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May 2, 2014

Mr. John Benedict, Director
West Virginia Department of Environmental Protection
Division of Air Quality
Charleston, WV 25304

**Re: MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant
Application for Title V Operating (45SR30) Permit**

Dear Mr. Benedict:

MarkWest Liberty Midstream & Resources L.L.C. (MarkWest) is submitting the enclosed Title V Operating Permit application in accordance with the West Virginia Air Pollution Control Act and Title 45 Series 30 (45CSR30) for the Majorsville Gas Plant in Marshall County. The Majorsville Gas Plant became a major source of greenhouse gases with the startup of the De-Ethanizer. The De-Ethanizer began operations on December 14, 2013, and is currently operating under permit R13-2818D.

This package contains the required application forms for the referenced facility.

If you have any questions or comments, please call myself at (303) 542-1212 or email dmichaud@markwest.com, or call Nathan Wheldon at (303) 542-0686 or e-mail nwheldon@markwest.com at your convenience.

Sincerely,

A handwritten signature in blue ink, appearing to read "Dan Michaud", with a stylized flourish at the end.

Dan Michaud
Environmental Coordinator
Enclosures (2 CDs + Hard copies)

MARKWEST LIBERTY MIDSTREAM & RESOURCES L.L.C.

MAJORSVILLE GAS PLANT

45CSR30 TITLE V OPERATING PERMIT APPLICATION

**SUBMITTED TO WVDEP DIVISION OF AIR QUALITY
MAY 2014**

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Introduction

MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) owns and operates the Majorsville Gas Plant under the provisions of Permit R13-2818D. The facility is comprised of four cryogenic processing plants, Majorsville I, II, III, and V, and a de-ethanizer. With the addition of Majorsville III, V, and the de-ethanizer, the facility became a major source for greenhouse gases. MarkWest is hereby submitting a Title V Operating Permit application in accordance with 45 CSR 30.

The Majorsville Gas Plant is a natural gas gathering and processing plant for gas wells throughout West Virginia. Emission sources at the facility include three (3) 2,370-hp, Caterpillar G3608 compressor engines, two (2) 5.60 mmbtu/hr regeneration gas heaters, one (1) 15.4 mmbtu/hr heat medium oil heater, two (2) 7.69 mmbtu/hr regeneration gas heaters, one (1) 16.07 mmbtu/hr heat medium oil heater, one (1) 119.2 mmbtu/hr heat medium oil heater, one (1) 14.25 mmbtu/hr regeneration gas heater, two (2) 3.70 mmscf/hr flares, facility blowdowns and fugitive equipment leaks.

This facility is located at 1700 Majorsville Rd, in Marshall County, West Virginia. This submittal includes the following:

- Title V Permit Application Checklist
- Title V Application – General Forms
- Attachment A – Area Map
- Attachment B – Plot Plan
- Attachment C – Process Flow Diagram
- Attachment D – Title V Equipment Form
- Attachment E – Emission Unit Form
- Attachment G – Air Pollution Control Device Form
- Emissions Summary

If there are any questions concerning this submittal the following may be contacted:

Nathan Wheldon
Environmental Manager
MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street, Tower 1, Suite 1600
Denver, CO 80202-2137
Phone: (303) 542-0686
Fax: (303) 542-0686

Title V Permit Application Checklist For Administrative Completeness

A complete application is demonstrated when all of the information required below is properly prepared, completed and attached. The items listed below are required information which must be submitted with a Title V permit application. Any submittal will be considered incomplete if the required information is not included.*

<input checked="" type="checkbox"/>	Two signed copies of the application (at least one <u>must</u> contain the original "Certification" page signed and dated in blue ink)
<input checked="" type="checkbox"/>	Correct number of copies of the application on separate CDs or diskettes, (i.e. at least one disc per copy)
<input checked="" type="checkbox"/>	*Table of Contents (needs to be included but not for administrative completeness)
<input checked="" type="checkbox"/>	Facility information
<input checked="" type="checkbox"/>	Description of process and products, including NAICS and SIC codes, and including alternative operating scenarios
<input checked="" type="checkbox"/>	Area map showing plant location
<input checked="" type="checkbox"/>	Plot plan showing buildings and process areas
<input checked="" type="checkbox"/>	Process flow diagram(s), showing all emission units, control equipment, emission points, and their relationships
<input checked="" type="checkbox"/>	Identification of all applicable requirements with a description of the compliance status, the methods used for demonstrating compliance, and a Schedule of Compliance Form (ATTACHMENT F) for all requirements for which the source is not in compliance
<input checked="" type="checkbox"/>	Listing of all active permits and consent orders (if applicable)
<input checked="" type="checkbox"/>	Facility-wide emissions summary
<input checked="" type="checkbox"/>	Identification of Insignificant Activities
<input checked="" type="checkbox"/>	ATTACHMENT D - Title V Equipment Table completed for all emission units at the facility except those designated as insignificant activities
<input checked="" type="checkbox"/>	ATTACHMENT E - Emission Unit Form completed for each emission unit listed in the Title V Equipment Table (ATTACHMENT D) and a Schedule of Compliance Form (ATTACHMENT F) for all requirements for which the emission unit is not in compliance
<input checked="" type="checkbox"/>	ATTACHMENT G - Air Pollution Control Device Form completed for each control device listed in the Title V Equipment Table (ATTACHMENT D)
<input type="checkbox"/>	ATTACHMENT H – Compliance Assurance Monitoring (CAM) Plan Form completed for each control device for which the "Is the device subject to CAM?" question is answered "Yes" on the Air Pollution Control Device Form (ATTACHMENT G)
<input checked="" type="checkbox"/>	General Application Forms signed by a Responsible Official
<input type="checkbox"/>	Confidential Information submitted in accordance with 45CSR31

Title V Application General Forms



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street SE
Charleston, WV 25304
Phone: (304) 926-0475

www.dep.wv.gov/daq

INITIAL/RENEWAL TITLE V PERMIT APPLICATION - GENERAL FORMS

Section 1: General Information

1. Name of Applicant (As registered with the WV Secretary of State's Office): MarkWest Liberty Midstream and Resources, L.L.C
2. Facility Name or Location: Majorsville Gas Plant
3. DAQ Plant ID No.: 0 5 1 — 0 0 1 2 5
4. Federal Employer ID No. (FEIN): 3 0 0 5 2 8 0 5 9
5. Permit Application Type: [X] Initial Permit When did operations commence? 04/28/2013
6. Type of Business Entity: [X] LLC
7. Is the Applicant the: [X] Both
8. Number of onsite employees: 21
9. Governmental Code: [X] Privately owned and operated; 0
10. Business Confidentiality Claims: Does this application include confidential information (per 45CSR31)? [X] No

11. Mailing Address		
Street or P.O. Box: 1515 Arapahoe Street		
City: Denver	State: CO	Zip: 80202-2137
Telephone Number: (303) 925-9200	Fax Number: (303) 290-8769	

12. Facility Location		
Street: 1700 Majorsville Road	City: Dallas	County: Marshall
UTM Easting: 540.95 km	UTM Northing: 4,423.83 km	Zone: <input checked="" type="checkbox"/> 17 or <input type="checkbox"/> 18
Directions: From Dallas, head south on Dallas Pike Rd toward Dallas St. Turn right onto Number 2 Ridge Rd (1.4 mi), turn left onto Warton Hill Rd (341 ft), take the first right to stay on Warton Hill Rd (2.6 mi), turn right onto Calis Majorsville Rd (0.2 mi), destination is on the right.		
Portable Source? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Is facility located within a nonattainment area? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, for what air pollutants? SO2	
Is facility located within 50 miles of another state? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, name the affected state(s). Pennsylvania, Ohio	
Is facility located within 100 km of a Class I Area ¹ ? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes, name the area(s).	
If no, do emissions impact a Class I Area ¹ ? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
¹ Class I areas include Dolly Sods and Otter Creek Wilderness Areas in West Virginia, and Shenandoah National Park and James River Face Wilderness Area in Virginia.		

13. Contact Information		
Responsible Official: Leanne Meyer		Title: VP of EH&S
Street or P.O. Box: 1515 Arapahoe Street, Tower 1, Suite 1600		
City: Denver	State: CO	Zip: 80202-2137
Telephone Number: (303) 925-9200	Fax Number: (303) 542-8708	
E-mail address: lmeyer@markwest.com		
Environmental Contact: Nathan Wheldon		Title: Environmental Manager
Street or P.O. Box: 1515 Arapahoe Street, Tower 1, Suite 1600		
City: Denver	State: CO	Zip: 80202-2137
Telephone Number: (303) 542-0686	Fax Number: (303) 573-4954	
E-mail address: nwheldon@markwest.com		
Application Preparer: Dan Michaud		Title: Environmental Coordinator
Company: MarkWest Liberty Midstream and Resources, L.L.C		
Street or P.O. Box: 1515 Arapahoe Street, Tower 1, Suite 1600		
City: Denver	State: CO	Zip: 80203-2137
Telephone Number: (303) 542-1212	Fax Number: (303) 573-4954	
E-mail address: dmichaud@markwest.com		

14. Facility Description

List all processes, products, NAICS and SIC codes for normal operation, in order of priority. Also list any process, products, NAICS and SIC codes associated with any alternative operating scenarios if different from those listed for normal operation.

Process	Products	NAICS	SIC
Natural Gas Processing	Pipeline grade natural gas and natural gas liquids	211112	1311

Provide a general description of operations.

Natural gas from surrounding area wells enters the facility through an inlet separator which removes any free liquids entrained in the gas. The gas is subsequently compressed, and is then sent through a molecular sieve to remove any remaining liquids from the gas stream. The gas is then cooled through a cryogenic process which serves to remove ethane and heavier hydrocarbons from the gas stream. The remaining gas stream (mostly methane) is compressed and transferred offsite via pipeline. The mixed hydrocarbon or natural gas liquid (NGL) stream then passes through the de-ethanizer to separate the ethane. Ethane is transferred off site via pipeline. The remaining de-ethanized NGL stream is transferred off site via pipeline.

- 15. Provide an **Area Map** showing plant location as **ATTACHMENT A**.
- 16. Provide a **Plot Plan(s)**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is located as **ATTACHMENT B**. For instructions, refer to "Plot Plan - Guidelines."
- 17. Provide a detailed **Process Flow Diagram(s)** showing each process or emissions unit as **ATTACHMENT C**. Process Flow Diagrams should show all emission units, control equipment, emission points, and their relationships.

Section 2: Applicable Requirements

18. Applicable Requirements Summary	
Instructions: Mark all applicable requirements.	
<input type="checkbox"/> SIP	<input type="checkbox"/> FIP
<input checked="" type="checkbox"/> Minor source NSR (45CSR13)	<input type="checkbox"/> PSD (45CSR14)
<input checked="" type="checkbox"/> NESHAP (45CSR34)	<input type="checkbox"/> Nonattainment NSR (45CSR19)
<input checked="" type="checkbox"/> Section 111 NSPS	<input type="checkbox"/> Section 112(d) MACT standards
<input type="checkbox"/> Section 112(g) Case-by-case MACT	<input checked="" type="checkbox"/> 112(r) RMP
<input type="checkbox"/> Section 112(i) Early reduction of HAP	<input type="checkbox"/> Consumer/commercial prod. reqts., section 183(e)
<input type="checkbox"/> Section 129 Standards/Reqs.	<input type="checkbox"/> Stratospheric ozone (Title VI)
<input type="checkbox"/> Tank vessel reqt., section 183(f)	<input type="checkbox"/> Emissions cap 45CSR§30-2.6.1
<input type="checkbox"/> NAAQS, increments or visibility (temp. sources)	<input type="checkbox"/> 45CSR27 State enforceable only rule
<input checked="" type="checkbox"/> 45CSR4 State enforceable only rule	<input type="checkbox"/> Acid Rain (Title IV, 45CSR33)
<input type="checkbox"/> Emissions Trading and Banking (45CSR28)	<input type="checkbox"/> Compliance Assurance Monitoring (40CFR64)
<input type="checkbox"/> CAIR NO _x Annual Trading Program (45CSR39)	<input type="checkbox"/> CAIR NO _x Ozone Season Trading Program (45CSR40)
<input type="checkbox"/> CAIR SO ₂ Trading Program (45CSR41)	

19. Non Applicability Determinations

List all requirements which the source has determined not applicable and for which a permit shield is requested. The listing shall also include the rule citation and the reason why the shield applies.

State Implementation Plan: This application does not involve a stationary source to be located in a non-attainment area subject to a SIP.

Federal Implementation Plan: No Federal Implementation Plan is in effect where this stationary source is located.

45 CSR 14 – Prevention of Significant Deterioration: The facility is not a major stationary source as defined by the PSD rule, and is therefore not subject to the provisions of this rule.

45 CSR 19 – Nonattainment New Source Review: The facility is located in Marshall County, an area that is non-attainment for SO₂. The facility is not a major source of SO₂, therefore this rule does not apply.

45 CSR 27 – Toxic Air Pollutants: The facility is not a chemical process unit as defined in the rule, therefore this rule does not apply.

45 CSR 28 – Emissions Trading and Banking: MarkWest does not voluntarily choose to participate in an emission reduction credit trading program.

45 CSR 30-2.6.1: The facility is not subject to any emissions caps as provided by this rule.

45 CSR 33 – Acid Rain Program: The facility is not an affected source under the provisions of the Acid Rain Program, therefore this rule does not apply.

45 CSR 39 – CAIR NO_x Annual Trading Program: There are no CAIR NO_x Annual units present at the facility, therefore the requirements of this rule do not apply.

45 CSR 40 – CAIR NO_x Ozone Season Trading Program: There are no CAIR NO_x Ozone Season units present at the facility, therefore the requirements of this rule do not apply.

45 CSR 41 – CAIR SO₂ Annual Trading Program: There are no CAIR SO₂ Annual units present at the facility, therefore the requirements of this rule do not apply.

Section 112(d) MACT standards: The facility is not a major source of hazardous air pollutants, therefore this rule does not apply.

Section 112(g) MACT standards: The facility is not a major source of hazardous air pollutants, therefore this rule does not apply.

