	0.24	Gas	Sum	
								CO2	---	0.07	---	0.07	Gas	MB	
								CH4	---	16.79	---	16.79	Gas	MD	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	420	---	420	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	See BLR-01 thru BLR-03						
	Dehydrator 01 thru 03 55.0 MMscfd (w/ 100% Flash Tank Recycle/Reclaim) (Each)							CO	See BLR-01 thru BLR-03						
								NMNEHC	52.27	228.93	1.79	7.85	Gas	GLYCalc	
								VOC	52.27	228.93	1.79	7.85	Gas	GLYCalc	
								PM10/2.5	See BLR-01 thru BLR-03						
								SO2	See BLR-01 thru BLR-03						
								Acetaldehyde	See BLR-01 thru BLR-03						
								Acrolein	See BLR-01 thru BLR-03						
								Benzene	1.75	7.66	0.06	0.27	Gas	GLYCalc	
								Butadiene	See BLR-01 thru BLR-03						
								Ethylbenzene	0.32	1.41	4E-03	0.02	Gas	GLYCalc	
								HCHO	See BLR-01 thru BLR-03						
EPDHY-1 EPDHY-2 EPDHY-3 (Each)	Upward Vertical Stack (Each)	EUDHY-1 EUDHY-2 EUDHY-3 (Each)	DHY-01 DHY-02 DHY-03 (Each)	BTEX-01 BTEX-02 BTEX-03 (Each)	Cond/ Comb (Each)	C (Each)	8,760 (Each)	n-Hexane	2.30	10.07	0.09	0.40	Gas	GLYCalc	
								Methanol	See BLR-01 thru BLR-03						
								POM	See BLR-01 thru BLR-03						
								Toluene	4.42	19.35	0.10	0.43	Gas	GLYCalc	
								2,2,4-TMP	0.23	1.00	2E-03	1E-02	Gas	GLYCalc	
								Xylenes	3.79	16.58	0.04	0.17	Gas	GLYCalc	
								Other HAP	See BLR-01 thru BLR-03						
								Total HAP	12.80	56.07	0.30	1.30	Gas	Sum	
								CO2	0.58	2.54	0.58	2.54	Gas	GLYCalc	
								CH4	1.76	7.73	0.09	0.39	Gas	GLYCalc	
								N2O	GRI-GLYCalc 4.0						
								CO2e	44.70	195.78	2.79	12.20	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	0.10	0.43	0.10	0.43	Gas	AP-42	
	Reboiler 01 thru 03 1.00 MMBtu/hr (Each)							CO	0.08	0.36	0.08	0.36	Gas	AP-42	
								NMNEHC	0.01	0.02	0.01	0.02	Gas	AP-42	
								VOC	0.01	0.02	0.01	0.02	Gas	AP-42	
								PM10/2.5	0.01	0.03	0.01	0.03	S/L/G	AP-42	
								SO2	6E-04	3E-03	6E-04	3E-03	Gas	AP-42	
								Acetaldehyde	---	---	---	---	Gas	AP-42	
								Acrolein	---	---	---	---	Gas	AP-42	
								Benzene	2E-06	9E-06	2E-06	9E-06	Gas	AP-42	
								Butadiene	---	---	---	---	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	7E-05	3E-04	7E-05	3E-04	Gas	AP-42	
EPRBL-1 EPRBL-2 EPRBL-3	Upward Vertical Stack	EURBL-1 EURBL-2 EURBL-3	BLR-01 BLR-02 BLR-03	na	na	C	8,760	n-Hexane	2E-03	8E-03	2E-03	8E-03	Gas	AP-42	
								Methanol	---	---	---	---	Gas	AP-42	
								POM	7E-07	3E-06	7E-07	3E-06	Gas	AP-42	
(Each)	(Each)	(Each)	(Each)			(Each)	(Each)	Toluene	3E-06	1E-05	3E-06	1E-05	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	1E-06	5E-06	1E-06	5E-06	Gas	AP-42	
								Total HAP	2E-03	8E-03	2E-03	0.01	Gas	Sum	
								CO2	118	515	118	515	Gas	AP-42	
								CH4	2E-03	0.01	2E-03	0.01	Gas	AP-42	
								N2O	2E-03	0.01	2E-03	0.01	Gas	AP-42	
								CO2e	118	518	118	518	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	0.06	0.21	0.06	0.21	Gas	AP-42	
	Heater Treater 01 and 02 0.50 MMBtu/hr (Each)							CO	0.05	0.18	0.05	0.18	Gas	AP-42	
								NMNEHC	3E-03	0.01	3E-03	0.01	Gas	AP-42	
								VOC	3E-03	0.01	3E-03	0.01	Gas	AP-42	
								PM10/2.5	5E-03	0.02	5E-03	0.02	S/L/G	AP-42	
								SO2	4E-04	1E-03	4E-04	1E-03	Gas	AP-42	
								Acetaldehyde	---	---	---	---	Gas	AP-42	
								Acrolein	---	---	---	---	Gas	AP-42	
								Benzene	1E-06	5E-06	1E-06	5E-06	Gas	AP-42	
								Butadiene	---	---	---	---	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	5E-05	2E-04	5E-05	2E-04	Gas	AP-42	
								n-Hexane	1E-03	4E-03	1E-03	4E-03	Gas	AP-42	
EPHT-1 EPHT-2 (Each)	Upward Vertical Stack (Each)	EUHT-1 EUHT-2 (Each)	HTR-01 HTR-02 (Each)	na	na	C (Each)	8,760 (Each)	Methanol	---	---	---	---	Gas	AP-42	
								POM	4E-07	1E-06	4E-07	1E-06	Gas	AP-42	
								Toluene	2E-06	7E-06	2E-06	7E-06	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	7E-07	3E-06	7E-07	3E-06	Gas	AP-42	
								Total HAP	1E-03	4E-03	1E-03	4E-03	Gas	Sum	
								CO2	72	258	72	258	Gas	AP-42	
								CH4	1E-03	5E-03	1E-03	5E-03	Gas	AP-42	
								N2O	1E-03	5E-03	1E-03	5E-03	Gas	AP-42	
								CO2e	59	259	59	259	Gas	Sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								NMNEHC	0.77	3.37	0.04	0.17	Gas	EPA	
								VOC	0.77	3.37	0.04	0.17	Gas	EPA	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.02	0.07	8E-04	0.00	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
EPTK-1 EPTK-2 EPTK-3 EPTK-4 EPTK-5 EPTK-6 EPTK-7 EPTK-8 (Each)	Upward Vertical Stack (Each)	EUTK-1 EUTK-2 EUTK-3 EUTK-4 EUTK-5 EUTK-6 EUTK-7 EUTK-8 (Each)	TK-01 TK-02 TK-03 TK-04 TK-05 TK-06 TK-07 TK-08 (Each)	VRU-01 VRU-01 VRU-01 VRU-01 VRU-01 VRU-01 VRU-01 VRU-01 (Each)	VRU	C (Each)	8,760 (Each)	Ethylbenzene	0.02	0.07	8E-04	0.00	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	0.15	0.67	0.01	0.03	Gas	MB	
								Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	0.02	0.07	8E-04	0.00	Gas	MB	
								2,2,4-TMP	0.02	0.07	8E-04	0.00	Gas	MB	
								Xylenes	0.02	0.07	8E-04	0.00	Gas	---	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.23	1.01	0.01	0.05	Gas	Sum	
								CO2	---	---	---	---	Gas	MB	
								CH4	---	---	---	---	Gas	MB	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	Sum	

Stabilized Condensate (SC) Tanks 01 thru 08
400 bbl Each

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								NMNEHC	0.01	0.03	0.01	0.03	Gas	EPA	
								VOC	0.01	0.03	0.01	0.03	Gas	EPA	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	1E-04	6E-04	1E-04	6E-04	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	1E-04	6E-04	1E-04	6E-04	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
EPWTK-1 EPWTK-2 (Each)	Upward Vertical Stack (Each)	EUWTK-1 EUWTK-2 (Each)	WTK-01 WTK-02 (Each)	na	na	C (Each)	8,760 (Each)	n-Hexane	1E-03	6E-03	1E-03	6E-03	Gas	MB	
								Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	1E-04	6E-04	1E-04	6E-04	Gas	MB	
								2,2,4-TMP	1E-04	6E-04	1E-04	6E-04	Gas	MB	
								Xylenes	1E-04	6E-04	1E-04	6E-04	Gas	---	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	2E-03	0.01	2E-03	9E-03	Gas	Sum	
								CO2	---	---	---	---	Gas	MB	
								CH4	---	---	---	---	Gas	MB	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	Sum	

Produced Water (PW) Tanks 01 and 02
400 bbl Each

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	Stabilized Condensate (SC) Truck Load-Out							NMNEHC	35.72	25.43	11.97	8.52	Gas	AP-42	
								VOC	35.72	25.43	11.97	8.52	Gas	AP-42	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.71	0.51	0.24	0.17	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	0.71	0.51	0.24	0.17	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	7.14	5.09	2.39	1.70	Gas	MB	
EPLOAD-1	Upward Vertical Stack	EULOAD-1	TLO	CARB-01	Carbon Can-nister	7,000 gal/hr	0	Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	0.71	0.51	0.24	0.17	Gas	MB	
								2,2,4-TMP	0.71	0.51	0.24	0.17	Gas	MB	
								Xylenes	0.71	0.51	0.24	0.17	Gas	---	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	10.72	7.63	3.59	2.56	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmvd 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			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	Produced Water (PW) Truck Load-Out							NMNEHC	0.72	0.08	0.72	0.08	Gas	AP-42	
								VOC	0.72	0.08	0.72	0.08	Gas	AP-42	
								PM10/2.5	---	---	---	---	S/L/G	---	
								SO2	---	---	---	---	Gas	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.01	2E-03	0.01	2E-03	Gas	MB	
								Butadiene	---	---	---	---	Gas	---	
								Ethylbenzene	0.01	2E-03	0.01	2E-03	Gas	MB	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	0.14	2E-02	0.14	2E-02	Gas	MB	
EPLOAD-2	Upward Vertical Stack	EULOAD-2	WTLO	na	na	7,000 gal/hr	0	Methanol	---	---	---	---	Gas	---	
								POM	---	---	---	---	Gas	---	
								Toluene	0.01	2E-03	0.01	2E-03	Gas	MB	
								2,2,4-TMP	0.01	2E-03	0.01	2E-03	Gas	MB	
								Xylenes	0.01	2E-03	0.01	2E-03	Gas	---	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.22	0.02	0.22	0.02	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmvd 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			
								NOX	19	84	19	83.77	Gas	Varies	
								CO	110.46	483.75	17.99	78.70	Gas	Varies	
								NMNEHC	589	981	378	145.51	Gas	Varies	
								VOC	605	1,051	380	153.79	Gas	Varies	
								PM10/2.5	1.42	6.22	1.42	6.22	S/L/G	AP-42	
								SO2	0.09	0.38	0.09	0.38	Gas	AP-42	
								Acetaldehyde	1.13	4.94	0.28	1.24	Gas	AP-42	
								Acrolein	0.69	3.03	0.17	0.76	Gas	AP-42	
								Benzene	6.75	24.41	1.05	1.20	Gas	Varies	
								Butadiene	0.04	0.16	0.01	0.04	Gas	AP-42	
								Ethylbenzene	2.41	5.42	0.86	0.37	Gas	Varies	
								HCHO	14.25	62.41	1.43	6.28	Gas	Varies	
								n-Hexane	24.37	43.11	11.72	5.10	Gas	Varies	
								Methanol	0.34	1.48	0.08	0.37	Gas	AP-42	
								POM	0.05	0.21	0.01	0.05	Gas	AP-42	
								Toluene	14.75	59.47	1.16	1.69	Gas	Varies	
								2,2,4-TMP	2.16	4.32	0.86	0.38	Gas	Varies	
								Xylenes	12.82	51.02	0.97	0.85	Gas	Varies	
								Other HAP	0.04	0.19	0.01	0.05	Gas	AP-42	
								Total HAP	79.79	260.16	18.62	18.37	Gas	Sum	
								CO2	19,919	87,117	19,919	87,117	Gas	Varies	
								CH4	981	919	976	897	Gas	Varies	
								N2O	0.06	0.26	0.06	0.26	Gas	40CFR98	
								CO2e	44,435	110,168	44,309	109,617	Gas	sum	

PLANT-WIDE SUMMARY
(w/o Fugitives)

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmvd 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			
								NOX	19.20	83.98	19.20	83.98	Gas	Varies	
	PLANT-WIDE SUMMARY (with Fugitives)							CO	110.75	484.99	18.27	79.95	Gas	Varies	
								NMNEHC	617	1,105	392.08	207.33	Gas	Varies	
								VOC	617	1,105	392.08	207.33	Gas	Varies	
								PM10/2.5	1.43	6.24	1.43	6.24	S/L/G	AP-42	
								SO2	0.09	0.38	0.09	0.38	Gas	AP-42	
								Acetaldehyde	1.13	4.95	0.29	1.25	Gas	AP-42	
								Acrolein	0.69	3.04	0.18	0.77	Gas	AP-42	
								Benzene	6.77	24.50	1.07	1.29	Gas	Varies	
								Butadiene	0.04	0.16	0.01	0.04	Gas	AP-42	
								Ethylbenzene	2.43	5.51	0.88	0.46	Gas	Varies	
								HCHO	14.29	62.57	1.47	6.44	Gas	Varies	
								n-Hexane	24.68	44.44	12.02	6.43	Gas	Varies	
								Methanol	0.34	1.48	0.09	0.37	Gas	AP-42	
								POM	0.05	0.21	0.01	0.05	Gas	AP-42	
								Toluene	14.77	59.56	1.18	1.78	Gas	Varies	
								2,2,4-TMP	2.18	4.41	0.88	0.47	Gas	Varies	
								Xylenes	12.84	51.11	0.99	0.94	Gas	Varies	
								Other HAP	0.04	0.19	0.01	0.05	Gas	AP-42	
								Total HAP	80.24	262.12	19.07	20.34	Gas	Sum	
								CO2	19,968	87,330	19,968	87,330	Gas	Varies	
								CH4	992	968	987	946	Gas	Varies	
								N2O	0.06	0.26	0.06	0.26	Gas	40CFR98	
								CO2e	44,761	111,597	44,636	111,046	Gas	sum	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 1: Emissions Data - Continued

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 J
EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (oF)	Volumetric Flow[1] (acfm) (A*t operating conditions)*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height[2] *(Height of emissions above ground level)*	Northing	Easting
EPCE-1	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-2	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-3	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-4	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-5	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-6	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-7	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-8	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-9	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-10	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-11	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-12	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCRP	0.3	1,382	2,995	---	1,175 ft	8 ft	4,426.495	537.897
EPGEN-1	---	110	---	---	1,175 ft	---	4,426.495	537.897
EPSTL-1	2.0	110	---	---	1,175 ft	20 ft	4,426.495	537.897
EPSTL-2	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPSTL-3	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-1	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-2	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-3	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPHT-1	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPHT-2	0.7	450	---	---	1,175 ft	---	4,426.495	537.897
EPTK-1	0.7	450	---	---	1,175 ft	---	4,426.495	537.897
EPTK-2	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-3	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-4	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-5	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-6	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-7	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-8	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPWTK-9	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPWTK-10	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPLOAD-1	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPLOAD-2	---	Ambient	---	---	1,175 ft	8 ft	4,426.495	537.897
EPBD	---	Ambient	---	---	1,175 ft	8 ft	4,426.495	537.897

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

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 Data Summary Sheet**

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

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? ☐ Yes ☑ No ☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☑ No ☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☐ Yes ☑ No ((Truck Load-Out (TLO and WTLO) are include in the Point Source Emissions)) ☐ 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? ☐ Yes ☑ No ☐ 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.)? ☑ Yes ☐ No ☑ If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☑ No ☐ 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.”

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

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	((Truck Load-Out (TLO and WTLO) are include in the Point Source Emissions))					
Wastewater Treatment	na	---	---	---	---	---
Process and Piping Fugitives (FUG-G, FUG-O)	NOX	0.05	0.21	0.05	0.21	Vendor
	CO	0.28	1.24	0.28	1.24	Vendor
	VOC	12.22	53.54	12.22	53.54	Varies
Engine Crankcase (ECC)	PM10/2.5	4E-03	0.02	4E-03	0.02	Vendor
	SO2	2E-04	9E-04	2E-04	9E-04	Vendor
(Total Combined)	Total HAPs	0.45	1.97	0.45	1.97	Sum
	Carbon Dioxide Equivalent (CO2e)	326	1,429	326	1,429	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, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases, etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in 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).

Attachment L

Emissions Unit Data Sheet(s)

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

- **Natural Gas-Fired Compressor/Generator Engine Data Sheet**
    - 1,380 bhp CAT G3516B Generator Engines (CE-01 thru CE-12)
    - 805 bhp Capstone C600 Microturbine Generator (GEN)
- **Natural Gas Glycol Dehydrator Unit Data Sheet**
    - Dehydrators (DHY-01 thru DHY-03)
    - Reboilers (BLR-01 thru BLR-03)
    - 40 CFR Part 63; Subpart HH & HHH Registration Form
- **Gas-Fired Boiler/Line Heater Data Sheet**
    - 0.50 MMBtu/hr Heater Treaters (HTR-01 and HTR-02)
- **Storage Tank Data Sheet**
    - Stabilized Condensate (SC) Storage Tanks (TK-01 thru TK-08)
    - Produced Water (PW) Storage Tanks (WTK-01 and WTK-02)
- **Bulk Liquid Transfer Operations Data Sheet**
    - Stabilized Condensate (SC) Truck Load-Out (TLO)
    - Produced Water (PW) Truck Load-Out (WTLO)
- **Leak Source Data Sheet**

Attachment J
EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 1: Emissions Data - Continued

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 J
EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (oF)	Volumetric Flow[1] (acfm) (A*t operating conditions)*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height[2] *(Height of emissions above ground level)*	Northing	Easting
EPCE-1	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-2	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-3	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-4	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-5	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-6	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-7	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-8	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-9	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-10	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-11	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCE-12	1.0	1,012	9,227	195.8	1,175 ft	20 ft	4,426.495	537.897
EPCRP	0.3	1,382	2,995	---	1,175 ft	8 ft	4,426.495	537.897
EPGEN-1	---	110	---	---	1,175 ft	---	4,426.495	537.897
EPSTL-1	2.0	110	---	---	1,175 ft	20 ft	4,426.495	537.897
EPSTL-2	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPSTL-3	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-1	---	212	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-2	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPRBL-3	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPHT-1	1.1	400	---	---	1,175 ft	---	4,426.495	537.897
EPHT-2	0.7	450	---	---	1,175 ft	---	4,426.495	537.897
EPTK-1	0.7	450	---	---	1,175 ft	---	4,426.495	537.897
EPTK-2	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-3	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-4	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-5	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-6	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-7	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPTK-8	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPWTK-9	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPWTK-10	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPLOAD-1	---	Ambient	---	---	1,175 ft	20 ft	4,426.495	537.897
EPLOAD-2	---	Ambient	---	---	1,175 ft	8 ft	4,426.495	537.897
EPBD	---	Ambient	---	---	1,175 ft	8 ft	4,426.495	537.897

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

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

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? ☐ Yes ☑ No ☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☑ No ☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☐ Yes ☑ No ((Truck Load-Out (TLO and WTLO) are include in the Point Source Emissions)) ☐ 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? ☐ Yes ☑ No ☐ 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.)? ☑ Yes ☐ No ☑ If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☑ No ☐ 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.”

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

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	((Truck Load-Out (TLO and WTLO) are include in the Point Source Emissions))					
Wastewater Treatment	na	---	---	---	---	---
Process and Piping Fugitives (FUG-G, FUG-O)	NOX	0.05	0.21	0.05	0.21	Vendor
	CO	0.28	1.24	0.28	1.24	Vendor
	VOC	12.22	53.54	12.22	53.54	Varies
Engine Crankcase (ECC)	PM10/2.5	4E-03	0.02	4E-03	0.02	Vendor
	SO2	2E-04	9E-04	2E-04	9E-04	Vendor
(Total Combined)	Total HAPs	0.45	1.97	0.45	1.97	Sum
	Carbon Dioxide Equivalent (CO2e)	326	1,429	326	1,429	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, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases, etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in 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).

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment L - Emission Unit Data Sheet

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Description		Compressor Engines		Generator Turbine	
Source Identification Number[1]		CE-01 thru CE-12 (Each)		GEN	
Engine Manufacturer and Model		CAT G3516B		0.00	
Manufacturer's Rated bhp/rpm		1,380 / 1,400		805 / 61,000	
Source Status[2]		MS		MS	
Date Installed/Modified/Removed[3]		2012 / 2018 / na		2012 / 2018 / na	
Manufactured/Reconstruction Date[4]		2012 / 2018 / na		2012 / 2018 / na	
Certified Engine (40CFR60 NSPS JJJJ)[5]		No		No	
Engine, Fuel and Combustion Data	Engine Type[6]	4SLB		Microturbine	
	APCD Type[7]	OxCat		na	
	Fuel Type[8]	RG		RG	
	H_2S (gr/100 scf)	0.2		0.2	
	Operating bhp/rpm	1,380 / 1,400		805 / 61,000	
	BSFC (Btu/bhp-hr)	8,138		0	
	Fuel (ft^3/hr)	11,010		6,709	
	Fuel ($MMft^3$/yr)	96.45		58.77	
	Operation (hrs/yr)	8,760		0	
Reference[9]	PTE[10]	lbs/hr	tons/yr	lbs/hr	tons/yr
MD/AP	NOX	1.52	6.66	0.48	2.10
MD/AP	CO	1.36	5.96	1.32	5.78
MD/AP	NMNEHC	0.82	3.60	0.12	0.53
MD/AP	VOC	0.98	4.28	0.13	0.57
AP	PM10/2.5	0.11	0.49	0.05	0.20
AP	SO2	0.01	0.03	0.00	0.02
AP	Acetaldehyde	0.02	0.10	5E-04	2E-03
AP	Acrolein	0.01	0.06	9E-05	4E-04
AP	Benzene	1E-03	5E-03	2E-04	7E-04
AP	Butadiene, 1,3-	7E-04	3E-03	6E-06	3E-05
AP	Ethylbenzene	1E-04	5E-04	4E-04	2E-03
MD/AP	Formaldehyde	0.12	0.52	0.01	0.04
AP	n-Hexane	3E-03	0.01	---	---
AP	Methanol (MeOH)	0.01	0.03	---	---
AP	POM	1E-03	4E-03	4E-04	2E-03
AP	Toluene	1E-03	5E-03	2E-03	8E-03
AP	2,2,4-TMP (i-Octane)	7E-04	3E-03	---	---
AP	Xylenes	5E-04	2E-03	9E-04	4E-03
AP	Other/Trace HAP	9E-04	4E-03	4E-04	2E-03
SUM	Total HAP	0.17	0.76	0.01	0.06
MD/AP	CO2	1,552	6,796	798	3,494
MD/40CFR98	CH4	14	61	0.12	0.52
MD/40CFR98	N2O	2E-03	0.01	0.02	0.09
WGT SUM	CO2e	1,903	8,336	807	3,534

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Proposed Permit Modifications

Emission Unit Description **CE-01 thru CE-12 (each)**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

5.1.1. To demonstrate compliance with Section 5.1.2, the quantity of natural gas that shall be consumed in each of the twelve (12) 1,380 hp natural gas fired reciprocating engines, Caterpillar G3516B (EPCE-1 - EPCE-12) shall not exceed ~~9,233~~ **11,010** scf/hr and ~~80.88~~ **96.45** x 10^6 scf/yr for each engine.

5.1.2. Maximum emissions from each of the twelve (12) 1,380 hp natural gas fired reciprocating engines, Caterpillar G3516B (EPCE-1 - EPCE-12) shall not exceed the following limits:

Pollutant	Maximum lb/hr	Maximum ton/yr
Nitrogen Oxides	1.52	6.66
Carbon Monoxide	1.36	5.96
Volatile Organic Compounds	~~0.88~~ **0.98**	~~3.86~~ **4.28**
Formaldehyde	~~0.06~~ **0.12**	~~0.27~~ **0.52**

Emission Unit Description **GEN**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

6.1.1. To demonstrate compliance with Section 6.1.2, the quantity of natural gas that shall be consumed in 805 hp natural gas-fired microturbine generator, Capstone C600 (EPGEN-1) shall not exceed ~~5,623~~ **6,709** scf/hr and ~~49.26~~ **58.77** x 10^6 scf/yr.

6.1.2. Maximum emissions from the 805 hp natural gas-fired microturbine generator, Capstone C600 (EPGEN-1) shall not exceed the following limits:

Pollutant	Maximum lb/hr	Maximum ton/yr
Nitrogen Oxides	~~0.25~~ **0.48**	~~1.09~~ **2.10**
Carbon Monoxide	~~0.62~~ **1.32**	~~2.70~~ **5.78**
Volatile Organic Compounds	~~0.02~~ **0.13**	~~0.07~~ **0.57**
Formaldehyde	0.01	~~0.02~~ **0.04**

Notes to NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

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

2. Enter the Source Status using the following codes:
   NS = Construction of New Source (installation)
   ES = Existing Source
   MS = Modification of Existing Source
   RS = Removal of Source

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

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

5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

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

6. Enter the Engine Type designation(s) using the following codes:
   LB2S = Lean Burn Two Stroke
   RB4S = Rich Burn Four Stroke
   LB4S = Lean Burn Four Stroke

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:
   A/F = Air/Fuel Ratio
   IR = Ignition Retard
   HEIS = High Energy Ignition System
   SIPC = Screw-in Precombustion Chambers
   PSC = Prestratified Charge
   LEC = Low Emission Combustion
   NSCR = Non-Selective Catalytic Reduction
   SCR = Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:
   PQ = Pipeline Quality Natural Gas
   RG = Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this Compressor/Generator Data Sheet(s).
   MD = Manufacturer's Data
   AP = AP-42
   GR = GRI-HAPCalcTM
   OT = Other (please list) _____

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

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment L - Emission Unit Data Sheet

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Company ID		DHY-01 thru -03			
		Manufacturer and Model		---			
		Max Dry Gas Flow Rate (MMscfd)		55.0			
		Heat Input (MMBtu/hr) - HHV		1.00			
		Design Type (DEG or TEG)		TEG			
		Source Status[2]		MS			
		Date Installed/Modified/Removed[3]		2012 / 2018 / na			
		Regenerator Still Vent APCD[4]		CC			
		Fuel HV (Btu/scf) - HHV		1,020			
		H_2S Content (gr/100 scf)		0.20			
		Operation (hrs/yr)		8,760			
Source ID #[1]	Vent	Reference[5]	PTE[6]	lbs/hr	tons/yr		
DHY-01 DHY-02 DHY-03 (Each)	Dehydrator 01 thru 03 Regenerator Still Vent (Flash Tank Off-Gas is 100% Recycle/Recalim)	GRI-GLYCalc	VOC	1.79	7.85		
		GRI-GLYCalc	Benzene	0.06	0.27		
		GRI-GLYCalc	E-Benzene	4E-03	0.02		
		GRI-GLYCalc	n-Hexane	0.09	0.40		
		GRI-GLYCalc	Toluene	0.10	0.43		
		GRI-GLYCalc	2,2,4-TMP	2E-03	0.01		
		GRI-GLYCalc	Xylenes	0.04	0.17		
		GRI-GLYCalc	Total HAP	0.30	1.30		
		GRI-GLYCalc	CO2e	2.79	12.20		
BLR-01 BLR-02 BLR-03 (Each)	Reboiler 01 thru 03 (Each)	AP-42	NOX	0.10	0.43		
		AP-42	CO	0.08	0.36		
		AP-42	VOC	0.01	0.02		
		AP-42	PM10/2.5	0.01	0.03		
		AP-42	SO2	6E-04	3E-03		
		AP-42	Acetaldehyde	---	---		
		AP-42	Acrolein	---	---		
		AP-42	Benzene	2E-06	9E-06		
		AP-42	Butadiene, 1,3-	---	---		
		AP-42	Ethylbenzene	---	---		
		AP-42	Formaldehyde	7E-05	3E-04		
		AP-42	n-Hexane	2E-03	0.01		
		AP-42	Methanol	---	---		
		AP-42	POM	7E-07	3E-06		
		AP-42	Toluene	3E-06	1E-05		
		AP-42	TMP, 2,2,4-	---	---		
		AP-42	Xylenes	---	---		
		AP-42	Other HAP	1E-06	5E-06		
		AP-42	Total HAP	2E-03	0.01		
		AP-42	CO2	118	515		
		AP-42	CH4	2E-03	0.01		
		AP-42	N2O	2E-03	0.01		
		40CFR98	CO2e	118	518		

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

Proposed Permit Modifications

Emission Unit Description **DHY-01 thru DHY-03**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

7.1.5. Maximum emissions from each of the Glycol Regenerator Still Columns (EPSTL-1, EPSTL-2, EPSTL-3) shall not exceed the following limits:

Pollutant	Maximum lb/hr	Maximum ton/yr
Volatile Organic Compounds	~~0.42~~ **1.79**	~~1.84~~ **7.85**
Total HAPs	~~0.01~~ **0.30**	~~0.01~~ **1.30**

Emission Unit Description **BLR-01 thru BLR-03**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

7.1.3. To demonstrate compliance with Section 7.1.4, the quantity of natural gas that shall be consumed in each of the 1.0 MMBtu/hr Glycol Reboilers (EPRBL-1, EPRBL-2, EPRBL-3) shall not exceed ~~750~~ **980** scf/hr and ~~6.55~~ **8.59** x 10^6 scf/yr for each reboiler.