Section 112(i) MACT standards: The facility is not a major source of hazardous air pollutants, therefore this rule does not apply.

Section 183(e) Consumer/commercial Product Requirements: Operation of the facility does not involve the manufacture or sale of consumer or commercial products and will not be subject to this regulatory provision.

Section 129 Standards/Requirements: Operation of this facility does not involve solid waste combustion or incineration; therefore, this rule does not apply.

Section 183(f) – Tank Vessel Requirements: There are no marine tank vessels present at the facility, therefore this rule does not apply.

NAAQS, increment or visibility (temp. sources): There are no temporary sources present at the facility, therefore this rule does not apply.

Stratospheric Ozone (Title IV): The facility does not use Class I ozone-depleting substances (ODS) including chlorofluorocarbons (CFC) and Class II ODS, which are hydrochlorofluorocarbons (HCFC), so this provision does not apply.

Permit Shield

19. Non Applicability Determinations (Continued) - Attach additional pages as necessary.

List all requirements which the source has determined not applicable and for which a permit shield is requested. The listing shall also include the rule citation and the reason why the shield applies.

40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units: This subpart applies to steam generating units with maximum design heat input capacity of 100 mmbtu/hr or less, but greater than or equal to 10 mmbtu/hr. All the heaters at the facility are process heaters, which are excluded from the definition of steam generating unit. Therefore, this subpart does not apply.

40 CFR 60 Subpart LLL – Standards of Performance for SO₂ Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011: There are no sweetening units, as defined in this subpart, present at the facility. Therefore, this subpart does not apply.

40 CFR 64 – Compliance Assurance Monitoring: The compressor engines and their control devices operating at the facility are subject to the emission limitations and standards of 40 CFR 60 Subpart JJJJ, therefore the requirements of this subpart do not apply.

Permit Shield

20. Facility-Wide Applicable Requirements

List all facility-wide applicable requirements. For each applicable requirement, include the underlying rule/regulation citation and/or **construction permit** with the condition number. (*Note: Title V permit condition numbers alone are not the underlying applicable requirements*).

Permit R13-2818D Conditions:

- 3.1.1 Open burning [45CSR§6-3.1]
- 3.1.2 Open burning exemptions [45CSR§6-3.2]
- 3.1.3 Asbestos [40CFR§61.145(b) and 45CSR§34]
- 3.1.4 Odor [45CSR§4-3.1]
- 3.1.5 Permanent shutdown [45CSR§13-10.5.]
- 3.1.6 Standby plan for reducing emissions [45CSR§11-5.2.]
- 3.3.1 Stack Testing [WV Code § 22-5-4(a)(14-15) and 45CSR13]
- 3.4.1 Retention of Records
- 3.4.2 Odors [45CSR§4]
- 3.5.1 Responsible Official
- 3.5.2 Confidential Information
- 3.5.3 Correspondence
- 3.5.4 Operating Permit Program [45 CSR 30]
- 3.5.5 Emission Inventory

Majorsville I and II

- 11.1.1 Maximum Throughput Limitation
- 11.1.2 NSPS Subpart KKK [40CFR§60.630 to 40CFR§60.636]
- 11.2 Record Keeping Requirements

Majorsville III, V, and De-Ethanizer

NSPS Subpart OOOO [40CFR§60.5400, §60.5401, §60.5402, §60.5410, §60.5415, §60.5420, §60.5422, §60.5425, and §60.5430]

Permit Shield

For all facility-wide applicable requirements listed above, provide monitoring/testing / recordkeeping / reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number and/or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
3.1.1	NA	NA	NA	Notification	45CSR§6-3.1
3.1.2	NA	NA	NA	NA	45CSR§6-3.2
3.1.3	NA	NA	Asbestos inspection	Notification	40CFR§61.145(b), 45CSR§34
3.1.4	NA	NA	NA	Deviations	45CSR§4-3.1
3.1.5	NA	NA	NA	Permit application	45CSR§13-10.5
3.1.6	NA	NA	Prepare standby plans when requested by the Secretary	NA	45CSR§11-5.2
3.3.1	NA	Stack testing	NA	Results of stack test	WV Code§22-5-4(a)(14-15), 45CSR§13
3.4.1	NA	Na	Maintain all required records for 5 years. Maintain most recent two years of records on site.	NA	3.4.1
3.4.2	NA	NA	Odor complaints	NA	45CSR§30
3.5.1	NA	NA	NA	Certification by responsible official for any application form, report, or compliance certification required by the permit	3.5.1
3.5.2	NA	NA	NA	NA	3.5.2
3.5.3	NA	NA	NA	NA	3.5.3
3.5.4	NA	NA	Emissions inventory receipt	Certified emissions statement	3.5.4, 45CSR30
3.5.5	NA	NA	NA	Emissions inventory	3.5.5
11.1.1	Natural gas throughput	NA	Rolling 12-month total of gas throughput.	NA	11.1.1
11.1.2	Leak detection per NSPS Subpart KKK	NA	Recordkeeping in accordance with NSPS Subpart KKK	Reporting in accordance with NSPS Subpart KKK	40CFR§60.630 to §60.636
11.2	NA	NA	Maintain records onsite or readily accessible location maintained by the permittee for 5 years.	NA	11.2
NSPS Subpart OOOO	Leak detection per NSPS Subpart OOOO	NA	Recordkeeping in accordance with NSPS Subpart OOOO	Reporting in accordance with NSPS Subpart OOOO	40CFR§60.5400, §60.5401, §60.5402, §60.5410, §60.5415, §60.5420, §60.5422, §60.5425, and §60.5430

Are you in compliance with all facility-wide applicable requirements? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

Section 3: Facility-Wide Emissions

23. Facility-Wide Emissions Summary [Tons per Year]	
Criteria Pollutants	Potential Emissions
Carbon Monoxide (CO)	54.95
Nitrogen Oxides (NO _x)	71.97
Lead (Pb)	0.00
Particulate Matter (PM _{2.5}) ¹	8.69
Particulate Matter (PM ₁₀) ¹	8.69
Total Particulate Matter (TSP)	8.69
Sulfur Dioxide (SO ₂)	0.62
Volatile Organic Compounds (VOC)	44.04
Hazardous Air Pollutants ²	Potential Emissions
Formaldehyde	5.55
n-Hexane	1.71
Benzene	0.09
Toluene	0.09
Xylenes	0.04
Total HAPs	11.85
Regulated Pollutants other than Criteria and HAP	Potential Emissions
Greenhouse Gases (GHGs)	Potential Emissions
Carbon Dioxide (CO ₂)	125,132.63
Nitrous Oxide (N ₂ O)	0.23
Methane (CH ₄)	148
Hydrofluorocarbons (HFCs)	
Perfluorocarbons (PFCs)	
Sulfur hexafluoride (SF ₆)	
CO ₂ equivalent (CO ₂ e)	128,313.52
¹ PM _{2.5} and PM ₁₀ are components of TSP.	
² For HAPs that are also considered PM or VOCs, emissions should be included in both the HAPs section and the Criteria Pollutants section.	

Section 4: Insignificant Activities

24. Insignificant Activities (Check all that apply)	
<input checked="" type="checkbox"/>	1. Air compressors and pneumatically operated equipment, including hand tools.
<input checked="" type="checkbox"/>	2. Air contaminant detectors or recorders, combustion controllers or shutoffs.
<input checked="" type="checkbox"/>	3. Any consumer product used in the same manner as in normal consumer use, provided the use results in a duration and frequency of exposure which are not greater than those experienced by consumer, and which may include, but not be limited to, personal use items; janitorial cleaning supplies, office supplies and supplies to maintain copying equipment.
<input checked="" type="checkbox"/>	4. Bathroom/toilet vent emissions.
<input checked="" type="checkbox"/>	5. Batteries and battery charging stations, except at battery manufacturing plants.
<input checked="" type="checkbox"/>	6. Bench-scale laboratory equipment used for physical or chemical analysis, but not lab fume hoods or vents. Many lab fume hoods or vents might qualify for treatment as insignificant (depending on the applicable SIP) or be grouped together for purposes of description.
<input type="checkbox"/>	7. Blacksmith forges.
<input type="checkbox"/>	8. Boiler water treatment operations, not including cooling towers.
<input type="checkbox"/>	9. Brazing, soldering or welding equipment used as an auxiliary to the principal equipment at the source.
<input type="checkbox"/>	10. CO ₂ lasers, used only on metals and other materials which do not emit HAP in the process.
<input type="checkbox"/>	11. Combustion emissions from propulsion of mobile sources, except for vessel emissions from Outer Continental Shelf sources.
<input checked="" type="checkbox"/>	12. Combustion units designed and used exclusively for comfort heating that use liquid petroleum gas or natural gas as fuel.
<input checked="" type="checkbox"/>	13. Comfort air conditioning or ventilation systems not used to remove air contaminants generated by or released from specific units of equipment.
<input type="checkbox"/>	14. Demineralized water tanks and demineralizer vents.
<input type="checkbox"/>	15. Drop hammers or hydraulic presses for forging or metalworking.
<input type="checkbox"/>	16. Electric or steam-heated drying ovens and autoclaves, but not the emissions from the articles or substances being processed in the ovens or autoclaves or the boilers delivering the steam.
<input type="checkbox"/>	17. Emergency (backup) electrical generators at residential locations.
<input type="checkbox"/>	18. Emergency road flares.
<input type="checkbox"/>	19. Emission units which do not have any applicable requirements and which emit criteria pollutants (CO, NO _x , SO ₂ , VOC and PM) into the atmosphere at a rate of less than 1 pound per hour and less than 10,000 pounds per year aggregate total for each criteria pollutant from all emission units. Please specify all emission units for which this exemption applies along with the quantity of criteria pollutants emitted on an hourly and annual basis: _____ _____ _____ _____ _____ _____ _____ _____ _____

24. Insignificant Activities (Check all that apply)

<input type="checkbox"/>	<p>20. Emission units which do not have any applicable requirements and which emit hazardous air pollutants into the atmosphere at a rate of less than 0.1 pounds per hour and less than 1,000 pounds per year aggregate total for all HAPs from all emission sources. This limitation cannot be used for any source which emits dioxin/furans nor for toxic air pollutants as per 45CSR27.</p> <p>Please specify all emission units for which this exemption applies along with the quantity of hazardous air pollutants emitted on an hourly and annual basis:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<input type="checkbox"/>	21. Environmental chambers not using hazardous air pollutant (HAP) gases.
<input type="checkbox"/>	22. Equipment on the premises of industrial and manufacturing operations used solely for the purpose of preparing food for human consumption.
<input type="checkbox"/>	23. Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment.
<input checked="" type="checkbox"/>	24. Equipment used for quality control/assurance or inspection purposes, including sampling equipment used to withdraw materials for analysis.
<input type="checkbox"/>	25. Equipment used for surface coating, painting, dipping or spray operations, except those that will emit VOC or HAP.
<input checked="" type="checkbox"/>	26. Fire suppression systems.
<input checked="" type="checkbox"/>	27. Firefighting equipment and the equipment used to train firefighters.
<input type="checkbox"/>	28. Flares used solely to indicate danger to the public.
<input checked="" type="checkbox"/>	29. Fugitive emission related to movement of passenger vehicle provided the emissions are not counted for applicability purposes and any required fugitive dust control plan or its equivalent is submitted.
<input type="checkbox"/>	30. Hand-held applicator equipment for hot melt adhesives with no VOC in the adhesive formulation.
<input checked="" type="checkbox"/>	31. Hand-held equipment for buffing, polishing, cutting, drilling, sawing, grinding, turning or machining wood, metal or plastic.
<input type="checkbox"/>	32. Humidity chambers.
<input checked="" type="checkbox"/>	33. Hydraulic and hydrostatic testing equipment.
<input type="checkbox"/>	34. Indoor or outdoor kerosene heaters.
<input checked="" type="checkbox"/>	35. Internal combustion engines used for landscaping purposes.
<input type="checkbox"/>	36. Laser trimmers using dust collection to prevent fugitive emissions.
<input type="checkbox"/>	37. Laundry activities, except for dry-cleaning and steam boilers.
<input type="checkbox"/>	38. Natural gas pressure regulator vents, excluding venting at oil and gas production facilities.
<input type="checkbox"/>	39. Oxygen scavenging (de-aeration) of water.
<input type="checkbox"/>	40. Ozone generators.
<input checked="" type="checkbox"/>	41. Plant maintenance and upkeep activities (e.g., grounds-keeping, general repairs, cleaning, painting, welding, plumbing, re-tarring roofs, installing insulation, and paving parking lots) provided these activities are not conducted as part of a manufacturing process, are not related to the source's primary business activity, and not otherwise triggering a permit modification. (Cleaning and painting activities qualify if they are not subject to VOC or HAP control requirements. Asphalt batch plant

24. Insignificant Activities (Check all that apply)	
	owners/operators must still get a permit if otherwise requested.)
<input type="checkbox"/>	42. Portable electrical generators that can be moved by hand from one location to another. "Moved by Hand" means that it can be moved without the assistance of any motorized or non-motorized vehicle, conveyance, or device.
<input type="checkbox"/>	43. Process water filtration systems and demineralizers.
<input checked="" type="checkbox"/>	44. Repair or maintenance shop activities not related to the source's primary business activity, not including emissions from surface coating or de-greasing (solvent metal cleaning) activities, and not otherwise triggering a permit modification.
<input checked="" type="checkbox"/>	45. Repairs or maintenance where no structural repairs are made and where no new air pollutant emitting facilities are installed or modified.
<input type="checkbox"/>	46. Routing calibration and maintenance of laboratory equipment or other analytical instruments.
<input type="checkbox"/>	47. Salt baths using nonvolatile salts that do not result in emissions of any regulated air pollutants. Shock chambers.
<input type="checkbox"/>	48. Shock chambers.
<input type="checkbox"/>	49. Solar simulators.
<input type="checkbox"/>	50. Space heaters operating by direct heat transfer.
<input type="checkbox"/>	51. Steam cleaning operations.
<input type="checkbox"/>	52. Steam leaks.
<input type="checkbox"/>	53. Steam sterilizers.
<input type="checkbox"/>	54. Steam vents and safety relief valves.
<input type="checkbox"/>	55. Storage tanks, reservoirs, and pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized.
<input checked="" type="checkbox"/>	56. Storage tanks, vessels, and containers holding or storing liquid substances that will not emit any VOC or HAP. Exemptions for storage tanks containing petroleum liquids or other volatile organic liquids should be based on size limits such as storage tank capacity and vapor pressure of liquids stored and are not appropriate for this list.
<input type="checkbox"/>	57. Such other sources or activities as the Director may determine.
<input checked="" type="checkbox"/>	58. Tobacco smoking rooms and areas.
<input type="checkbox"/>	59. Vents from continuous emissions monitors and other analyzers.