7.1.4. Maximum emissions from each of the Glycol Reboilers (EURBL-1, EURBL-2, EURBL-3) shall not exceed the following limits:

Pollutant	Maximum lb/hr	Maximum ton/yr
Nitrogen Oxides	~~0.08~~ **0.10**	~~0.33~~ **0.43**
Carbon Monoxide	~~0.06~~ **0.08**	~~0.28~~ **0.36**
Volatile Organic Compounds	0.01	0.02

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.**

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment L

40 CFR Part 63; Subpart HH & HHH Registration Form

West Virginia Department of Environmental Protection

Division of Air Quality DIVISION OF AIR QUALITY : (304) 926-0475

40 CFR Part 63; Subpart HH & HHH Registration Form 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 (Each)**	
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	**na**	
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	☑ Yes	☐ No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	☑ Yes	☐ No
The affected facility is: ☑ prior to a NG processing plant ☐ NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant		
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	☐ Yes	☑ No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): **na** scf/bbl API gravity: **na** degrees	☐ Yes	☑ No

Section B: Dehydration Unit (if applicable)[1]						
Description:	**55.0 MMscfd - Dehydrator 01 thru -03 (Each)**					
Date of Installation:	**2012**	Annual Operating Hours:	**8,760**	Burner rating (MMbtu/hr):	**1.00**	
Exhaust Stack Height (ft):	**10.0**	Stack Diameter (ft):	**0.6**	Stack Temp. (oF):	**120**	
Glycol Type:	☑ TEG	☐ EG	☐ Other: **na**			
Glycol Pump Type:	☑ Elect	☐ Gas	If Gas, what is the volume ratio?: **na**			
Condenser installed?	☑ Yes	☐ No	Exit Temp: **120 oF**	Condenser Pressure: **14.08 psia**		
Incinerator/flare installed?	☐ Yes	☑ No	Destruction Eff.: **na**			
Other controls installed?	☑ Yes	☐ No	Describe: **Condenser Off Gas used as fuel w/ 95% Control**			
Wet Gas[2]: (Upstream of Contact Tower)	Gas Temperature: **95 oF**		Gas Pressure: **1,100 psig**			
	Saturated Gas?: ☑ Yes	☐ 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]: **22.0 gpm**		Max[4]: **22.0 gpm**			
	Pump make/model: **Electric**					
Glycol Flash Tank (if applicable):	Temp: **120 oF**	Pressure: **50 psig**	Vented: ☐ Yes ☑ No			
	If no, describe vapor control: **100% Flash Tank Off-Gas Recycle or Reclaim**					
Stripping Gas (if applicable):	Source of Gas **na**		Rate: **na**			

40 CFR Part 63; Subpart HH & HHH Registration Form - Continued

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

Affected facility status: (choose only one)

☑ 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).

☐ 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.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment L

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Source ID	Status	Design Heat Input (MMBtu/hr)	Hours of Operation (hrs/yr)	Fuel Heating Value (Btu/scf)	
HTR-01	Existing	0.5 MMBtu/hr	8,760	1,020	
HTR-02	Existing	0.5 MMBtu/hr	8,760	1,020	

Notes to NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit reboiler vent data on the Glycol Dehydration Unit Data Sheet.
2. Enter the Status for each boiler or line heater using the following:
   EXIST Existing Equipment NEW Installation of New Equipment REM Equipment Removed
3. Enter boiler or line heater design heat input in mmBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Proposed Permit Modifications

Emission Unit Description	**HTR-01 and HTR-02**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

8.1.2. Maximum emissions from each of the 0.50 MMBTU/hr Heater-Treaters (EPHT-1, EPHT-2) shall not exceed the following limits:

Pollutant	Maximum lb/hr	Maximum ton/yr
Nitrogen Oxides	~~0.04~~ **0.06**	~~0.16~~ **0.21**
Carbon Monoxide	~~0.03~~ **0.05**	~~0.14~~ **0.18**

8.1.3. To demonstrate compliance with Section 8.1.2, the quantity of natural gas that shall be consumed in each of the 0.50 MMBTU/hr Heater-Treaters (EPHT-1, EPHT-2) shall not exceed ~~375~~ **600** scf/hr and ~~3.27~~ **4.29** x 10^6 scf/yr.

STORAGE TANK DATA SHEET

Source ID	Status	Contents	Volume (gal)	Diam (ft)	Thru-Put (gal/yr)	Orientation	Ave Liq Hght (ft)
TK-01	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-02	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-03	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-04	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-05	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-06	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-07	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
TK-08	Existing	Stabilized Condensate (SC)	16,800	12.0	1.25 MM	Vert	10.0
WTK-01	Existing	Produced Water (PW)	16,800	12.0	0.77 MM	Vert	10.0
WTK-02	Existing	Produced Water (PW)	16,800	12.0	0.77 MM	Vert	10.0

Notes to STORAGE TANK DATA SHEET

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:
   EXIST Existing Equipment
   NEW Installation of New Equipment
   REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:
   VERT Vertical Tank
   HORZ Horizontal Tank
8. Enter storage tank average liquid height in feet.

STORAGE TANK DATA SHEET

Proposed Permit Modifications

Emission Unit Description	**TK-01 thru TK-08, and WTK-01 and WTK-02**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

9.1.1. Emissions from the stabilized condensate storage tanks (EPTK-1 - EPTK-8~~,~~ ~~EPWTK-1,~~ ~~EPWTK-2~~) shall be controlled by a vapor recovery system. This vapor recovery system shall be designed to achieve a minimum guaranteed control efficiency of ~~98%~~ 95% for volatile organic compound (VOC) emissions.

9.1.2. The vapor recovery system must be installed and operating prior to start-up of the storage tanks (EPTK-1 - EPTK-8~~,~~ ~~EPWTK-1, EPWTK-2~~).

9.2.1. For the purposes of determining compliance with Section 9.1.1, the permittee shall conduct monitoring to show compliance with the capture efficiency requirement of the storage tanks (EPTK-1 - EPTK-8~~,~~ ~~EPWTK-1,~~ ~~EPWTK-2~~). The monitoring shall be conducted initially within 60 days after achieving the maximum roduction rate at which the facility will be operated or within 180 days of start-up, whichever is earlier. Monitoring will be conducted once every calendar year thereafter per the requirements of §60.482-10.

a. The vapor recovery system will be operated and monitored in compliance with §60.482-10(b), (f) through (m), and §60.485.

b. Records of the vapor recovery system will be maintained according to the requirements of §60.486 and §60.635(b).

Attachment L - Emission Unit Data Sheet

Bulk Liquid Transfer Operations

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the Equipment List Form and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks

Identification Number (as assigned on Equipment List Form):	**TLO / WTLO**
1. Loading Area Name:	**Sand Hill Compressor Station (SHCS)**
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): ☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ **Tank Trucks**	
3. Loading Rack or Transfer Point Data:	
Number of Pumps	**Two (2)**
Number of Liquids Loaded	**Two (2)**
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time:	**Two (2)**
4. Does ballasting of marine vessels occur at this loading area?: ☐ Yes ☐ No ☒ **Does Not Apply**	
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: **na**	
6. Are cargo vessels pressure tested for leaks at this or any other location? ☐ Yes ☒ **No** If YES, describe: **na**	
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):	

Maximum	Jan - Mar	Apr - Jun	Jul - Sep	Oct - Dec
hours/day	**24**	**24**	**24**	**24**
days/week	**7**	**7**	**7**	**7**
weeks/quarter	**13**	**13**	**13**	**13**

Bulk Liquid Transfer Operations - Continued

8. Bulk Liquid Data (add pages as necessary):

Pump ID No.		**SC**	**PW**
Liquid Name		**Stabilized Condensate (SC)**	**Produced Water (PW)**
Max daily thruput (1,000 gal/day)		**134**	**14**
Max annual thruput (1,000 gal/yr)		**9,965**	**1,533**
Loading Method[1]		**SUB**	**SUB**
Max Fill Rate (gal/min)		**150**	**150**
Ave Fill Time (min/load)		**60**	**60**
Max Bulk Liquid Temperature (oF)		**100**	**100**
True Vapor Pressure[2]		**5.44**	**0.25**
Cargo Vessel Condition[3]		**U**	**U**
Control Equipment or Method[4]		**CA**	**None**
Minimum Control Efficiency		**66.5%**	**na**
Maximum Emission Rate:	Loading (lb/hr)	**11.97**	**0.72**
	Annual (lb/yr)	**17,035**	**157**
Estimation Method[5]		**EPA**	**EPA**

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets):
CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation
SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption
TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation
VB = Dedicated Vapor Balance (closed system) O = other (describe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)

Bulk Liquid Transfer Operations

Proposed Permit Modifications

Emission Unit Description	**TLO and WTLO**

Proposed Modifications to WVDEP-DAQ Permit R13-2913A are shown below:

10.1.1. Maximum Throughput Limitation. The maximum condensate throughput to the Condensate Truck Loading (EPLOAD-1) shall not exceed ~~15.2~~ **134.4** x 10^3 gal/day and ~~2.52~~ **9.965** x 10^6 gal/yr. Compliance with the Maximum Throughput Limitation shall be determined using a twelve month rolling total. A twelve month rolling total shall mean the sum of the monthly throughput at any given time during the previous twelve consecutive calendar months.

10.1.2. Maximum Throughput Limitation. The maximum produced water throughput to the Produced Water Truck Loading (EPLOAD-2) shall not exceed ~~15.12~~ **33.6** x 10^3 gal/day and ~~15.33~~ **1.53** x 10^6 gal/yr. Compliance with the Maximum Throughput Limitation shall be determined using a twelve-month rolling total. A twelve-month rolling total shall mean the sum of the monthly throughput at any given time during the previous twelve consecutive calendar months.

10.1.3. The Condensate Truck Loading (EPLOAD-1) and the Produced Water Truck Loading (EPLOAD-2) shall be operated in accordance with the plans and specifications filed in Permit Application Rl3-2913. All emissions from the Condensate Truck Loading (EPLOAD-1) ~~and the Produced Water Truck Loading (EPLOAD-2)~~ will be controlled by a carbon canister (APC-CARBON) that shall be designed to achieve a minimum guaranteed control efficiency of 95% for volatile organic compound (VOC) emissions.

10.1.4. The carbon canister (APC-CARBON) must be operated at all times when gases, vapors, and fumes are vented from the Condensate Truck Loading (EPLOAD-1) ~~and the Produced Water Truck Loading (EPLOAD-2)~~. In addition, the carbon canister must be operated in series, as dual carbon canisters, in case of emission breakthrough in one carbon canister.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment L - Emission Unit Data Sheet

Fugitive Emissions Data Summary Sheet

Leak Source Data Sheet

Soure 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]	18	na	na	0.52
	Heavy Liquid VOC[8]	---	---	---	---
	Non-VOC[9]	---	---	---	---
Valves[10]	Gas VOC	1,440	na	na	3.35
	Light Liquid VOC	864	na	na	4.76
	Heavy Liquid VOC	---	---	---	---
	Non-VOC	---	---	---	---
Safety Relief Valves[11]	Gas VOC	See "Other"	na	na	---
	Light Liquid VOC	See "Other"	na	na	---
	Non-VOC	---	---	---	---
Open Ended Lines[12]	Gas VOC	50	na	na	0.05
	Light Liquid VOC	30	na	na	0.09
	Non-VOC	---	---	---	---
Sampling Connections[13]	Gas VOC	See "Open Ended Lines"	na	na	---
	Light Liquid VOC	See "Open Ended Lines"	na	na	---
	Non-VOC	---	---	---	---
Compressors	Gas VOC	See "Other"	na	na	---
	Non-VOC	---	---	---	---
Flanges	Gas VOC	1,175	na	na	0.24
	Light Liquid VOC	486	na	na	0.12
	Non-VOC	---	---	---	---
Connectors	Gas VOC	4,699	na	na	0.49
	Light Liquid VOC	1,944	na	na	0.90
	Non-VOC	---	---	---	---
Other	Gas VOC	108	na	na	0.49
	Light Liquid VOC	65	na	na	1.07
	Non-VOC	---	---	---	---

Notes for Leak Source Data Sheet

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; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); 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, NO, SO, etc. DO NOT LIST CO, H, H20, 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 ifthe 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 M

Air Pollution Control Device Sheet(s)

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

- **Oxidation Catalyst (OxCat-01 thru OxCat-12) (Serves CE-01 thru CE-12)**
- **BTEX Buster/Condenser (BTEX-01 and BTEX-02) (Serves DHY-01 thru DHY-03)**
- **Vapor Recovery Unit (VRU) (Serves TK-01 thru TK-08)**
- **Carbon Canister (CarbCan) (Serves TLO)**

Attachment M

AIR POLLUTION CONTROL DEVICE (APCD) SHEET (OxCat)

Control Device Unit No. (must match Emision Units Table): OxCat-01 thru OxCat-12 (Each)

Equipment Information

1. Manufacturer: **EMIT Technologies**	2. Control Device Name: **Oxidation Catalyst (OxCat) (Each of 12) (Controls CE-01 thru CE-12)**
3. 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.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: **CO 100%** **NMNEHC 100%** **HCHO 100%**	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: **9,240 ACFM**	10. Capacity: **na**
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. **na**	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na**	
13. Description of method of handling the collected material(s) for reuse of disposal. **na**	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☑ No
Are particulates present?	☐ Yes	☑ No
Are metals present?	☐ Yes	☑ No

15. Inlet emission stream parameters:	Maximum	Typical
Pressure (mmHg):	**na**	**na**
Heat Content (BTU/scf):	**na**	**na**
Oxygen Content (%):	**na**	**na**
Moisture Content (%):	**na**	**na**
Relative Humidity (%):	**na**	**na**

AIR POLLUTION CONTROL DEVICE (APCD) SHEET
(OxCat)

Control Device Unit No. (must match Emision Units Table): OxCat-01 thru OxCat-12 (Each)

Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **CO, NMNEHC/VOC, HCHO**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **9,240 ACFM**

20. Gas stream temperature: Inlet: **1,012 oF** Outlet: **na oF**

21. Gas flow rate: Design Maximum: **9,240 ACFM** Average Expected: **9,240 ACFM**

22. Particulate Grain Loading: Inlet: **na grains/scf** Outlet: **na grains/scf**

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant g/bhp-hr	IN Pollutant lb/hr	Capture Efficiency	OUT Pollutant g/bhp-hr	OUT Pollutant lb/hr	Control Efficiency
CO	**2.98**	**9.07**	**100%**	**0.45**	**1.36**	**85%**
NMNEHC (VOC w/o HCHO)	**1.08**	**3.29**	**100%**	**0.27**	**0.82**	**75%**
VOC (including HCHO)	**1.52**	**4.62**	**100%**	**0.32**	**0.98**	**79%**
HCHO	**0.39**	**1.19**	**100%**	**0.04**	**0.12**	**90%**

24. Dimensions of stack: Height: **20.0 ft** Diameter: **1.0 ft**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2	**na**	**na**
2 – 4	**na**	**na**
4 – 6	**na**	**na**
6 – 8	**na**	**na**
8 – 10	**na**	**na**
10 – 12	**na**	**na**
12 – 16	**na**	**na**
16 – 20	**na**	**na**
20 – 30	**na**	**na**
30 – 40	**na**	**na**
40 – 50	**na**	**na**
50 – 60	**na**	**na**
60 – 70	**na**	**na**
70 – 80	**na**	**na**
80 – 90	**na**	**na**
90 – 100	**na**	**na**
>100	**na**	**na**

AIR POLLUTION CONTROL DEVICE (APCD) SHEET (OxCat)

Control Device Unit No. (must match Emision Units Table): OxCat-01 thru OxCat-12 (Each)

Equipment Information - Continued

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

na

28. Describe the collection material disposal system:

na

29. Describe the collection material disposal system: **na**

30. 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:**
As per NSPS JJJJ and Current Permit	**As per NSPS JJJJ and Current Permit**
REPORTING:	**TESTING:**
As per NSPS JJJJ and Current Permit	**As per NSPS JJJJ and Current Permit**

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.

31. Manufacturer's Guaranteed Collection Efficiency for each air pollutant.

CO 100% **NMNEHC/VOC 100%** **HCHO 100%**

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

CO ≥100% **NMNEHC/VOC ≥75%** **HCHO ≥90%**

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

na

Air Pollution Control Device (APCD) Sheet (Condenser)

Control Device Unit No. (must match Emission Units Table): **BTEX-01 thru BTEX-03**

Equipment Information

1. Manufacturer: **NATCO**	2. Control Device Name: **BETX Buster (Condenser) (Controls DHY-01 thru DHY-03)**
3. 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.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: **VOC 100%** **V-HAP 100%**	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: **2,570 SCFH**	
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. **na**	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na**	
13. Description of method of handling the collected material(s) for reuse of disposal. **na**	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☑ No
Are particulates present?	☐ Yes	☑ No
Are metals present?	☐ Yes	☑ No

15. Inlet emission stream parameters:	Maximum	Typical
Pressure (mmHg):	**na**	**na**
Heat Content (BTU/scf):	**na**	**na**
Oxygen Content (%):	**na**	**na**
Moisture Content (%):	**na**	**na**
Relative Humidity (%):	**na**	**na**

Air Pollution Control Device (APCD) Sheet (Condenser)

Control Device Unit No. (must match Emission Units Table): **BTEX-01 thru BTEX-03**

Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **VOC, V-HAP**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **2,570 SCFH**

20. Gas stream temperature: Inlet: **212 oF** Outlet: **120 oF**

21. Gas flow rate: Design Maximum: **2,570 SCFH** Average Expected: **2,570 SCFH**

22. Particulate Grain Loading: Inlet: **na grains/scf** Outlet: **na grains/scf**

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant lb/yr	IN Pollutant tpy	Capture Efficiency	OUT Pollutant lb/yr	OUT Pollutant tpy	Control Efficiency
VOC	**52.27**	**228.93**	**100%**	**1.79**	**7.85**	**96.6%**
TOTAL HAP	**12.80**	**56.07**	**100%**	**0.30**	**1.30**	**97.7%**

24. Dimensions of stack: Height: **na** Diameter: **na**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2	**na**	**na**
2 – 4	**na**	**na**
4 – 6	**na**	**na**
6 – 8	**na**	**na**
8 – 10	**na**	**na**
10 – 12	**na**	**na**
12 – 16	**na**	**na**
16 – 20	**na**	**na**
20 – 30	**na**	**na**
30 – 40	**na**	**na**
40 – 50	**na**	**na**
50 – 60	**na**	**na**
60 – 70	**na**	**na**
70 – 80	**na**	**na**
80 – 90	**na**	**na**
90 – 100	**na**	**na**
>100	**na**	**na**

Air Pollution Control Device (APCD) Sheet (Condenser)

Control Device Unit No. (must match Emission Units Table): **BTEX-01 thru BTEX-03**

Equipment Information - Continued

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

Exhaust Gases are Burned as Fuel (Recycle) or Recompressed (Reclaimed)

28. Describe the collection material disposal system:

Condensed Liquids are pumped to the Stabilized Condensate Storage Tanks (TK-01 thru TK-08)

29. Describe the collection material disposal system: **na**

30. 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:**
As per Current Permit	**As per Current Permit**
REPORTING:	**TESTING:**
As per Current Permit	**As per Current Permit**

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.

31. Manufacturer's Guaranteed Collection Efficiency for each air pollutant.

na

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

na

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

na

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Attachment M

Air Pollution Control Device (APCD) Sheet (VRU)

Control Device Unit No. (must match Emission Units Table): **VRU**

Equipment Information

1. Manufacturer: **na**	2. Control Device Name: **Vapor Recovery Unit (VRU)** **(Controls TK-01 thru TK-08)**
3. 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.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: **na**	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: **na**	10. Capacity: **na**
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. **na**	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na**	
13. Description of method of handling the collected material(s) for reuse of disposal. **na**	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☑ No
Are particulates present?	☐ Yes	☑ No
Are metals present?	☐ Yes	☑ No

15. Inlet emission stream parameters:	Maximum	Typical
Pressure (mmHg):	**na**	**na**
Heat Content (BTU/scf):	**na**	**na**
Oxygen Content (%):	**na**	**na**
Moisture Content (%):	**na**	**na**
Relative Humidity (%):	**na**	**na**

Air Pollution Control Device (APCD) Sheet (VRU)

Control Device Unit No. (must match Emission Units Table): **VRU**

Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **VOC, V-HAP**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **na**

20. Gas stream temperature: Inlet: **na** Outlet: **na**

21. Gas flow rate: Design Maximum: **na** Average Expected: **na**

22. Particulate Grain Loading: Inlet: **na** Outlet: **na**

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant lb/yr	IN Pollutant tpy	Capture Efficiency	OUT Pollutant lb/yr	OUT Pollutant tpy	Control Efficiency
VOC	**6.16**	**26.97**	**100%**	**0.31**	**1.35**	**95%**
TOTAL HAP	**1.85**	**8.09**	**100%**	**0.09**	**0.40**	**95%**

24. Dimensions of stack: Height: **na** Diameter: **na**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2	**na**	**na**
2 – 4	**na**	**na**
4 – 6	**na**	**na**
6 – 8	**na**	**na**
8 – 10	**na**	**na**
10 – 12	**na**	**na**
12 – 16	**na**	**na**
16 – 20	**na**	**na**
20 – 30	**na**	**na**
30 – 40	**na**	**na**
40 – 50	**na**	**na**
50 – 60	**na**	**na**
60 – 70	**na**	**na**
70 – 80	**na**	**na**
80 – 90	**na**	**na**
90 – 100	**na**	**na**
>100	**na**	**na**

Attachment M

Air Pollution Control Device (APCD) Sheet
(VRU)

Control Device Unit No. (must match Emission Units Table): **VRU**

Equipment Information - Continued

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

Exhaust Gases are Burned as Fuel (Recycle) or Recompressed (Reclaimed)

28. Describe the collection material disposal system:

Condensed Liquids are returned to the Stabilized Condensate Storage Tanks (TK-01 thru TK-08)

29. Describe the collection material disposal system: **na**

30. 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:**
As per Current Permit (Except Remove WTK-01 and WTK-02)	**As per Current Permit (Except Remove WTK-01 and WTK-02)**
REPORTING:	**TESTING:**
As per Current Permit (Except Remove WTK-01 and WTK-02)	**As per Current Permit (Except Remove WTK-01 and WTK-02)**

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.

31. Manufacturer's Guaranteed Collection Efficiency for each air pollutant.
na

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
na

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

Attachment M

Air Pollution Control Device (APCD) Sheet (Adsorption)

Control Device Unit No. (must match Emission Units Table): **CarbCan**

Equipment Information

1. Manufacturer: **na**	2. Control Device Name: **Carbon Canister (Controls TLO)**
3. 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.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: **VOC: 70%** **V-HAP: 70%**	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: **na**	10. Capacity: **na**
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. **na**	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. **na**	
13. Description of method of handling the collected material(s) for reuse of disposal. **na**	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☑ No
Are particulates present?	☐ Yes	☑ No
Are metals present?	☐ Yes	☑ No

15. Inlet emission stream parameters:	Maximum	Typical
Pressure (mmHg):	**na**	**na**
Heat Content (BTU/scf):	**na**	**na**
Oxygen Content (%):	**na**	**na**
Moisture Content (%):	**na**	**na**
Relative Humidity (%):	**na**	**na**

Air Pollution Control Device (APCD) Sheet (Adsorption)

Control Device Unit No. (must match Emission Units Table): **CarbCan**

Equipment Information - Continued

16. Type of pollutant(s) controlled: ☐ SO2 ☐ Odor ☐ PM ☑ Other: **VOC, V-HAP**

17. Inlet gas velocity: **na**

18. Pollutant specific gravity: **varies**

19. Gas flow into the collector: **na**

20. Gas stream temperature: Inlet: **na** Outlet: **na**

21. Gas flow rate: Design Maximum: **na** Average Expected: **na**

22. Particulate Grain Loading: Inlet: **na** Outlet: **na**

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant lb/yr	IN Pollutant tpy	Capture Efficiency	OUT Pollutant lb/yr	OUT Pollutant tpy	Control Efficiency
VOC	**35.72**	**25.43**	**70%**	**11.97**	**8.52**	**95%**
TOTAL HAP	**10.72**	**7.63**	**70%**	**3.59**	**2.56**	**95%**

24. Dimensions of stack: Height: **4.0 ft** Diameter: **0.3 ft**

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2	**na**	**na**
2 – 4	**na**	**na**
4 – 6	**na**	**na**
6 – 8	**na**	**na**
8 – 10	**na**	**na**
10 – 12	**na**	**na**
12 – 16	**na**	**na**
16 – 20	**na**	**na**
20 – 30	**na**	**na**
30 – 40	**na**	**na**
40 – 50	**na**	**na**
50 – 60	**na**	**na**
60 – 70	**na**	**na**
70 – 80	**na**	**na**
80 – 90	**na**	**na**
90 – 100	**na**	**na**
>100	**na**	**na**

Attachment M

Air Pollution Control Device (APCD) Sheet
(Adsorption)

Control Device Unit No. (must match Emission Units Table): **CarbCan**

Equipment Information - Continued

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

na

28. Describe the collection material disposal system:

The Carbon Canisters (CarbCan) are returned to the manufacture for regeneration as requisite.

29. Describe the collection material disposal system: **na**

30. 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:**
As per Current Permit (Except Remove WTLO)	**As per Current Permit (Except Remove WTLO)**
REPORTING:	**TESTING:**
As per Current Permit (Except Remove WTLO)	**As per Current Permit (Except Remove WTLO)**

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.

31. Manufacturer's Guaranteed Collection Efficiency for each air pollutant.

na

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

na

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

na

Attachment N

Emissions Calculations

"30. Provide all **Supporting Emissions Calculations** as Attachment N."

- **Emission Summary Spreadsheets**
  - Potential to Emit (PTE) – Criteria Pollutants – Controlled
  - Potential to Emit (PTE) – Hazardous Air Pollutants (HAP) – Controlled
  - Potential to Emit (PTE) – Greenhouse Gases (GHG) – Controlled
  - Potential to Emit (PTE) – Criteria Pollutants – PRE-Controlled
  - Potential to Emit (PTE) – Hazardous Air Pollutants (HAP) – PRE-Controlled
  - Potential to Emit (PTE) – Greenhouse Gases (GHG) – PRE-Controlled
- **Unit-Specific Emission Spreadsheets**
  - Compressor Engine (CE-01 thru CE-12) Emissions
  - Compressor Rod Packing (CRP) Emissions
  - Microturbine Generator (GEN) Emissions
  - Dehydrator (DHY-01 thru DHY-03) Emissions
  - Reboiler (BLR-01 thru BLR-03) Emissions
  - Heater Treater (HTR-01 and HTR-02) Emissions
  - Stabilized Condensate - Storage Tank (TK-01 thru TK-08) Emissions
  - Produced Water - Storage Tank (WTK-01 and WTK-02) Emissions
  - Stabilized Condensate (SC) - Truck Load-Out (TLO) Emissions
  - Produced Water (PW) - Truck Load-Out (WTLO) Emissions
  - Compressor Blowdown (CBD) / Emergency Shutdown (ESD) Emissions
- **Fugitive Emissions**
  - Process Piping and Equipment Leak (FUG-G) Emissions – Gas
  - Process Piping and Equipment Leak (FUG-O) Emissions – Light Liquid
  - Engine Crankcase (ECC) Emissions

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Criteria Pollutants - Controlled

Unit ID	Point ID	Source ID	Description	Site Rating	NOX		CO		VOC (w/HCHO)		PM10/2.5		SO2	
					lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy
Sand Hill Compressor Station (SHCS) - Point Sources														
EUCE-1	EPCE-1	CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-2	EPCE-2	CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-3	EPCE-3	CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-4	EPCE-4	CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-5	EPCE-5	CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-6	EPCE-6	CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-7	EPCE-7	CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-8	EPCE-8	CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-9	EPCE-9	CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-10	EPCE-10	CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-11	EPCE-11	CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCE-12	EPCE-12	CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	1.36	5.96	0.98	4.28	0.11	0.49	0.01	0.03
EUCRP	EPCRP	CRP	Compressor Rod Packing	12 Units	---	---	---	---	9.87	43.23	---	---	---	---
EUGEN-1	EPGEN-1	GEN	Generator - Capstone C600 Microturbine	805 bhp	0.48	2.10	1.32	5.78	0.13	0.57	0.05	0.20	4E-03	0.02
EUDHY-1	EPSTL-1	DHY-01	Dehydrator 01 (BTEX Buster)	55.0 MMscfd	---	---	---	---	1.79	7.85	---	---	---	---
EUDHY-2	EPSTL-2	DHY-02	Dehydrator 02 (BTEX Buster)	55.0 MMscfd	---	---	---	---	1.79	7.85	---	---	---	---
EUDHY-3	EPSTL-3	DHY-03	Dehydrator 03 (BTEX Buster)	55.0 MMscfd	---	---	---	---	1.79	7.85	---	---	---	---
EURBL-1	EPRBL-1	BLR-01	Reboiler 01	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EURBL-2	EPRBL-2	BLR-02	Reboiler 02	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EURBL-3	EPRBL-3	BLR-03	Reboiler 03	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EUHT-1	EPHT-1	HTR-01	Heater-Treater Burner 01	0.50 MMBtu/hr	0.06	0.21	0.05	0.18	3E-03	0.01	5E-03	0.02	4E-04	1E-03
EUHT-2	EPHT-2	HTR-02	Heater-Treater Burner 02	0.50 MMBtu/hr	0.06	0.21	0.05	0.18	3E-03	0.01	5E-03	0.02	4E-04	1E-03
EUTK-1	EPTK-1	TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-2	EPTK-2	TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-3	EPTK-3	TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-4	EPTK-4	TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-5	EPTK-5	TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-6	EPTK-6	TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-7	EPTK-7	TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUTK-8	EPTK-8	TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.04	0.17	---	---	---	---
EUWTK-9	EPWTK-9	WTK-01	Storage Tank W01 - Produced Water (PW)	400 bbl	---	---	---	---	0.01	0.03	---	---	---	---
EUWTK-10	EPWTK-10	WTK-02	Storage Tank W02 - Produced Water (PW)	400 bbl	---	---	---	---	0.01	0.03	---	---	---	---
EULOAD-1	EPLOAD-1	TLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	9,965 Mgal/yr	---	---	---	---	11.97	8.52	---	---	---	---
EULOAD-2	EPLOAD-2	WTLO	Truck Loading - Produced Water (PW)	1,533 Mgal/yr	---	---	---	---	0.72	0.08	---	---	---	---
EUBD	EPBD	CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	1,249 events/yr	---	---	---	---	28.31	24.94	---	---	---	---
			Sand Hill Compressor Station (SHCS) - Point Sources		**19.15**	**83.77**	**17.99**	**78.70**	**68.45**	**153.79**	**1.42**	**6.22**	**0.09**	**0.38**
Sand Hill Compressor Station (SHCS) - Fugitives														
EUFUG	EPFUG	FUG-G	Piping & Equip Leaks - Gas	7,472 Units	---	---	---	---	4.62	20.23	---	---	---	---
		FUG-O	Piping & Equip Leaks - Light Liquid	3,407 Units	---	---	---	---	7.46	32.68	---	---	---	---
EUECC	EPECC	ECC	Engine Crankcase Fugitives	17,365 bhp	0.05	0.21	0.28	1.24	0.14	0.63	4E-03	0.02	2E-04	9E-04
			Sand Hill Compressor Station (SHCS) - Fugitives		**0.05**	**0.21**	**0.28**	**1.24**	**12.22**	**53.54**	**4E-03**	**0.02**	**2E-04**	**9E-04**
Sand Hill Compressor Station (SHCS) - Total														
			Sand Hill Compressor Station (SHCS) - Total		**19.20**	**83.98**	**18.27**	**79.95**	**80.67**	**207.33**	**1.43**	**6.24**	**0.09**	**0.38**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Hazardous Air Pollutants (HAP) - Controlled