Section 5: Emission Units, Control Devices, and Emission Points

25. Equipment Table
Fill out the Title V Equipment Table and provide it as ATTACHMENT D .
26. Emission Units
For each emission unit listed in the Title V Equipment Table , fill out and provide an Emission Unit Form as ATTACHMENT E .
For each emission unit not in compliance with an applicable requirement, fill out a Schedule of Compliance Form as ATTACHMENT F .
27. Control Devices
For each control device listed in the Title V Equipment Table , fill out and provide an Air Pollution Control Device Form as ATTACHMENT G .
For any control device that is required on an emission unit in order to meet a standard or limitation for which the potential pre-control device emissions of an applicable regulated air pollutant is greater than or equal to the Title V Major Source Threshold Level, refer to the Compliance Assurance Monitoring (CAM) Form(s) for CAM applicability. Fill out and provide these forms, if applicable, for each Pollutant Specific Emission Unit (PSEU) as ATTACHMENT H .

Section 6: Certification of Information

28. Certification of Truth, Accuracy and Completeness and Certification of Compliance

Note: This Certification must be signed by a responsible official. The original, signed in blue ink, must be submitted with the application. Applications without an original signed certification will be considered as incomplete.

a. Certification of Truth, Accuracy and Completeness

I certify that I am a responsible official (as defined at 45CSR§30-2.38) and am accordingly authorized to make this submission on behalf of the owners or operators of the source described in this document and its attachments. I certify under penalty of law that I have personally examined and am familiar with the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine and/or imprisonment.

b. 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.

Responsible official (type or print)

Name: Leanne Meyer

Title: VP of EH&S

Responsible official's signature:

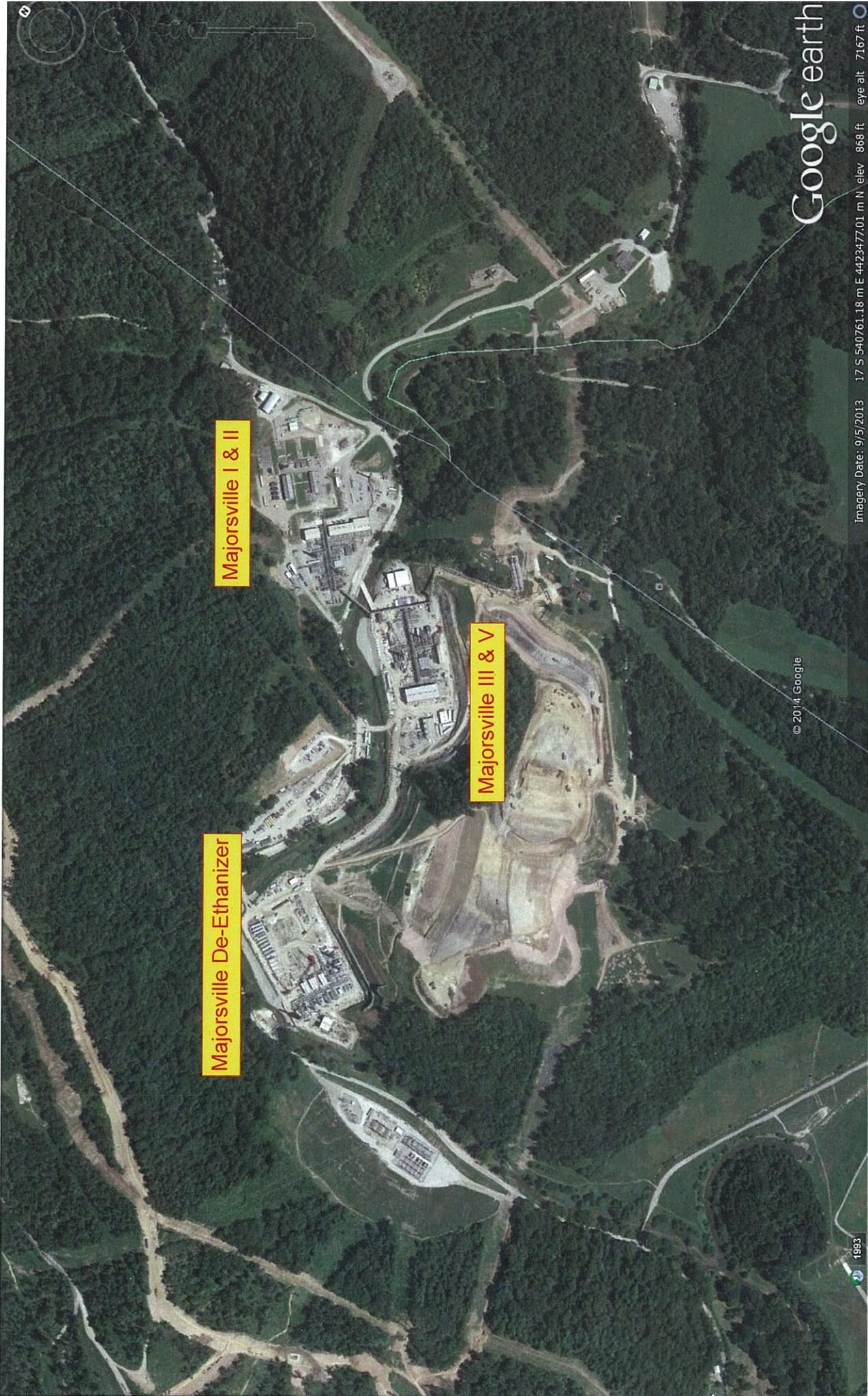
Signature:  Signature Date: 4-29-14
(Must be signed and dated in blue ink)

Note: Please check all applicable attachments included with this permit application:

<input checked="" type="checkbox"/>	ATTACHMENT A: Area Map
<input checked="" type="checkbox"/>	ATTACHMENT B: Plot Plan(s)
<input checked="" type="checkbox"/>	ATTACHMENT C: Process Flow Diagram(s)
<input checked="" type="checkbox"/>	ATTACHMENT D: Equipment Table
<input checked="" type="checkbox"/>	ATTACHMENT E: Emission Unit Form(s)
<input type="checkbox"/>	ATTACHMENT F: Schedule of Compliance Form(s)
<input checked="" type="checkbox"/>	ATTACHMENT G: Air Pollution Control Device Form(s)
<input type="checkbox"/>	ATTACHMENT H: Compliance Assurance Monitoring (CAM) Form(s)

All of the required forms and additional information can be found and downloaded from, the DEP website at www.dep.wv.gov/dag, requested by phone (304) 926-0475, and/or obtained through the mail.

Attachment A - Area Map



Majorsville De-Ethimizer

Majorsville I & II

Majorsville III & V

© 2014 Google

Google earth

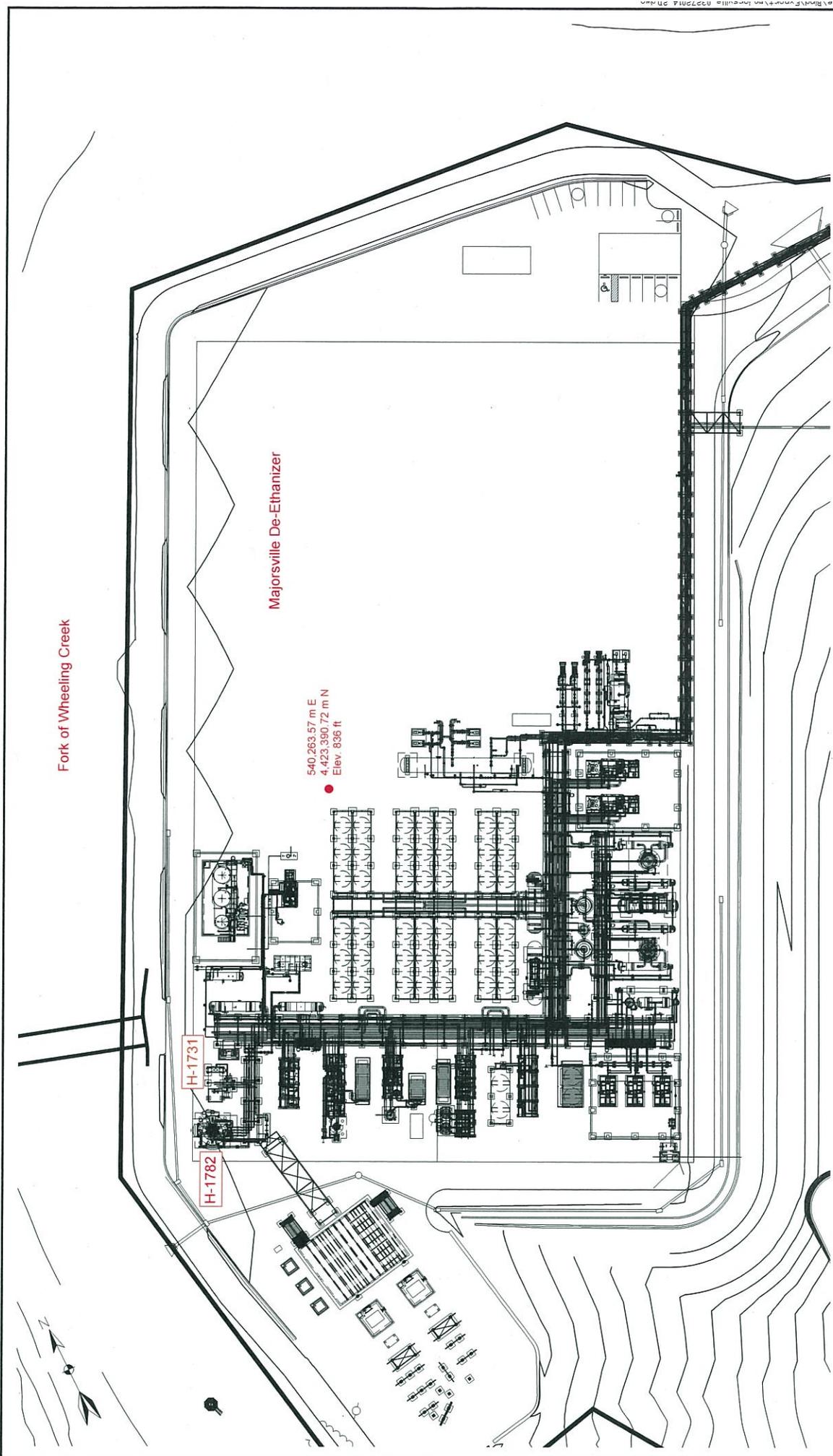
1993

Imagery Date: 9/5/2013

17 S 540761.18 m E 442347701 m N, elev 868 ft

eye alt 7167 ft

Attachment B – Plot Plans



Fork of Wheeling Creek

Majorsville De-Ethanolizer

540,263.57 m E
4,423,390.72 m N
Elev. 836 ft

H-1731

H-1762

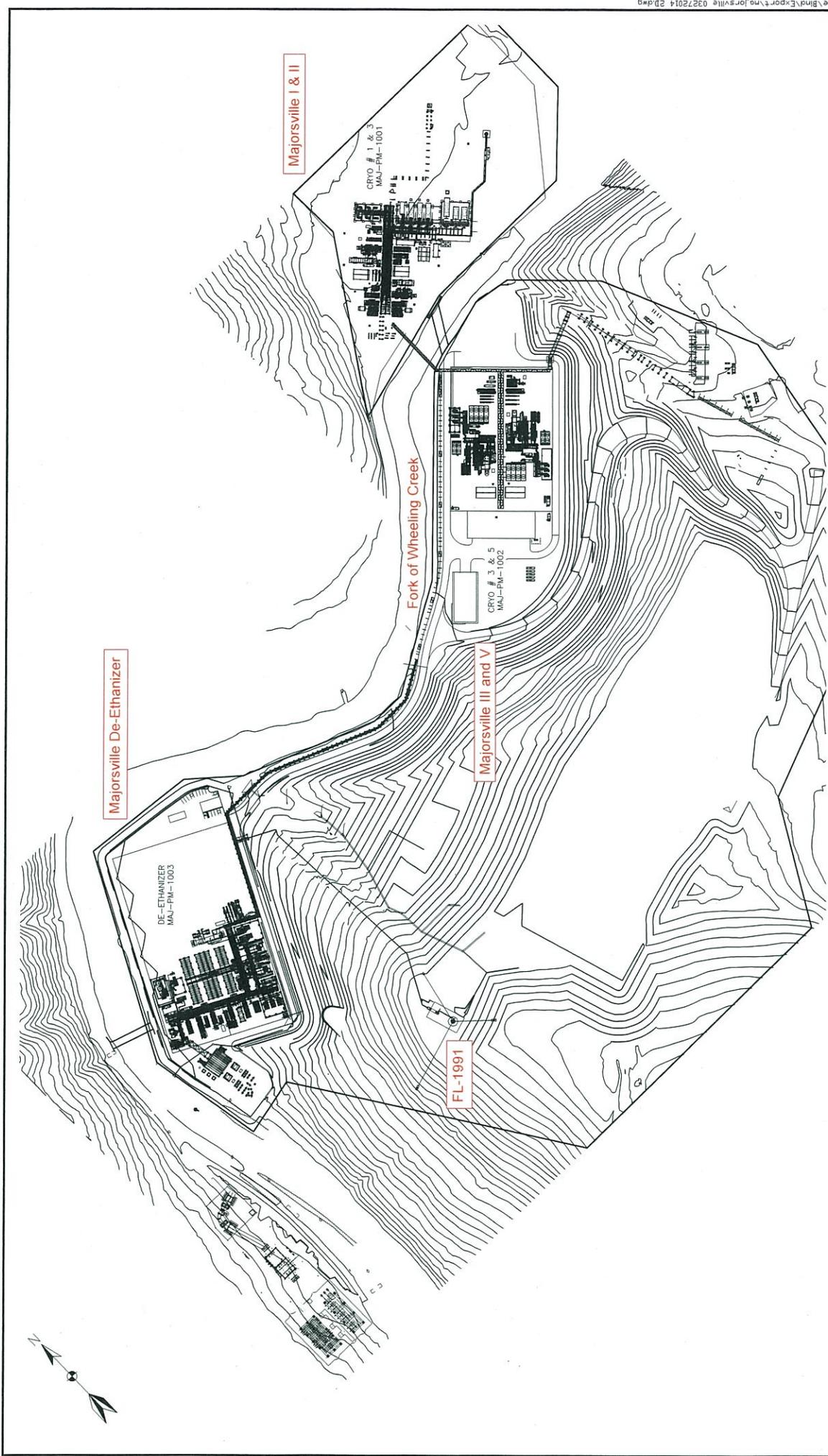
DATE	ISSUED FOR	DESCRIPTION	NO.	ISSUED FOR	DESCRIPTION	NO.	ISSUED FOR	DESCRIPTION	NO.
03/20/14	ISSUED FOR CONSTRUCTION		0	ISSUED FOR CONSTRUCTION		0	ISSUED FOR CONSTRUCTION		0

CSD
 CONSULTING ENGINEERS
 L.L.C.