Source ID	Acetaldehyde		Acrolein		Benzene		Butadiene, 1,3-		Ethylbenzene		HCHO		n-Hexane		Methanol		POM		Toluene		TMP, 2,2,4-		Xylenes		Other HAP		TOTAL HAPs	
	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	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy
Sand Hill Compressor Station (SHCS) - Point Sources																												
CE-01	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-02	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-03	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-04	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-05	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-06	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-07	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-08	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-09	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-10	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-11	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CE-12	0.02	0.10	0.01	0.06	1E-03	5E-03	7E-04	3E-03	1E-04	5E-04	0.12	0.52	3E-03	0.01	0.01	0.03	1E-03	4E-03	1E-03	5E-03	7E-04	3E-03	5E-04	2E-03	9E-04	4E-03	**0.17**	**0.76**
CRP	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.25	1.09	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.33**	**1.45**
GEN	0.00	0.00	0.00	0.00	0.00	0.00	6E-06	0.00	4E-04	2E-03	0.01	0.04	---	---	---	---	4E-04	2E-03	2E-03	0.01	---	---	9E-04	4E-03	4E-04	2E-03	**0.01**	**0.06**
DHY-01	---	---	---	---	0.06	0.27	---	---	4E-03	0.02	---	---	0.09	0.40	---	---	---	---	0.10	0.43	2E-03	0.01	0.04	0.17	---	---	**0.30**	**1.30**
DHY-02	---	---	---	---	0.06	0.27	---	---	4E-03	0.02	---	---	0.09	0.40	---	---	---	---	0.10	0.43	2E-03	0.01	0.04	0.17	---	---	**0.30**	**1.30**
DHY-03	---	---	---	---	0.06	0.27	---	---	4E-03	0.02	---	---	0.09	0.40	---	---	---	---	0.10	0.43	2E-03	0.01	0.04	0.17	---	---	**0.30**	**1.30**
BLR-01	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
BLR-02	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
BLR-03	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
HTR-01	---	---	---	---	1E-06	5E-06	---	---	---	---	5E-05	2E-04	1E-03	4E-03	---	---	4E-07	1E-06	2E-06	7E-06	---	---	---	---	7E-07	3E-06	**1E-03**	**4E-03**
HTR-02	---	---	---	---	1E-06	5E-06	---	---	---	---	5E-05	2E-04	1E-03	4E-03	---	---	4E-07	1E-06	2E-06	7E-06	---	---	---	---	7E-07	3E-06	**1E-03**	**4E-03**
TK-01	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-02	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-03	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-04	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-05	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-06	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-07	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
TK-08	---	---	---	---	8E-04	3E-03	---	---	8E-04	3E-03	---	---	0.01	0.03	---	---	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	---	---	**0.01**	**0.05**
WTK-01	---	---	---	---	1E-04	6E-04	---	---	1E-04	6E-04	---	---	1E-03	0.01	---	---	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	---	---	**2E-03**	**0.01**
WTK-02	---	---	---	---	1E-04	6E-04	---	---	1E-04	6E-04	---	---	1E-03	0.01	---	---	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	---	---	**2E-03**	**0.01**
TLO	---	---	---	---	0.24	0.17	---	---	0.24	0.17	---	---	2.39	1.70	---	---	---	---	0.24	0.17	0.24	0.17	0.24	0.17	---	---	**3.59**	**2.56**
WTLO	---	---	---	---	0.01	2E-03	---	---	0.01	2E-03	---	---	0.14	0.02	---	---	---	---	0.01	2E-03	0.01	2E-03	0.01	2E-03	---	---	**0.22**	**0.02**
CBD/ESD	---	---	---	---	0.05	0.04	---	---	0.05	0.04	---	---	0.71	0.63	---	---	---	---	0.05	0.04	0.05	0.04	0.05	0.04	---	---	**0.95**	**0.84**
SHCS-PS	**0.28**	**1.24**	**0.17**	**0.76**	**0.53**	**1.20**	**0.01**	**0.04**	**0.34**	**0.37**	**1.43**	**6.28**	**3.88**	**5.10**	**0.08**	**0.37**	**0.01**	**0.05**	**0.64**	**1.69**	**0.34**	**0.38**	**0.45**	**0.85**	**0.01**	**0.05**	**8.17**	**18.37**
Sand Hill Compressor Station (SHCS) - Fugitives																												
FUG-G	---	---	---	---	0.01	0.03	---	---	0.01	0.03	---	---	0.12	0.51	---	---	---	---	0.01	0.03	0.01	0.03	0.01	0.03	---	---	**0.16**	**0.68**
FUG-O	---	---	---	---	0.01	0.05	---	---	0.01	0.05	---	---	0.19	0.82	---	---	---	---	0.01	0.05	0.01	0.05	0.01	0.05	---	---	**0.25**	**1.10**
ECC	3E-03	0.01	2E-03	0.01	2E-04	7E-04	9E-05	4E-04	1E-05	6E-05	0.04	0.16	4E-04	2E-03	9E-04	4E-03	1E-04	5E-04	1E-04	6E-04	9E-05	4E-04	6E-05	3E-04	1E-04	5E-04	**0.04**	**0.19**
SHCS-FUG	**3E-03**	**0.01**	**2E-03**	**0.01**	**0.02**	**0.09**	**9E-05**	**4E-04**	**0.02**	**0.09**	**0.04**	**0.16**	**0.30**	**1.33**	**9E-04**	**4E-03**	**1E-04**	**5E-04**	**0.02**	**0.09**	**0.02**	**0.09**	**0.02**	**0.09**	**1E-04**	**5E-04**	**0.45**	**1.97**
Sand Hill Compressor Station (SHCS) - Total																												
SHCS-TOT	**0.29**	**1.25**	**0.18**	**0.77**	**0.55**	**1.29**	**0.01**	**0.04**	**0.36**	**0.46**	**1.47**	**6.44**	**4.18**	**6.43**	**0.09**	**0.37**	**0.01**	**0.05**	**0.66**	**1.78**	**0.36**	**0.47**	**0.47**	**0.94**	**0.01**	**0.05**	**8.62**	**20.34**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Greenhouse Gas (GHG) Pollutants - Controlled

Source ID	Description	Site Rating	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr*	CO2 GWP: 1 tpy	CO2e 1 tpy	CH4 GWP: 25 tpy	CO2e 25 tpy	N2O GWP: 298 tpy	CO2e 298 tpy	TOTAL CO2e lb/hr*	TOTAL CO2e tpy
Sand Hill Compressor Station (SHCS) - Point Sources												
CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CRP	Compressor Rod Packing	12 Units	---	8,760	0.44	0.44	99.81	2,495	---	---	**570**	**2,496**
GEN	Generator - Capstone C600 Microturbine	805 bhp	6.84	8,760	3,494	3,494	0.52	13	9E-02	26.80	**807**	**3,534**
DHY-01	Dehydrator 01 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	0.39	9.66	---	---	**2.79**	**12.20**
DHY-02	Dehydrator 02 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	0.39	9.66	---	---	**2.79**	**12.20**
DHY-03	Dehydrator 03 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	0.39	9.66	---	---	**2.79**	**12.20**
BLR-01	Reboiler 01	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
BLR-02	Reboiler 02	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
BLR-03	Reboiler 03	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
HTR-01	Heater-Treater Burner 01	0.50 MMBtu/hr	0.50	8,760	258	258	5E-03	0.12	5E-03	1.41	**59.17**	**259**
HTR-02	Heater-Treater Burner 02	0.50 MMBtu/hr	0.50	8,760	258	258	5E-03	0.12	5E-03	1.41	**59.17**	**259**
TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	There are De Minimis GHGs in Stabilized Condensate (SC) Storage Tank Emissions										
TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)											
TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)											
TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)											
TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)											
TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)											
TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)											
TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)											
WTK-01	Storage Tank W01 - Produced Water (PW)	There are De Minimis GHGs in Produced Water (PW) Storage Tank Emissions										
WTK-02	Storage Tank W02 - Produced Water (PW)											
TLO	Truck Loading - Produced Water (PW)	There are De Minimis GHGs in Stabilized Condensate (SC) Truck Loading Emissions										
WTLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	There are De Minimis GHGs in Produce Water (PW) Truck Loading Emissions										
CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	1,249 events/yr	---	8,760	0.25	0.25	57.57	1,439	---	---	**329**	**1,440**
		Sand Hill Compressor Station (SHCS) - Point Sources			**87,117**	**87,117**	**897**	**22,423**	**0.26**	**76.84**	**25,027**	**109,617**
Sand Hill Compressor Station (SHCS) - Fugitives												
FUG-G	Piping & Equip Leaks - Gas	7,472 Units	---	8,760	0.20	0.20	46.71	1,168	---	---	**267**	**1,168**
FUG-O	Piping & Equip Leaks - Light Liquid	There are De Minimis GHGs in Light Liquid Piping & Equip Leak Emissions										
ECC	Engine Crankcase Fugitives	17,365 bhp	---	8,760	213	213	1.93	48.15	3E-04	0.10	**59.62**	**261**
		Sand Hill Compressor Station (SHCS) - Fugitives			**213**	**213**	**48.63**	**1,216**	**3E-04**	**0.10**	**326**	**1,429**
Sand Hill Compressor Station (SHCS) - Total												
		Sand Hill Compressor Station (SHCS) - Total			**87,330**	**87,330**	**946**	**23,639**	**0.26**	**76.94**	**25,353**	**111,046**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Criteria Pollutants - PRE-Control

Unit ID	Point ID	Source ID	Description	Site Rating	NOX		CO		VOC (w/HCHO)		PM10/2.5		SO2	
					lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy
Sand Hill Cmpressor Station (SHCS) - Point Sources - PRE-Control														
EUCE-1	EPCE-1	CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-2	EPCE-2	CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-3	EPCE-3	CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-4	EPCE-4	CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-5	EPCE-5	CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-6	EPCE-6	CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-7	EPCE-7	CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-8	EPCE-8	CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-9	EPCE-9	CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-10	EPCE-10	CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-11	EPCE-11	CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCE-12	EPCE-12	CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	1,380 bhp	1.52	6.66	9.07	39.71	4.62	20.25	0.11	0.49	0.01	0.03
EUCRP	EPCRP	CRP	Compressor Rod Packing	12 Units	---	---	---	---	9.87	43.23	---	---	---	---
EUGEN-1	EPGEN-1	GEN	Generator - Capstone C600 Microturbine	805 bhp	0.48	2.10	1.32	5.78	0.13	0.57	0.05	0.20	4E-03	0.02
EUDHY-1	EPSTL-1	DHY-01	Dehydrator 01 (BTEX Buster)	55.0 MMscfd	---	---	---	---	52.27	229	---	---	---	---
EUDHY-2	EPSTL-2	DHY-02	Dehydrator 02 (BTEX Buster)	55.0 MMscfd	---	---	---	---	52.27	229	---	---	---	---
EUDHY-3	EPSTL-3	DHY-03	Dehydrator 03 (BTEX Buster)	55.0 MMscfd	---	---	---	---	52.27	229	---	---	---	---
EURBL-1	EPRBL-1	BLR-01	Reboiler 01	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EURBL-2	EPRBL-2	BLR-02	Reboiler 02	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EURBL-3	EPRBL-3	BLR-03	Reboiler 03	1.00 MMBtu/hr	0.10	0.43	0.08	0.36	0.01	0.02	0.01	0.03	6E-04	3E-03
EUHT-1	EPHT-1	HTR-01	Heater-Treater Burner 01	0.50 MMBtu/hr	0.06	0.21	0.05	0.18	3E-03	0.01	5E-03	0.02	4E-04	1E-03
EUHT-2	EPHT-2	HTR-02	Heater-Treater Burner 02	0.50 MMBtu/hr	0.06	0.21	0.05	0.18	3E-03	0.01	5E-03	0.02	4E-04	1E-03
EUTK-1	EPTK-1	TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-2	EPTK-2	TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-3	EPTK-3	TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-4	EPTK-4	TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-5	EPTK-5	TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-6	EPTK-6	TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-7	EPTK-7	TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUTK-8	EPTK-8	TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)	400 bbl	---	---	---	---	0.77	3.37	---	---	---	---
EUWTK-9	EPWTK-9	WTK-01	Storage Tank W01 - Produced Water (PW)	400 bbl	---	---	---	---	0.01	0.03	---	---	---	---
EUWTK-10	EPWTK-10	WTK-02	Storage Tank W02 - Produced Water (PW)	400 bbl	---	---	---	---	0.01	0.03	---	---	---	---
EULOAD-1	EPLOAD-1	TLO	Truck Loading - Produced Water (PW)	9,965 Mgal/yr	---	---	---	---	35.72	25.43	---	---	---	---
EULOAD-2	EPLOAD-2	WTLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	1,533 Mgal/yr	---	---	---	---	0.72	0.08	---	---	---	---
EUBD	EPBD	CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	1,249 events/yr	---	---	---	---	5.69	24.94	---	---	---	---
Sand Hill Cmpressor Station (SHCS) - Point Sources - PRE-Control					**19.15**	**84**	**110**	**484**	**271**	**1,051**	**1.42**	**6.22**	**0.09**	**0.38**
Sand Hill Compressor Station (SHCS) - Fugitives - PRE-Control														
EUFUG	EPFUG	FUG-G	Piping & Equip Leaks - Gas	7,472 Units	---	---	---	---	4.62	20.23	---	---	---	---
		FUG-O	Piping & Equip Leaks - Light Liquid	3,407 Units	---	---	---	---	7.46	32.68	---	---	---	---
EUECC	EPECC	ECC	Engine Crankcase Fugitives	17,365 bhp	0.05	0.21	0.28	1.24	0.14	0.63	4E-03	0.02	2E-04	9E-04
Sand Hill Compressor Station (SHCS) - Fugitives - PRE-Control					**0.05**	**0.21**	**0.28**	**1.24**	**12.22**	**53.54**	**4E-03**	**0.02**	**2E-04**	**9E-04**
Sand Hill Compressor Station (SHCS) - Total - PRE-Control														
Sand Hill Compressor Station (SHCS) - Total - PRE-Control					**19.20**	**84**	**111**	**485**	**283**	**1,105**	**1.43**	**6.24**	**0.09**	**0.38**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Hazardous Air Pollutants (HAP) - PRE-Control

Source ID	Acetaldehyde		Acrolein		Benzene		Butadiene, 1,3-		Ethylbenzene		HCHO		n-Hexane		Methanol		POM		Toluene		TMP, 2,2,4-		Xylenes		Other HAP		TOTAL HAPs	
	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	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy	lb/hr*	tpy
Sand Hill Cmpressor Station (SHCS) - Point Sources - PRE-Control																												
CE-01	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-02	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-03	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-04	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-05	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-06	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-07	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-08	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-09	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-10	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-11	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CE-12	0.09	0.41	0.06	0.25	5E-03	0.02	3E-03	0.01	4E-04	2E-03	1.19	5.20	0.01	0.05	0.03	0.12	4E-03	0.02	5E-03	0.02	3E-03	0.01	2E-03	0.01	4E-03	0.02	**1.40**	**6.15**
CRP	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.25	1.09	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.33**	**1.45**
GEN	0.00	0.00	0.00	0.00	0.00	0.00	6E-06	0.00	4E-04	2E-03	0.01	0.04	---	---	---	---	4E-04	2E-03	2E-03	0.01	---	---	9E-04	4E-03	4E-04	2E-03	**0.01**	**0.06**
DHY-01	---	---	---	---	1.75	7.66	---	---	0.32	1.41	---	---	2.30	10.07	---	---	---	---	4.42	19.35	0.23	1.00	3.79	16.58	---	---	**12.80**	**56.07**
DHY-02	---	---	---	---	1.75	7.66	---	---	0.32	1.41	---	---	2.30	10.07	---	---	---	---	4.42	19.35	0.23	1.00	3.79	16.58	---	---	**12.80**	**56.07**
DHY-03	---	---	---	---	1.75	7.66	---	---	0.32	1.41	---	---	2.30	10.07	---	---	---	---	4.42	19.35	0.23	1.00	3.79	16.58	---	---	**12.80**	**56.07**
BLR-01	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
BLR-02	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
BLR-03	---	---	---	---	2E-06	9E-06	---	---	---	---	7E-05	3E-04	2E-03	0.01	---	---	7E-07	3E-06	3E-06	1E-05	---	---	---	---	1E-06	5E-06	**2E-03**	**0.01**
HTR-01	---	---	---	---	1E-06	5E-06	---	---	---	---	5E-05	2E-04	1E-03	4E-03	---	---	4E-07	1E-06	2E-06	7E-06	---	---	---	---	7E-07	3E-06	**1E-03**	**4E-03**
HTR-02	---	---	---	---	1E-06	5E-06	---	---	---	---	5E-05	2E-04	1E-03	4E-03	---	---	4E-07	1E-06	2E-06	7E-06	---	---	---	---	7E-07	3E-06	**1E-03**	**4E-03**
TK-01	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-02	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-03	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-04	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-05	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-06	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-07	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
TK-08	---	---	---	---	0.02	0.07	---	---	0.02	0.07	---	---	0.15	0.67	---	---	---	---	0.02	0.07	0.02	0.07	0.02	0.07	---	---	**0.23**	**1.01**
WTK-01	---	---	---	---	1E-04	6E-04	---	---	1E-04	6E-04	---	---	1E-03	0.01	---	---	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	---	---	**2E-03**	**0.01**
WTK-02	---	---	---	---	1E-04	6E-04	---	---	1E-04	6E-04	---	---	1E-03	0.01	---	---	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	---	---	**2E-03**	**0.01**
TLO	---	---	---	---	0.71	0.51	---	---	0.71	0.51	---	---	7.14	5.09	---	---	---	---	0.71	0.51	0.71	0.51	0.71	0.51	---	---	**10.72**	**7.63**
WTLO	---	---	---	---	0.01	2E-03	---	---	0.01	2E-03	---	---	0.14	0.02	---	---	---	---	0.01	2E-03	0.01	2E-03	0.01	2E-03	---	---	**0.22**	**0.02**
CBD/ESD	---	---	---	---	0.05	0.04	---	---	0.05	0.04	---	---	0.71	0.63	---	---	---	---	0.05	0.04	0.05	0.04	0.05	0.04	---	---	**0.95**	**0.84**
SHCS-PS	**1.13**	**4.94**	**0.69**	**3.03**	**6.22**	**24.41**	**0.04**	**0.16**	**1.89**	**5.42**	**14.25**	**62.41**	**16.53**	**43.11**	**0.34**	**1.48**	**0.05**	**0.21**	**14.23**	**59.47**	**1.64**	**4.32**	**12.30**	**51.02**	**0.04**	**0.19**	**69.34**	**260.16**
Sand Hill Compressor Station (SHCS) - Fugitives - PRE-Control																												
FUG-G	---	---	---	---	0.01	0.03	---	---	0.01	0.03	---	---	0.12	0.51	---	---	---	---	0.01	0.03	0.01	0.03	0.01	0.03	---	---	**0.16**	**0.68**
FUG-O	---	---	---	---	0.01	0.05	---	---	0.01	0.05	---	---	0.19	0.82	---	---	---	---	0.01	0.05	0.01	0.05	0.01	0.05	---	---	**0.25**	**1.10**
ECC	3E-03	0.01	2E-03	0.01	2E-04	7E-04	9E-05	4E-04	1E-05	6E-05	0.04	0.16	4E-04	2E-03	9E-04	4E-03	1E-04	5E-04	1E-04	6E-04	9E-05	4E-04	6E-05	3E-04	1E-04	5E-04	**0.04**	**0.19**
SHCS-FUG	**3E-03**	**0.01**	**2E-03**	**0.01**	**0.02**	**0.09**	**9E-05**	**4E-04**	**0.02**	**0.09**	**0.04**	**0.16**	**0.30**	**1.33**	**9E-04**	**4E-03**	**1E-04**	**5E-04**	**0.02**	**0.09**	**0.02**	**0.09**	**0.02**	**0.09**	**1E-04**	**5E-04**	**0.45**	**1.97**
Sand Hill Compressor Station (SHCS) - Total - PRE-Control																												
SHCS-TOT	**1.13**	**4.95**	**0.69**	**3.04**	**6.24**	**24.50**	**0.04**	**0.16**	**1.91**	**5.51**	**14.29**	**62.57**	**16.84**	**44.44**	**0.34**	**1.48**	**0.05**	**0.21**	**14.25**	**59.56**	**1.66**	**4.41**	**12.32**	**51.11**	**0.04**	**0.19**	**69.79**	**262.12**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Greenhouse Gas (GHG) Pollutants - PRE-Control

Source ID	Description	Site Rating	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr*	CO2 GWP: 1 tpy	CO2e 1 tpy	CH4 GWP: 25 tpy	CO2e 25 tpy	N2O GWP: 298 tpy	CO2e 298 tpy	TOTAL CO2e lb/hr*	TOTAL CO2e tpy
Sand Hill Cmpressor Station (SHCS) - Point Sources - PRE-Control												
CE-01	Compressor Engine 01 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-02	Compressor Engine 02 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-03	Compressor Engine 03 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-04	Compressor Engine 04 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-05	Compressor Engine 05 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-06	Compressor Engine 06 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-07	Compressor Engine 07 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-08	Compressor Engine 08 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-09	Compressor Engine 09 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-10	Compressor Engine 10 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-11	Compressor Engine 11 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CE-12	Compressor Engine 12 - CAT G3516B (OxCat)	1,380 bhp	11.23	8,760	6,796	6,796	61.49	1,537	0.01	3.23	**1,903**	**8,336**
CRP	Compressor Rod Packing	12 Units	---	8,760	0.44	0.44	99.81	2,495	---	---	**570**	**2,496**
GEN	Generator - Capstone C600 Microturbine	805 bhp	6.84	8,760	3,494	3,494	0.52	12.95	0.09	26.80	**807**	**3,534**
DHY-01	Dehydrator 01 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	7.73	193	---	---	**44.70**	**196**
DHY-02	Dehydrator 02 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	7.73	193	---	---	**44.70**	**196**
DHY-03	Dehydrator 03 (BTEX Buster)	55.0 MMscfd	---	8,760	2.54	2.54	7.73	193	---	---	**44.70**	**196**
BLR-01	Reboiler 01	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
BLR-02	Reboiler 02	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
BLR-03	Reboiler 03	1.00 MMBtu/hr	1.00	8,760	515	515	0.01	0.25	0.01	2.82	**118**	**518**
HTR-01	Heater-Treater Burner 01	0.50 MMBtu/hr	0.50	8,760	258	258	5E-03	0.12	5E-03	1.41	**59.17**	**259**
HTR-02	Heater-Treater Burner 02	0.50 MMBtu/hr	0.50	8,760	258	258	5E-03	0.12	5E-03	1.41	**59.17**	**259**
TK-01	Storage Tank 01 - Stabilized Condensate (SC) (VRU)	There are De Minimis GHGs in Stabilized Condensate (SC) Storage Tank Emissions										
TK-02	Storage Tank 02 - Stabilized Condensate (SC) (VRU)											
TK-03	Storage Tank 03 - Stabilized Condensate (SC) (VRU)											
TK-04	Storage Tank 04 - Stabilized Condensate (SC) (VRU)											
TK-05	Storage Tank 05 - Stabilized Condensate (SC) (VRU)											
TK-06	Storage Tank 06 - Stabilized Condensate (SC) (VRU)											
TK-07	Storage Tank 07 - Stabilized Condensate (SC) (VRU)											
TK-08	Storage Tank 08 - Stabilized Condensate (SC) (VRU)											
WTK-01	Storage Tank W01 - Produced Water (PW)	There are De Minimis GHGs in Produced Water (PW) Storage Tank Emissions										
WTK-02	Storage Tank W02 - Produced Water (PW)											
TLO	Truck Loading - Produced Water (PW)	There are De Minimis GHGs in Stabilized Condensate (SC) Truck Loading Emissions										
WTLO	Truck Loading - Stabilized Condensate (SC) (CarbCan)	There are De Minimis GHGs in Produce Water (PW) Truck Loading Emissions										
CBD/ESD	Compressor Blowdown/Emergency Shutdown Tests	1,249 events/yr	---	8,760	0.25	0.25	57.57	1,439	---	---	**329**	**1,440**
		Sand Hill Compressor Station (SHCS) - Point Sources			**87,117**	**87,117**	**919**	**22,974**	**0.26**	**76.8**	**25,152**	**110,168**
Sand Hill Compressor Station (SHCS) - Fugitives - PRE-Control												
FUG-G	Piping & Equip Leaks - Gas	7,472 Units	---	8,760	0.20	0.20	46.71	1,168	---	---	**267**	**1,168**
FUG-O	Piping & Equip Leaks - Light Liquid	There are De Minimis GHGs in Light Liquid Piping & Equip Leak Emissions										
ECC	Engine Crankcase Fugitives	17,365 bhp	---	8,760	213	213	1.93	48.15	3E-04	0.10	**59.62**	**261**
		Sand Hill Compressor Station (SHCS) - Fugitives			**213**	**213**	**48.63**	**1,216**	**3E-04**	**0.10**	**326**	**1,429**
Sand Hill Compressor Station (SHCS) - Total - PRE-Control												
		Sand Hill Compressor Station (SHCS) - Total			**87,330**	**87,330**	**968**	**24,190**	**0.26**	**76.94**	**25,479**	**111,597**

* = lb/hr is based on 8,760 hr/yr, except Compressor Blowdowns (CBD/ESD), Truck Load-Out (TLO, WTLO), and Pigging (PIG) are less frequent.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Compressor Engine (CE-01 thru CE-12) Emissions

Source ID	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions		
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
CE-01 CE-02 CE-03 CE-04 CE-05 CE-06 CE-07 CE-08 CE-09 CE-10 CE-11 CE-12 (Each)	Compressor Engines 01 thru 12 (Each) (OxCat-01 thru OxCat-12) Caterpillar (CAT) G3516B (4SLB) 1,380 bhp (Each) 8,760 hr/yr (Each) 1,400 rpm, 16 cyl 264 in3/cyl 1,012 Exhaust Temp (oF) 9,240 Exhaust Flow (acfm) Manufactured ≥ 07/01/10 NSPS JJJJ Affected 8,138 Btu/bhp-hr (HHV) 11.23 MMBtu/hr (HHV) (Each) 11,010 scf/hr (Each) 96.45 MMscf/yr (Each) 1,020 Btu/scf (HHV)	Vendor Data	NOX	0.50	0.14	1.52	6.66	---	**0.50**	**1.52**	**6.66**
		Vendor Data	CO	2.98	0.81	9.07	39.71	85.0%	**0.45**	**1.36**	**5.96**
		Vendor Data	NMNEHC	1.08	0.29	3.29	14.39	75.0%	**0.27**	**0.82**	**3.60**
		Sum	VOC (w/Aldehyde)	1.52	0.41	4.62	20.25	78.8%	**0.32**	**0.98**	**4.28**
		AP-42 Table 3.2-2	PM10/2.5	3.69E-02	9.99E-03	0.11	0.49	---	**0.04**	**0.11**	**0.49**
		AP-42 Table 3.2-2	SO2	2.17E-03	5.88E-04	0.01	0.03	---	**2E-03**	**0.01**	**0.03**
		AP-42 Table 3.2-2	*Acetaldehyde	3.09E-02	8.36E-03	0.09	0.41	75.0%	**0.01**	**0.02**	**0.10**
		AP-42 Table 3.2-2	*Acrolein	1.90E-02	5.14E-03	0.06	0.25	75.0%	**5E-03**	**0.01**	**0.06**
		AP-42 Table 3.2-2	Benzene	1.62E-03	4.40E-04	5E-03	0.02	75.0%	**4E-04**	**1E-03**	**5E-03**
		AP-42 Table 3.2-2	Butadiene, 1,3-	9.86E-04	2.67E-04	3E-03	0.01	75.0%	**2E-04**	**7E-04**	**3E-03**
		AP-42 Table 3.2-2	Ethylbenzene	1.47E-04	3.97E-05	4E-04	2E-03	75.0%	**4E-05**	**1E-04**	**5E-04**
		Vendor Data	*Formaldehyde	0.39	0.11	1.19	5.20	90.0%	**0.04**	**0.12**	**0.52**
		AP-42 Table 3.2-2	n-Hexane	4.10E-03	1.11E-03	0.01	0.05	75.0%	**1E-03**	**3E-03**	**0.01**
		AP-42 Table 3.2-2	Methanol	9.23E-03	2.50E-03	0.03	0.12	75.0%	**2E-03**	**0.01**	**0.03**
		AP-42 Table 3.2-2	POM	1.28E-03	3.47E-04	4E-03	0.02	75.0%	**3E-04**	**1E-03**	**4E-03**
		AP-42 Table 3.2-2	Toluene	1.51E-03	4.08E-04	5E-03	0.02	75.0%	**4E-04**	**1E-03**	**5E-03**
		AP-42 Table 3.2-2	TMP, 2,2,4-	9.86E-04	2.67E-04	3E-03	0.01	75.0%	**2E-04**	**7E-04**	**3E-03**
		AP-42 Table 3.2-2	Xylenes	6.79E-04	1.84E-04	2E-03	0.01	75.0%	**2E-04**	**5E-04**	**2E-03**
		AP-42 Table 3.2-2	Other/Trace HAP	1.18E-03	3.21E-04	4E-03	0.02	75.0%	**3E-04**	**9E-04**	**4E-03**
		Sum	Total HAP	0.46	0.13	1.40	6.15	87.7%	**0.06**	**0.17**	**0.76**
		Vendor Data	CO2 (GWP=1)	510	138	1,552	6,796	---	**510**	**1,552**	**6,796**
		AP-42 Table 3.2-2	CH4 (GWP=25)	4.61	1.25	14.04	61.49	---	**4.61**	**14.04**	**61.49**
		40CFR98 - Table C2	N2O (GWP=298)	8.14E-04	2.20E-04	2E-03	0.01	---	**8E-04**	**2E-03**	**0.01**
		Weighted Sum	CO2e	626	169	1,903	8,336	---	**626**	**1,903**	**8,336**

* = Aldehyde

Notes:

1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - As per vendor specifications, NMNEHC (non-methane/non-ethane hydrocarbons) do NOT include aldehydes. VOC is the sum of NMNEHC, Acetaldehyde, Acrolein, and Formaldehyde.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

5 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

6 - Total NMNEHC, VOC, HCHO, HAP and CO2e emissions include Compressor Rod Packing (CRP), Compressor Blowdown (CBD), Engine Start-up (ESU), and Engine Crankcase (ECC) Emissions:

Description (Each Engine w/ Compressor)	NMNEHC	VOC	HCHO	Tot HAP	CO2e
Engine Operations (See Above)	3.60 tpy	4.28 tpy	0.52 tpy	0.76 tpy	8,336 tpy
Compressor Rod Packing (CRP)	3.60 tpy	3.60 tpy	---	0.12 tpy	208 tpy
Compressor Blowdown (CBD)	1.47 tpy	1.47 tpy	---	0.05 tpy	84.98 tpy
Engine Start-up (ESU)	Electric or Compressed Air Starter - No Start-up Emissions				
Engine Crankcase (ECC)	0.04 tpy	0.05 tpy	0.01 tpy	0.02 tpy	20.75 tpy
TOTAL:	**8.71 tpy**	**9.41 tpy**	**0.53 tpy**	**0.94 tpy**	**8,650 tpy**

7 - Last permit application showed CO control at 98%. To be conservative this has been reduced to 93%.