MARKWEST
 MarkWest Energy Partners, L.P.

DATE	ISSUED FOR	DESCRIPTION	NO.	ISSUED FOR	DESCRIPTION	NO.	ISSUED FOR	DESCRIPTION	NO.
03/20/14	ISSUED FOR CONSTRUCTION		0	ISSUED FOR CONSTRUCTION		0	ISSUED FOR CONSTRUCTION		0

MAJORSVILLE DE-ETHANOLIZER
 MAJORSVILLE, MARSHALL COUNTY, WEST VIRGINIA
 MAJ-PM-1003



Majorsville De-Ethanolizer

Majorsville I & II

Fork of Wheeling Creek

Majorsville III and V

FL-1991

NO.	REVISION-DESCRIPTION	DATE	ISSUED FOR CONSTRUCTION	PROJ. NO.	PROJ. NAME	SCALE	DATE	BY	CHKD.	APP.	DATE
0	ISSUED FOR CONSTRUCTION	03/20/14									

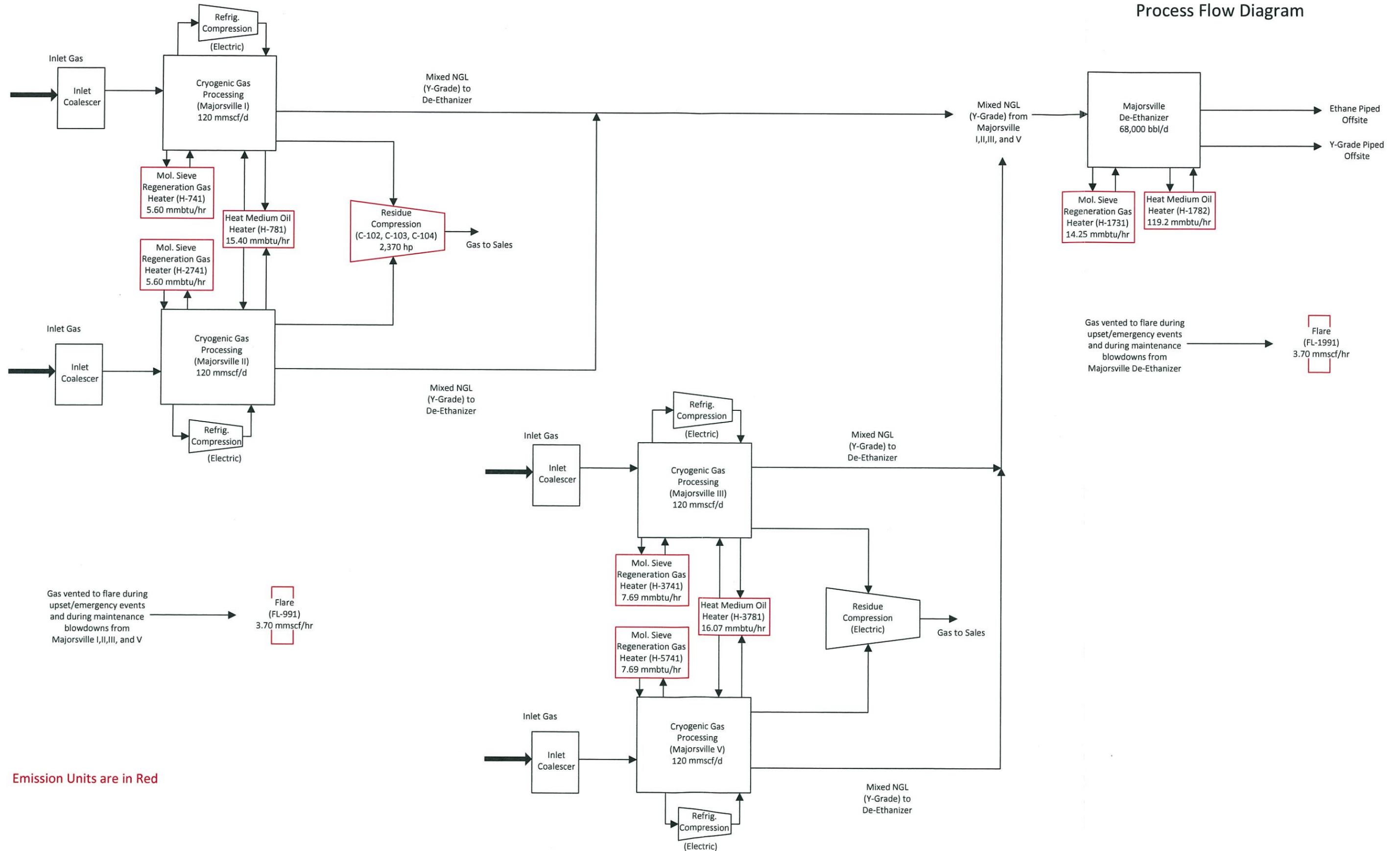
CSD ENGINEERS
 CONSULTING ENGINEERS
 L.L.C.

MARKWEST
 MarkWest Energy Partners, L.P.
 PERKINS INSTRUMENT SAGHAM
 MAJORSVILLE
 OVERALL LAYOUT
 WEST VIRGINIA

DATE	BY	CHKD.	APP.	DATE
03/20/14				

Attachment C – Process Flow Diagram

Majorsville Processing Plants I, II, III, and V and De-Ethanizer Process Flow Diagram



Emission Units are in Red

Attachment D – Title V Equipment Table

Attachment E – Emission Unit Form

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number:
C-102

Emission unit name:
Caterpillar G3608 LE
Compressor Engine

List any control devices associated with this emission unit: Oxidation Catalyst

Provide a description of the emission unit (type, method of operation, design parameters, etc.):
2,370 hp natural gas fired 4-stroke lean-burn compressor engine

Manufacturer:
Caterpillar

Model number:
G3608 LE

Serial number:
BEN0644

Construction date:
01/28/2010

Installation date:
09/13/2010

Modification date(s):
NA

Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 2,370 hp

Maximum Hourly Throughput:

Maximum Annual Throughput:

Maximum Operating Schedule:
8,760 hrs/year

Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? Yes No

If yes, is it?

Indirect Fired Direct Fired

Maximum design heat input and/or maximum horsepower rating:
15.71 mmbtu/hr
2,370 hp

Type and Btu/hr rating of burners:
NA

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
13,978 scf/hr
122.44 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

<i>Emissions Data</i>		
Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.99	4.35
Nitrogen Oxides (NO _x)	2.61	11.44
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.16	0.69
Particulate Matter (PM ₁₀)	0.16	0.69
Total Particulate Matter (TSP)	0.16	0.69
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	1.67	7.32
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Acetaldehyde	0.13	0.58
Acrolein	0.08	0.35
Formaldehyde	0.42	1.83
Methanol	0.04	0.17
Total HAPs	0.72	3.17
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO2(e)	2,021.82	8,855.58
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x, CO, VOC, HCHO: Engine and catalyst manufacturer specified emission factors (g/hp-hr) -PM_{2.5}, PM₁₀, TSP, SO₂, HAPs (excluding HCHO): AP-42 Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines -CO₂(e): 40 CFR 98 Table C-1. Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel and Table C-2. Default CH₄ and N₂O Emission Factors for Various Types of Fuel</p>		
<i>Applicable Requirements</i>		
List all applicable requirements for this emission unit. For each applicable requirement, include the		

underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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- 4.1.1
- 4.1.2
- 4.1.3 [45CSR§13-5.11]
- 4.1.4
- 5.1.1
- 5.1.2
- 5.2
- 5.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
- 5.4
- 5.5
- 9.2.2 d [40CFR§60.4243(b)(2)(ii), 40CFR§60.4244]
- 9.3.2 b [40CFR§60.4243(b)]
- 9.3.4 [40CFR§60.4243(e)]
- 9.3.5 [40CFR§60.4243(g)]
- 9.4 [40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)]
- 9.5.1 a [40CFR§60.4245 (a)]
- 9.5.1 c [40CFR§60.4245(c), §60.7(a)(1)]
- 9.5.1 d [40CFR§60.4245(d)]

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
4.1.1	NA	NA	Records of monitoring	NA	4.1.1
4.1.2	NA	NA	Total HAP emission calculations	NA	4.1.2
4.1.3	Monitor air pollution control equipment and associated monitoring equipment to ensure operation and maintenance in accordance with safety and good air pollution control practices	NA	NA	NA	45CSR§13-5.11
4.1.4	NA	NA	Control equipment malfunction events	NA	4.1.4
5.1.1	Quantity of natural gas consumed by each engine	NA	Records of natural gas consumed	NA	5.1.1
5.1.2	NA	NA	Emission calculations for NOx, CO, VOC, and formaldehyde based on fuel consumption	NA	5.1.2
5.2	Regularly inspect catalytic reduction devices and auxiliary air pollution control devices	NA	NA	NA	5.2

5.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
5.4	NA	NA	Amount and type of fuel consumed and hours of operation. Maintain records for 5 years	NA	5.4
5.5	NA	NA	NA	Reporting in accordance with Section 3.5	5.5, 3.5
9.2.2d	NA	Initial performance test and subsequent performance testing every 8,760 hours or 3 years, whichever comes first	NA	NA	40CFR§60.4243(b)(2)(ii), 40CFR§60.4244
9.3.2 b	NA	Initial performance test and subsequent annual performance testing.	Keep a maintenance plan and records of conducted maintenance	NA	40CFR§60.4243(b)
9.3.4	NA	Performance test required if operating over 100 hours using propane fuel.	Record operating hours when using propane fuel		40CFR§60.4243(e)
9.3.5	Monitor AFR controller to ensure proper maintenance and operation	NA	NA	NA	40CFR§60.4243(g)
9.4	NA	NO _x , CO, and VOC performance testing	NA	NA	40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)
9.5.1 a	NA	NA	Notifications, engine maintenance, manufacturer certifications, emissions testing documentation	Notification and testing reports	40CFR§60.4245 (a)
9.5.1 c	NA	NA	NA	Initial notification	40CFR§60.4245(c), §60.7(a)(1)
9.5.1 d	NA	NA	NA	Submit copy of each performance test within 60 days after test has been completed	40CFR§60.4245(d)

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: C-103	Emission unit name: Caterpillar G3608 LE Compressor Engine	List any control devices associated with this emission unit: Oxidation Catalyst	
Provide a description of the emission unit (type, method of operation, design parameters, etc.): 2,370 hp natural gas fired 4-stroke lean-burn compressor engine			
Manufacturer: Caterpillar	Model number: G3608 LE	Serial number: BEN0646	
Construction date: 02/18/2010	Installation date: 09/13/2010	Modification date(s): NA	
Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 2,370 hp			
Maximum Hourly Throughput:	Maximum Annual Throughput:	Maximum Operating Schedule: 8,760 hrs/year	
Fuel Usage Data (fill out all applicable fields)			
Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired	
Maximum design heat input and/or maximum horsepower rating: 15.71 mmbtu/hr 2,370 hp		Type and Btu/hr rating of burners: NA	
List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each. Natural Gas 13,978 scf/hr 122.44 mmscf/yr			
Describe each fuel expected to be used during the term of the permit.			
Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data		
Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.99	4.35
Nitrogen Oxides (NO _x)	2.61	11.44
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.16	0.69
Particulate Matter (PM ₁₀)	0.16	0.69
Total Particulate Matter (TSP)	0.16	0.69
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	1.67	7.32
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Acetaldehyde	0.13	0.58
Acrolein	0.08	0.35
Formaldehyde	0.42	1.83
Methanol	0.04	0.17
Total HAPs	0.72	3.17
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	2,021.82	8,855.58
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x, CO, VOC, HCHO: Engine and catalyst manufacturer specified emission factors (g/hp-hr) -PM_{2.5}, PM₁₀, TSP, SO₂, HAPs (excluding HCHO): AP-42 Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines -CO₂(e): 40 CFR 98 Table C-1. Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel and Table C-2. Default CH₄ and N₂O Emission Factors for Various Types of Fuel</p>		
Applicable Requirements		
<p>List all applicable requirements for this emission unit. For each applicable requirement, include the</p>		

underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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4.1.1

4.1.2

4.1.3 [45CSR§13-5.11]

4.1.4

5.1.1

5.1.2

5.2

5.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]

5.4

5.5

9.2.2 d [40CFR§60.4243(b)(2)(ii), 40CFR§60.4244]

9.3.2 b [40CFR§60.4243(b)]

9.3.4 [40CFR§60.4243(e)]

9.3.5 [40CFR§60.4243(g)]