8 - Last permit application showed HCHO control at 95%. To be conservative this has been reduced to 90%.

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Compressor Rod Packing (CRP) Emissions

Source ID	Unit Description (Compressor Rod Packing)	No of Cylinders	scfh per Cylinder	Contin-gency	Total Fugitive Leak Rate		Control Efficiency	VOC 14,900.00 lb/MMscf		CO2 150.00 lb/MMscf		CH4 34,400.00 lb/MMscf		CO2e CH4 GWP = 25	
					scfh	MMscfy		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CRP	Reciprocating Compressor - 01	4	12.0	15%	55.20	0.48	na	0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 02	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 03	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 04	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 05	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 06	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 07	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 08	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 09	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 10	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 11	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
	Reciprocating Compressor - 12	4	12.0	15%	55.20	0.48		0.82	3.60	0.01	0.04	1.90	8.32	47	208
							TOTAL:	**9.87**	**43.23**	**0.10**	**0.44**	**22.79**	**99.81**	**570**	**2,496**

Source ID	Unit Description (Compressor Rod Packing)	Benzene 25.00 lb/MMscf		E-Benzene 25.00 lb/MMscf		n-Hexane 375.00 lb/MMscf		Toluene 25.00 lb/MMscf		2,2,4-TMP 25.00 lb/MMscf		Xylene 25.00 lb/MMscf		Tot HAP 500.00 lb/MMscf	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CRP	Reciprocating Compressor - 01	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 02	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 03	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 04	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 05	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 06	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 07	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 08	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 09	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 10	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 11	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	Reciprocating Compressor - 12	1E-03	0.01	1E-03	0.01	0.02	0.09	1E-03	0.01	1E-03	0.01	1E-03	0.01	0.03	0.12
	TOTAL:	**0.02**	**0.07**	**0.02**	**0.07**	**0.25**	**1.09**	**0.02**	**0.07**	**0.02**	**0.07**	**0.02**	**0.07**	**0.33**	**1.45**

Notes:

1 - As per the manufacturer (Ariel): "Packing in new and broken-in condition will leak 5-10 scfh through the vent. This leakage rate will increase over time due to wear of the non-metallic sealing rings." The Williams' engineering department provides a conservative leak rate estimate of 12 scfh/cylinder (equal to 48 scfh/compressor). In this instance, an additional 15% contingency was added to yield 55.20 scfh/compressor.

2 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix A - Lab Data):

		Minimum Contingency: 10%		
Pollutant	**Wet Gas**	**Worst Case**	**%Total**	**%VOC**
CO2	101 lb/MMscf	150 lb/MMscf	0.24	---
Methane (CH4)	31,244 lb/MMscf	34,400 lb/MMscf	54.17	---
N2/Water/Ethane/Etc	12,858 lb/MMscf	14,050 lb/MMscf	22.13	---
VOC	13,518 lb/MMscf	14,900 lb/MMscf	23.46	100.00
TOTAL Gas	57,720 lb/MMscf	63,500 lb/MMscf	100.00	100.00
		63,500	100	100

3 - Prior permit applications did not include Compressor Rod Packing (CRP) emissions.

		Minimum Contingency: 10%		
Pollutant	**Wet Gas**	**Worst Case**	**%Total**	**%VOC**
Benzene	4 lb/MMscf	25 lb/MMscf	0.04	0.17
Ethylbenzene	1 lb/MMscf	25 lb/MMscf	0.04	0.17
n-Hexane	322 lb/MMscf	375 lb/MMscf	0.59	2.52
Toluene	8 lb/MMscf	25 lb/MMscf	0.04	0.17
2,2,4-TMP	6 lb/MMscf	25 lb/MMscf	0.04	0.17
Xylenes	5 lb/MMscf	25 lb/MMscf	0.04	0.17
Total HAP	346 lb/MMscf	500 lb/MMscf	0.79	3.36
	346	500	0.79	3.36

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Generator Engine (GEN) Emissions

Source ID	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions		
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
GEN	Non-Emergency Microturbine Generator Capstone C600 805 bhp 8,760 hr/yr 535 Exhaust Temp (oF) 8,501 Btu/bhp-hr (HHV) 6.84 MMBtu/hr (HHV) 6,709 scf/hr 58.77 MMscf/yr 1,020 Btu/scf (HHV)	Vendor Data x 2	NOX	0.27	7.01E-02	0.48	2.10	---	**0.27**	**0.48**	**2.10**
		Vendor Data x 2	CO	0.74	0.19	1.32	5.78	---	**0.74**	**1.32**	**5.78**
		Vendor Data x 2	NMNEHC	6.76E-02	1.75E-02	0.12	0.53	---	**0.07**	**0.12**	**0.53**
		SUM	VOC (w/HCHO)	7.34E-02	1.90E-02	0.13	0.57	---	**0.07**	**0.13**	**0.57**
		AP-42 Table 3.1-2a	PM10/2.5	2.56E-02	6.63E-03	0.05	0.20	---	**0.03**	**0.05**	**0.20**
		AP-42 Table 3.1-2a	SO2	2.27E-03	5.88E-04	4E-03	0.02	---	**2E-03**	**4E-03**	**0.02**
		AP-42 Table 3.1-3 x 2	Acetaldehyde	3.08E-04	8.00E-05	5.47E-04	2E-03	---	**3E-04**	**5E-04**	**2E-03**
		AP-42 Table 3.1-3 x 2	Acrolein	4.94E-05	1.28E-05	8.76E-05	4E-04	---	**5E-05**	**9E-05**	**4E-04**
		AP-42 Table 3.1-3 x 2	Benzene	9.25E-05	2.40E-05	1.64E-04	7E-04	---	**9E-05**	**2E-04**	**7E-04**
		AP-42 Table 3.1-3 x 2	Butaadiene, 1,3-	3.32E-06	8.60E-07	6E-06	3E-05	---	**3E-06**	**6E-06**	**3E-05**
		AP-42 Table 3.1-3 x 2	Ethylbenzene	2.47E-04	6.40E-05	4E-04	2E-03	---	**2E-04**	**4E-04**	**2E-03**
		AP-42 Table 3.1-3 x 2	Formaldehyde	5.48E-03	1.42E-03	9.72E-03	0.04	---	**0.01**	**0.01**	**0.04**
		AP-42 Table 3.1-3 x 2	n-Hexane	---	---	---	---	---	**---**	**---**	**---**
		AP-42 Table 3.1-3 x 2	Methanol	---	---	---	---	---	**---**	**---**	**---**
		AP-42 Table 3.1-3 x 2	POM	2.51E-04	6.50E-05	4E-04	2E-03	---	**3E-04**	**4E-04**	**2E-03**
		AP-42 Table 3.1-3 x 2	Toluene	1.00E-03	2.60E-04	2E-03	0.01	---	**1E-03**	**2E-03**	**0.01**
		AP-42 Table 3.1-3 x 2	TMP, 2,2,4-	---	---	---	---	---	**---**	**---**	**---**
		AP-42 Table 3.1-3 x 2	Xylenes	4.94E-04	1.28E-04	9E-04	4E-03	---	**5E-04**	**9E-04**	**4E-03**
		AP-42 Table 3.1-3 x 2	Other/Trace HAP	2.24E-04	5.80E-05	4E-04	2E-03	---	**2E-04**	**4E-04**	**2E-03**
		Sum	Total HAP	8.15E-03	2.11E-03	0.01	0.06	---	**0.01**	**0.01**	**0.06**
		Vendor Data	CO2 (GWP=1)	450	117	798	3,494	---	**450**	**798**	**3,494**
		AP-42 Table 3.1-3 x 2	CH4 (GWP=25)	6.66E-02	1.73E-02	0.12	0.52	---	**0.07**	**0.12**	**0.52**
		40CFR98 - Table C2	N2O (GWP=298)	1.16E-02	3.00E-03	2E-02	0.09	---	**1E-02**	**2E-02**	**9E-02**
		Weighted Sum	CO2e	455	118	807	3,534	---	**455**	**807**	**3,534**

* = Aldehyde

Notes:

1 - The emissions estimates are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.

2 - A footnote to AP-42 Table 3.4-1 indicates that "THC is based on EPA Test Method 25A" and "VOC = THC - Methane".
However, EPA Method 25A does NOT measure aldehydes (or methanol).
Accordingly, and to be conservative, total VOC is estimated by NMNEHC + aldehydes.

3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5

4 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

5 - The turbine's operating load has a considerable effect on the resulting emission levels.
With reduced loads (lower than 80 percent) the NOX, CO, and THC (NMNEHC, VOC, HAP, and CH4) emissions are expected to be higher.
The vendor states that "fuel flows can be up to two times higher than steady state values."
Accordingly, and to be conservative, the vendor and AP-42 [full load, steady-state] emission factor data are increased by a factor of two (2).
(The Capstone C600 is comprised of three (3) 200 kWhe turbine generators operating in parallel, thus mininizing the low-load operations.)

Dehydrator (DHY-01 thru -03) Emissions

Source ID	Description	Reference	Pollutant	Worst-Case PRE-Control Emissions lb/hr	Worst-Case PRE-Control Emissions tpy	Control Efficiency %	Worst-Case Controlled Emissions lb/hr	Worst-Case Controlled Emissions tpy
DHY-01 DHY-02 DHY-03 (Each)	Dehydrator 01 thru 03 (Each) (No Combustion Emissions Shown, See BLR-01 thru 03) 55.0 MMscfd (Each) 8,760 hr/yr (Each) *All the Flash-Tank Off-Gas Stream is Recycled as Fuel or otherwise reclaimed. Recycle/reclaim is *NOT* an Emissions Control Technology. 20,075 MMscf/yr (Each) 2.29 MMscf/hr (Each) NESHAP HH - Exempt (Less than 1.0 tpy Benzene)	See BLR-01 thru BLR-03	NOX			See BLR-01 thru BLR-03		
		See BLR-01 thru BLR-03	CO			See BLR-01 thru BLR-03		
		GRI-GLYCalc 4.0	NMNEHC	52.27	228.93	96.6%	**1.79**	**7.85**
		GRI-GLYCalc 4.0	VOC	52.27	228.93	96.6%	**1.79**	**7.85**
		See BLR-01 thru BLR-03	SO2			See BLR-01 thru BLR-03		
		See BLR-01 thru BLR-03	PM10/2.5			See BLR-01 thru BLR-03		
		See BLR-01 thru BLR-03	Acetaldehyde			See BLR-01 thru BLR-03		
		See BLR-01 thru BLR-03	Acrolein			See BLR-01 thru BLR-03		
		GRI-GLYCalc 4.0	Benzene	1.75	7.66	96.4%	**0.06**	**0.27**
		See BLR-01 thru BLR-03	Butadiene, 1,3-			See BLR-01 thru BLR-03		
		GRI-GLYCalc 4.0	Ethylbenzene	0.32	1.41	98.9%	**4E-03**	**0.02**
		See BLR-01 thru BLR-03	Formaldehyde			See BLR-01 thru BLR-03		
		GRI-GLYCalc 4.0	n-Hexane	2.30	10.07	96.1%	**0.09**	**0.40**
		See BLR-01 thru BLR-03	Methanol			See BLR-01 thru BLR-03		
		See BLR-01 thru BLR-03	POM			See BLR-01 thru BLR-03		
		GRI-GLYCalc 4.0	Toluene	4.42	19.35	97.8%	**0.10**	**0.43**
		GRI-GLYCalc 4.0	TMP, 2,2,4-	0.23	1.00	99.0%	**2E-03**	**0.01**
		GRI-GLYCalc 4.0	Xylenes	3.79	16.58	99.0%	**0.04**	**0.17**
		See BLR-01 thru BLR-03	Other/Trace HAP			See BLR-01 thru BLR-03		
		SUM	Total HAP	12.80	56.07	97.7%	**0.30**	**1.30**
		GRI-GLYCalc 4.0	CO2 (GWP=1)	0.58	2.54	---	**0.58**	**2.54**
		GRI-GLYCalc 4.0	CH4 (GWP=25)	1.76	7.73	95.0%	**0.09**	**0.39**
		GRI-GLYCalc 4.0	N2O (GWP=298)			GRI-GLYCalc 4.0		
		WEIGHTED SUM	CO2e	44.70	195.78	94%	**2.79**	**12.20**

Notes: 1 - Results of GRI-GLYCalc Model are shown below:

55.0 MMscfd DHY-01	GRI-GLYCalc 4.0* PRE-Control Emissions GLYCalc Results	PRE-Control Emissions Worst-Case**	Controlled Emissions GLYCalc Results	Controlled Emissions Worst-Case**
NMNEHC = VOC	208.12 tpy	228.93 tpy	**7.14 tpy**	**7.85 tpy**
Benzene	6.96 tpy	7.66 tpy	**0.25 tpy**	**0.27 tpy**
Ethylbenzene	1.28 tpy	1.41 tpy	**1E-02 tpy**	**0.02 tpy**
n-Hexane	9.15 tpy	10.07 tpy	**0.36 tpy**	**0.40 tpy**
Toluene	17.59 tpy	19.35 tpy	**0.40 tpy**	**0.43 tpy**
2,2,4-TMP	0.11 tpy	1.00 tpy	**3E-03 tpy**	**0.01 tpy**
Xylenes	15.07 tpy	16.58 tpy	**0.15 tpy**	**0.17 tpy**
Total HAP	50.17 tpy	56.07 tpy	**1.17 tpy**	**1.30 tpy**
Carbon Dioxide (CO2)	2.31 tpy	2.54 tpy	**2.31 tpy**	**2.54 tpy**
Methane (CH4)	7.03 tpy	7.73 tpy	**0.35 tpy**	**0.39 tpy**

(**Worst-Case is determined with a 110% "Safety Margin".)

*Dehydrator Operating Parameters (See Supplement S6 - Emission Programs)			
Manufacturer:	na	Dry Gas Flow Rate:	55.0 MMscfd
Wet Gas:	95.00 oF	Gas Analysis:	11/02/16
Wet Gas:	1,100.00 psig	Primary Pump:	Electric
Wet Gas:	Saturated	Backup Pump:	2xKimray 45020PV
Wet Gas:	47.69 lb-H2O/MMscf	Glycol Circ Rate:	22.00 gpm
Dry Gas:	7.00 lb H2O/MMscf	Glycol Circ Ratio:	12.57 gal/lb-H2O
Lean Glycol:	1.50 wt% H2O	Rich Glycol:	2.30 wt% H2O
Flash Temp:	120.00 oF	Regen Overhead:	2,570 scfh
Flash Pressure:	50.00 psig	Regen Control:	Cond/Comb
Flash Off-Gas:	1,560 scfh	Condenser Temp:	120.00 oF
Off-Gas Recycle:	100.00%	Condenser Press:	14.08 psia
Off-Gas Control:	na	Comb Control Eff:	95.00%
Stripping Gas:	na	Ambient Temp:	52.00 oF
Stripping Gas:	na	Condenser Vent:	286 scfh

2 - The emissions shown are based on operation at 100% of rated capacity for 8,760 hr/yr. Actual load and operating hours will be less.

3 - Emissions from utilization of the Kimray 45020PV Backup glycol pump (2x7.5 gpm) actually results in a reduction of hourly VOC emissions (Kimray: 0.71 lb/hr vs Electric: 1.72 lb/hr)

Reboiler (BLR-01 thru -03) Emissions

Source ID	Description	Reference	Pollutant	Emission Factor		Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy
BLR-01 BLR-02 BLT-03 (Each)	Reboiler 01 thru 03 (Each) 1.00 MMBtu/hr (HHV) (Each) 1,020 Btu/scf (HHV) 8,760 hr/yr (Each) 980 scf/hr (Each) 8.59 MMscf/yr (Each)	EPA AP-42 Table 1.4-1	NOX	100	9.80E-02	**0.10**	**0.43**
		EPA AP-42 Table 1.4-1	CO	84	8.24E-02	**0.08**	**0.36**
		EPA AP-42 Table 1.4-2	NMNEHC	5.5	5.39E-03	**0.01**	**0.02**
		EPA AP-42 Table 1.4-2	VOC	5.5	5.39E-03	**0.01**	**0.02**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.6	7.45E-03	**0.01**	**0.03**
		EPA AP-42 Table 1.4-2	SO2	0.6	5.88E-04	**6E-04**	**3E-03**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Acrolein	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Benzene	2.10E-03	2.06E-06	**2E-06**	**9E-06**
		EPA AP-42 Table 1.4-4	Butadiene, 1,3-	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	7.50E-02	7.35E-05	**7E-05**	**3E-04**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	**2E-03**	**0.01**
		EPA AP-42 Table 1.4-3	Methanol	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	POM	6.98E-04	6.85E-07	**7E-07**	**3E-06**
		EPA AP-42 Table 1.4-3	Toluene	3.40E-03	3.33E-06	**3E-06**	**1E-05**
		EPA AP-42 Table 1.4-3	TMP, 2,2,4-	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Xylenes	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Other/Trace HAP	1.20E-03	1.18E-06	**1E-06**	**5E-06**
		SUM	Total HAP	1.88	1.85E-03	**2E-03**	**0.01**
		EPA AP-42 Table 1.4-2	CO2 (GWP=1)	120,000	118	**118**	**515**
		EPA AP-42 Table 1.4-2	CH4 (GWP=25)	2.30	2.25E-03	**2E-03**	**0.01**
		EPA AP-42 Table 1.4-2	N2O (GWP=298)	2.20	2.16E-03	**2E-03**	**0.01**
		WEIGHTED SUM	CO2e	120,713	118	**118**	**518**

Notes:
1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.
2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5
4 - "Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

Heater-Treater (HTR-01 and HTR-02) Emissions

Source ID	Description	Reference	Pollutant	Emission Factor		Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy
HTR-01 HTR-02	Heater-Treater 01 and 02 (Each) 0.50 MMBtu/hr (HHV) (Each) 1,020 Btu/scf (HHV) 8,760 hr/yr (Each) 600 scf/hr (Each) 4.29 MMscf/yr (Each)	EPA AP-42 Table 1.4-1	NOX	100	9.80E-02	**0.06**	**0.21**
		EPA AP-42 Table 1.4-1	CO	84	8.24E-02	**0.05**	**0.18**
		EPA AP-42 Table 1.4-2	NMNEHC	5.5	5.39E-03	**3E-03**	**0.01**
		EPA AP-42 Table 1.4-2	VOC	5.5	5.39E-03	**3E-03**	**0.01**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.6	7.45E-03	**5E-03**	**0.02**
		EPA AP-42 Table 1.4-2	SO2	0.6	5.88E-04	**4E-04**	**1E-03**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Acrolein	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Benzene	2.10E-03	2.06E-06	**1E-06**	**5E-06**
		EPA AP-42 Table 1.4-4	Butadiene, 1,3-	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	7.50E-02	7.35E-05	**5E-05**	**2E-04**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	**1E-03**	**4E-03**
		EPA AP-42 Table 1.4-3	Methanol	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	POM	6.98E-04	6.85E-07	**4E-07**	**1E-06**
		EPA AP-42 Table 1.4-3	Toluene	3.40E-03	3.33E-06	**2E-06**	**7E-06**
		EPA AP-42 Table 1.4-3	TMP, 2,2,4-	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Xylenes	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Other/Trace HAP	1.20E-03	1.18E-06	**7E-07**	**3E-06**
		SUM	Total HAP	1.88	1.85E-03	**1E-03**	**4E-03**
		EPA AP-42 Table 1.4-2	CO2 (GWP=1)	120,000	118	**72**	**258**
		EPA AP-42 Table 1.4-2	CH4 (GWP=25)	2.30	2.25E-03	**1E-03**	**5E-03**
		EPA AP-42 Table 1.4-2	N2O (GWP=298)	2.20	2.16E-03	**1E-03**	**5E-03**
		WEIGHTED SUM	CO2e	120,713	118	**59**	**259**

Notes:
1 - The emissions shown are based on operation at 100% of rated load for 8,760 hr/yr. Actual load and operating hours will be less.
2 - The fuel heating value will vary, 1,020 Btu/scf (HHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate. (Operator experience indicates 600 scf/hr is requisite for "cold-starts".)
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5
4 -"Other/Trace HAPs" includes: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

Stabilized Condensate - Storage Tank (TK01 thru TK-08) Emissions

Source ID	Source ID	Material Stored	Capacity	T-Put	PRE-CONTROL			VRU Control Efficiency	VOC (100%)		CO2 (w/o Control) --- VOC		CH4 --- VOC		CO2e CH4 GWP = 25	
					W+B	Flash	Total									
			bbl	bbl/yr	lb/yr	lb/yr	lb/yr		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EUTK1-8	TK-01	Stabilized Condensate	400	29,656	6,741	---	6,741	95%	0.04	0.17	---	---	---	---	---	---
	TK-02	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-03	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-04	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-05	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-06	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-07	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
	TK-08	Stabilized Condensate	400	29,656	6,741	---	6,741		0.04	0.17	---	---	---	---	---	---
			3,200	**237,250**			**53,931**	**TOTAL:**	**0.31**	**1.35**	**---**	**---**	**---**	**---**	**---**	**---**
			Mgal/yr:	9,965				PRE-Control (Each):	0.77	3.37	---	---	---	---	---	---
			Turnovers:	74.14				PRE-Control (Total):	6.16	26.97	---	---	---	---	---	---

Source ID	Tank ID	Benzene 2.00% VOC		Ethylbenzene 2.00% VOC		n-Hexane 20.00% VOC		Methanol (MeOH)		Toluene 2.00% VOC		2,2,4-TMP 2.00% VOC		Xylene 2.00% VOC		Total HAP 30.00% VOC	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EUTK1-8	TK-01	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-02	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-03	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-04	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-05	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-06	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-07	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TK-08	8E-04	3E-03	8E-04	3E-03	0.01	0.03	---	---	8E-04	3E-03	8E-04	3E-03	8E-04	3E-03	0.01	0.05
	TOTAL:	**0.01**	**0.03**	**0.01**	**0.03**	**0.06**	**0.27**	**---**	**---**	**0.01**	**0.03**	**0.01**	**0.03**	**0.01**	**0.03**	**0.09**	**0.40**
	PRE-Control (Each):	0.02	0.07	0.02	0.07	0.15	0.67	---	---	0.02	0.07	0.02	0.07	0.02	0.07	0.23	1.01
	PRE-Control (Total):	0.12	0.54	0.12	0.54	1.23	5.39	---	---	0.12	0.54	0.12	0.54	0.12	0.54	1.85	8.09

Notes: 1 - EPA TANKS 4.0.9d was used to determine working and breathing losses from each (of 2) Produced Water Storage Tank - See Supplement S6 - Emission Programs.

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Battle Run CF 400 bbl Stablized Condensate Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	5,721.52	1,019.88	6,741.40

Produced Water - Storage Tank (WTK-01 and WTK-02) Emissions

Source ID	Tank ID	Material Stored	Capacity	T-Put	PRE-CONTROL			VRU Control Efficiency	VOC		CO2 (w/o Control) --- VOC		CH4 --- VOC		CO2e CH4 GWP = 25	
					W+B	Flash	Total									
			bbl	bbl/yr	lb/yr	lb/yr	lb/yr		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EPWTK	WTK-01	Produced Water	400	18,250	61	---	61	0%	0.01	0.03	---	---	---	---	---	---
	WTK-02	Produced Water	400	18,250	61	---	61		0.01	0.03	---	---	---	---	---	---
			800	**36,500**			**122.00**	**TOTAL:**	**0.01**	**0.06**	**---**	**---**	**---**	**---**	**---**	**---**
			Mgal/yr:	1,533				PRE-Control (Each):	0.01	0.03	---	---	---	---	---	---
			Turnovers:	45.63				PRE-Control (Total):	0.01	0.06	---	---	---	---	---	---

Source ID	Tank ID	Benzene 2.00% VOC		Ethylbenzene 2.00% VOC		n-Hexane 20.00% VOC		Methanol (MeOH)		Toluene 2.00% VOC		2,2,4-TMP 2.00% VOC		Xylene 2.00% VOC		Total HAP 30.00% VOC	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EPWTK	WTK-01	1E-04	6E-04	1E-04	6E-04	1E-03	0.01	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	2E-03	0.01
	WTK-02	1E-04	6E-04	1E-04	6E-04	1E-03	0.01	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	2E-03	0.01
	TOTAL:	**3E-04**	**1E-03**	**3E-04**	**1E-03**	**3E-03**	**0.01**	**---**	**---**	**3E-04**	**1E-03**	**3E-04**	**1E-03**	**3E-04**	**1E-03**	**4E-03**	**0.02**
PRE-Control (Each):		1E-04	6E-04	1E-04	6E-04	1E-03	0.01	---	---	1E-04	6E-04	1E-04	6E-04	1E-04	6E-04	2E-03	0.01
PRE-Control (Total):		3E-04	1E-03	3E-04	1E-03	3E-03	0.01	---	---	3E-04	1E-03	3E-04	1E-03	3E-04	1E-03	4E-03	0.02

Notes: 1 - EPA TANKS 4.0.9d was used to determine working and breathing losses from each (of 2) Produced Water Storage Tank - See Supplement S6 - Emission Programs.

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Battle Run 400 bbl Produced Water Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Produced Water	101.51	18.57	120.08
Water	49.94	9.14	59.08
Gasoline (RVP 12)	51.57	9.44	61.00

Stabilized Condensate (SC) - Truck Load-Out (TLO) Emissions

Source ID	Description	S	P	M	T	CE	L_L	T-Put	VOC		CO2 ---		CH4 ---		CO2e CH4 GWP = 25	
		sat. fac.	psia	lb/lb-mol	°R	%	lb/Mgal	Mgal/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TLO	Truck Load-Out - SC	0.60	5.44	64.00	510	66.5%	1.71	9,965	11.97	8.52	---	---	---	---	---	---
(See Attachment D3 - EPA TANKS 4.0.9d Emission Report)								**TOTAL:**	**11.97**	**8.52**	**---**	**---**	**---**	**---**	**---**	**---**
								PRE-Control:	35.72	25.4	---	---	---	---	---	---

Source ID	Benzene 2.00% VOC		Ethylbenzene 2.00% VOC		n-Hexane 20.00% VOC		Methanol (MeOH)		Toluene 2.00% VOC		2,2,4-TMP 2.00% VOC		Xylene 2.00% VOC		Total HAP 30.00% VOC	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TLO	0.24	0.17	0.24	0.17	2.39	1.70	---	---	0.24	0.17	0.24	0.17	0.24	0.17	3.59	2.56
TOTAL:	**0.24**	**0.17**	**0.24**	**0.17**	**2.39**	**1.70**	**---**	**---**	**0.24**	**0.17**	**0.24**	**0.17**	**0.24**	**0.17**	**3.59**	**2.56**
PRE-Cont:	0.71	0.51	0.71	0.51	7.14	5.09	---	---	0.71	0.51	0.71	0.51	0.71	0.51	10.72	7.63

Notes: 1 - Emission factors and formulas are from AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids":

$L_L = 12.46 \times S \times P \times M / T \times (1 - CE)$

where: L_L = loading loss, lb/1000 gal of liquid loaded
S = saturation factor, use 0.60 for submerged fill.
P = true vapor pressure of liquid loaded, psia.
M = molecular weight of vapors, lb/lb-mol.
T = temperature of bulk liquid loaded, °R = °F + 460
CE = overall emission reduction efficiency (collection efficiency x control efficiency).

2 - For condensate loading, the collection efficiency is 70% for tanker trucks not subject to annual leak test.

3 - Emissions from loading of stabilized condensate will be controlled with 95% efficient carbon canisters.

4 - Stabilized condensate (SC) vapor pressure, molecular weight, and temperature are from EPA TANKS 4.0.9d output.

5 - The total stabilized condensate storage tank capacity at the facility is: **3,200** bbl = **134,400** gal.

6 -The maxium stabilized condensate throughput at the facility is: **237,250** bbl/yr = **9,964,500** gal/yr = **74.14** t-o/yr

7 - n-Hexane, each BTEX, and 2,2,4-TMP components are conservatively estimated at 5% of VOC emissions and Total HAP is estimated at 30% of VOC emissions.

8 - It is assumed each tanker truck holds 7,000 gallons and can be loaded in one hour: **1,424** hr/yr

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Battle Run CF 400 bbl Stablized Condensate Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 12)	All	51.94	47.06	56.81	50.33	5.4430	4.9447	5.9807	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Produced Water (PW) - Truck Load-Out (WTLO) Emissions

Source ID	Description	S	P	M	T	CE	L_L	T-Put	VOC		CO2 ---		CH4 ---		CO2e CH4 GWP = 25	
		sat. fac.	psia	lb/lb-mol	°R	%	lb/Mgal	Mgal/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
WTLO	Truck Load-Out - PW	0.60	0.25	28.35	510	---	0.10	1,533	0.72	0.08	---	---	---	---	---	---
								TOTAL:	**0.72**	**0.08**	**---**	**---**	**---**	**---**	**---**	**---**
								PRE-Control:	0.72	0.08	---	---	---	---	---	---

Source ID	Benzene 2.00% VOC		Ethylbenzene 2.00% VOC		n-Hexane 20.00% VOC		Methanol (MeOH)		Toluene 2.00% VOC		2,2,4-TMP 2.00% VOC		Xylene 2.00% VOC		Total HAP 30.00% VOC	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
WTLO	0.01	2E-03	0.01	2E-03	0.14	0.02	---	---	0.01	2E-03	0.01	2E-03	0.01	2E-03	0.22	0.02
TOTAL:	**0.01**	**2E-03**	**0.01**	**2E-03**	**0.14**	**0.02**	**---**	**---**	**0.01**	**2E-03**	**0.01**	**2E-03**	**0.01**	**2E-03**	**0.22**	**0.02**
PRE-Cont:	0.01	2E-03	0.01	2E-03	0.14	0.02	---	---	0.01	2E-03	0.01	2E-03	0.01	2E-03	0.22	0.02

Notes: 1 - Emission factors and formulas are from AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids":

$L_L = 12.46 \times S \times P \times M / T \times (1 - CE)$

where: L_L = loading loss, lb/1000 gal of liquid loaded; M = molecular weight of vapors, lb/lb-mol.; S = saturation factor, use 0.60 for submerged fill.; T = temperature of bulk liquid loaded, °R = °F + 460; P = true vapor pressure of liquid loaded, psia.; CE = overall emission reduction efficiency (collection efficiency x control efficiency).