9.4 [40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)]

9.5.1 a [40CFR§60.4245 (a)]

9.5.1 c [40CFR§60.4245(c), §60.7(a)(1)]

9.5.1 d [40CFR§60.4245(d)]

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
4.1.1	NA	NA	Records of monitoring	NA	4.1.1
4.1.2	NA	NA	Total HAP emission calculations	NA	4.1.2
4.1.3	Monitor air pollution control equipment and associated monitoring equipment to ensure operation and maintenance in accordance with safety and good air pollution control practices	NA	NA	NA	45CSR§13-5.11
4.1.4	NA	NA	Control equipment malfunction events	NA	4.1.4
5.1.1	Quantity of natural gas consumed by each engine	NA	Records of natural gas consumed	NA	5.1.1
5.1.2	NA	NA	Emission calculations for NOx, CO, VOC, and formaldehyde based on fuel consumption	NA	5.1.2
5.2	Regularly inspect catalytic reduction devices and auxiliary air pollution control devices	NA	NA	NA	5.2

5.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
5.4	NA	NA	Amount and type of fuel consumed and hours of operation. Maintain records for 5 years	NA	5.4
5.5	NA	NA	NA	Reporting in accordance with Section 3.5	5.5, 3.5
9.2.2d	NA	Initial performance test and subsequent performance testing every 8,760 hours or 3 years, whichever comes first	NA	NA	40CFR§60.4243(b)(2)(ii), 40CFR§60.4244
9.3.2 b	NA	Initial performance test and subsequent annual performance testing.	Keep a maintenance plan and records of conducted maintenance	NA	40CFR§60.4243(b)
9.3.4	NA	Performance test required if operating over 100 hours using propane fuel.	Record operating hours when using propane fuel		40CFR§60.4243(e)
9.3.5	Monitor AFR controller to ensure proper maintenance and operation	NA	NA	NA	40CFR§60.4243(g)
9.4	NA	NOx, CO, and VOC performance testing	NA	NA	40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)
9.5.1 a	NA	NA	Notifications, engine maintenance, manufacturer certifications, emissions testing documentation	Notification and testing reports	40CFR§60.4245 (a)
9.5.1 c	NA	NA	NA	Initial notification	40CFR§60.4245(c), §60.7(a)(1)
9.5.1 d	NA	NA	NA	Submit copy of each performance test within-60 days after test has been completed	40CFR§60.4245(d)

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

<i>Emission Unit Description</i>			
Emission unit ID number: C-104	Emission unit name: Caterpillar G3608 LE Compressor Engine	List any control devices associated with this emission unit: Oxidation Catalyst	
Provide a description of the emission unit (type, method of operation, design parameters, etc.): 2,370 hp natural gas fired 4-stroke lean-burn compressor engine			
Manufacturer: Caterpillar	Model number: G3608 LE	Serial number: BEN0645	
Construction date: 02/16/2010	Installation date: 09/13/2010	Modification date(s): NA	
Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 2,370 hp			
Maximum Hourly Throughput:	Maximum Annual Throughput:	Maximum Operating Schedule: 8,760 hrs/year	
Fuel Usage Data (fill out all applicable fields)			
Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired	
Maximum design heat input and/or maximum horsepower rating: 15.71 mmbtu/hr 2,370 hp		Type and Btu/hr rating of burners: NA	
List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each. Natural Gas 13,978 scf/hr 122.44 mmscf/yr			
Describe each fuel expected to be used during the term of the permit.			
Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,124 btu/scf
Emissions Data			
Criteria Pollutants	Potential Emissions		

	PPH	TPY
Carbon Monoxide (CO)	0.99	4.35
Nitrogen Oxides (NO _x)	2.61	11.44
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.16	0.69
Particulate Matter (PM ₁₀)	0.16	0.69
Total Particulate Matter (TSP)	0.16	0.69
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	1.67	7.32
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Acetaldehyde	0.13	0.58
Acrolein	0.08	0.35
Formaldehyde	0.42	1.83
Methanol	0.04	0.17
Total HAPs	0.72	3.17
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	2,021.82	8,855.58

List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).

- NO_x, CO, VOC, HCHO: Engine and catalyst manufacturer specified emission factors (g/hp-hr)
- PM_{2.5}, PM₁₀, TSP, SO₂, HAPs (excluding HCHO): AP-42 Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines
- CO₂(e): 40 CFR 98 Table C-1. Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel and Table C-2. Default CH₄ and N₂O Emission Factors for Various Types of Fuel

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter,

this information should also be included.

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- 4.1.1
- 4.1.2
- 4.1.3 [45CSR§13-5.11]
- 4.1.4
- 5.1.1
- 5.1.2
- 5.2
- 5.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
- 5.4
- 5.5
- 9.2.2 d [40CFR§60.4243(b)(2)(ii), 40CFR§60.4244]
- 9.3.2 b [40CFR§60.4243(b)]
- 9.3.4 [40CFR§60.4243(e)]
- 9.3.5 [40CFR§60.4243(g)]
- 9.4 [40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)]
- 9.5.1 a [40CFR§60.4245 (a)]
- 9.5.1 c [40CFR§60.4245(c), §60.7(a)(1)]
- 9.5.1 d [40CFR§60.4245(d)]

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
4.1.1	NA	NA	Records of monitoring	NA	4.1.1
4.1.2	NA	NA	Total HAP emission calculations	NA	4.1.2
4.1.3	Monitor air pollution control equipment and associated monitoring equipment to ensure operation and maintenance in accordance with safety and good air pollution control practices	NA	NA	NA	45CSR§13-5.11
4.1.4	NA	NA	Control equipment malfunction events	NA	4.1.4
5.1.1	Quantity of natural gas consumed by each engine	NA	Records of natural gas consumed	NA	5.1.1
5.1.2	NA	NA	Emission calculations for NOx, CO, VOC, and formaldehyde based on fuel consumption	NA	5.1.2
5.2	Regularly inspect catalytic reduction devices and auxiliary air pollution control devices	NA	NA	NA	5.2
5.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]

5.4	NA	NA	Amount and type of fuel consumed and hours of operation. Maintain records for 5 years	NA	5.4
5.5	NA	NA	NA	Reporting in accordance with Section 3.5	5.5, 3.5
9.2.2d	NA	Initial performance test and subsequent performance testing every 8,760 hours or 3 years, whichever comes first	NA	NA	40CFR§60.4243(b)(2)(ii), 40CFR§60.4244
9.3.2 b	NA	Initial performance test and subsequent annual performance testing.	Keep a maintenance plan and records of conducted maintenance	NA	40CFR§60.4243(b)
9.3.4	NA	Performance test required if operating over 100 hours using propane fuel.	Record operating hours when using propane fuel		40CFR§60.4243(e)
9.3.5	Monitor AFR controller to ensure proper maintenance and operation	NA	NA	NA	40CFR§60.4243(g)
9.4	NA	NOx, CO, and VOC performance testing	NA	NA	40CFR§60.4244 (a),(b),(c),(e),(d),(f),(g)
9.5.1 a	NA	NA	Notifications, engine maintenance, manufacturer certifications, emissions testing documentation	Notification and testing reports	40CFR§60.4245 (a)
9.5.1 c	NA	NA	NA	Initial notification	40CFR§60.4245(c), §60.7(a)(1)
9.5.1 d	NA	NA	NA	Submit copy of each performance test within 60 days after test has been completed	40CFR§60.4245(d)

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number:
H-741

Emission unit name:
Heatec Process Heater

List any control devices associated with this emission unit:NA

Provide a description of the emission unit (type, method of operation, design parameters, etc.):
5.60 mmbtu/hr natural gas-fired regeneration heater

Manufacturer:
Heatec

Model number:

Serial number:

Construction date:
MM/DD/YYYY

Installation date:
2010

Modification date(s):
NA

Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 5.60 mmbtu/hr

Maximum Hourly Throughput:
5.60 mmbtu/hr

Maximum Annual Throughput:
49,056 mmbtu/yr

Maximum Operating Schedule:
8,760 hrs/year

Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? Yes No

If yes, is it?

Indirect Fired Direct Fired

Maximum design heat input and/or maximum horsepower rating:
5.60 mmbtu/hr

Type and Btu/hr rating of burners:
Helical coil
5.60 mmbtu/hr

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
5,490.20 scf/hr
48.09 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.46	2.02
Nitrogen Oxides (NO _x)	0.30	1.32
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.04	0.18
Particulate Matter (PM ₁₀)	0.04	0.18
Total Particulate Matter (TSP)	0.04	0.18
Sulfur Dioxide (SO ₂)	0.00	0.01
Volatile Organic Compounds (VOC)	0.03	0.13
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.01	0.04
Total HAPs	0.01	0.05
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	665.22	2,869.86

List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).

- NO_x emission factor from vendor guarantee
- All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3
- GHG: 40 CFR 98, Subpart C Tier 1 Methodology

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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- 6.1.1
- 6.1.2
- 6.2
- 6.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
- 6.4
- 6.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
6.1.1	NA	NA	Equipment specifications	NA	6.1.1
6.1.2	NA	NA	Equipment specifications	NA	6.1.2
6.2	Monitoring in accordance with Section 3.2	NA	NA	NA	6.2, 3.2
6.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
6.4	NA	NA	Recordkeeping in accordance with Section 3.4. Maintain required records for at least 5 years	NA	6.4, 3.4
6.5	NA	NA	NA	Reporting in accordance with Section 3.5	6.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-2741	Emission unit name: Heatec Process Heater	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
5.60 mmbtu/hr natural gas-fired regeneration heater

Manufacturer: Heatec	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2011	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 5.60 mmbtu/hr

Maximum Hourly Throughput: 5.60 mmbtu/hr	Maximum Annual Throughput: 49,056 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating: 5.60 mmbtu/hr	Type and Btu/hr rating of burners: Helical coil 5.60 mmbtu/hr
---	--

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
5,490.20 scf/hr
48.09 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.46	2.02
Nitrogen Oxides (NO _x)	0.30	1.32
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.04	0.18
Particulate Matter (PM ₁₀)	0.04	0.18
Total Particulate Matter (TSP)	0.04	0.18
Sulfur Dioxide (SO ₂)	0.00	0.01
Volatile Organic Compounds (VOC)	0.03	0.13
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.01	0.04
Total HAPs	0.01	0.05
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	665.22	2,869.86

List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).

- NO_x emission factor from vendor guarantee
- All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3
- GHG: 40 CFR 98, Subpart C Tier 1 Methodology

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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- 6.1.1
- 6.1.2
- 6.2
- 6.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
- 6.4
- 6.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
6.1.1	NA	NA	Equipment specifications	NA	6.1.1
6.1.2	NA	NA	Equipment specifications	NA	6.1.2
6.2	Monitoring in accordance with Section 3.2	NA	NA	NA	6.2, 3.2
6.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
6.4	NA	NA	Recordkeeping in accordance with Section 3.4. Maintain required records for at least 5 years	NA	6.4, 3.4
6.5	NA	NA	NA	Reporting in accordance with Section 3.5	6.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-781	Emission unit name: Heatec Process Heater	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
15.40 mmbtu/hr natural gas-fired hot oil heater

Manufacturer: Heatec	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2010	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 15.40 mmbtu/hr

Maximum Hourly Throughput: 15.40 mmbtu/hr	Maximum Annual Throughput: 134,904 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating: 15.40 mmbtu/hr	Type and Btu/hr rating of burners: Helical coil 15.40 mmbtu/hr
--	---

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
15,098.04 scf/hr
132.26 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	1.27	5.56
Nitrogen Oxides (NO _x)	1.34	5.85
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.11	0.50
Particulate Matter (PM ₁₀)	0.11	0.50
Total Particulate Matter (TSP)	0.11	0.50
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	0.08	0.36
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.03	0.12
Total HAPs	0.03	0.13
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	1,801.86	7,892.13
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x emission factor from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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6.1.3

6.1.4

6.2

6.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]

6.4

6.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
6.1.3	NA	NA	Equipment specifications	NA	6.1.3
6.1.4	NA	NA	Equipment specifications	NA	6.1.4
6.2	Monitoring in accordance with Section 3.2	NA	NA	NA	6.2, 3.2
6.3	NA	Stack testing in accordance with Section 3.3	NA	Reporting in accordance with Section 3.3	5.3, 3.3 [WV Code § 22-5-4(a)(14-15) and 45CSR13]
6.4	NA	NA	Recordkeeping in accordance with Section 3.4. Maintain required records for at least 5 years	NA	6.4, 3.4
6.5	NA	NA	NA	Reporting in accordance with Section 3.5	6.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-3741	Emission unit name: Majorsville III Regeneration Heater	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
7.69 mmbtu/hr natural gas-fired molecular sieve regeneration heater

Manufacturer: Heatec	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2013	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 7.69 mmbtu/hr

Maximum Hourly Throughput: 7.69 mmbtu/hr	Maximum Annual Throughput: 67,364.40 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating: 7.69 mmbtu/hr	Type and Btu/hr rating of burners: Helical coil 7.69 mmbtu/hr
---	--

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.
Natural Gas
7,539.22 scf/hr
66.04 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.32	1.38
Nitrogen Oxides (NO _x)	0.41	1.80
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.06	0.25
Particulate Matter (PM ₁₀)	0.06	0.25
Total Particulate Matter (TSP)	0.06	0.25
Sulfur Dioxide (SO ₂)	0.00	0.02
Volatile Organic Compounds (VOC)	0.04	0.18
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.01	0.06
Total HAPs	0.01	0.06
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	899.76	3,940.94
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x and CO emission factors from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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10.1.1

10.1.2

10.1.3 [40CFR60 Appendix A]

10.2

10.3.1

10.4

10.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
10.1.1	NA	NA	Equipment specifications	NA	10.1.1
10.1.2	NA	NA	Equipment specifications	NA	10.1.2
10.1.3	EPA Method 22 within 1 year of permit issuance or initial startup whichever is later.	NA	NA	NA	10.3.1, 40 CFR 60 Appendix A
10.2	Monitoring requirement in accordance with Section 3.2	NA	Control equipment malfunction events	NA	10.2, 3.2
10.3.1	EPA Method 22	NA	Records of EPA Method 22 test	NA	10.3.1
10.4	Natural gas consumption	NA	Recordkeeping in accordance with Section 3.4	NA	10.4, 3.4
10.5	NA	NA	NA	Reporting in accordance with 3.5	10.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-5741	Emission unit name: Majorsville IV Regeneration Heater	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
7.69 mmbtu/hr natural gas-fired molecular sieve regeneration heater

Manufacturer: Heatec	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2013	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 7.69 mmbtu/hr

Maximum Hourly Throughput: 7.69 mmbtu/hr	Maximum Annual Throughput: 67,364.40 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating: 7.69 mmbtu/hr	Type and Btu/hr rating of burners: Helical coil 7.69 mmbtu/hr
---	--

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
7,539.22 scf/hr
66.04 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data		
Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.32	1.38
Nitrogen Oxides (NO _x)	0.41	1.80
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.06	0.25
Particulate Matter (PM ₁₀)	0.06	0.25
Total Particulate Matter (TSP)	0.06	0.25
Sulfur Dioxide (SO ₂)	0.00	0.02
Volatile Organic Compounds (VOC)	0.04	0.18
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.01	0.06
Total HAPs	0.01	0.06
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	899.76	3,940.94
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x and CO emission factors from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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10.1.1

10.1.2

10.1.3 [40CFR60 Appendix A]

10.2

10.3.1

10.4

10.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
10.1.1	NA	NA	Equipment specifications	NA	10.1.1
10.1.2	NA	NA	Equipment specifications	NA	10.1.2
10.1.3	EPA Method 22 within 1 year of permit issuance or initial startup whichever is later.	NA	NA	NA	10.3.1, 40 CFR 60 Appendix A
10.2	Monitoring requirement in accordance with Section 3.2	NA	Control equipment malfunction events	NA	10.2, 3.2
10.3.1	EPA Method 22	NA	Records of EPA Method 22 test	NA	10.3.1
10.4	Natural gas consumption	NA	Recordkeeping in accordance with Section 3.4	NA	10.4, 3.4
10.5	NA	NA	NA	Reporting in accordance with 3.5	10.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the Schedule of Compliance Form as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number:
H-3781

Emission unit name:
Majorsville III HMO Heater

List any control devices associated with this emission unit: NA

Provide a description of the emission unit (type, method of operation, design parameters, etc.):
16.07 mmbtu/hr natural gas-fired hot oil heater

Manufacturer:
Heatec

Model number:

Serial number:

Construction date:
MM/DD/YYYY

Installation date:
2013

Modification date(s):
NA

Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 16.07 mmbtu/hr

Maximum Hourly Throughput:
16.07 mmbtu/hr

Maximum Annual Throughput:
140,773.20 mmbtu/yr

Maximum Operating Schedule:
8,760 hrs/year

Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? Yes No

If yes, is it?

Indirect Fired Direct Fired

Maximum design heat input and/or maximum horsepower rating:
16.07 mmbtu/hr

Type and Btu/hr rating of burners:
Helical coil
16.07 mmbtu/hr

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
15,755 scf/hr
138.01 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

<i>Emissions Data</i>		
Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	1.32	5.80
Nitrogen Oxides (NO _x)	1.61	7.04
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.12	0.52
Particulate Matter (PM ₁₀)	0.12	0.52
Total Particulate Matter (TSP)	0.12	0.52
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	0.09	0.38
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.01
n-Hexane	0.03	0.12
Total HAPs	0.03	0.13
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	1,880.25	8,235.49
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x and CO emission factors from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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10.1.1

10.1.2

10.1.3 [40CFR60 Appendix A]

10.2

10.3.1

10.4

10.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
10.1.1	NA	NA	Equipment specifications	NA	10.1.1
10.1.2	NA	NA	Equipment specifications	NA	10.1.2
10.1.3	EPA Method 22 within 1 year of permit issuance or initial startup whichever is later.	NA	NA	NA	10.3.1, 40 CFR 60 Appendix A
10.2	Monitoring requirement in accordance with Section 3.2	NA	Control equipment malfunction events	NA	10.2, 3.2
10.3.1	EPA Method 22	NA	Records of EPA Method 22 test	NA	10.3.1
10.4	Natural gas consumption	NA	Recordkeeping in accordance with Section 3.4	NA	10.4, 3.4
10.5	NA	NA	NA	Reporting in accordance with 3.5	10.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-1782	Emission unit name: De-Ethanizer I HMO Heater	List any control devices associated with this emission unit: NA	
Provide a description of the emission unit (type, method of operation, design parameters, etc.): 119.20 mmbtu/hr natural gas-fired hot oil heater			
Manufacturer: Optimized Process Furnaces	Model number:	Serial number:	
Construction date: MM/DD/YYYY	Installation date: 2013	Modification date(s): NA	
Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 119.20 mmbtu/hr			
Maximum Hourly Throughput: 119.20 mmbtu/hr	Maximum Annual Throughput: 1,044,192.00 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year	
Fuel Usage Data (fill out all applicable fields)			
Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired	
Maximum design heat input and/or maximum horsepower rating: 119.20 mmbtu/hr		Type and Btu/hr rating of burners: Vertical cylindrical heater 8 burners @ 14.9 mmbtu/hr each	
List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each. Natural Gas 116,862.75 scf/hr 1,023.72 mmscf/yr			
Describe each fuel expected to be used during the term of the permit.			
Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

<i>Emissions Data</i>		
Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	4.77	20.88
Nitrogen Oxides (NO _x)	3.58	15.66
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.89	3.89
Particulate Matter (PM ₁₀)	0.89	3.89
Total Particulate Matter (TSP)	0.89	3.89
Sulfur Dioxide (SO ₂)	0.07	0.31
Volatile Organic Compounds (VOC)	0.64	2.82
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.01	0.04
n-Hexane	0.21	0.92
Total HAPs	0.22	0.97
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	13,946.83	61,087.11
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x and CO emission factors from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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10.1.1

10.1.2

10.1.3 [40CFR60 Appendix A]

10.2

10.3.1

10.4

10.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
10.1.1	NA	NA	Equipment specifications	NA	10.1.1
10.1.2	NA	NA	Equipment specifications	NA	10.1.2
10.1.3	EPA Method 22 within 1 year of permit issuance or initial startup whichever is later.	NA	NA	NA	10.3.1, 40 CFR 60 Appendix A
10.2	Monitoring requirement in accordance with Section 3.2	NA	Control equipment malfunction events	NA	10.2, 3.2
10.3.1	EPA Method 22	NA	Records of EPA Method 22 test	NA	10.3.1
10.4	Natural gas consumption	NA	Recordkeeping in accordance with Section 3.4	NA	10.4, 3.4
10.5	NA	NA	NA	Reporting in accordance with 3.5	10.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: H-1731	Emission unit name: De-Ethanizer I Regeneration Heater	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
14.25 mmbtu/hr natural gas-fired regeneration heater

Manufacturer: Tulsa Heaters Inc.	Model number:	Serial number:
Construction date: MM/DD/YYYY	Installation date: 2013	Modification date(s): NA

Design Capacity (examples: furnaces - tons/hr, tanks - gallons): 14.25 mmbtu/hr

Maximum Hourly Throughput: 14.25 mmbtu/hr	Maximum Annual Throughput: 124,830 mmbtu/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating: 14.25 mmbtu/hr	Type and Btu/hr rating of burners: Helical Coil 3 burners @ 4.75 mmbtu/hr each
--	---

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas
13,970.59 scf/hr
122.38 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,020 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.58	2.56
Nitrogen Oxides (NO _x)	0.57	2.50
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.19	0.81
Particulate Matter (PM ₁₀)	0.19	0.81
Total Particulate Matter (TSP)	0.19	0.81
Sulfur Dioxide (SO ₂)	0.01	0.04
Volatile Organic Compounds (VOC)	0.27	1.19
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Formaldehyde	0.00	0.00
n-Hexane	0.03	0.11
Total HAPs	0.03	0.12
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	1,667.30	7,302.78
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-NO_x, CO, PM Total, and VOC emission factors from vendor guarantee -All other criteria pollutants and HAP emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG: 40 CFR 98, Subpart C Tier 1 Methodology</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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10.1.1

10.1.2

10.1.3 [40CFR60 Appendix A]

10.2

10.3.1

10.4

10.5

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
10.1.1	NA	NA	Equipment specifications	NA	10.1.1
10.1.2	NA	NA	Equipment specifications	NA	10.1.2
10.1.3	EPA Method 22 within 1 year of permit issuance or initial startup whichever is later.	NA	NA	NA	10.3.1, 40 CFR 60 Appendix A
10.2	Monitoring requirement in accordance with Section 3.2	NA	Control equipment malfunction events	NA	10.2, 3.2
10.3.1	EPA Method 22	NA	Records of EPA Method 22 test	NA	10.3.1
10.4	Natural gas consumption	NA	Recordkeeping in accordance with Section 3.4	NA	10.4, 3.4
10.5	NA	NA	NA	Reporting in accordance with 3.5	10.5, 3.5

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: FL-991	Emission unit name: Flare Pilot	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
Pilot gas combustion

Manufacturer: Callidus	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2010	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons):

Maximum Hourly Throughput: 417 scf/hr	Maximum Annual Throughput: 3.65 mmscf/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating:	Type and Btu/hr rating of burners: 5 pilots @ 85,000 btu/hr
--	---

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.

Natural Gas (Pilot)
417 scf/hr
3.65 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,050 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.04	0.15
Nitrogen Oxides (NO _x)	0.04	0.18
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.00	0.01
Particulate Matter (PM ₁₀)	0.00	0.01
Total Particulate Matter (TSP)	0.00	0.01
Sulfur Dioxide (SO ₂)	0.00	0.00
Volatile Organic Compounds (VOC)	0.00	0.01
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	68.45	299.83
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 -GHG calculated using API Compendium Section 4.6</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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- 8.1.1 [40 CFR 63, Supart HH]
- 8.1.2 a [40 CFR Appendix A, Method 22]
- 8.1.2 b
- 8.1.2 c
- 8.1.2 d
- 8.1.2 e
- 8.1.3 [40 CFR Appendix A]
- 8.1.4
- 8.1.5 [45CSR§6-4.3] [40 CFR 60 Appendix A, Method 22]
- 8.1.6 [45CSR§6-4.4]
- 8.1.7 [45CSR§6-4.6]
- 8.1.8 [45CSR§6-4.1]
- 8.2.2
- 8.4.6
- 8.5.1
- 8.5.2
- 8.5.3

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
8.1.1	NA	NA	Records of PTE HAP emission calculations	NA	8.4.5, 40 CFR 63 Subpart HH
8.1.2 a	NA	NA	Records of equipment specifications	Deviations	8.1.2a, 8.5.3
8.1.2 b	NA	EPA Method 22 within one year of permit issuance or initial startup whichever is later	Records of EPA Method 22 testing	Deviations	8.3.1, 8.5.3, 40 CFR 60 Appendix A Method 22
8.1.2 c	Monitor presence of a flame with a thermocouple except during SSM events	NA	Records of times and duration of all periods which the pilot flame was absent	Deviations	8.2.1, 8.4.4, 8.5.3
8.1.2 d	NA	NA	Records of net heating value calculations	Deviations	8.1.2 d, 8.5.3
8.1.2 e	NA	NA	Records of exit velocity calculations	Deviations	8.1.2 e, 8.5.3
8.1.3	NA	Testing as requested by the Director.	Records of flare design evaluation and flare compliance assessment. Records of any testing	Compliance assessment as requested by the Director.	8.3.2, 8.4.2, 8.4.3, 40 CFR 60 Appendix A Test Methods 2, 2A, 2C, 2D, or 18.
8.1.4	Monitor pilot light fuel	NA	Records of pilot light	NA	8.1.9

	consumption		fuel consumption		
8.1.5	NA	EPA Method 22	Records of EPA Method 22 testing	Deviations	45CSR§6-4.3, 40 CFR 60 Appendix A Method 22
8.1.6	Monitor percent opacity during start-up	NA	NA	NA	45CSR§6-4.4
8.1.7	NA	NA	NA	Deviations	45CSR§6-4.6
8.1.8	NA	NA	Records of PM emission calculations	Deviations	45CSR§6-4.1
8.2.2	Throughput of wet natural gas fed to the flare	NA	Records of wet natural gas throughput fed to the flare on a monthly basis. Maintain records for 5 years.	Provide records to the Director upon request	8.4.3, 8.4.7
8.4.6	NA	NA	Maintain all records required under Section 8.4 for a period of five years	Provide records to the Director upon request	8.4.6
8.5.1	NA	NA	NA	If compliance demonstration with 8.1.1 is required, submit testing protocol 30 days prior to testing. Submit notification 15 days prior to testing. Submit testing results and all supporting calculations and testing data within 60 days of testing.	8.5.1
8.5.2	NA	NA	NA	Report deviations from allowable visible emission requirements discovered using Method 9 or Method 22 within 10 days.	8.5.2
8.5.3	NA	NA	NA	Report deviations from the flare design and operation criteria in writing within 10 days of discovery of such deviation	8.5.3

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as ATTACHMENT F.

ATTACHMENT E - Emission Unit Form

Emission Unit Description

Emission unit ID number: FL-1991	Emission unit name: Flare Pilot	List any control devices associated with this emission unit: NA
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Provide a description of the emission unit (type, method of operation, design parameters, etc.):
Pilot gas combustion

Manufacturer: Callidus	Model number:	Serial number:
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Construction date: MM/DD/YYYY	Installation date: 2013	Modification date(s): NA
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Design Capacity (examples: furnaces - tons/hr, tanks - gallons):

Maximum Hourly Throughput: 417 scf/hr	Maximum Annual Throughput: 3.65 mmscf/yr	Maximum Operating Schedule: 8,760 hrs/year
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Fuel Usage Data (fill out all applicable fields)

Does this emission unit combust fuel? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, is it? <input type="checkbox"/> Indirect Fired <input checked="" type="checkbox"/> Direct Fired
--	---

Maximum design heat input and/or maximum horsepower rating:	Type and Btu/hr rating of burners: 5 pilots @ 85,000 btu/hr
--	---

List the primary fuel type(s) and if applicable, the secondary fuel type(s). For each fuel type listed, provide the maximum hourly and annual fuel usage for each.
Natural Gas (Pilot)
417 scf/hr
3.65 mmscf/yr

Describe each fuel expected to be used during the term of the permit.