2 - Produced water vapor pressure, molecular weight, and temperature are based on operator experience and sampling data at various locations in the Marcellus Shale basin.

3 - The total produced water storage tank capacity at the facility is: **800** bbl = **33,600** gal.

4 - The maxium produced water throughput at the facility is: **36,500** bbl/yr = **1,533,000** gal/yr = **45.63** t-o/yr

5 - n-Hexane

6 - It is assumed each tanker truck holds 7,000 gallons and can be loaded in one hour: **219** hr/yr

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Battle Run 400 bbl Produced Water Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Produced Water	All	51.94	47.06	56.81	50.33	0.2465	0.2101	0.2893	28.3522			18.75	
Gasoline (RVP 12)						5.4430	4.9447	5.9807	64.0000	0.0500	0.5080	92.00	Option 4: RVP=12, ASTM Slope=3
Water						0.1930	0.1614	0.2307	18.0000	0.9500	0.4920	18.00	Option 1: VP50 = .178073 VP60 = .255246

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Compressor Blowdown (CBD) / Emergency Shutdown (ESD) Emissions

Source ID	Unit Description	Site Rating	Blowdown and ESD	Blowdown Gas	Total Gas Vented	Control %	VOC 14,900 lb/MMscf			CO2 150 lb/MMscf		CH4 34,400 lb/MMscf		CO2e CH4 GWP = 25	
		bhp	Events/yr	scf/bhp	MMscf/yr		lb/hr	tpy		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CBD/ESD	Reciprocating Compressor - 01	1,380	104	1.38	0.20	na	28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 02	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 03	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 04	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 05	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 06	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 07	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 08	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 09	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 10	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 11	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Reciprocating Compressor - 12	1,380	104	1.38	0.20		28.31	1.47		0.29	0.01	65.36	3.40	1,634	84.98
	Emergency Shutdown Testing (ESD)	16,560	1	58.93	0.98		---	7.27		---	0.07	---	16.79	---	419.72
Assumes 1 hr/CBD		**TOTAL:**	**1,249**	**TOTAL:**	**3.35**	**TOTAL:**	**28.31**	**24.94**	**TOTAL:**	**0.29**	**0.25**	**65.36**	**57.57**	**1,634**	**1,440**
						Pre-Controlled:	28.31	24.94		0.29	0.25	65.36	57.57	1,634	1,440

Source ID	Unit Description (Compressor Blowdown - Raw Natural Gas)	Benzene 25.00 lb/MMscf		Ethylbenzene 25.00 lb/MMscf		n-Hexane 375.00 lb/MMscf		Toluene 25.00 lb/MMscf		2,2,4-TMP 25.00 lb/MMscf		Xylene 25.00 lb/MMscf		Total HAP 500.00 lb/MMscf	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CBD/ESD	Reciprocating Compressor - 01	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 02	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 03	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 04	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 05	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 06	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 07	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 08	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 09	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 10	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 11	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Reciprocating Compressor - 12	0.05	2E-03	0.05	2E-03	0.71	0.04	0.05	2E-03	0.05	2E-03	0.05	2E-03	0.95	0.05
	Emergency Shutdown Testing (ESD)	---	0.01	---	0.01	---	0.18	---	0.01	---	0.01	---	0.01	---	0.24
Assumes 1 hr/CBD	**TOTAL:**	**0.05**	**0.04**	**0.05**	**0.04**	**0.71**	**0.63**	**0.05**	**0.04**	**0.05**	**0.04**	**0.05**	**0.04**	**0.95**	**0.84**
	Pre-Controlled:	0.05	0.04	0.05	0.04	0.71	0.63	0.05	0.04	0.05	0.04	0.05	0.04	0.95	0.84

Notes: 1 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix A - Lab Data):

		Minimum Contingency: 10%		
Pollutant	**Wet Gas**	**Worst Case**	**%Total**	**%VOC**
CO2	101 lb/MMscf	150 lb/MMscf	0.24	0.01
Methane (CH4)	31,244 lb/MMscf	34,400 lb/MMscf	54.17	2.31
N2/Water/Ethane/Etc	12,858 lb/MMscf	14,050 lb/MMscf	22.13	0.94
VOC	13,518 lb/MMscf	14,900 lb/MMscf	23.46	1.00
TOTAL Gas	57,720 lb/MMscf	63,500 lb/MMscf	100.00	---

Pollutant	Wet Gas	Worst Case	%Total	%VOC
Benzene	4.12 lb/MMscf	25.00 lb/MMscf	0.04	0.17
Ethylbenzene	0.56 lb/MMscf	25.00 lb/MMscf	0.04	0.17
n-Hexane	322.24 lb/MMscf	375.00 lb/MMscf	0.59	2.52
Toluene	8.50 lb/MMscf	25.00 lb/MMscf	0.04	0.17
2,2,4-TMP	5.72 lb/MMscf	25.00 lb/MMscf	0.04	0.17
Xylenes	5.04 lb/MMscf	25.00 lb/MMscf	0.04	0.17
Total HAP	346.17 lb/MMscf	500.00 lb/MMscf	0.79	3.36

2 - Conversion from Actual Cubic Feet (acf) to Standard Cubic Feet (scf):
scf = acf x [(psig+ave.psia)/(std.psia)] x [(std.oF+460)/(oF+460)]
(https://www.mide.com/pages/air-pressure-at-altitude-calculator)

Description	acf	psig	oF	% Gas	scf
Emergency Shutdown Testing (ESD)	15,000	1,000	100	100	975,920

Ave Atmospheric pressure at: 1,175 ft elev = 14.0825 ave.psia

Standard Temperature and Pressure: 68.0 std.oF 14.6959 std.psia

Hourly ESD Emission are Not Applicable

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Process Piping and Equipment Leak (FUG-G) Emissions – Gas

Source ID	Description	Component (Unit) Type (Gas)	Unit Count	Cons'tive Multipiler 150%	Leak Factor lb/hr/Unit	LDAR Control Credit	Controlled Leaks lb/hr	Controlled Leaks tpy	VOC 23.465 Wgt% lb/hr	VOC 23.465 Wgt% tpy	CO2 0.236 Wgt% lb/hr	CO2 0.236 Wgt% tpy	CH4 54.173 Wgt% lb/hr	CH4 54.173 Wgt% tpy	CO2e CH4 GWP = 25 lb/hr	CO2e CH4 GWP = 25 tpy
FUG-G	Process Piping and Equipment Leaks (Gas)	Valves	960	1,440	9.92E-03	---	14.29	62.57	3.35	14.68	0.03	0.15	7.74	33.90	194	848
		Pump Seals	---	---	5.29E-03	---	---	---	---	---	---	---	---	---	---	---
		Other	72	108	1.94E-02	---	2.10	9.18	0.49	2.15	5E-03	0.02	1.14	4.97	28.38	124
		Connectors	3,132	4,699	4.41E-04	---	2.07	9.07	0.49	2.13	5E-03	0.02	1.12	4.92	28.06	123
		Flanges	783	1,175	8.60E-04	---	1.01	4.42	0.24	1.04	2E-03	0.01	0.55	2.40	13.68	59.92
		Open-ended Lines	34	50	4.41E-03	---	0.22	0.97	0.05	0.23	5E-04	2E-03	0.12	0.53	3.01	13.18
		TOTAL:	**4,981**	**7,472**				**TOTAL:**	**4.62**	**20.23**	**0.05**	**0.20**	**10.66**	**46.71**	**267**	**1,168**
		PRE-Controlled:							4.62	20.23	0.05	0.20	10.66	46.71	267	1168

Source ID	Description	Component (Unit) Type (Gas)	Benzene 0.039 Wgt% lb/hr	Benzene 0.039 Wgt% tpy	Ethylbenzene 0.039 Wgt% lb/hr	Ethylbenzene 0.039 Wgt% tpy	n-Hexane 0.591 Wgt% lb/hr	n-Hexane 0.591 Wgt% tpy	Toluene 0.039 Wgt% lb/hr	Toluene 0.039 Wgt% tpy	2,2,4-TMP 0.039 Wgt% lb/hr	2,2,4-TMP 0.039 Wgt% tpy	Xylenes 0.039 Wgt% lb/hr	Xylenes 0.039 Wgt% tpy	Total HAP 0.787 Wgt% lb/hr	Total HAP 0.787 Wgt% tpy
FUG-G	Process Piping and Equipment Leaks (Gas)	Valves	0.01	0.02	0.01	0.02	0.08	0.37	0.01	0.02	0.01	0.02	0.01	0.02	0.11	0.49
		Pump Seals	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	8E-04	4E-03	8E-04	4E-03	0.01	0.05	8E-04	4E-03	8E-04	4E-03	8E-04	4E-03	0.02	0.07
		Connectors	8E-04	4E-03	8E-04	4E-03	0.01	0.05	8E-04	4E-03	8E-04	4E-03	8E-04	4E-03	0.02	0.07
		Flanges	4E-04	2E-03	4E-04	2E-03	0.01	0.03	4E-04	2E-03	4E-04	2E-03	4E-04	2E-03	0.01	0.03
		Open-ended Lines	9E-05	4E-04	9E-05	4E-04	1E-03	0.01	9E-05	4E-04	9E-05	4E-04	9E-05	4E-04	2E-03	0.01
		TOTAL:	**0.01**	**0.03**	**0.01**	**0.03**	**0.12**	**0.51**	**0.01**	**0.03**	**0.01**	**0.03**	**0.01**	**0.03**	**0.16**	**0.68**
		PRE-Controlled:	0.01	0.03	0.01	0.03	0.12	0.51	0.01	0.03	0.01	0.03	0.01	0.03	0.16	0.68

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

2 - Gas/Vapor emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995; Table 2-4, Oil and Gas Production Operations:

Equipment Type	Gas kg/hr	Gas lb/hr/unit	Light Oil kg/hr	Light Oil lb/hr/unit	Water/Oil kg/hr	Water/Oil lb/hr/unit
Valves	4.5E-03	9.92E-03	2.5E-03	5.51E-03	9.8E-05	2.16E-04
Pump Seals	2.4E-03	5.29E-03	1.3E-02	2.87E-02	2.4E-05	5.29E-05
Others	8.8E-03	1.94E-02	7.5E-03	1.65E-02	1.4E-02	3.09E-02
Connectors	2.0E-04	4.41E-04	2.1E-04	4.63E-04	1.1E-04	2.43E-04
Flanges	3.9E-04	8.60E-04	1.1E-04	2.43E-04	2.9E-06	6.39E-06
Open-Ended Lines	2.0E-03	4.41E-03	1.4E-03	3.09E-03	2.5E-04	5.51E-04

3 - "Other" components include pressure relief devices (PRD), compressors, diaphragms, drains, meters, etc.

4 - Component counts based on engineering judgment plus a 50% contingency.

5 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix A - Lab Data):

		Minimum Contingency: 10%		
Pollutant	**Wet Gas**	**Worst Case**	**%Total**	**%VOC**
CO2	101 lb/MMscf	150 lb/MMscf	0.236	---
Methane (CH4)	31,244 lb/MMscf	34,400 lb/MMscf	54.173	---
N2/Water/Ethane/Etc	12,858 lb/MMscf	14,050 lb/MMscf	22.126	---
VOC	13,518 lb/MMscf	14,900 lb/MMscf	23.465	100.000
TOTAL Gas	57,720 lb/MMscf	63,500 lb/MMscf	100.000	---
Benzene	4 lb/MMscf	25 lb/MMscf	0.039	0.168
Ethylbenzene	1 lb/MMscf	25 lb/MMscf	0.039	0.168
n-Hexane	322 lb/MMscf	375 lb/MMscf	0.591	2.517
Toluene	8 lb/MMscf	25 lb/MMscf	0.039	0.168
2,2,4-TMP	6 lb/MMscf	25 lb/MMscf	0.039	0.168
Xylenes	5 lb/MMscf	25 lb/MMscf	0.039	0.168
Total HAP	346 lb/MMscf	500 lb/MMscf	0.787	3.356
	57,720	63,500		
	346	500		

Process Piping and Equipment Leak (FUG-O) Emissions – Light Oil

Source ID	Description	Component (Unit) Type (Light Liquid)	Unit Count	Cons'tive Multipiler 150%	Leak Factor lb/hr/Unit	LDAR Control Credit	Controlled Leaks lb/hr	Controlled Leaks tpy	VOC 100.000 Wgt% lb/hr	VOC 100.000 Wgt% tpy	CO2 --- Wgt% lb/hr	CO2 --- Wgt% tpy	CH4 --- Wgt% lb/hr	CH4 --- Wgt% tpy	CO2e CH4 GWP = 25 lb/hr	CO2e CH4 GWP = 25 tpy
FUG-O	Process Piping and Equipment Leaks (Light Oil)	Valves	576	864	5.51E-03	0%	4.76	20.86	4.76	20.86	---	---	---	---	---	---
		Pump Seals	12	18	2.87E-02	0%	0.52	2.26	0.52	2.26	---	---	---	---	---	---
		Other	43	65	1.65E-02	0%	1.07	4.69	1.07	4.69	---	---	---	---	---	---
		Connectors	1,296	1,944	4.63E-04	0%	0.90	3.94	0.90	3.94	---	---	---	---	---	---
		Flanges	324	486	2.43E-04	0%	0.12	0.52	0.12	0.52	---	---	---	---	---	---
		Open-ended Lines	20	30	3.09E-03	0%	0.09	0.41	0.09	0.41	---	---	---	---	---	---
		TOTAL:	**2,271**	**3,407**				**TOTAL:**	**7.46**	**32.68**	**---**	**---**	**---**	**---**	**---**	**---**
		PRE-Controlled:							7.46	32.68	---	---	---	---	---	---

Source ID	Description	Component (Unit) Type (Gas)	Benzene 0.168 %VOC lb/hr	Benzene 0.168 %VOC tpy	Ethylbenzene 0.168 %VOC lb/hr	Ethylbenzene 0.168 %VOC tpy	n-Hexane 2.517 %VOC lb/hr	n-Hexane 2.517 %VOC tpy	Toluene 0.168 %VOC lb/hr	Toluene 0.168 %VOC tpy	2,2,4-TMP 0.168 %VOC lb/hr	2,2,4-TMP 0.168 %VOC tpy	Xylenes 0.168 %VOC lb/hr	Xylenes 0.168 %VOC tpy	Total HAP 3.356 %VOC lb/hr	Total HAP 3.356 %VOC tpy
FUG-O	Process Piping and Equipment Leaks (Light Oil)	Valves	0.01	0.03	0.01	0.03	0.12	0.52	0.01	0.03	0.01	0.03	0.01	0.03	0.16	0.70
		Pump Seals	9E-04	4E-03	9E-04	4E-03	0.01	0.06	9E-04	4E-03	9E-04	4E-03	9E-04	4E-03	0.02	0.08
		Other	2E-03	0.01	2E-03	0.01	0.03	0.12	2E-03	0.01	2E-03	0.01	2E-03	0.01	0.04	0.16
		Connectors	2E-03	0.01	2E-03	0.01	0.02	0.10	2E-03	0.01	2E-03	0.01	2E-03	0.01	0.03	0.13
		Flanges	2E-04	9E-04	2E-04	9E-04	3E-03	0.01	2E-04	9E-04	2E-04	9E-04	2E-04	9E-04	4E-03	0.02
		Open-ended Lines	2E-04	7E-04	2E-04	7E-04	2E-03	0.01	2E-04	7E-04	2E-04	7E-04	2E-04	7E-04	3E-03	0.01
		TOTAL:	**0.01**	**0.05**	**0.01**	**0.05**	**0.19**	**0.82**	**0.01**	**0.05**	**0.01**	**0.05**	**0.01**	**0.05**	**0.25**	**1.10**
		PRE-Controlled:	0.01	0.05	0.01	0.05	0.19	0.82	0.01	0.05	0.01	0.05	0.01	0.05	0.25	1.10

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

2 - Light oil emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995; Table 2-4, Oil and Gas Production Operations:

Equipment Type	Gas kg/hr	Gas lb/hr/unit	Light Oil kg/hr	Light Oil lb/hr/unit	Water/Oil kg/hr	Water/Oil lb/hr/unit
Valves	4.5E-03	9.92E-03	2.5E-03	5.51E-03	9.8E-05	2.16E-04
Pump Seals	2.4E-03	5.29E-03	1.3E-02	2.87E-02	2.4E-05	5.29E-05
Others	8.8E-03	1.94E-02	7.5E-03	1.65E-02	1.4E-02	3.09E-02
Connectors	2.0E-04	4.41E-04	2.1E-04	4.63E-04	1.1E-04	2.43E-04
Flanges	3.9E-04	8.60E-04	1.1E-04	2.43E-04	2.9E-06	6.39E-06
Open-Ended Lines	2.0E-03	4.41E-03	1.4E-03	3.09E-03	2.5E-04	5.51E-04

3 - "Other" components include pressure relief devices (PRD), diaphragms, drains, meters, etc.

4 - Component counts based on engineering judgment plus a 50% contingency.

5 - The results of a representative **Wet Gas Analysis** were used to determine the following worst-case components (See Appendix A - Lab Data):

Pollutant	Wet Gas	Minimum Contingency: 10% Worst Case	%Total	%VOC
CO2	101 lb/MMscf	150 lb/MMscf	0.236	---
Methane (CH4)	31,244 lb/MMscf	34,400 lb/MMscf	54.173	---
N2/Water/Ethane/Etc	12,858 lb/MMscf	14,050 lb/MMscf	22.126	---
VOC	13,518 lb/MMscf	14,900 lb/MMscf	23.465	100.000
TOTAL Gas	57,720 lb/MMscf	63,500 lb/MMscf	100.000	---
Benzene	4 lb/MMscf	25 lb/MMscf	0.039	0.168
Ethylbenzene	1 lb/MMscf	25 lb/MMscf	0.039	0.168
n-Hexane	322 lb/MMscf	375 lb/MMscf	0.591	2.517
Toluene	8 lb/MMscf	25 lb/MMscf	0.039	0.168
2,2,4-TMP	6 lb/MMscf	25 lb/MMscf	0.039	0.168
Xylenes	5 lb/MMscf	25 lb/MMscf	0.039	0.168
Total HAP	346 lb/MMscf	500 lb/MMscf	0.787	3.356
	57,720	63,500		
	346	500		

Appalachia Midstream Services, LLC (AMS)

Sand Hill Compressor Station (SHCS)

Application for 45CSR13 New Source review Permit Modification (NSR)

Engine Crankcase (ECC) Emissions

Source ID	Site Rating	Operations	Leak Rate 0.36 scf/bhp-hr MMscf/yr		NOx 1.52 lb/hr		CO 9.07 lb/hr		VOC 4.62 lb/hr		PM 0.11 lb/hr		SO2 0.01 lb/hr			CO2 1,552 lb/hr		CH4 14.04 lb/hr		N2O 2.48E-03 lb/hr		CO2e 1,903 lb/hr	
					7.65 lb/MMscf		45.61 lb/MMscf		23.26 lb/MMscf		0.56 lb/MMscf		0.03 lb/MMscf			7,806 lb/MMscf		70.62 lb/MMscf		1.25E-02 lb/MMscf		9,575 lb/MMscf	
					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
CE-01	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-02	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-03	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-04	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-05	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-06	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-07	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-08	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-09	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-10	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-11	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
CE-12	1,380 bhp	8,760 hr/yr	4.33		4E-03	0.02	0.02	0.10	0.01	0.05	3E-04	1E-03	2E-05	7E-05		3.86	16.92	0.03	0.15	6E-06	3E-05	4.74	20.75
GEN	805 bhp	8,760 hr/yr	2.53		2E-03	0.01	0.01	0.06	0.01	0.03	2E-04	7E-04	1E-05	4E-05		2.25	9.87	0.02	0.09	4E-06	2E-05	2.76	12.10
TOT:	**17,365 bhp**	**113,880 hr/yr**	**54.54**	**TOT:**	**0.05**	**0.21**	**0.28**	**1.24**	**0.14**	**0.63**	**4E-03**	**0.02**	**2E-04**	**9E-04**	**TOT:**	**48.60**	**213**	**0.44**	**1.93**	**8E-05**	**3E-04**	**59.62**	**261**

Source ID	Acetaldehyde 9.39E-02 lb/hr		Acrolein 5.77E-02 lb/hr		Benzene 4.94E-03 lb/hr		Butadiene 3.00E-03 lb/hr		Ethylbenzene 4.46E-04 lb/hr		HCHO 1.19E+00 lb/hr		n-Hexane 1.25E-02 lb/hr		Methanol 2.81E-02 lb/hr		POM 3.89E-03 lb/hr		Toluene 4.58E-03 lb/hr		TMP, 2,2,4- 3.00E-03 lb/hr		Xylenes 2.07E-03 lb/hr		Other/Trace 3.60E-03 lb/hr		Total HAPs 1.40 lb/hr	
	4.72E-01 lb/MMscf		2.90E-01 lb/MMscf		2.49E-02 lb/MMscf		1.51E-02 lb/MMscf		2.24E-03 lb/MMscf		5.97E+00 lb/MMscf		6.27E-02 lb/MMscf		1.41E-01 lb/MMscf		1.96E-02 lb/MMscf		2.31E-02 lb/MMscf		1.51E-02 lb/MMscf		1.04E-02 lb/MMscf		1.81E-02 lb/MMscf		7.06 lb/MMscf	
	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	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-02	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-03	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-04	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-05	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-06	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-07	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-08	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-09	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-10	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-11	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
CE-12	2E-04	1E-03	1E-04	6E-04	1E-05	5E-05	7E-06	3E-05	1E-06	5E-06	3E-03	0.01	3E-05	1E-04	7E-05	3E-04	1E-05	4E-05	1E-05	5E-05	7E-06	3E-05	5E-06	2E-05	9E-06	4E-05	3E-03	0.02
GEN	1E-04	6E-04	8E-05	4E-04	7E-06	3E-05	4E-06	2E-05	6E-07	3E-06	2E-03	0.01	2E-05	8E-05	4E-05	2E-04	6E-06	2E-05	7E-06	3E-05	4E-06	2E-05	3E-06	1E-05	5E-06	2E-05	2E-03	0.01
TOTAL:	**3E-03**	**0.01**	**2E-03**	**0.01**	**2E-04**	**7E-04**	**9E-05**	**4E-04**	**1E-05**	**6E-05**	**0.04**	**0.16**	**4E-04**	**2E-03**	**9E-04**	**4E-03**	**1E-04**	**5E-04**	**1E-04**	**6E-04**	**9E-05**	**4E-04**	**6E-05**	**3E-04**	**1E-04**	**5E-04**	**0.04**	**0.19**

Notes: 1 - As per Caterpillar's Application & Installation Guide - Crankcase Ventilation Systems:
"[B]ow-by on a new engine is approx. 0.5 ft3 /bhp-hr
and design for a worn engine should be 1.0 ft3 /bhp-hr."
http://s7d2.scene7.com/is/content/Caterpillar/CM20160713-53120-62603

2 - Blowby emission rates converted from "actual" cubic feet to "standard" cubic feet:
scf = acf * [(P+14.6959)/14.6959] * [527.67/(T+459.67)]

Actual to Standard Conversions (@ 1,012 oF vs. 68 oF (Ignore Δ psi):	1.0 acf =	0.36 scf

3 - Engine Exhaust Flow Rates converted from "actual" cubic feet per minute to "standard" cubic feet per minute:
scf = acf * [(P+14.6959)/14.6959] * [527.67/(T+459.67)]

Actual to Standard Conversions (@ 1,012 oF vs. 68 oF (Ignore Δ psi):	9,240 acfm =	3,313 scfm

Attachment O

Monitoring/Recordkeeping/Reporting/Testing Plans

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

NOTE: AMS is not submitting any special recommendations for monitoring, recordkeeping, reporting, or testing plans other than those typically established for the emissions units in this application.

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.

The advertisement shall contain, at a minimum, the name of the applicant, the type and location of the source, the type and amount of air pollutants that will be discharged, the nature of the permit being sought, the proposed start-up date for the source and a contact telephone number for more information.

The location of the source should be as specific as possible starting with:

1) the street address of the source;
2) the nearest street or road;
3) the nearest town or unincorporated area;
4) the county; and
5) latitude and longitude coordinates.

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.

ATTACHMENT P
Public Notice

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Appalachia Midstream Services, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Permit Modification for the existing Sand Hill Compressor Station (SHCS), located on Golden Rd / McCausland Hill Rd (Approx. 2.5 miles SW of Dallas), in the Sand Hill Tax District of Marshal County, West Virginia.
.

The latitude and longitude coordinates are 39°59'16.0"N and -80°33'22.0"W.

The applicant estimates the increase/(decrease) in the potential to discharge the following regulated air pollutants will be:

1.61	tons of nitrogen oxides per year
4.65	tons of carbon monoxide per year
109.29	tons of volatile organic compounds per year
(0.60)	tons of particulate matter per year
(0.13)	tons of sulfur dioxide per year
3.41	tons of total hazardous air pollutants per year
20,664	tons of carbon dioxide equivalent per year

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

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

Dated this the _____ day of _____ 2018.

By: Appalachia Midstream Services, LLC
Mr. Paul V. Hunter
Vice President
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

Attachment Q
Business Confidential Claims
(Not Applicable)

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also

Attachment R
Authority Forms
(Not Applicable)

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also

Attachment S
Title V Permit Revision Information
(Not Applicable)

Supplement S1

Lab Analysis (Inlet Gas)

- **Wet Gas – Summary – Sand Hill Compressor Station (SHCS)**
- **Wet Gas – Lab Analysis – Sand Hill Compressor Station (SHCS)**

Wet Gas - Summary

Sampled: 11/02/16

GPSA-Sec 23

Component	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (MF)	lb/MMscf (WS/UGC#)	Weight % Total	Weight % THC	Weight % VOC	Component Btu/scf (HHV)	Btu/scf (HHV)
Water	109-86-4	H2O	18.015	---	---	---	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.0869	0.038	100.78	0.1746	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---	---	638	---
Nitrogen	7727-37-9	N2	28.013	0.4303	0.121	317.65	0.5503	---	---	---	---
Methane*	75-82-8	CH4	16.042	73.9064	11.856	31,243.65	54.1297	54.5249	---	1,010	746.455
Ethane*	74-84-0	C2H6	30.069	15.8261	4.759	12,540.14	21.7258	21.8844	---	1,770	280.074
Propane**	74-98-6	C3H8	44.096	5.9829	2.638	6,952.10	12.0445	12.1325	51.4292	2,516	150.542
iso-Butane**	75-28-5	C4H10	58.122	0.6737	0.392	1,031.85	1.7877	1.8007	7.6333	3,252	21.909
n-Butane**	106-97-8	C4H10	58.122	1.7221	1.001	2,637.60	4.5696	4.6030	19.5121	3,262	56.182
iso-Pentane**	78-78-4	C5H12	72.149	0.3661	0.264	696.05	1.2059	1.2147	5.1491	4,001	14.647
n-Pentane**	---	C5H12	72.149	0.4834	0.349	919.06	1.5923	1.6039	6.7989	4,009	19.379
Cyclopentane**	287-92-3	C5H10	70.100	0.0182	0.013	33.62	0.0582	0.0587	0.2487	3,764	0.685
Cyclohexane**	---	C6H12	84.162	0.0303	0.026	67.20	0.1164	0.1173	0.4971	4,482	1.358
Other Hexanes**	---	C6H14	86.175	0.1545	0.133	350.85	0.6078	0.6123	2.5955	4,750	7.339
Heptanes**	142-82-5	C7H16	100.205	0.1015	0.102	268.02	0.4643	0.4677	1.9827	5,503	5.585
Methylcyclohexane**	108-87-2	C7H14	98.186	0.0246	0.024	63.65	0.1103	0.1111	0.4709	5,216	1.283
C8+ Heavies**	Various	C8+	138.00 est.	0.0417	0.058	151.64	0.2627	0.2646	1.1218	7,000	2.919
Benzene***	71-43-2	C6H6	78.112	0.0020	0.002	4.12	0.0071	0.0072	0.0305	3,742	0.075
Ethylbenzene***	100-41-4	C8H10	106.165	0.0002	0.000	0.56	0.0010	0.0010	0.0041	5,222	0.010
n-Hexane***	110-54-3	C6H14	86.175	0.1419	0.122	322.24	0.5583	0.5624	2.3838	4,756	6.749
Toluene***	108-88-3	C7H8	92.138	0.0035	0.003	8.50	0.0147	0.0148	0.0629	4,475	0.157
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0019	0.002	5.72	0.0099	0.0100	0.0423	6,214	0.118
Xylenes***	1330-20-7	C8H10	106.165	0.0018	0.002	5.04	0.0087	0.0088	0.0373	5,209	0.094
Totals:				100.0000	21.90	57,720.03	100.0000	---	---		
THC:				99.4828	21.74	57,301.60	99.2751	100.0000	---		
Total VOC:				9.7503	5.13	13,517.81	23.4196	23.5906	100.0000		
Total HAP:				0.1513	0.13	346.17	0.5997	0.6041	2.5608		

Calculated Btu/scf (HHV): 1,333

Worst-Case Btu/scf (HHV): 1,020

#UGC (Universal Gas Constant)
= 379.482 scf/lb-mol @ 60 oF and 14.6959 psia.

lb "X"/scf =
(M% of "X") x (MW of "X") / #UGC

Component	Representative Gas Analysis			Assumed "Worst-Case" Min Margin: 10%	
	Mole %	Wgt %	lb/MMscf	Wgt %	lb/MMscf
CO2	0.087	0.1746	100.78	0.2362	150.00
Methane*	73.906	54.1297	31,243.65	54.1732	34,400.00
Other (N2, C2, O2, CO, H2O)	16.256	22.2761	12,857.79	22.1260	14,050.00
VOC**	9.750	23.4196	13,517.81	23.4646	14,900.00
TOTAL GAS	**100.000**	**100.0000**	**57,720.03**	**100.0000**	**63,500.00**
Benzene***	0.002	0.0071	4.12	0.0394	25.00
Ethylbenzene***	2E-04	0.0010	0.56	0.0394	25.00
n-Hexane***	0.142	0.5583	322.24	0.5906	375.00
Toluene***	0.004	0.0147	8.50	0.0394	25.00
2,2,4-Trimethylpentane***	0.002	0.0099	5.72	0.0394	25.00
Xylenes***	0.002	0.0087	5.04	0.0394	25.00
Total HAP***	**0.151**	**0.5997**	**346.17**	**0.7874**	**500.00**

* = Hydrocarbon (HC)
** = also Volatile Organic Compound (VOC)
*** = also Hazardous Air Pollutant (HAP)

Wet Gas - Lab Analysis

Williams Quality Control Facility
Extended Analysis by GPA 2186

Sample Information

	Sample Information
Sample Name	SAND HILL CF DEHY INLET
Meter Number	Operational - Environmental
Effective Date	12/01/2016 10:00:00
Sample Date	11/02/2016 14:14:00
Sample Type	S
Field Remarks	None
Office Remarks	None
Sample Technician	FR
Sample Pressure, psig	940
Sample Temperature, deg F	102
Sample Bottle No.	7025
Calibration Name	GPA 2286 Ext Gas Analysis - LOW C1
Injection Date	2016-11-04 10:38:15
Report Date	2016-11-04 11:18:10
EZReporter Configuration File	Utica Gas Extended Analysis - May 2016.cfgx

Component Results

Component Name	Ret. Time	Peak Area	Norm Mole%	
Nitrogen	3.54	4.200	0.4303	
Methane	3.49	402.392	73.9064	
Carbon Dioxide	4.53	1.000	0.0869	
Ethane	3.63	170.776	15.8261	
Propane	3.94	96.505	5.9829	
iso-Butane	4.42	14.440	0.6737	
n-Butane	4.83	37.122	1.7221	
Neopentane	5.03	0.266	0.0096	
iso-Pentane	6.20	9.936	0.3661	
n-Pentane	6.84	12.912	0.4738	
Hexanes Plus	0.00	0.000	0.5221	
Total:			100.0000	

Result	Dry	
Pressure Base (psia)	14.73	
Temperature Base	60.0	
Gross Heating Value (BTU / Ideal cu.ft.)	1317.4	
Gross Heating Value (BTU / Real cu.ft.)	1322.8	
Relative Density (G), Ideal	0.7555	
Relative Density (G), Real	0.7583	
Compressibility (Z) Factor	0.9959	
BTEX, mol%	0.0073	
Ethane, GPM @ 14.73 psia	4.2472	
Propane, GPM @ 14.73 psia	1.6541	
i-Butane, GPM @ 14.73 psia	0.2213	
n-Butane, GPM @ 14.73 psia	0.5451	
i-Pentane, GPM @ 14.73 psia	0.1345	
n-Pentane, GPM @ 14.73 psia	0.1723	
Hexanes Plus, GPM @ 14.73 psia	0.2274	
C5+, GPM @ 14.73 psia	0.5343	
C5+, mol%	1.3620	

Wet Gas - Lab Analysis

Total Component Results

Component	Weight%	Mole%	Volume%
Nitrogen	0.5507	0.4303	0.2395
Methane	54.1672	73.9064	63.4019
Carbon Dioxide	0.1747	0.0869	0.0750
Ethane	21.7409	15.8261	21.4232
Propane	12.0529	5.9829	8.3442
iso-Butane	1.7889	0.6737	1.1155
n-Butane	4.5727	1.7221	2.7481
Neopentane	0.0316	0.0096	0.0186
iso-Pentane	1.2067	0.3661	0.6783
n-Pentane	1.5617	0.4738	0.8686
2,2-Dimethylbutane	0.0421	0.0107	0.0226
2,3-Dimethylbutane/Cyclopentane	0.0650	0.0182	0.0323
2-Methylpentane	0.3242	0.0908	0.1611
3-Methylpentane	0.2087	0.0530	0.1094
n-Hexane	0.5586	0.1419	0.2952
2,2-Dimethylpentane	0.0101	0.0022	0.0052
Methylcyclopentane/2,4-Dimethylpentane	0.0604	0.0157	0.0281
Benzene	0.0071	0.0020	0.0028
3,3-Dimethylpentane	0.0069	0.0015	0.0035
Cyclohexane	0.0561	0.0146	0.0251
2-Methylhexane	0.1108	0.0242	0.0569
2,3-Dimethylpentane	0.0261	0.0057	0.0131
3-Methylhexane	0.1190	0.0260	0.0603
trans-1,3-Dimethylcyclopentane	0.0087	0.0019	0.0044
cis-1,3-Dimethylcyclopentane	0.0069	0.0015	0.0035
2,2,4-Trimethylpentane	0.0099	0.0019	0.0050
3-Ethylpentane	0.0064	0.0014	0.0032
n-Heptane	0.1854	0.0405	0.0945
cis-1,2-Dimethylcyclopentane	0.0031	0.0006	0.0015
Methylcyclohexane/1,1,3-Trimethylcyclopentane/2,2-Dimethylhexane	0.0924	0.0206	0.0419
2,5-Dimethylhexane	0.0057	0.0011	0.0029
2,4-Dimethylhexane/Ethylcyclopentane/2,2,3-Trimethylpentane	0.0141	0.0027	0.0070
3,3-Dimethylhexane	0.0052	0.0010	0.0026
trans-1,2-cis-3-Trimethylcyclopentane	0.0016	0.0003	0.0008
Toluene	0.0147	0.0035	0.0059
1,1,2-Trimethylcyclopentane	0.0057	0.0011	0.0028
2-Methylheptane/4-Methylheptane	0.0344	0.0066	0.0172
3-Methylheptane	0.0256	0.0049	0.0126
3-Ethylhexane	0.0371	0.0071	0.0184
trans-1,2-Dimethylcyclohexane	0.0047	0.0009	0.0023
cis-1,3-Dimethylcyclohexane	0.0169	0.0033	0.0077
1,1-Dimethylcyclohexane	0.0031	0.0006	0.0015
2,2,4-Trimethylhexane	0.0016	0.0003	0.0008
n-Octane	0.0391	0.0075	0.0194
trans-1,3-Dimethylcyclohexane	0.0036	0.0007	0.0016
1-Methyl-cis-2-Ethylcyclopentane	0.0018	0.0003	0.0009
cis-1,2-Dimethylcyclohexane	0.0031	0.0006	0.0014
2,3,3-Trimethylhexane	0.0012	0.0002	0.0006
1,1,4-Trimethylcyclohexane	0.0006	0.0001	0.0003
2,3,4-Trimethylhexane	0.0006	0.0001	0.0003
Ethylbenzene	0.0010	0.0002	0.0004
2,3-Dimethylheptane	0.0012	0.0002	0.0006
m-Xylene	0.0078	0.0016	0.0031
o-Xylene	0.0010	0.0002	0.0004
1,1,2-Trimethylcyclohexane	0.0006	0.0001	0.0003
n-Nonane	0.0070	0.0012	0.0034
n-Propylcyclohexane	0.0006	0.0001	0.0003
m-Ethyltoluene	0.0007	0.0001	0.0003
p-Ethyltoluene	0.0013	0.0002	0.0006
2-Methylnonane	0.0007	0.0001	0.0003
1,2,4-Trimethylbenzene/tert-Butylbenzene/Methylcyclooctane	0.0005	0.0001	0.0002
n-Decane	0.0013	0.0002	0.0006
Total:	100.0000	100.0000	100.0000

Supplement S2

Vendor Data

- **1380 bhp CAT G3516B w/ Emit OxCat**
- **805 bhp Capstone C600 Microturbine Generator**
- **BTEX Buster (Condenser)**
- **Vapor Recovery Unit (VRU)**
- **Carbon Canister (CarbCan)**

G3516B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Gantzer 10H

CATERPILLAR®

ENGINE SPEED (rpm):	1400	FUEL SYSTEM:	CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL
COMPRESSION RATIO:	8:1		
AFTERCOOLER - STAGE 2 INLET (°F):	130	**SITE CONDITIONS:**	
AFTERCOOLER - STAGE 1 INLET (°F):	201	FUEL:	Gantzer 10H
JACKET WATER OUTLET (°F):	210	FUEL PRESSURE RANGE(psig):	7.0-50.0
ASPIRATION:	TA	FUEL METHANE NUMBER:	43.9
COOLING SYSTEM:	JW+OC+1AC, 2AC	FUEL LHV (Btu/scf):	1216
IGNITION SYSTEM:	ADEM3	ALTITUDE(ft):	500
EXHAUST MANIFOLD:	DRY	MAXIMUM INLET AIR TEMPERATURE(°F):	77
COMBUSTION:	Ultra Lean Burn	STANDARD RATED POWER:	1380 bhp@1400rpm
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5		
SET POINT TIMING:	28		

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	1371	1371	1028	690
INLET AIR TEMPERATURE			°F	77	77	77	77
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	7396	7396	7921	8500
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8138	8138	8716	9353
AIR FLOW (77°F, 14.7 psia)	(WET)	(3)(4)	scfm	3118	3118	2446	1720
AIR FLOW	(WET)	(3)(4)	lb/hr	13826	13826	10846	7626
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	91.6	91.6	74.4	52.6
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	1024	1024	1017	1037
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	9227	9227	7215	5148
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	14314	14314	11237	7908
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(8)(9)	g/bhp-hr	3.10	3.10	3.32	3.26
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	4.06	4.06	4.35	4.41
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	2.03	2.03	2.18	2.21
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	1.04	1.04	1.11	1.13
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.36	0.36	0.35	0.35
CO2		(8)(9)	g/bhp-hr	527	527	563	611
EXHAUST OXYGEN		(8)(11)	% DRY	9.1	9.1	8.8	8.4
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	21373	21373	20032	18830
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	6083	6083	5072	4074
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	4462	4462	3967	3363
HEAT REJ. TO A/C - STAGE 1 (1AC)		(12)(13)	Btu/min	9231	9231	7552	2392
HEAT REJ. TO A/C - STAGE 2 (2AC)		(12)(13)	Btu/min	5248	5248	4962	3291

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(13)(14)	Btu/min	38558
TOTAL AFTERCOOLER CIRCUIT (2AC)	(13)(14)	Btu/min	5510
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

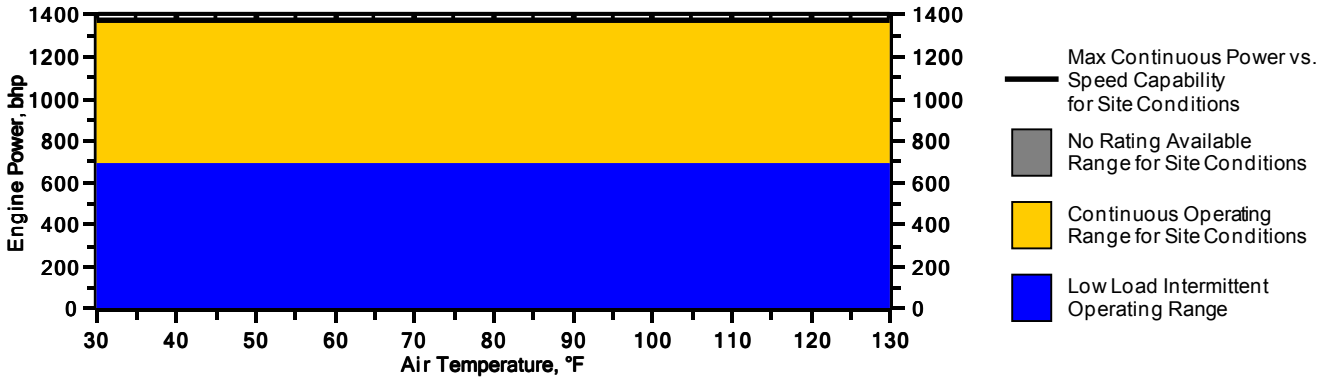
CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Max. rating is the maximum capability for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

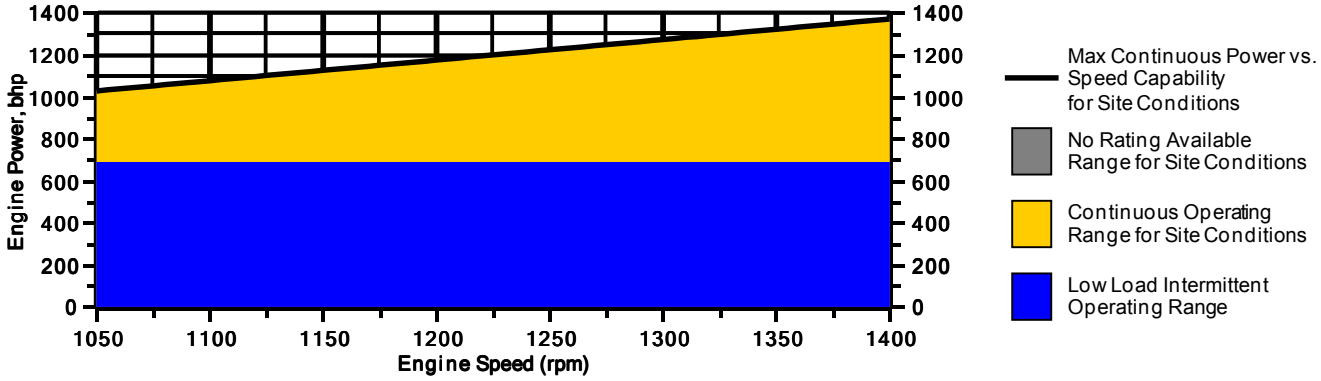
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 500 ft and 1400 rpm



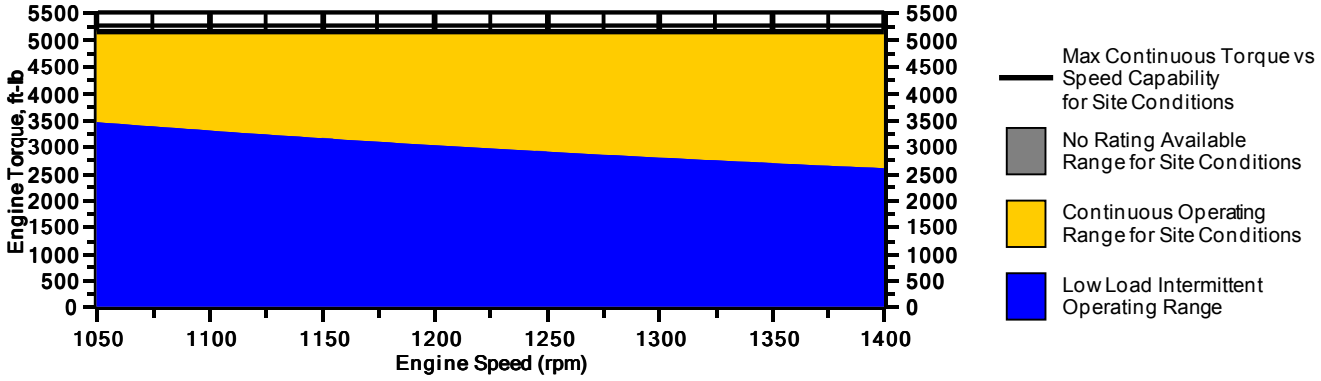
Engine Power vs. Engine Speed

Data represents speed sweep at 500 ft and 77 ºF



Engine Torque vs. Engine Speed

Data represents speed sweep at 500 ft and 77 ºF



Note: At site conditions of 500 ft and 77°F inlet air temp., constant torque can be maintained down to 1050 rpm. The minimum speed for loading at these conditions is 1050 rpm.

G3516B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Gantzer 10H

CATERPILLAR®

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

2. Fuel consumption tolerance is ± 3.0% of full load data.

3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

5. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

7. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

8. Emissions data is at engine exhaust flange prior to any after treatment.

9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

12. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	71.4070	71.4070
Ethane	C2H6	17.4920	17.4920
Propane	C3H8	6.7840	6.7840
Isobutane	iso-C4H1O	0.6640	0.6640
Norbutane	nor-C4H1O	1.8620	1.8620
Isopentane	iso-C5H12	0.3070	0.3070
Norpentane	nor-C5H12	0.4650	0.4650
Hexane	C6H14	0.3740	0.3740
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.4920	0.4920
Carbon Dioxide	CO2	0.1530	0.1530
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:	Gantzer 10H
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	43.9
Lower Heating Value (Btu/scf):	1216
Higher Heating Value (Btu/scf):	1338
WOBBE Index (Btu/scf):	1387
THC: Free Inert Ratio:	154.04
Total % Inerts (% N2, CO2, He):	0.65%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.996
Stoich A/F Ratio (Vol/Vol):	12.58
Stoich A/F Ratio (Mass/Mass):	16.37
Specific Gravity (Relative to Air):	0.769
Specific Heat Constant (K):	1.271

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

772 Airfield Lane
Sheridan, WY 82801
Office: 307.673.0883
EST@emittechnologies.com

Prepared For:
Jason Stinson
MIDCON COMPRESSION, LP

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3516B
Horsepower:	1371
RPM:	1400
Compression Ratio:	8.0:1
Exhaust Flow Rate:	9227 CFM
Exhaust Temperature:	1024 °F
Reference:	DM8800-04
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

NOx:	0.50 g/bhp-hr
CO:	3.10 g/bhp-hr
THC:	4.06 g/bhp-hr
NMHC:	2.03 g/bhp-hr
NMNEHC:	1.04 g/bhp-hr
HCHO:	0.36 g/bhp-hr
Oxygen:	9.10 %

POST CATALYST EMISSIONS

NOx:	Unaffected by Oxidation Catalyst
CO:	>98% Reduction
VOC:	>80% Reduction
HCHO:	>95% Reduction

CONTROL EQUIPMENT

Catalytic Converter

Model:	**ELH-4200V-1616F-42CEE-242**
Catalyst Type:	VOC, Precious group metals
Manufacturer:	EMIT Technologies, Inc.
Element Size:	Rectangle 24 x 15 x 3.5
Catalyst Elements:	2
Housing Type:	4 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	6 (0.5" NPT)
Inlet Connections:	16" Flat Face Flange
Outlet Connections:	16" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA

772 Airfield Lane
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WARRANTY

EMIT Technologies,Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of one (1) year from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst (Rich Burn Engines Only) shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures.

The exhaust temperature operating range at the converter inlet is 600°F minimum for oxidation catalyst and 750 °F for NSCR catalyst and 1250°F maximum.

If a high temperature shut down switch is not installed, thermal deactivation of catalyst at temperatures above 1300 °F is not covered.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent.

Engine lubrication oil shall contain less than 0.6% ash (by weight) with a maximum allowable specific oil consumption of 0.01 gal/bhp-hr. The maximum ash loading on the catalyst shall be limited to 350 g/m3. Phosphorous and zinc additives are limited to 0.03% (by weight).

The catalyst must not be exposed to the following know poisoning agents, including: iron, nickel, sodium, chromium, arsenic, zinc, lead, phosphorous, silicon, potassium, magnesium, copper, tin, and mercury. Total poison concentrations in the gas are limited to 0.3 ppm.

C600 600kW Power Package
High-pressure Natural Gas

World's largest air-bearing microturbine produces 600kW of clean, green, and reliable power.

- High electrical efficiency over a very wide operating range
- Low-maintenance air bearings require no lube oil or coolant
- Ultra-low emissions
- High availability – part load redundancy
- Proven technology with tens of millions of operating hours
- Integrated utility synchronization and protection with a modular design
- 5 and 9 year Factory Protection Plans available
- Remote monitoring and diagnostic capabilities
- Upgradable to 800kW or 1MW with field installed Capstone 200kW power modules
- Internal fuel gas compressor available for low fuel pressure natural gas applications

C600 Power Package

Electrical Performance[1]

Electrical Power Output	600kW
Voltage	400–480 VAC
Electrical Service	3-Phase, 4 wire
Frequency	50/60 Hz, grid connect operation
	10–60 Hz, stand alone operation
Maximum Output Current	870A RMS @ 400V, grid connect operation
	720A RMS @ 480V, grid connect operation
	930A RMS, stand alone operation[2]
Electrical Efficiency LHV	33%

Fuel/Engine Characteristics[1]

Natural Gas HHV	30.7–47.5 MJ/m^3 (825–1,275 BTU/scf)
Inlet Pressure[3]	517–552 kPa gauge (75–80 psig)
Fuel Flow HHV	7,200 MJ/hr (6,840,000 BTU/hr)
Net Heat Rate LHV	10.9 MJ/kWh (10,300 BTU/kWh)

Exhaust Characteristics[1]	Standard	Low-Emissions Version
NOx Emissions @ 15% O_2[4]	< 9 ppmvd (18 mg/m^3)	< 4 ppmvd (8 mg/m^3)
NOx / Electrical Output[4]	0.14 g/bhp-hr (0.4 lb/MWhe)	0.05 g/bhp-hr (0.14 lb/MWhe)
Exhaust Gas Flow	4.0 kg/s (8.8 lbm/s)	4.0 kg/s (8.8 lbm/s)
Exhaust Gas Temperature	280°C (535°F)	280°C (535°F)
Exhaust Energy	4,260 MJ/hr (4,050,000 BTU/hr)	4,260 MJ/hr (4,050,000 BTU/hr)

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

Dimensions & Weight[5]

Width x Depth x Height	2.4 x 9.1 x 2.9 m (96 x 360 x 114 in)
Weight - Grid Connect Model	12565 kg (27,700 lbs)
Weight - Dual Mode Model	15014 kg (33,100 lbs)

Minimum Clearance Requirements[6]

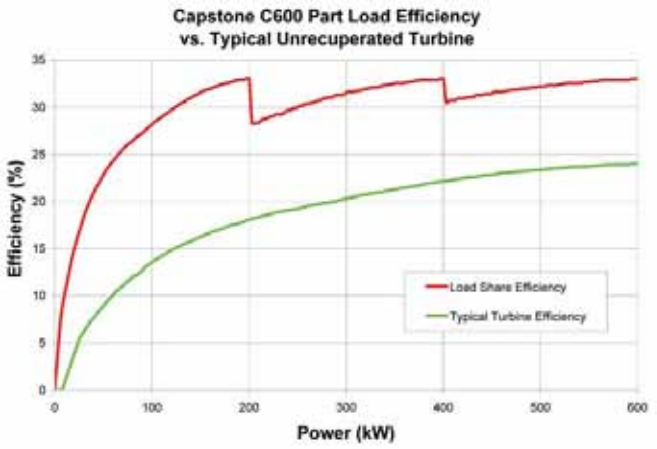
Vertical Clearance	0.6 m (24 in)
Horizontal Clearance	
Left	1.5 m (60 in)
Right	0.0 m (0 in)
Front	1.5 m (60 in)
Rear	2.0 m (80 in)

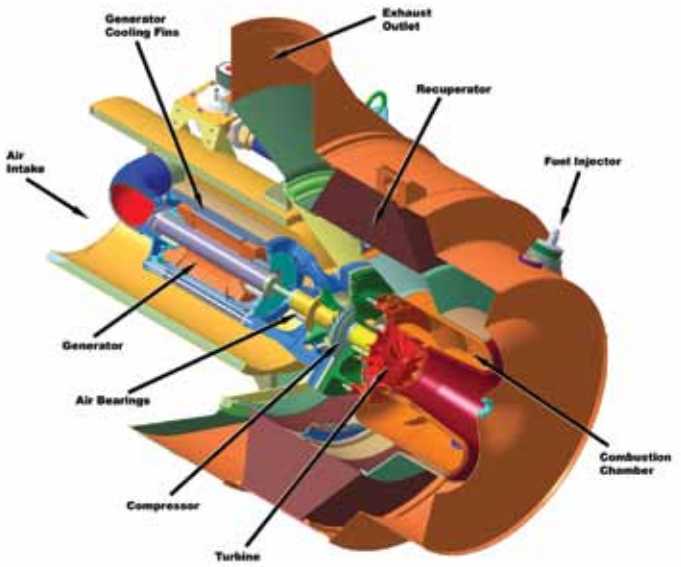
Sound Levels

Acoustic Emissions at Full Load Power	
Nominal at 10 m (33 ft)	65 dBA

Planned Certifications

- UL 2200 and UL 1741 for natural gas operation under existing UL files[7]
- Will comply with IEEE 1547 and will meet statewide utility interconnection requirements for California Rule 21 and the New York State Public Service Commission
- Models will be available with optional equipment for CE marking





C200 Engine

(1) Nominal full power performance at ISO conditions: 59°F, 14.696 psia, 60% RH
(2) With linear load
(3) Inlet pressure for standard natural gas at 39.4 MJ/Nm³ (1,000 BTU/scf) (HHV)
(4) Emissions for standard natural gas at 39.4 MJ/Nm³ (1,000 BTU/scf) (HHV)
(5) Approximate dimensions and weights
(6) Clearance requirements may increase due to local code considerations
(7) All models are planned to be UL Listed or available with optional equipment for CE marking

Specifications are not warranted and are subject to change without notice.

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Technical Reference

Capstone MicroTurbine™ Systems Emissions

The C600 Generator is comprised of Three (3) C200 Microturbine Units

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 (CO_2). This CO_2 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

Fuel Flow (HHV) = 11.4 MMBtu/1000 kW

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

Table 2 provides the same output-based information shown in Table 1, but expressed in grams per horsepower hour (g/hp-hr).

Table 2. Emission for Different Capstone Microturbine Models in [g/hp-hr]

Model	Fuel	NOx	CO	VOC [5]
C30 NG	Natural Gas [1]	0.22	0.60	0.078
CR30 MBTU	Landfill Gas [2]	0.22	7.4	0.340
CR30 MBTU	Digester Gas [3]	0.22	3.7	0.340
C30 Liquid	Diesel #2 [4]	0.90	0.14	0.078
C65 NG Standard	Natural Gas [1]	0.16	0.42	0.034
C65 NG Low NOx	Natural Gas [1]	0.06	0.44	0.034
C65 NG CARB	Natural Gas [1]	0.06	0.08	0.017
CR65 Landfill	Landfill Gas [2]	0.16	1.4	0.034
CR65 Digester	Digester Gas [3]	0.16	1.4	0.034
C200 NG	Natural Gas [1]	0.14	0.37	0.034
C200 NG CARB	Natural Gas [1]	0.05	0.07	0.014
CR200 Digester	Digester Gas [3]	0.14	1.3	0.034

Notes: - same as for Table 1

Emissions may also be reported on a volumetric basis, with the most common unit of measurement being parts per million. This is typically a measurement that is corrected to specific oxygen content in the exhaust and without considering moisture content. The abbreviation for this unit of measurement is “ppmvd” (parts per million by volume, dry) and is corrected to 15% oxygen for electrical generating equipment such as microturbines. The relationship between an output based measurement like pounds per MWh and a volumetric measurement like ppmvd depends on the characteristics of the generating equipment and the molecular weight of the criteria pollutant being measured. Table 3 expresses the emissions in ppmvd at 15% oxygen for the Capstone microturbine models shown in Table 1. Note that raw measurements expressed in ppmv will typically be lower than the corrected values shown in Table 3 because the microturbine exhaust has greater than 15% oxygen.

Another volumetric unit of measurement expresses the mass of a specific criteria pollutant per standard unit of volume. Table 4 expresses the emissions in milligrams per normal cubic meter at 15% oxygen. Normal conditions for this purpose are expresses as one atmosphere of pressure and zero degrees Celsius. Note that both the ppmvd and mg/m3 measurements are for specific oxygen content. A conversion can be made to adjust either unit of measurement to other reference oxygen contents, if required. Use the equation below to convert from one reference oxygen content to another:

$$\text{Emissions at New } O_2 = \frac{(20.9 - \text{New } O_2 \text{ Percent})}{(20.9 - \text{Current } O_2 \text{ Percent})} \text{ X Emissions at Current } O_2$$

For example, to express 9 ppmvd of NOx at 15% oxygen to ppmvd at 3% oxygen:

$$\text{Emissions at 3\% } O_2 = \frac{(20.9 - 3.0)}{(20.9 - 15.0)} \text{ X } 9 = 27 \text{ ppmvd}$$

Table 3. Emission for Different Capstone Microturbine Models in [ppmvd] at 15% O_2

Model	Fuel	NOx	CO	VOC
C30 NG	Natural Gas (1)	9	40	9
CR30 MBTU	Landfill Gas (2)	9	500	40
CR30 MBTU	Digester Gas (3)	9	250	40
C30 Liquid	Diesel #2 (4)	35	9	9
C65 NG Standard	Natural Gas (1)	9	40	7
C65 NG Low NOx	Natural Gas (1)	4	40	7
C65 NG CARB	Natural Gas (1)	4	8	3
CR65 Landfill	Landfill Gas (2)	9	130	7
CR65 Digester	Digester Gas (3)	9	130	7
C200 NG	Natural Gas (1)	9	40	7
C200 NG CARB	Natural Gas (1)	4	8	3
CR200 Digester	Digester Gas (3)	9	130	7

Notes: same as Table 1

Table 4. Emission for Different Capstone Microturbine Models in [mg/m3] at 15% O_2

Model	Fuel	NOx	CO	VOC (5)
C30 NG	Natural Gas (1)	18	50	6
CR30 MBTU	Landfill Gas (2)	18	620	30
CR30 MBTU	Digester Gas (3)	18	310	30
C30 Liquid	Diesel #2 (4)	72	11	6
C65 NG Standard	Natural Gas (1)	19	50	5
C65 NG Low NOx	Natural Gas (1)	8	50	5
C65 NG CARB	Natural Gas (1)	8	9	2
CR65 Landfill	Landfill Gas (2)	18	160	5
CR65 Digester	Digester Gas (3)	18	160	5
C200 NG	Natural Gas (1)	18	50	5
C200 NG CARB	Natural Gas (1)	8	9	2
CR200 Digester	Digester Gas (3)	18	160	5

Notes: same as Table 1

The emissions stated in Tables 1, 2, 3 and 4 are guaranteed by Capstone for new microturbines during the standard warranty period. They are also the expected emissions for a properly maintained microturbine according to manufacturer's published maintenance schedule for the useful life of the equipment.

Emissions at Full Power but Not at ISO Conditions

The maximum emissions in Tables 1, 2, 3 and 4 are at full power under ISO conditions. These levels are also the expected values at full power operation over the published allowable ambient temperature and elevation ranges.

Emissions at Part Power

Capstone microturbines are designed to maintain combustion stability and low emissions over a wide operating range. Capstone microturbines utilize multiple fuel injectors, which are switched on or off depending on the power output of the turbine. All injectors are typically on when maximum power is demanded, regardless of the ambient temperature or elevation. As the load requirements of the microturbine are decreased, injectors will be switched off to maintain stability and low emissions. However, the emissions relative to the lower power output may increase. This effect differs for each microturbine model.

Emissions Calculations for Permitting

Air Permitting agencies are normally concerned with the maximum amount of a given pollutant being emitted per unit of time (for example pounds per day of NOx). The simplest way to make this calculation is to use the maximum microturbine full electrical power output (expressed in MW) multiplied by the emissions rate in pounds per MWhe times the number of hours per day. For example, the C65 CARB microturbine operating on natural gas would have a NOx emissions rate of:

NOx = .17 X (65/1000) X 24 = .27 pounds per day

This would be representative of operating the equipment full time, 24 hours per day, at full power output of 65 kWe.

As a general rule, if local permitting is required, use the published agency levels as the stated emissions for the permit and make sure that this permitted level is above the calculated values in this technical reference.