Fuel Type	Max. Sulfur Content	Max. Ash Content	BTU Value
Natural Gas	0%	0%	1,050 btu/scf

Emissions Data

Criteria Pollutants	Potential Emissions	
	PPH	TPY
Carbon Monoxide (CO)	0.04	0.15
Nitrogen Oxides (NO _x)	0.04	0.18
Lead (Pb)	0.00	0.00
Particulate Matter (PM _{2.5})	0.00	0.01
Particulate Matter (PM ₁₀)	0.00	0.01
Total Particulate Matter (TSP)	0.00	0.01
Sulfur Dioxide (SO ₂)	0.00	0.00
Volatile Organic Compounds (VOC)	0.00	0.01
Hazardous Air Pollutants	Potential Emissions	
	PPH	TPY
Regulated Pollutants other than Criteria and HAP	Potential Emissions	
	PPH	TPY
CO ₂ (e)	68.45	299.83
<p>List the method(s) used to calculate the potential emissions (include dates of any stack tests conducted, versions of software used, source and dates of emission factors, etc.).</p> <p>-Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, &1.4-3 -GHG calculated using API Compendium Section 4.6</p>		

Applicable Requirements

List all applicable requirements for this emission unit. For each applicable requirement, include the underlying rule/regulation citation and/or construction permit with the condition number. (Note: Title V permit condition numbers alone are not the underlying applicable requirements). If an emission limit is calculated based on the type of source and design capacity or if a standard is based on a design parameter, this information should also be included.

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- 8.1.1 [40 CFR 63, Supart HH]
- 8.1.2 a [40 CFR Appendix A, Method 22]
- 8.1.2 b
- 8.1.2 c
- 8.1.2 d
- 8.1.2 e
- 8.1.3 [40 CFR Appendix A]
- 8.1.4
- 8.1.5 [45CSR§6-4.3] [40 CFR 60 Appendix A, Method 22]
- 8.1.6 [45CSR§6-4.4]
- 8.1.7 [45CSR§6-4.6]
- 8.1.8 [45CSR§6-4.1]
- 8.2.2
- 8.4.6
- 8.5.1
- 8.5.2
- 8.5.3

Permit Shield

For all applicable requirements listed above, provide monitoring/testing/recordkeeping/reporting which shall be used to demonstrate compliance. If the method is based on a permit or rule, include the condition number or citation. (Note: Each requirement listed above must have an associated method of demonstrating compliance. If there is not already a required method in place, then a method must be proposed.)

Section	Monitoring	Testing	Recordkeeping	Reporting	Condition or Citation
8.1.1	NA	NA	Records of PTE HAP emission calculations	NA	8.4.5, 40 CFR 63 Subpart HH
8.1.2 a	NA	NA	Records of equipment specifications	Deviations	8.1.2a, 8.5.3
8.1.2 b	NA	EPA Method 22 within one year of permit issuance or initial startup whichever is later	Records of EPA Method 22 testing	Deviations	8.3.1, 8.5.3, 40 CFR 60 Appendix A Method 22
8.1.2 c	Monitor presence of a flame with a thermocouple except during SSM events	NA	Records of times and duration of all periods which the pilot flame was absent	Deviations	8.2.1, 8.4.4, 8.5.3
8.1.2 d	NA	NA	Records of net heating value calculations	Deviations	8.1.2 d, 8.5.3
8.1.2 e	NA	NA	Records of exit velocity calculations	Deviations	8.1.2 e, 8.5.3
8.1.3	NA	Testing as requested by the Director.	Records of flare design evaluation and flare compliance assessment. Records of any testing	Compliance assessment as requested by the Director.	8.3.2, 8.4.2, 8.4.3, 40 CFR 60 Appendix A Test Methods 2, 2A, 2C, 2D, or 18.
8.1.4	Monitor pilot light fuel	NA	Records of pilot light	NA	8.1.9

	consumption		fuel consumption		
8.1.5	NA	EPA Method 22	Records of EPA Method 22 testing	Deviations	45CSR§6-4.3, 40 CFR 60 Appendix A Method 22
8.1.6	Monitor percent opacity during start-up	NA	NA	NA	45CSR§6-4.4
8.1.7	NA	NA	NA	Deviations	45CSR§6-4.6
8.1.8	NA	NA	Records of PM emission calculations	Deviations	45CSR§6-4.1
8.2.2	Throughput of wet natural gas fed to the flare	NA	Records of wet natural gas throughput fed to the flare on a monthly basis. Maintain records for 5 years.	Provide records to the Director upon request	8.4.3, 8.4.7
8.4.6	NA	NA	Maintain all records required under Section 8.4 for a period of five years	Provide records to the Director upon request	8.4.6
8.5.1	NA	NA	NA	If compliance demonstration with 8.1.1 is required, submit testing protocol 30 days prior to testing. Submit notification 15 days prior to testing. Submit testing results and all supporting calculations and testing data within 60 days of testing.	8.5.1
8.5.2	NA	NA	NA	Report deviations from allowable visible emission requirements discovered using Method 9 or Method 22 within 10 days.	8.5.2
8.5.3	NA	NA	NA	Report deviations from the flare design and operation criteria in writing within 10 days of discovery of such deviation	8.5.3

Are you in compliance with all applicable requirements for this emission unit? Yes No

If no, complete the **Schedule of Compliance Form** as **ATTACHMENT F**.

Attachment G – Air Pollution Control Device Form

ATTACHMENT G - Air Pollution Control Device Form

Control device ID number:
C-102

List all emission units associated with this control device.
C-102

Manufacturer:
Miratech

Model number:
SP-ZESIOG-54x61-20/24-
XH3.5B2

Installation date:
9/13/2010

Type of Air Pollution Control Device:

- | | | |
|---|--|---|
| <input type="checkbox"/> Baghouse/Fabric Filter | <input type="checkbox"/> Venturi Scrubber | <input type="checkbox"/> Multiclone |
| <input type="checkbox"/> Carbon Bed Adsorber | <input type="checkbox"/> Packed Tower Scrubber | <input type="checkbox"/> Single Cyclone |
| <input type="checkbox"/> Carbon Drum(s) | <input type="checkbox"/> Other Wet Scrubber | <input type="checkbox"/> Cyclone Bank |
| <input type="checkbox"/> Catalytic Incinerator | <input type="checkbox"/> Condenser | <input type="checkbox"/> Settling Chamber |
| <input type="checkbox"/> Thermal Incinerator | <input type="checkbox"/> Flare | <input checked="" type="checkbox"/> Other (describe): <u>Oxidation Catalyst</u> |
| <input type="checkbox"/> Wet Plate Electrostatic Precipitator | | <input type="checkbox"/> Dry Plate Electrostatic Precipitator |

List the pollutants for which this device is intended to control and the capture and control efficiencies.

Pollutant	Capture Efficiency	Control Efficiency
NOx		N/A
CO		93%
VOC		50%
HCHO		80%

Explain the characteristic design parameters of this control device (flow rates, pressure drops, number of bags, size, temperatures, etc.).

Catalyst inlet temperature: 550 – 1250 °F
 Catalyst outlet temperature: 1350 °F
 Exhaust flow rate: 16,144 acfm
 Exhaust temperature: 857 °F
 Pressure drop: 6.0 in. of WC

Is this device subject to the CAM requirements of 40 C.F.R. 64? Yes No

If Yes, **Complete ATTACHMENT H**

If No, **Provide justification.** Compressor engine is subject to the emission limitations of 40 CFR 60 Subpart JJJJ.

Describe the parameters monitored and/or methods used to indicate performance of this control device.

5.2.1 a. The permittee shall regularly inspect, properly maintain and/or replace catalytic reduction devices and auxiliary air pollution control devices to ensure functional and effective operation of the engine's physical and operational design. The permittee shall ensure proper operation, maintenance and performance of catalytic reduction devices and auxiliary air pollution control devices by:

1. Maintaining proper operation of the automatic air/fuel ratio controller or automatic feedback controller.
2. Following operating and maintenance recommendations of the catalyst element manufacturer.

ATTACHMENT G - Air Pollution Control Device Form

Control device ID number: C-103	List all emission units associated with this control device. C-103	
Manufacturer: Miratech	Model number: SP-ZESIOG-54x61-20/24- XH3.5B2	Installation date: 9/13/2010

Type of Air Pollution Control Device:

<input type="checkbox"/> Baghouse/Fabric Filter	<input type="checkbox"/> Venturi Scrubber	<input type="checkbox"/> Multiclone
<input type="checkbox"/> Carbon Bed Adsorber	<input type="checkbox"/> Packed Tower Scrubber	<input type="checkbox"/> Single Cyclone
<input type="checkbox"/> Carbon Drum(s)	<input type="checkbox"/> Other Wet Scrubber	<input type="checkbox"/> Cyclone Bank
<input type="checkbox"/> Catalytic Incinerator	<input type="checkbox"/> Condenser	<input type="checkbox"/> Settling Chamber
<input type="checkbox"/> Thermal Incinerator	<input type="checkbox"/> Flare	<input checked="" type="checkbox"/> Other (describe): <u>Oxidation Catalyst</u>
<input type="checkbox"/> Wet Plate Electrostatic Precipitator		<input type="checkbox"/> Dry Plate Electrostatic Precipitator

List the pollutants for which this device is intended to control and the capture and control efficiencies.

Pollutant	Capture Efficiency	Control Efficiency
NO _x		N/A
CO		93%
VOC		50%
HCHO		80%

Explain the characteristic design parameters of this control device (flow rates, pressure drops, number of bags, size, temperatures, etc.).

Catalyst inlet temperature: 550 – 1250 °F
 Catalyst outlet temperature: 1350 °F
 Exhaust flow rate: 16,144 acfm
 Exhaust temperature: 857 °F
 Pressure drop: 6.0 in. of WC

Is this device subject to the CAM requirements of 40 C.F.R. 64? Yes No

If Yes, **Complete ATTACHMENT H**

If No, **Provide justification.** Compressor engine is subject to the emission limitations of 40 CFR 60 Subpart JJJJ.

Describe the parameters monitored and/or methods used to indicate performance of this control device.

5.2.1 a. The permittee shall regularly inspect, properly maintain and/or replace catalytic reduction devices and auxiliary air pollution control devices to ensure functional and effective operation of the engine's physical and operational design. The permittee shall ensure proper operation, maintenance and performance of catalytic reduction devices and auxiliary air pollution control devices by:

1. Maintaining proper operation of the automatic air/fuel ratio controller or automatic feedback controller.
2. Following operating and maintenance recommendations of the catalyst element manufacturer.

ATTACHMENT G - Air Pollution Control Device Form

Control device ID number:
C-104

List all emission units associated with this control device.
C-104

Manufacturer:
Miratech

Model number:
SP-ZESIOG-54x61-20/24-
XH3.5B2

Installation date:
9/13/2010

Type of Air Pollution Control Device:

- | | | |
|---|--|---|
| <input type="checkbox"/> Baghouse/Fabric Filter | <input type="checkbox"/> Venturi Scrubber | <input type="checkbox"/> Multiclone |
| <input type="checkbox"/> Carbon Bed Adsorber | <input type="checkbox"/> Packed Tower Scrubber | <input type="checkbox"/> Single Cyclone |
| <input type="checkbox"/> Carbon Drum(s) | <input type="checkbox"/> Other Wet Scrubber | <input type="checkbox"/> Cyclone Bank |
| <input type="checkbox"/> Catalytic Incinerator | <input type="checkbox"/> Condenser | <input type="checkbox"/> Settling Chamber |
| <input type="checkbox"/> Thermal Incinerator | <input type="checkbox"/> Flare | <input checked="" type="checkbox"/> Other (describe): <u>Oxidation Catalyst</u> |
| <input type="checkbox"/> Wet Plate Electrostatic Precipitator | | <input type="checkbox"/> Dry Plate Electrostatic Precipitator |

List the pollutants for which this device is intended to control and the capture and control efficiencies.

Pollutant	Capture Efficiency	Control Efficiency
NOx		N/A
CO		93%
VOC		50%
HCHO		80%

Explain the characteristic design parameters of this control device (flow rates, pressure drops, number of bags, size, temperatures, etc.).

Catalyst inlet temperature: 550 – 1250 °F
 Catalyst outlet temperature: 1350 °F
 Exhaust flow rate: 16,144 acfm
 Exhaust temperature: 857 °F
 Pressure drop: 6.0 in. of WC

Is this device subject to the CAM requirements of 40 C.F.R. 64? Yes No

If Yes, **Complete ATTACHMENT H**

If No, **Provide justification.** Compressor engine is subject to the emission limitations of 40 CFR 60 Subpart JJJJ.

Describe the parameters monitored and/or methods used to indicate performance of this control device.

5.2.1 a. The permittee shall regularly inspect, properly maintain and/or replace catalytic reduction devices and auxiliary air pollution control devices to ensure functional and effective operation of the engine's physical and operational design. The permittee shall ensure proper operation, maintenance and performance of catalytic reduction devices and auxiliary air pollution control devices by:

1. Maintaining proper operation of the automatic air/fuel ratio controller or automatic feedback controller.
2. Following operating and maintenance recommendations of the catalyst element manufacturer.