Consideration of Useful Thermal Output

Capstone microturbines are often deployed where their clean exhaust can be used to provide heating or cooling, either directly or using hot water or other heat transfer fluids. In this case, the local permitting or standards agencies will usually consider the emissions from traditional heating sources as being displaced by the useful thermal output of the microturbine exhaust energy. This increases the useful output of the microturbine, and decreases the relative emissions of the combined heat and power system. For example, the CARB version C65 ICHP system with integral heat recovery can achieve a total system efficiency of 70% or more, depending on inlet water temperatures and other installation-specific characteristics. The electric efficiency of the CARB version C65 microturbine is 28% at ISO conditions. This means that the total NOx output based emissions, including the captured thermal value, is the electric-only emissions times the ratio of electric efficiency divided by total system efficiency:

NOx = .17 X 28/70 = .068 pounds per MWh (based on total system output)

This is typically much less than the emissions that would result from providing electric power using traditional central power plants, plus the emissions from a local hot water heater or boiler. In fact microturbine emissions are so low compared with traditional hot water heaters that installing a Capstone microturbine with heat recovery can actually decrease the local emissions of NOx and other criteria pollutants, without even considering the elimination of emissions from a remote power plant.

Greenhouse Gas Emissions

Many gasses are considered "greenhouse gasses", and agencies have ranked them based on their global warming potential (GWP) in the atmosphere compared with carbon dioxide (CO_2), as well as their ability to maintain this effect over time. For example, methane is a greenhouse gas with a GWP of 21. Criteria pollutants like NOx and organic compounds like methane are monitored by local air permitting authorities, and are subject to strong emissions controls. Even though some of these criteria pollutants can be more troublesome for global warming than CO_2, they are released in small quantities – especially from Capstone microturbines. So the major contributor of concern is carbon dioxide, or CO_2. Emission of CO_2 depends on two things:

1. Carbon content in the fuel
2. Efficiency of converting fuel to useful energy

It is for these reasons that many local authorities are focused on using clean fuels (for example natural gas compared with diesel fuel), achieving high efficiency using combined heat and power systems, and displacing emissions from traditional power plants using renewable fuels like waste landfill and digester gasses.

Table 5 shows the typical CO_2 emissions due to combustion for different Capstone microturbine models at full power and ISO conditions. The values do not include CO_2 that may already exist in the fuel itself, which is typical for renewable fuels like landfill and digester gas. These values are expressed on an output basis, as is done for criteria pollutants in Table 1. The table shows the pounds per megawatt hour based on electric power output only, as well as considering total useful output in a CHP system with total 70% efficiency (LHV). As for criteria pollutants, the relative quantity of CO_2 released is substantially less when useful thermal output is also considered in the measurement.

Table 5. CO_2 Emission for Capstone Microturbine Models in [lb/MWh]

Model	Fuel	CO_2	
		Electric Only	70% Total CHP
C30 NG	Natural Gas (1)	1,690	625
CR30 MBTU	Landfill Gas (1)	1,690	625
CR30 MBTU	Digester Gas (1)	1,690	625
C30 Liquid	Diesel #2 (2)	2,400	855
C65 NG Standard	Natural Gas (1)	1,520	625
C65 NG Low NOx	Natural Gas (1)	1,570	625
C65 NG CARB	Natural Gas (1)	1,570	625
CR65 Landfill	Landfill Gas (1)	1,520	625
CR65 Digester	Digester Gas (1)	1,520	625
C200 NG	Natural Gas (1)	1,330	625
C200 NG CARB	Natural Gas (1)	1,330	625
CR200 Digester	Digester Gas (1)	1,330	625

Notes:

(1) Emissions due to combustion, assuming natural gas with CO_2 content of 117 lb/MMBTU (HHV)

(2) Emissions due to combustion, assuming diesel fuel with CO_2 content of 160 lb/MMBTU (HHV)

Useful Conversions

The conversions shown in Table 6 can be used to obtain other units of emissions outputs. These are approximate conversions.

Table 6. Useful Unit Conversions

From	Multiply By	To Get
lb/MWh	0.338	g/bhp-hr
g/bhp-hr	2.96	lb/MWh
lb	0.454	kg
kg	2.20	lb
kg	1,000	g
hp (electric)	.746	kW
kW	1.34	hp (electric)
MW	1,000	kW
kW	0.001	MW

Definitions

- ISO conditions are defined as: 15 °C (59 °F), 60% relative humidity, and sea level pressure of 101.3 kPa (14.696 psia).
- HHV: Higher Heating Value
- LHV: Lower Heating Value
- kW_{th}: Kilowatt (thermal)
- kW_e : Kilowatt (electric)
- MWh: Megawatt-hour
- hp-hr: horsepower-hour (sometimes referred to as “electric horsepower-hour”)
- Scf: Standard cubic foot (standard references ISO temperature and pressure)
- m3: Normal cubic meter (normal references 0 °C and one atmosphere pressure)

Capstone Contact Information

If questions arise regarding this technical reference, please contact Capstone Turbine Corporation for assistance and information:

Capstone Applications

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Fax: (818) 734-5385

E-mail: applications@capstoneturbine.com

CAMERON

NATCO BTEX BUSTER

WELL SITE MIDSTREAM

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

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

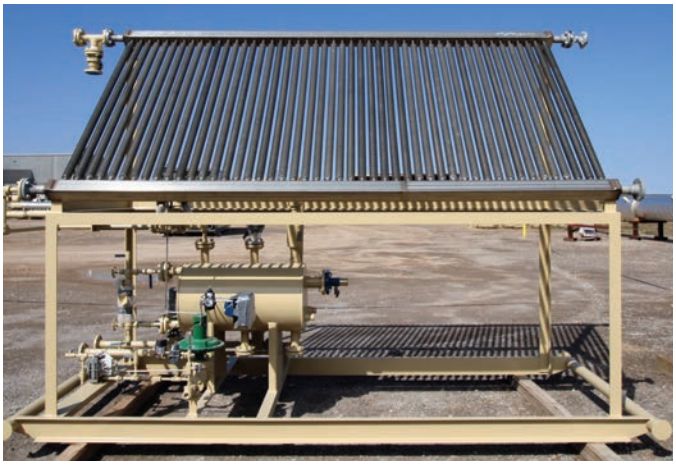
Cameron's NATCO® BTEX BUSTER® provides a removal efficiency greater than 99.7%*, helps recover and collect saleable liquid hydrocarbons and prevents the loss of expensive fuel gas from glycol reconcentrator vent emissions.

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.

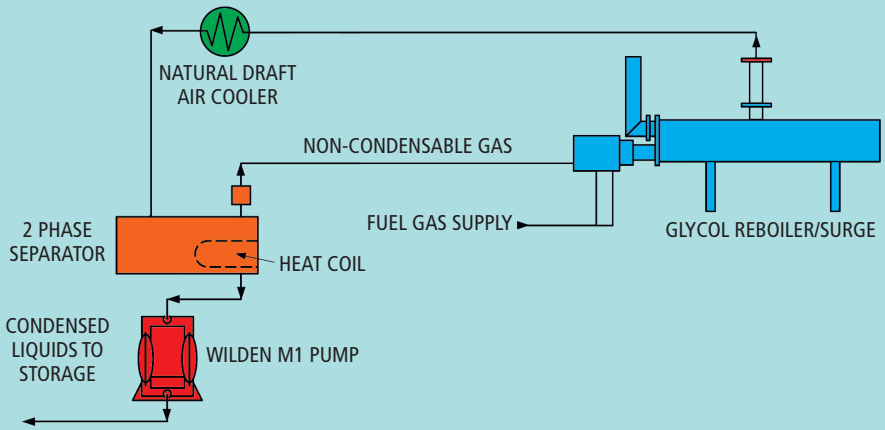
The vapors emitted from the glycol still column are cooled in the natural draft air cooler to temperatures below 120° F (49° C).

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.

CAMERON

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.*

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Midcontinent
Oklahoma City 405.677.8827

Rockies
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Bloomfield 505.634.1400
Grand Junction 970.243.3600
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Williston 701.774.5500

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Corpus Christi 361.289.0488
Godley 817.389.2676
Longview 903.759.2738
Odessa 432.530.3600

Canada
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Installing Vapor Recovery Units on Storage Tanks

Executive Summary

There are about 500,000 crude oil storage tanks in the United States. These tanks are used to hold oil for brief periods of time in order to stabilize flow between production wells and pipeline or trucking transportation sites. In addition, the condensate liquids contained in produced gas that are captured by a mist eliminator filter/ coalescer ahead of the first compressor station in transmission pipelines are often directed to a storage tank as well. During storage, light hydrocarbons dissolved in the crude oil or condensate—including methane and other volatile organic compounds (VOC), natural gas liquids (NGLs), hazardous air pollutants (HAP), and some inert gases—vaporize or "flash out" and collect in the space between the liquid and the fixed roof of the tank. As the liquid level in the tank fluctuates, these vapors are often vented to the atmosphere.

One way to prevent emissions of these light hydrocarbon vapors and yield significant economic savings is to install vapor recovery units (VRUs) on storage tanks. VRUs are relatively simple systems that can capture about 95 percent of the Btu-rich vapors for sale or for use onsite as fuel. Currently, between 7,000 and 9,000 VRUs are installed in the oil production sector, with an average of four tanks connected to each VRU.

Natural Gas STAR partners have generated significant savings from recovering and marketing these vapors while at the same time substantially reducing methane and HAP emissions. Partners have found that when the volume of vapors is sufficient, installing a VRU on one or multiple storage tanks can save up to $606,800 per year and payback in as little as two months. This Lessons Learned study describes how partners can identify when and where VRUs should be installed to realize these economic and environmental benefits.

Technology Background

Underground crude oil contains many lighter hydrocarbons in solution. When the oil is brought to the surface and processed, many of the dissolved lighter hydrocarbons (as well as water) are removed through a series of high-pressure and low-pressure separators. The crude oil is then injected into a storage tank to await sale and transportation off site; the remaining hydrocarbons in the oil are emitted as vapors into the tank. The same principles apply for condensate, which accumulates as a result of the conditions within the pipelines and is removed ahead of the first compressor station. The recovered condensate, which contains dissolved light hydrocarbons, is routed to a storage tank where the dissolved light hydrocarbons are emitted as vapors. These vapors are either vented, flared, or recovered by vapor recovery units (VRUs). Losses of the remaining lighter hydrocarbons are categorized in three ways:

- ★ Flash losses occur when the separator or heater treater, operating at approximately 35 pounds per square inch (psi), dumps oil into the storage tanks, which are at atmospheric pressure.
- ★ Working losses refer to the vapor released from the

Economic and Environmental Benefits

Method for Reducing Natural Gas Losses	Volume of Natural Gas Savings (Mcf/yr)	Value of Natural Gas Savings ($/yr) [1]			Implementation Cost ($)	Other Costs ($)	Payback (Months)		
		$3 per Mcf	$5 per Mcf	$7 per Mcf			$3 per Mcf	$5 per Mcf	$7 per Mcf
Installing Vapor Recovery Units (VRUs) on Oil Production Storage Tanks	4,900—96,000	$13,965—$273,600	$23,275—$456,000	$32,585—$638,400	$35,738—$103,959	$7,367—$16,839	6 — 37	4 — 23	3 — 16

[1] Assumes 95% of the annual volume of gas lost can be recovered using a VRU.

changing fluid levels and agitation of tank contents associated with the circulation of fresh oil through the storage tanks.

★ Standing losses occur with daily and seasonal temperature changes.

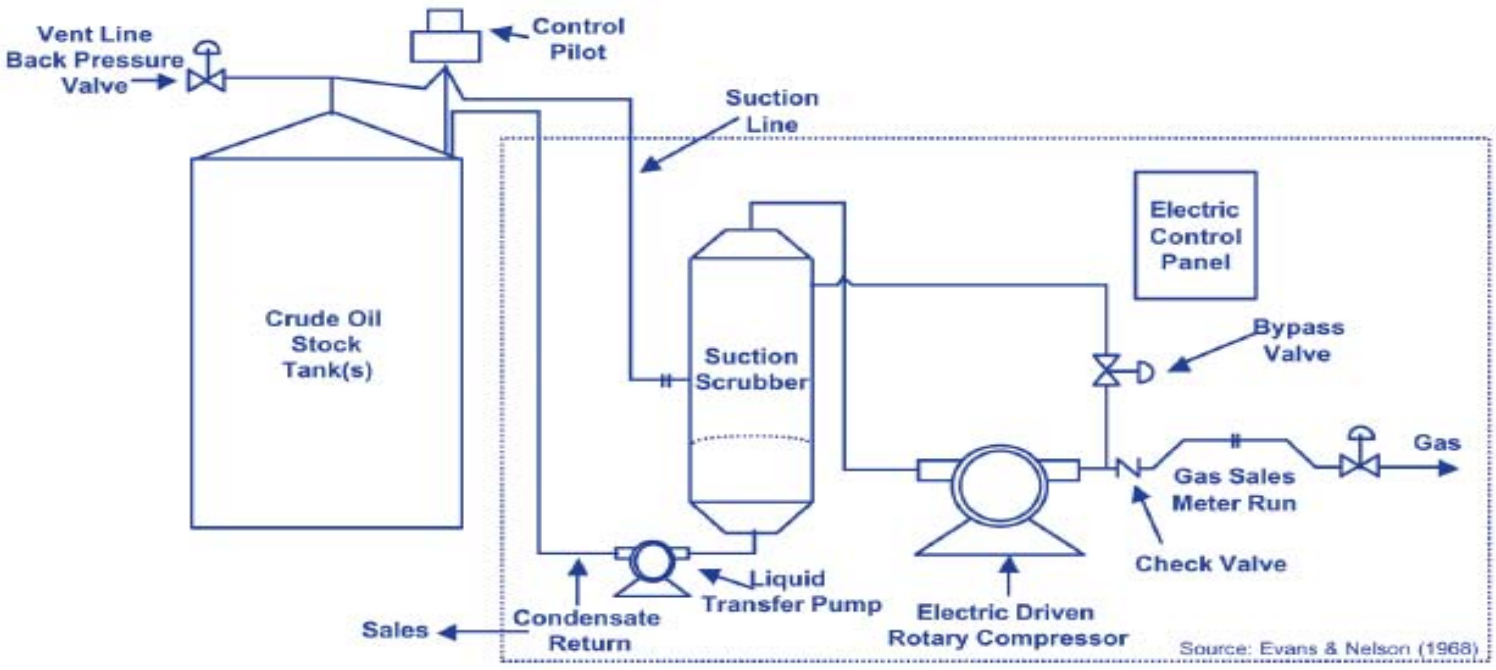
The volume of gas vapor coming off a storage tank depends on many factors. Lighter crude oils (API gravity>36°) flash more hydrocarbon vapors than heavier crudes (API gravity<36°). In storage tanks where the oil is frequently cycled and the overall throughput is high, more "working vapors" will be released than in tanks with low throughput and where the oil is held for longer periods and allowed to "weather." Finally, the operating temperature and pressure of oil in the vessel dumping into the tank will affect the volume of flashed gases coming out of the oil.

The makeup of these vapors varies, but the largest component is methane (between 40 and 60 percent). Other components include more complex hydrocarbon compounds such as propane, butane, and ethane; natural inert gases such as nitrogen and carbon dioxide; and HAP like benzene, toluene, ethyl-benzene, and xylene (collectively these four HAP are referred to as BTEX).

VRUs can recover over 95 percent of the hydrocarbon emissions that accumulate in storage tanks. Because recovered vapors contain natural gas liquids (even after condensates have been captured by the suction scrubber), they have a Btu content that is higher than that of pipeline quality natural gas (between 950 and 1,100 Btu per standard cubic foot [scf]). Depending on the volume of NGLs in the vapors, the Btu content can reach as high as 2,000 Btu per scf. Therefore, on a volumetric basis, the recovered vapors can be more valuable than methane alone.

Exhibit 1 illustrates a VRU installed on a single crude oil storage tank (multiple tank installations are also common). Hydrocarbon vapors are drawn out of the storage (stock) tank under low-pressure, typically between four ounces and two psi, and are first piped to a separator (suction scrubber) to collect any liquids that condense out. The liquids are usually recycled back to the storage tank. From the separator, the vapors flow through a compressor that provides the low-pressure suction for the VRU system. (To prevent the creation of a vacuum in the top of a tank when oil is withdrawn and the oil level drops, VRUs are equipped with a control pilot to shut down the compressor and permit the back flow of vapors into the tank.) The vapors are then metered and removed from the VRU system for pipeline sale or onsite fuel supply.

Exhibit 1: Standard Stock Tank Vapor Recovery System



CARBTROL®

AIR PURIFICATION CANISTERS 140-200 LB. ACTIVATED CARBON

G-1
G-2
G-3

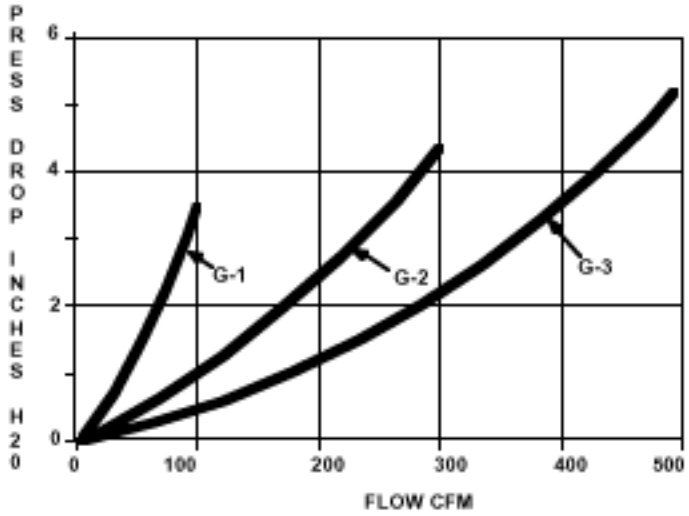
The CARBTROL "G" Canisters handles flows up to 500 CFM.

FEATURES

- High activity carbon.
- Epoxy lined steel or polyethylene construction.
- Acceptable for transport of hazardous spent carbon.
- Side drain for removal of accumulated condensate.
- Low pressure drop.
- PVC internal piping.
- High temperature (180°F) steel units available.

APPLICATIONS

- Soil vapor remediation
- Air stripper exhausts
- Tank vents
- Exhaust hoods
- Work area purification
- Sewage plant odor control



AT-116/#1

CARBTROL®
CORPORATION

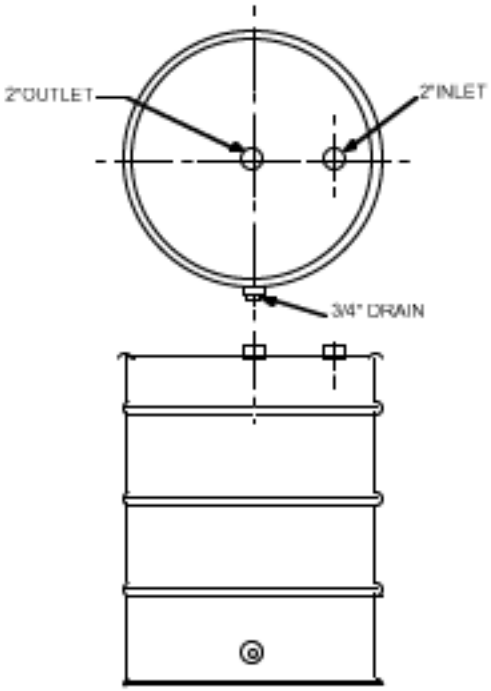
955 Connecticut Ave., Suite 5202
Bridgeport, CT 06607

800-242-1150 Fax: 203-337-4347
www.carbtrol.com info@carbtrol.com

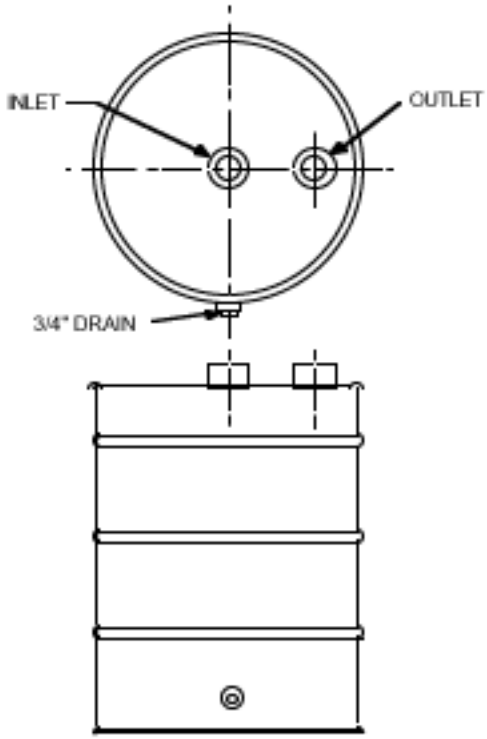
CARBTROL®

AIR PURIFICATION CANISTERS 140-200 LB. ACTIVATED CARBON

G-1
G-2
G-3



MODEL G-1



MODEL G-2,G-3

SPECIFICATIONS

MODEL	DIAMETER/HEIGHT	CARBON WEIGHT	INLET/OUTLET	MAXIMUM RATED FLOW	APPROXIMATE SHIP WEIGHT
G-1*	24"/36"	200 lbs.	2"/2"	100 CFM	250 lbs.
G-2*	24"/36"	170 lbs.	4"/4"	300 CFM	220 lbs.
G-3P	24"/36"	140 lbs.	6"/6"	500 CFM	190 lbs.
G-3S	24"/34"	140 lbs.	4"/4"	500 CFM	180 lbs.

* Specify: Polyethylene (P) or Epoxy Lined Steel (S)

SAFETY

Certain chemical compounds in the presence of activated carbon may oxidize, decompose or polymerize. This could result in temperature increases sufficient to cause ignition of the activated carbon or adsorbed material. If a compounds reaction with activated carbon is unknown, appropriate tests should be considered.

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Supplement S3

Emission Program Data

- **EPA Tanks 4.0.9d – Stabilized Condensate (SC) – Tank Emissions**
- **EPA Tanks 4.0.9d – Produced Water (PW) – Tank Emissions**
- **GRI-GLYCalc – 55.0 MMscfd Dehydrator**

Stabilized Condensate (SC) - Storage Tank (TK1-8)

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Battle Run CF 400 bbl Stablized Condensate Tank
City:	Near Dallas
State:	West Virginia
Company:	Appalachia Midstream Services
Type of Tank:	Vertical Fixed Roof Tank
Description:	Each of Eight 400 bbl Stabilized Condensate Tanks. Assume Gasoline RVP=12 as product stored.

Tank Dimensions

Shell Height (ft):		20.00
Diameter (ft):		12.00
Liquid Height (ft) :		19.00
Avg. Liquid Height (ft):		10.00
Volume (gallons):		16,074.56
Turnovers:		77.49
Net Throughput(gal/yr):		1,245,552.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		0.00
Slope (ft/ft) (Cone Roof)		0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Battle Run CF 400 bbl Stablized Condensate Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 12)	All	51.94	47.06	56.81	50.33	5.4430	4.9447	5.9807	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Battle Run CF 400 bbl Stablized Condensate Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	5,721.52	1,019.88	6,741.40

Produced Water (PW) - Storage Tank (WTK)

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Battle Run 400 bbl Produced Water Tank
City:	Near Dallas
State:	West Virginia
Company:	Appalachia Midstream Services
Type of Tank:	Vertical Fixed Roof Tank
Description:	400 bbl Produced Water Tank. Assume 95% Water + 5% Gasoline RVP=12 as product stored.

Tank Dimensions

Shell Height (ft):		20.00
Diameter (ft):		12.00
Liquid Height (ft) :		19.00
Avg. Liquid Height (ft):		10.00
Volume (gallons):		16,074.56
Turnovers:		47.68
Net Throughput(gal/yr):		766,500.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		0.00
Slope (ft/ft) (Cone Roof)		0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Battle Run 400 bbl Produced Water Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Produced Water	All	51.94	47.06	56.81	50.33	0.2465	0.2101	0.2893	28.3522			18.75	
Gasoline (RVP 12)						5.4430	4.9447	5.9807	64.0000	0.0500	0.5080	92.00	Option 4: RVP=12, ASTM Slope=3
Water						0.1930	0.1614	0.2307	18.0000	0.9500	0.4920	18.00	Option 1: VP50 = .178073 VP60 = .255246

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Battle Run 400 bbl Produced Water Tank - Vertical Fixed Roof Tank
Near Dallas, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Produced Water	101.51	18.57	120.08
Water	49.94	9.14	59.08
Gasoline (RVP 12)	51.57	9.44	61.00

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: SHCS-55.0 Dehy-Electric Pump-010818
File Name: C:\Users\Clyde\Documents\Documents\04.16 - Ecologic\07 - AMS - 000-BRCS-BCS-SHCS-TVOP-122617\SHCS-TVOP-DRAFT\SHCS-TVOP-S6c-55.0 Dehy - Electric Pump.ddf
Date: January 07, 2018

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0802	1.924	0.3511
Ethane	0.2803	6.728	1.2279
Propane	0.3613	8.672	1.5826
Isobutane	0.0875	2.100	0.3832
n-Butane	0.3368	8.084	1.4753
Isopentane	0.0834	2.002	0.3653
n-Pentane	0.1469	3.526	0.6434
n-Hexane	0.0821	1.970	0.3595
Cyclohexane	0.1006	2.415	0.4408
Other Hexanes	0.0755	1.813	0.3309
Heptanes	0.0958	2.299	0.4196
Methylcyclohexane	0.0726	1.743	0.3181
2,2,4-Trimethylpentane	0.0007	0.017	0.0030
Benzene	0.0566	1.358	0.2478
Toluene	0.0903	2.167	0.3954
Ethylbenzene	0.0033	0.080	0.0146
Xylenes	0.0348	0.835	0.1523
C8+ Heavies	0.0009	0.023	0.0041
Total Emissions	1.9897	47.753	8.7148
Total Hydrocarbon Emissions	1.9897	47.753	8.7148
Total VOC Emissions	1.6292	39.101	7.1359
Total HAP Emissions	0.2677	6.425	1.1726
Total BTEX Emissions	0.1850	4.439	0.8101

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.6043	38.503	7.0267
Ethane	5.6231	134.954	24.6292
Propane	7.3225	175.739	32.0724
Isobutane	1.7959	43.102	7.8661
n-Butane	6.9824	167.577	30.5829
Isopentane	1.8193	43.662	7.9684
n-Pentane	3.2803	78.728	14.3678
n-Hexane	2.0894	50.147	9.1518
Cyclohexane	2.7780	66.672	12.1677
Other Hexanes	1.8118	43.483	7.9357
Heptanes	3.3516	80.438	14.6800
Methylcyclohexane	2.5528	61.267	11.1812
2,2,4-Trimethylpentane	0.0244	0.587	0.1071
Benzene	1.5901	38.162	6.9646
Toluene	4.0164	96.393	17.5917
Ethylbenzene	0.2924	7.018	1.2809
Xylenes	3.4416	82.598	15.0742
C8+ Heavies	4.3664	104.795	19.1250

Total Emissions	54.7427	1313.826	239.7732
Total Hydrocarbon Emissions	54.7427	1313.826	239.7732
Total VOC Emissions	47.5154	1140.369	208.1173
Total HAP Emissions	11.4544	274.905	50.1701
Total BTEX Emissions	9.3405	224.172	40.9113

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	34.8694	836.865	152.7278
Ethane	32.9984	791.962	144.5331
Propane	20.4362	490.469	89.5106
Isobutane	3.2273	77.456	14.1357
n-Butane	9.4919	227.805	41.5744
Isopentane	2.1155	50.772	9.2658
n-Pentane	3.0205	72.491	13.2297
n-Hexane	1.0344	24.825	4.5306
Cyclohexane	0.3321	7.970	1.4545
Other Hexanes	1.1930	28.632	5.2253
Heptanes	0.7794	18.707	3.4139
Methylcyclohexane	0.2335	5.604	1.0228
2,2,4-Trimethylpentane	0.0115	0.275	0.0502
Benzene	0.0266	0.639	0.1166
Toluene	0.0419	1.006	0.1836
Ethylbenzene	0.0017	0.041	0.0075
Xylenes	0.0140	0.335	0.0612
C8+ Heavies	0.0858	2.058	0.3756
Total Emissions	109.9130	2637.911	481.4187
Total Hydrocarbon Emissions	109.9130	2637.911	481.4187
Total VOC Emissions	42.0452	1009.084	184.1579
Total HAP Emissions	1.1300	27.121	4.9496
Total BTEX Emissions	0.0842	2.021	0.3688

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0802	1.924	0.3511
Ethane	0.2803	6.728	1.2279
Propane	0.3613	8.672	1.5826
Isobutane	0.0875	2.100	0.3832
n-Butane	0.3368	8.084	1.4753
Isopentane	0.0834	2.002	0.3653
n-Pentane	0.1469	3.526	0.6434
n-Hexane	0.0821	1.970	0.3595
Cyclohexane	0.1006	2.415	0.4408
Other Hexanes	0.0755	1.813	0.3309
Heptanes	0.0958	2.299	0.4196
Methylcyclohexane	0.0726	1.743	0.3181

2,2,4-Trimethylpentane	0.0007	0.017	0.0030
Benzene	0.0566	1.358	0.2478
Toluene	0.0903	2.167	0.3954
Ethylbenzene	0.0033	0.080	0.0146
Xylenes	0.0348	0.835	0.1523
C8+ Heavies	0.0009	0.023	0.0041
Total Emissions	1.9897	47.753	8.7148
Total Hydrocarbon Emissions	1.9897	47.753	8.7148
Total VOC Emissions	1.6292	39.101	7.1359
Total HAP Emissions	0.2677	6.425	1.1726
Total BTEX Emissions	0.1850	4.439	0.8101

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: SHCS-55.0 Dehy-Electric Pump-010818
File Name: C:\Users\Clyde\Documents\Documents\04.16 - Ecologic\07 - AMS - 000-BRCS-BCS-SHCS-TVOP-122617\SHCS-TVOP-DRAFT\SHCS-TVOP-S6c-55.0 Dehy - Electric Pump.ddf
Date: January 07, 2018

DESCRIPTION:

Description: 55MMscfd, 1.0 MMbtu/hr reboiler
22 gpm Electric Pump
Flash Tank w/ 100% Recycle
BTEX Buster at 120 oF w/ 95% Control

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 95.00 deg. F
Pressure: 1100.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.0869
Nitrogen	0.4303
Methane	73.9064
Ethane	15.8261
Propane	5.9829
Isobutane	0.6737
n-Butane	1.7221
Isopentane	0.3757
n-Pentane	0.4738
n-Hexane	0.1419
Cyclohexane	0.0303
Other Hexanes	0.1727
Heptanes	0.1015
Methylcyclohexane	0.0246
2,2,4-Trimethylpentane	0.0019
Benzene	0.0020
Toluene	0.0035
Ethylbenzene	0.0002
Xylenes	0.0018
C8+ Heavies	0.0417

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: 22.0 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 120.0 deg. F
Pressure: 50.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 120.0 deg. F
Pressure: 14.1 psia

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 52.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: SHCS-55.0 Dehy-Electric Pump-010818
File Name: C:\Users\Clyde\Documents\Documents\04.16 - Ecologic\07 - AMS - 000-BRCS-BCS-SHCS-TVOP-122617\SHCS-TVOP-DRAFT\SHCS-TVOP-S6c-55.0 Dehy - Electric Pump.ddf
Date: January 07, 2018

DESCRIPTION:

Description: 55MMscfd, 1.0 MMbtu/hr reboiler
22 gpm Eectric Pump
Flash Tank w/ 100% Recycle
BTEX Buster at 120 oF w/ 95% Control

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0802	1.924	0.3511
Ethane	0.2803	6.728	1.2279
Propane	0.3613	8.672	1.5826
Isobutane	0.0875	2.100	0.3832
n-Butane	0.3368	8.084	1.4753
Isopentane	0.0834	2.002	0.3653
n-Pentane	0.1469	3.526	0.6434
n-Hexane	0.0821	1.970	0.3595
Cyclohexane	0.1006	2.415	0.4408
Other Hexanes	0.0755	1.813	0.3309
Heptanes	0.0958	2.299	0.4196
Methylcyclohexane	0.0726	1.743	0.3181
2,2,4-Trimethylpentane	0.0007	0.017	0.0030
Benzene	0.0566	1.358	0.2478
Toluene	0.0903	2.167	0.3954
Ethylbenzene	0.0033	0.080	0.0146
Xylenes	0.0348	0.835	0.1523
C8+ Heavies	0.0009	0.023	0.0041
Total Emissions	1.9897	47.753	8.7148
Total Hydrocarbon Emissions	1.9897	47.753	8.7148
Total VOC Emissions	1.6292	39.101	7.1359
Total HAP Emissions	0.2677	6.425	1.1726
Total BTEX Emissions	0.1850	4.439	0.8101

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.6043	38.503	7.0267
Ethane	5.6231	134.954	24.6292
Propane	7.3225	175.739	32.0724
Isobutane	1.7959	43.102	7.8661
n-Butane	6.9824	167.577	30.5829
Isopentane	1.8193	43.662	7.9684
n-Pentane	3.2803	78.728	14.3678

n-Hexane	2.0894	50.147	9.1518
Cyclohexane	2.7780	66.672	12.1677
Other Hexanes	1.8118	43.483	7.9357
Heptanes	3.3516	80.438	14.6800
Methylcyclohexane	2.5528	61.267	11.1812
2,2,4-Trimethylpentane	0.0244	0.587	0.1071
Benzene	1.5901	38.162	6.9646
Toluene	4.0164	96.393	17.5917
Ethylbenzene	0.2924	7.018	1.2809
Xylenes	3.4416	82.598	15.0742
C8+ Heavies	4.3664	104.795	19.1250
Total Emissions	54.7427	1313.826	239.7732
Total Hydrocarbon Emissions	54.7427	1313.826	239.7732
Total VOC Emissions	47.5154	1140.369	208.1173
Total HAP Emissions	11.4544	274.905	50.1701
Total BTEX Emissions	9.3405	224.172	40.9113

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	34.8694	836.865	152.7278
Ethane	32.9984	791.962	144.5331
Propane	20.4362	490.469	89.5106
Isobutane	3.2273	77.456	14.1357
n-Butane	9.4919	227.805	41.5744
Isopentane	2.1155	50.772	9.2658
n-Pentane	3.0205	72.491	13.2297
n-Hexane	1.0344	24.825	4.5306
Cyclohexane	0.3321	7.970	1.4545
Other Hexanes	1.1930	28.632	5.2253
Heptanes	0.7794	18.707	3.4139
Methylcyclohexane	0.2335	5.604	1.0228
2,2,4-Trimethylpentane	0.0115	0.275	0.0502
Benzene	0.0266	0.639	0.1166
Toluene	0.0419	1.006	0.1836
Ethylbenzene	0.0017	0.041	0.0075
Xylenes	0.0140	0.335	0.0612
C8+ Heavies	0.0858	2.058	0.3756
Total Emissions	109.9130	2637.911	481.4187
Total Hydrocarbon Emissions	109.9130	2637.911	481.4187
Total VOC Emissions	42.0452	1009.084	184.1579
Total HAP Emissions	1.1300	27.121	4.9496
Total BTEX Emissions	0.0842	2.021	0.3688

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr

Methane	0.0802	1.924	0.3511
Ethane	0.2803	6.728	1.2279
Propane	0.3613	8.672	1.5826
Isobutane	0.0875	2.100	0.3832
n-Butane	0.3368	8.084	1.4753
Isopentane	0.0834	2.002	0.3653
n-Pentane	0.1469	3.526	0.6434
n-Hexane	0.0821	1.970	0.3595
Cyclohexane	0.1006	2.415	0.4408
Other Hexanes	0.0755	1.813	0.3309
Heptanes	0.0958	2.299	0.4196
Methylcyclohexane	0.0726	1.743	0.3181
2,2,4-Trimethylpentane	0.0007	0.017	0.0030
Benzene	0.0566	1.358	0.2478
Toluene	0.0903	2.167	0.3954
Ethylbenzene	0.0033	0.080	0.0146
Xylenes	0.0348	0.835	0.1523
C8+ Heavies	0.0009	0.023	0.0041
Total Emissions	1.9897	47.753	8.7148
Total Hydrocarbon Emissions	1.9897	47.753	8.7148
Total VOC Emissions	1.6292	39.101	7.1359
Total HAP Emissions	0.2677	6.425	1.1726
Total BTEX Emissions	0.1850	4.439	0.8101

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	159.7545	0.3511	99.78
Ethane	169.1622	1.2279	99.27
Propane	121.5830	1.5826	98.70
Isobutane	22.0019	0.3832	98.26
n-Butane	72.1572	1.4753	97.96
Isopentane	17.2342	0.3653	97.88
n-Pentane	27.5975	0.6434	97.67
n-Hexane	13.6824	0.3595	97.37
Cyclohexane	13.6221	0.4408	96.76
Other Hexanes	13.1610	0.3309	97.49
Heptanes	18.0939	0.4196	97.68
Methylcyclohexane	12.2040	0.3181	97.39
2,2,4-Trimethylpentane	0.1573	0.0030	98.07
Benzene	7.0812	0.2478	96.50
Toluene	17.7752	0.3954	97.78
Ethylbenzene	1.2884	0.0146	98.87
Xylenes	15.1353	0.1523	98.99
C8+ Heavies	19.5006	0.0041	99.98
Total Emissions	721.1919	8.7148	98.79
Total Hydrocarbon Emissions	721.1919	8.7148	98.79
Total VOC Emissions	392.2752	7.1359	98.18
Total HAP Emissions	55.1197	1.1726	97.87
Total BTEX Emissions	41.2801	0.8101	98.04

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00	deg. F
Condenser Pressure:	14.08	psia
Condenser Duty:	1.61e-001	MM BTU/hr
Hydrocarbon Recovery:	1.20	bbls/day
Produced Water:	7.07	bbls/day
Ambient Temperature:	52.00	deg. F
Excess Oxygen:	0.00	%
Combustion Efficiency:	95.00	%
Supplemental Fuel Requirement:	1.61e-001	MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	4.99%	95.01%
Propane	4.93%	95.07%
Isobutane	4.87%	95.13%
n-Butane	4.82%	95.18%
Isopentane	4.58%	95.42%
n-Pentane	4.48%	95.52%
n-Hexane	3.93%	96.07%
Cyclohexane	3.62%	96.38%
Other Hexanes	4.17%	95.83%
Heptanes	2.86%	97.14%
Methylcyclohexane	2.84%	97.16%
2,2,4-Trimethylpentane	2.84%	97.16%
Benzene	3.56%	96.44%
Toluene	2.25%	97.75%
Ethylbenzene	1.14%	98.86%
Xylenes	1.01%	98.99%
C8+ Heavies	0.02%	99.98%

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:	1.87	lbs. H2O/MMSCF
Temperature:	95.0	deg. F
Pressure:	1100.0	psig
Dry Gas Flow Rate:	55.0000	MMSCF/day
Glycol Losses with Dry Gas:	2.1072	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	47.69	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	12.57	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.91%	96.09%
Carbon Dioxide	99.37%	0.63%
Nitrogen	99.94%	0.06%
Methane	99.95%	0.05%

Ethane	99.87%	0.13%
Propane	99.83%	0.17%
Isobutane	99.79%	0.21%
n-Butane	99.73%	0.27%
Isopentane	99.76%	0.24%
n-Pentane	99.70%	0.30%
n-Hexane	99.58%	0.42%
Cyclohexane	97.98%	2.02%
Other Hexanes	99.67%	0.33%
Heptanes	99.33%	0.67%
Methylcyclohexane	98.09%	1.91%
2,2,4-Trimethylpentane	99.73%	0.27%
Benzene	82.88%	17.12%
Toluene	79.18%	20.82%
Ethylbenzene	77.08%	22.92%
Xylenes	70.08%	29.92%
C8+ Heavies	98.96%	1.04%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 120.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.96%	0.04%
Carbon Dioxide	36.36%	63.64%
Nitrogen	4.30%	95.70%
Methane	4.40%	95.60%
Ethane	14.56%	85.44%
Propane	26.38%	73.62%
Isobutane	35.75%	64.25%
n-Butane	42.38%	57.62%
Isopentane	46.50%	53.50%
n-Pentane	52.30%	47.70%
n-Hexane	67.05%	32.95%
Cyclohexane	89.66%	10.34%
Other Hexanes	60.69%	39.31%
Heptanes	81.23%	18.77%
Methylcyclohexane	91.95%	8.05%
2,2,4-Trimethylpentane	68.56%	31.44%
Benzene	98.44%	1.56%
Toluene	99.05%	0.95%
Ethylbenzene	99.48%	0.52%
Xylenes	99.65%	0.35%
C8+ Heavies	98.31%	1.69%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead

Water	63.87%	36.13%
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	1.07%	98.93%
n-Pentane	0.96%	99.04%
n-Hexane	0.75%	99.25%
Cyclohexane	3.57%	96.43%
Other Hexanes	1.65%	98.35%
Heptanes	0.62%	99.38%
Methylcyclohexane	4.35%	95.65%
2,2,4-Trimethylpentane	2.19%	97.81%
Benzene	5.08%	94.92%
Toluene	7.98%	92.02%
Ethylbenzene	10.46%	89.54%
Xylenes	12.96%	87.04%
C8+ Heavies	12.21%	87.79%

STREAM REPORTS:

WET GAS STREAM

Temperature: 95.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 2.30e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.00e-001	1.09e+002
Carbon Dioxide	8.68e-002	2.31e+002
Nitrogen	4.30e-001	7.29e+002
Methane	7.38e+001	7.17e+004
Ethane	1.58e+001	2.88e+004
Propane	5.98e+000	1.59e+004
Isobutane	6.73e-001	2.37e+003
n-Butane	1.72e+000	6.05e+003
Isopentane	3.75e-001	1.64e+003
n-Pentane	4.73e-001	2.07e+003
n-Hexane	1.42e-001	7.39e+002
Cyclohexane	3.03e-002	1.54e+002
Other Hexanes	1.73e-001	9.00e+002
Heptanes	1.01e-001	6.15e+002
Methylcyclohexane	2.46e-002	1.46e+002
2,2,4-Trimethylpentane	1.90e-003	1.31e+001
Benzene	2.00e-003	9.44e+000
Toluene	3.50e-003	1.95e+001
Ethylbenzene	2.00e-004	1.28e+000
Xylenes	1.80e-003	1.16e+001
C8+ Heavies	4.17e-002	4.29e+002
Total Components	100.00	1.33e+005

DRY GAS STREAM

Temperature: 95.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.94e-003	4.28e+000
Carbon Dioxide	8.64e-002	2.30e+002
Nitrogen	4.30e-001	7.28e+002
Methane	7.39e+001	7.16e+004
Ethane	1.58e+001	2.87e+004
Propane	5.98e+000	1.59e+004
Isobutane	6.73e-001	2.36e+003
n-Butane	1.72e+000	6.03e+003
Isopentane	3.75e-001	1.63e+003
n-Pentane	4.73e-001	2.06e+003
n-Hexane	1.41e-001	7.36e+002
Cyclohexane	2.97e-002	1.51e+002
Other Hexanes	1.72e-001	8.97e+002
Heptanes	1.01e-001	6.11e+002
Methylcyclohexane	2.41e-002	1.43e+002
2,2,4-Trimethylpentane	1.90e-003	1.31e+001
Benzene	1.66e-003	7.83e+000
Toluene	2.77e-003	1.54e+001
Ethylbenzene	1.54e-004	9.89e-001
Xylenes	1.26e-003	8.10e+000
C8+ Heavies	4.13e-002	4.25e+002
Total Components	100.00	1.32e+005

LEAN GLYCOL STREAM

Temperature: 95.00 deg. F
Flow Rate: 2.20e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.22e+004
Water	1.50e+000	1.86e+002
Carbon Dioxide	1.17e-012	1.45e-010
Nitrogen	3.70e-013	4.58e-011
Methane	9.90e-018	1.23e-015
Ethane	1.47e-007	1.82e-005
Propane	9.12e-009	1.13e-006
Isobutane	1.22e-009	1.51e-007
n-Butane	3.30e-009	4.08e-007
Isopentane	1.60e-004	1.98e-002
n-Pentane	2.56e-004	3.17e-002
n-Hexane	1.27e-004	1.57e-002
Cyclohexane	8.30e-004	1.03e-001
Other Hexanes	2.45e-004	3.03e-002
Heptanes	1.68e-004	2.08e-002
Methylcyclohexane	9.37e-004	1.16e-001
2,2,4-Trimethylpentane	4.41e-006	5.47e-004

Benzene	6.87e-004	8.51e-002
Toluene	2.81e-003	3.48e-001
Ethylbenzene	2.76e-004	3.42e-002
Xylenes	4.14e-003	5.12e-001
C8+ Heavies	4.91e-003	6.08e-001
Total Components	100.00	1.24e+004

RICH GLYCOL STREAM

Temperature: 95.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 2.26e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.64e+001	1.22e+004
Water	2.30e+000	2.91e+002
Carbon Dioxide	1.15e-002	1.45e+000
Nitrogen	3.63e-003	4.60e-001
Methane	2.88e-001	3.65e+001
Ethane	3.05e-001	3.86e+001
Propane	2.19e-001	2.78e+001
Isobutane	3.97e-002	5.02e+000
n-Butane	1.30e-001	1.65e+001
Isopentane	3.12e-002	3.95e+000
n-Pentane	5.00e-002	6.33e+000
n-Hexane	2.48e-002	3.14e+000
Cyclohexane	2.54e-002	3.21e+000
Other Hexanes	2.40e-002	3.04e+000
Heptanes	3.28e-002	4.15e+000
Methylcyclohexane	2.29e-002	2.90e+000
2,2,4-Trimethylpentane	2.88e-004	3.65e-002
Benzene	1.34e-002	1.70e+000
Toluene	3.48e-002	4.41e+000
Ethylbenzene	2.59e-003	3.28e-001
Xylenes	3.14e-002	3.97e+000
C8+ Heavies	4.00e-002	5.06e+000
Total Components	100.00	1.27e+004

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 64.70 psia
Flow Rate: 1.56e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.42e-001	1.05e-001
Carbon Dioxide	5.11e-001	9.24e-001
Nitrogen	3.82e-001	4.40e-001
Methane	5.29e+001	3.49e+001
Ethane	2.67e+001	3.30e+001
Propane	1.13e+001	2.04e+001
Isobutane	1.35e+000	3.23e+000
n-Butane	3.97e+000	9.49e+000

Isopentane	7.14e-001	2.12e+000
n-Pentane	1.02e+000	3.02e+000
n-Hexane	2.92e-001	1.03e+000
Cyclohexane	9.60e-002	3.32e-001
Other Hexanes	3.37e-001	1.19e+000
Heptanes	1.89e-001	7.79e-001
Methylcyclohexane	5.79e-002	2.34e-001
2,2,4-Trimethylpentane	2.44e-003	1.15e-002
Benzene	8.29e-003	2.66e-002
Toluene	1.11e-002	4.19e-002
Ethylbenzene	3.92e-004	1.71e-003
Xylenes	3.20e-003	1.40e-002
C8+ Heavies	1.23e-002	8.58e-002
Total Components	100.00	1.11e+002

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.23e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.72e+001	1.22e+004
Water	2.32e+000	2.91e+002
Carbon Dioxide	4.21e-003	5.28e-001
Nitrogen	1.58e-004	1.98e-002
Methane	1.28e-002	1.60e+000
Ethane	4.48e-002	5.62e+000
Propane	5.84e-002	7.32e+000
Isobutane	1.43e-002	1.80e+000
n-Butane	5.57e-002	6.98e+000
Isopentane	1.47e-002	1.84e+000
n-Pentane	2.64e-002	3.31e+000
n-Hexane	1.68e-002	2.11e+000
Cyclohexane	2.30e-002	2.88e+000
Other Hexanes	1.47e-002	1.84e+000
Heptanes	2.69e-002	3.37e+000
Methylcyclohexane	2.13e-002	2.67e+000
2,2,4-Trimethylpentane	1.99e-004	2.50e-002
Benzene	1.34e-002	1.68e+000
Toluene	3.48e-002	4.36e+000
Ethylbenzene	2.60e-003	3.27e-001
Xylenes	3.15e-002	3.95e+000
C8+ Heavies	3.97e-002	4.97e+000
Total Components	100.00	1.25e+004

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.57e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.60e+001	1.05e+002
Carbon Dioxide	1.77e-001	5.28e-001
Nitrogen	1.04e-002	1.98e-002
Methane	1.47e+000	1.60e+000
Ethane	2.76e+000	5.62e+000
Propane	2.45e+000	7.32e+000
Isobutane	4.55e-001	1.80e+000
n-Butane	1.77e+000	6.98e+000
Isopentane	3.72e-001	1.82e+000
n-Pentane	6.70e-001	3.28e+000
n-Hexane	3.57e-001	2.09e+000
Cyclohexane	4.86e-001	2.78e+000
Other Hexanes	3.10e-001	1.81e+000
Heptanes	4.93e-001	3.35e+000
Methylcyclohexane	3.83e-001	2.55e+000
2,2,4-Trimethylpentane	3.15e-003	2.44e-002
Benzene	3.00e-001	1.59e+000
Toluene	6.42e-001	4.02e+000
Ethylbenzene	4.06e-002	2.92e-001
Xylenes	4.78e-001	3.44e+000
C8+ Heavies	3.78e-001	4.37e+000
Total Components	100.00	1.60e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.06e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	1.03e+002	999666.
Carbon Dioxide	1.09e-003	1.13e-003	11.
Nitrogen	1.07e-006	1.11e-006	0.
Methane	1.67e-004	1.73e-004	2.
Ethane	6.65e-004	6.86e-004	7.
Propane	8.80e-004	9.07e-004	9.
Isobutane	1.16e-004	1.19e-004	1.
n-Butane	5.92e-004	6.10e-004	6.
Isopentane	1.03e-004	1.06e-004	1.
n-Pentane	1.95e-004	2.01e-004	2.
n-Hexane	9.02e-005	9.30e-005	1.
Cyclohexane	6.25e-004	6.45e-004	6.
Other Hexanes	6.69e-005	6.90e-005	1.
Heptanes	5.82e-005	6.01e-005	1.
Methylcyclohexane	2.15e-004	2.22e-004	2.
2,2,4-Trimethylpentane	2.82e-007	2.91e-007	0.
Benzene	9.93e-003	1.02e-002	99.
Toluene	1.30e-002	1.34e-002	130.
Ethylbenzene	3.60e-004	3.71e-004	4.
Xylenes	5.23e-003	5.39e-003	52.

C8+ Heavies	3.58e-007	3.70e-007	0.
Total Components	100.00	1.03e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 3.51e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	3.38e-002	5.04e-003
Carbon Dioxide	4.55e-003	6.79e-004
Nitrogen	4.32e-005	6.45e-006
Methane	5.56e-003	8.29e-004
Ethane	1.05e-001	1.57e-002
Propane	6.38e-001	9.52e-002
Isobutane	3.09e-001	4.62e-002
n-Butane	1.64e+000	2.45e-001
Isopentane	1.01e+000	1.51e-001
n-Pentane	2.29e+000	3.42e-001
n-Hexane	3.00e+000	4.48e-001
Cyclohexane	5.12e+000	7.65e-001
Other Hexanes	2.02e+000	3.01e-001
Heptanes	9.62e+000	1.44e+000
Methylcyclohexane	7.37e+000	1.10e+000
2,2,4-Trimethylpentane	7.07e-002	1.06e-002
Benzene	3.00e+000	4.48e-001
Toluene	1.47e+001	2.20e+000
Ethylbenzene	1.51e+000	2.26e-001
Xylenes	1.84e+001	2.74e+000
C8+ Heavies	2.91e+001	4.35e+000
Total Components	100.00	1.49e+001

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 14.08 psia
Flow Rate: 3.49e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.21e+001	2.00e+000
Carbon Dioxide	1.30e+000	5.26e-001
Nitrogen	7.67e-002	1.98e-002
Methane	1.09e+001	1.60e+000
Ethane	2.03e+001	5.61e+000
Propane	1.78e+001	7.23e+000
Isobutane	3.27e+000	1.75e+000
n-Butane	1.26e+001	6.74e+000
Isopentane	2.51e+000	1.67e+000
n-Pentane	4.43e+000	2.94e+000
n-Hexane	2.07e+000	1.64e+000
Cyclohexane	2.60e+000	2.01e+000
Other Hexanes	1.91e+000	1.51e+000
Heptanes	2.08e+000	1.92e+000

Methylcyclohexane	1.61e+000	1.45e+000
2,2,4-Trimethylpentane	1.32e-002	1.39e-002
Benzene	1.57e+000	1.13e+000
Toluene	2.13e+000	1.81e+000
Ethylbenzene	6.80e-002	6.64e-002
Xylenes	7.12e-001	6.96e-001
C8+ Heavies	1.20e-002	1.88e-002
Total Components	100.00	4.23e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.51e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	1.26e+001	8.02e-002
Ethane	2.34e+001	2.80e-001
Propane	2.06e+001	3.61e-001
Isobutane	3.78e+000	8.75e-002
n-Butane	1.46e+001	3.37e-001
Isopentane	2.90e+000	8.34e-002
n-Pentane	5.12e+000	1.47e-001
n-Hexane	2.39e+000	8.21e-002
Cyclohexane	3.00e+000	1.01e-001
Other Hexanes	2.20e+000	7.55e-002
Heptanes	2.40e+000	9.58e-002
Methylcyclohexane	1.86e+000	7.26e-002
2,2,4-Trimethylpentane	1.53e-002	6.94e-004
Benzene	1.82e+000	5.66e-002
Toluene	2.46e+000	9.03e-002
Ethylbenzene	7.86e-002	3.32e-003
Xylenes	8.23e-001	3.48e-002
C8+ Heavies	1.39e-002	9.41e-004
Total Components	100.00	1.99e+000

Supplement S4

AP-42 / EPA Emission Factors

- **AP-42 – Combustion Emission Factor Summary**
- **EPA Protocol for Equipment Leak Emission Estimates**

Potentially Applicable

AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

	Pollutant	GAS-FIRED ENGINES			GAS-FIRED TURBINES		
		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	3.23E-01	1.28E-01	9.91E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.23E-02	2.95E-02	1.51E-02
	VOC (NMNEHC w/o HCHO)	4.68E-02	4.92E-02	6.20E-04	2.06E-03	2.06E-03	2.06E-03
	VOC (NMNEHC w/ HCHO)	1.20E-01	1.18E-01	2.96E-02	2.82E-03	2.82E-03	2.13E-03
	PM10/2.5 (Total)	4.83E-02	9.99E-03	1.94E-02	6.63E-03	6.63E-03	6.63E-03
	SO2 (2,000 gr-S/MMscf ≈ 0.0007 W%)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04
HAPs	Acetaldehyde	7.76E-03	8.36E-03	2.79E-03	4.00E-05	4.00E-05	4.00E-05
	Acrolein	7.78E-03	5.14E-03	2.63E-03	6.40E-06	6.40E-06	6.40E-06
	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Butadiene, 1,3-	8.20E-04	2.67E-04	6.63E-04	4.30E-07	4.30E-07	4.30E-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	---	---	---
	Polycyclic Organic Matter (POM/PAH)	1.34E-04	3.47E-04	9.71E-05	3.25E-05	3.25E-05	3.25E-05
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	Trimethylpentane, 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
	Other/Trace HAP*	6.57E-04	3.21E-04	1.79E-04	2.90E-05	2.90E-05	2.90E-05
	TOTAL HAP	7.94E-02	7.22E-02	3.23E-02	1.06E-03	1.06E-03	3.55E-04
GHG	CO2 (GWP=1)	1.10E+02	1.10E+02	1.10E+02	1.10E+02	1.10E+02	1.10E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.64E-03	8.64E-03	8.64E-03
	N2O (GWP=298)	*2.20E-04*	*2.20E-04*	*2.20E-04*	3.00E-03	3.00E-03	3.00E-03
	CO2e	*1.46E+02*	*1.41E+02*	*1.16E+02*	*1.11E+02*	*1.11E+02*	*1.11E+02*

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

	Pollutant	GAS-FIRED EXTERNAL COMBUSTION			FLARE	DIESEL ENGINES	DIESEL EMGEN
		AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			13.5-1 06/17	3.3-1; 3.3-2 10/96	Tier 4 ≥ 751 bhp
		Uncontrolled lb/MMBtu	LoNOx Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	Combustion lb/MMBtu	Uncontrolled lb/MMBtu	Controlled lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	9.80E-02	4.90E-02	3.14E-02	External Comb.	4.41E+00	4.18E+00
	CO (≥ 90% Load)	8.24E-02	8.24E-02	8.24E-02	3.10E-01	9.50E-01	2.35E+00
	VOC (NMNEHC w/o HCHO)	5.32E-03	5.32E-03	5.32E-03	98% Control	3.52E-01	1.27E-01
	VOC (NMNEHC w/ HCHO)	5.39E-03	5.39E-03	5.39E-03	98% Control	3.53E-01	1.28E-01
	PM10/2.5 (Total)	7.45E-03	7.45E-03	7.45E-03	External Comb.	3.10E-01	1.35E-01
	SO2 (2,000 gr-S/MMscf ≈ 0.0007 W%)	5.88E-04	5.88E-04	5.88E-04	External Comb.	2.90E-01	2.90E-01
HAPs	Acetaldehyde	---	---	---	Use External Combustion or 98% Control, As Appropriate	7.67E-04	2.77E-04
	Acrolein	---	---	---		9.25E-05	3.35E-05
	Benzene	2.06E-06	2.06E-06	2.06E-06		9.33E-04	3.38E-04
	Butadiene, 1,3-	---	---	---		3.91E-05	1.41E-05
	Ethylbenzene	---	---	---		---	---
	Formaldehyde (HCHO)	7.35E-05	7.35E-05	7.35E-05		1.18E-03	4.27E-04
	n-Hexane	1.76E-03	1.76E-03	1.76E-03		---	---
	Methanol (MeOH)	---	---	---		---	---
	Polycyclic Organic Matter (POM/PAH)	6.85E-07	6.85E-07	6.85E-07		1.68E-04	6.08E-05
	Toluene	3.33E-06	3.33E-06	3.33E-06		4.09E-04	1.48E-04
	Trimethylpentane, 2,2,4- (i-Octane)	---	---	---		---	---
	Xylenes	---	---	---		2.85E-04	1.03E-04
	Other/Trace HAP*	1.18E-06	1.18E-06	1.18E-06		---	---
	TOTAL HAP	1.85E-03	1.85E-03	1.85E-03		3.87E-03	1.40E-03
GHG	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02		1.64E+02	1.64E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03		*6.61E-03*	*6.61E-03*
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04		*1.32E-03*	*1.32E-03*
	CO2e	*1.18E+02*	*1.18E+02*	*1.18E+02*		*1.65E+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		Weighted Sum
	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu	CO2e lb CO2e/MMBtu
Fuel Oil No. 2 (Diesel)	138,000 Btu/gal	1.63E+02	6.61E-03	1.32E-03	1.64E+02
Propane	91,000 Btu/gal	1.39E+02	6.61E-03	1.32E-03	1.39E+02
Natural Gas	1,026 Btu/scf	1.17E+02	2.20E-03	2.20E-04	1.17E+02

*Other/Trace HAPs include: CarbonTetrachloride, Chlorobenzene, Chloroform, Dichloropropene, 1,3-Dichloropropene, Ethylene Dibromide, Methylene Chloride, Phenol, Propylene Oxide, Styrene, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, and Vinyl Chloride (as per AP-42).

Global Warming Potential (100 Yr) (GWP)		
Table A-1 to Subpart A of Part 98		
CO2	CH4	N2O
1	25	298

Reviewed and Revised: 01/03/18 - CAR

United States Environmental Protection Agency | Office of Air Quality Planning and Standards Research Triangle Park NC 27711 | EPA-453/R-95-017 November 1995

Air

Protocol for Equipment Leak Emission Estimates

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

Equipment Type	Service[a]	Emission Factor (kg/hr/source)[b]
Valves	Gas	4.5E-03
	Heavy Oil	8.4E-06
	Light Oil	2.5E-03
	Water/Oil	9.8E-05
Pump seals	Gas	2.4E-03
	Heavy Oil	NA
	Light Oil	1.3E-02
	Water/Oil	2.4E-05
Others[c]	Gas	8.8E-03
	Heavy Oil	3.2E-05
	Light Oil	7.5E-03
	Water/Oil	1.4E-02
Connectors	Gas	2.0E-04
	Heavy Oil	7.5E-06
	Light Oil	2.1E-04
	Water/Oil	1.1E-04
Flanges	Gas	3.9E-04
	Heavy Oil	3.9E-07
	Light Oil	1.1E-04
	Water/Oil	2.9E-06
Open-ended lines	Gas	2.0E-03
	Heavy Oil	1.4E-04
	Light Oil	1.4E-03
	Water/Oil	2.5E-04

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

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**	**JJJJ-Compressor Engines**
○ NESHAP Requirements:	$2,500	Not Applicable
○ New Major Source:	$10,000	Not Applicable
○ Major Modifications:	$5,000	Not Applicable

- Total application fee is **$2,000**
  [= $1,000 Minimum Fee + $1,000 Additional Charges

**** End of Application for 45CSR13 New Source Review Permit Modification (NSR) ****