Emissions Summary

MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant

Summary of Potential Emissions

Criteria Pollutant Potential Emissions

Process/Facility	Potential Emissions (lb/hr)					
	NOx	CO	VOC	SO ₂	PM ¹	HAPs
Compressor Engine (C-102)	2.61	0.99	1.67	0.01	0.16	0.72
Compressor Engine (C-103)	2.61	0.99	1.67	0.01	0.16	0.72
Compressor Engine (C-104)	2.61	0.99	1.67	0.01	0.16	0.72
MI Regeneration Heater (H-741)	0.30	0.46	0.03	0.003	0.04	0.01
MII Regeneration Heater (H-2741)	0.30	0.46	0.03	0.003	0.04	0.01
MIII Regeneration Heater (H-3741)	0.41	0.32	0.04	0.005	0.06	0.01
MV Regeneration Heater (H-5741)	0.41	0.32	0.04	0.005	0.06	0.01
MI&II Hot Oil Heater (H-781)	1.33	1.27	0.08	0.009	0.11	0.03
MIII&V Hot Oil Heater (H-3781)	1.61	1.32	0.09	0.009	0.12	0.03
DeEthanizer HMO (H-1782)	3.58	4.77	0.64	0.07	0.89	0.22
DeEthanizer Regeneration Heater (H-1731)	0.57	0.58	0.27	0.008	0.19	0.03
Emergency Flare (FL-991) - MI, II, III, and V	0.04	0.04	0.002	0.0003	0.00	--
Emergency Flare (FL-1991) - Deethanizer	0.04	0.04	0.002	0.0003	0.00	--
Facility Blowdowns	--	--	0.34	--	--	0.02
Fugitive Emissions (FUG-001)	--	--	--	--	--	--
Site Wide Emissions (lb/hr)	16.43	12.55	6.59	0.14	1.98	2.54

¹ PM = PM₁₀ = PM_{2.5}

Process/Facility	Potential Emissions (tpy)					
	NOx	CO	VOC	SO ₂	PM ¹	HAPs
Compressor Engine (C-102)	11.44	4.35	7.32	0.04	0.69	3.17
Compressor Engine (C-103)	11.44	4.35	7.32	0.04	0.69	3.17
Compressor Engine (C-104)	11.44	4.35	7.32	0.04	0.69	3.17
MI Regeneration Heater (H-741)	1.32	2.02	0.13	0.01	0.18	0.045
MII Regeneration Heater (H-2741)	1.32	2.02	0.13	0.01	0.18	0.045
MIII Regeneration Heater (H-3741)	1.80	1.38	0.18	0.02	0.25	0.062
MV Regeneration Heater (H-5741)	1.80	1.38	0.18	0.02	0.25	0.062
MI&II Hot Oil Heater (H-781)	5.85	5.55	0.364	0.04	0.50	0.125
MIII&V Hot Oil Heater (H-3781)	7.04	5.80	0.380	0.04	0.52	0.130
DeEthanizer HMO (H-1782)	15.66	20.88	2.815	0.31	3.89	0.967
DeEthanizer Regeneration Heater (H-1731)	2.50	2.56	1.186	0.04	0.81	0.116
Emergency Flare (FL-991) - MI, II, III, and V	0.18	0.15	0.010	0.001	0.01	--
Emergency Flare (FL-1991) - Deethanizer	0.18	0.15	0.010	0.001	0.01	--
Facility Blowdowns	--	--	1.494	--	--	0.072
Fugitive Emissions (FUG-001)	--	--	15.18	--	--	0.728
Site Wide Emissions (tpy)	71.97	54.95	44.04	0.62	8.69	11.85

¹ PM = PM₁₀ = PM_{2.5}

MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant

Summary of Potential Emissions

Hazardous Air Pollutant Potential Emissions

Process/Facility	HAPs - Potential Emissions (lb/hr)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
Compressor Engine (C-102)	6.91E-03	6.24E-04	6.41E-03	2.89E-03	1.74E-02	4.18E-01
Compressor Engine (C-103)	6.91E-03	6.24E-04	6.41E-03	2.89E-03	1.74E-02	4.18E-01
Compressor Engine (C-104)	6.91E-03	6.24E-04	6.41E-03	2.89E-03	1.74E-02	4.18E-01
MI Regeneration Heater (H-741)	1.15E-05	--	1.87E-05	--	9.88E-03	4.12E-04
MII Regeneration Heater (H-2741)	1.15E-05	--	1.87E-05	--	9.88E-03	4.12E-04
MIII Regeneration Heater (H-3741)	1.58E-05	--	2.56E-05	--	1.36E-02	5.65E-04
MV Regeneration Heater (H-5741)	1.58E-05	--	2.56E-05	--	1.36E-02	5.65E-04
MI&II Hot Oil Heater (H-781)	3.17E-05	--	5.13E-05	--	2.72E-02	1.13E-03
MIII&V Hot Oil Heater (H-3781)	3.31E-05	--	5.36E-05	--	2.84E-02	1.18E-03
DeEthanizer HMO (H-1782)	2.45E-04	--	3.97E-04	--	2.10E-01	8.76E-03
DeEthanizer Regeneration Heater (H-1731)	2.93E-05	--	4.75E-05	--	2.51E-02	1.05E-03
Emergency Flare (FL-991) - MI, II, III, and V	--	--	--	--	--	--
Emergency Flare (FL-1991) - Deethanizer	--	--	--	--	--	--
Facility Blowdowns	--	--	--	--	--	--
Fugitive Emissions (FUG-001)	--	--	--	--	--	--
Site Wide Emissions (lb/hr)	0.02	0.00	0.02	0.01	0.39	1.27

Process/Facility	HAPs - Potential Emissions (tpy)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
Compressor Engine (C-102)	3.03E-02	2.73E-03	2.81E-02	1.27E-02	7.64E-02	1.83E+00
Compressor Engine (C-103)	3.03E-02	2.73E-03	2.81E-02	1.27E-02	7.64E-02	1.83E+00
Compressor Engine (C-104)	3.03E-02	2.73E-03	2.81E-02	1.27E-02	7.64E-02	1.83E+00
MI Regeneration Heater (H-741)	5.05E-05	--	8.18E-05	--	4.33E-02	1.80E-03
MII Regeneration Heater (H-2741)	5.05E-05	--	8.18E-05	--	4.33E-02	1.80E-03
MIII Regeneration Heater (H-3741)	6.93E-05	--	1.12E-04	--	5.94E-02	2.48E-03
MV Regeneration Heater (H-5741)	6.93E-05	--	1.12E-04	--	5.94E-02	2.48E-03
MI&II Hot Oil Heater (H-781)	1.39E-04	--	2.25E-04	--	1.19E-01	4.96E-03
MIII&V Hot Oil Heater (H-3781)	1.45E-04	--	2.35E-04	--	1.24E-01	5.18E-03
DeEthanizer HMO (H-1782)	1.07E-03	--	1.74E-03	--	9.21E-01	3.84E-02
DeEthanizer Regeneration Heater (H-1731)	1.29E-04	--	2.08E-04	--	1.10E-01	4.59E-03
Emergency Flare (FL-991) - MI, II, III, and V	--	--	--	--	--	--
Emergency Flare (FL-1991) - Deethanizer	--	--	--	--	--	--
Facility Blowdowns	--	--	--	--	--	--
Fugitive Emissions (FUG-001)	--	--	--	--	--	--
Site Wide Emissions (tpy)	0.09	0.01	0.09	0.04	1.71	5.55

Estimation of Potential GHG Emissions
Majorsville Gas Plant
MarkWest Energy Partners

Color Key:

Site-specific Data from E/Permit
Site-specific Data Entry Required
Data Constants (see reference tab)

Calculation Algorithms

Engine CO_{2,e} = Rated Capacity x Emission Factor x Hours of Operation x Conversion Factor

Flare CO_{2,e} = Vol Gas Flared x MolVol Conversion x MW CO₂ x Mass Conversion x [(Σ Moles C x 98 Moles CO₂/Mole C) + Mole CO₂]

GHG Emission Source	Total GHG Emissions	
	(m.t. CO ₂ e)	(tons CO ₂ e)
Natural Gas Combustion	113,675.39	125,305.51
Venting	2,729.59	3,008.01
Total Facility Emissions:	116,404.98	128,313.52

Facility-wide Summary

Combustion Sources

Source ID Number	Description	Maximum Hours of Operation	Rated HP	Rated Capacity (MMBtu/hr)	Conversion Factor (ton/m.t.)	Conversion Factor (m.t./MWh)	Emission Factors			Emissions			Global Warming Potential			Emissions			Total Emissions (m.t. CO ₂ e)
							CO ₂ (kg/MWh)	CH ₄ (kg/MWh)	N ₂ O (kg/MWh)	CO ₂ (m.t.)	CH ₄ (m.t.)	N ₂ O (m.t.)	CO ₂ (m.t.)	CH ₄ (m.t.)	N ₂ O (m.t.)	CO ₂ (m.t. CO ₂ e)	CH ₄ (m.t. CO ₂ e)	N ₂ O (m.t. CO ₂ e)	
Majorville C-102	Caterpillar 3608 w/ Oxid. Cat.	8,760	2,370	17,280	1.10231	0.001	53.02	0.001	8,025.79	0.15	0.02	1	21	310	8,025.79	3.18	4.69	8,033.66	8,855.58
Majorville C-103	Caterpillar 3608 w/ Oxid. Cat.	8,760	2,370	17,280	1.10231	0.001	53.02	0.001	8,025.79	0.15	0.02	1	21	310	8,025.79	3.18	4.69	8,033.66	8,855.58
Majorville C-104	Caterpillar 3608 w/ Oxid. Cat.	8,760	2,370	17,280	1.10231	0.001	53.02	0.001	8,025.79	0.15	0.02	1	21	310	8,025.79	3.18	4.69	8,033.66	8,855.58
H-741	H-741	8,760	--	5.60	1.10231	0.001	53.02	0.001	2,600.95	0.05	0.00	1	21	310	2,600.95	1.03	1.52	2,603.50	2,869.86
H-2741	H-2741	8,760	--	5.60	1.10231	0.001	53.02	0.001	2,600.95	0.05	0.00	1	21	310	2,600.95	1.03	1.52	2,603.50	2,869.86
H-3741	H-3741	8,760	--	7.69	1.10231	0.001	53.02	0.001	3,571.66	0.07	0.01	1	21	310	3,571.66	1.41	2.09	3,575.16	3,940.94
H-5741	H-5741	8,760	--	7.69	1.10231	0.001	53.02	0.001	3,571.66	0.07	0.01	1	21	310	3,571.66	1.41	2.09	3,575.16	3,940.94
H-781	H-781	8,760	--	15.40	1.10231	0.001	53.02	0.001	7,152.61	0.13	0.01	1	21	310	7,152.61	2.83	4.18	7,159.63	7,892.13
H-3781	H-3781	8,760	--	16.07	1.10231	0.001	53.02	0.001	7,463.80	0.14	0.01	1	21	310	7,463.80	2.96	4.36	7,471.12	8,255.49
H-1782	H-1782	8,760	--	119.20	1.10231	0.001	53.02	0.001	55,363.06	1.04	0.10	1	21	310	55,363.06	21.93	32.37	55,417.36	61,087.11
H-1731	H-1731	8,760	--	14.25	1.10231	0.001	53.02	0.001	6,618.49	0.12	0.01	1	21	310	6,618.49	2.62	3.87	6,624.98	7,302.78

Note - Emissions estimated using 40 CFR Part 98, Subpart C Tier 1 Methodology

Source ID Number	Description	Maximum Hours of Operation	Annual Gas Pilot Light Use (scf/yr)	Annual Gas Pilot Light Use (scf/hr)	Annual Gas Pilot Light Use (%)	Conversion Factor (ton/m.t.)	Emission Factor			Emissions			Global Warming Potential			Emissions			Total Emissions (tons CO ₂ e)		
							CO ₂ (mol %)	CH ₄ (mol %)	N ₂ O (m.t./MMscf)	CO ₂ (m.t.)	CH ₄ (m.t.)	N ₂ O (m.t.)	CO ₂ (m.t. CO ₂ e)	CH ₄ (m.t. CO ₂ e)	N ₂ O (m.t. CO ₂ e)						
FL-991	Flare Pilot Combustion ¹	8,760	3,652,920	417	6.18E-01	1.10231	0.001	0.78	7.10E-07	0.000003	249.01	1.09	0.000003	1	21	310	249.01	22.99	0.00	272.01	299.83
FL-1991	Flare Pilot Combustion ¹	8,760	3,652,920	417	6.18E-01	1.10231	0.001	0.78	7.10E-07	0.000003	249.01	1.09	0.000003	1	21	310	249.01	22.99	0.00	272.01	299.83

Note - Emissions estimated using API Compendium Section 4.6

Fugitive Sources - I&II

Source Type/Service	Number of Sources	TOC EF (kg/hr/cm)	Average Gas Leak Rate (lb/hr)	CH ₄ Emissions (lb/yr)	CH ₄ Emissions (tpy)	CO ₂ Emissions (tpy)
Valves - Gas	722	4.50E-03	7.16E-03	6.18E-01	8.9	186.0
Valves - Light Liquid	1,345	2.50E-03	7.41E-03	6.18E-01	9.2	192.5
Connectors - Gas	1,066	2.00E-04	4.70E-04	6.18E-01	0.6	12.2
Connectors - Light Liquid	698	2.10E-04	3.23E-04	6.18E-01	0.4	8.4
Pump Seals - Light Liquid	10	1.30E-02	2.87E-04	6.18E-01	0.4	7.4
Flanges - Light Liquid	1,143	1.10E-04	2.77E-04	6.18E-01	0.3	7.2
Other - Light Liquid	35	8.80E-03	6.79E-04	6.18E-01	0.8	17.6
Plant and Engine Blowdowns				28.0	122.7	2576.7

From Blowdown Spreadsheet in Emission Estimates

**Compressor Engine Emissions (Per Engine)
(C-102, C-103, C-104)**

Source Designation:	
Manufacturer:	Caterpillar
Model No.:	G3608 LE
Stroke Cycle:	4-stroke
Type of Burn:	Lean
Year Installed/Date Manufactured	TBD
Fuel Used:	Natural Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,020
Rated Horsepower (bhp):	2,370
Specific Fuel Consumption (Btu/bhp-hr)	6.629
Maximum Fuel Consumption at 100% Load (scf/hr):	15,403
Heat Input (MMBtu/hr)	15.71
Stack Designation:	TBD

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	134.93

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors ^a	Units	
NO _x	0.50	g/bhp-hr	*manufacturer
CO (uncontrolled)	2.75	g/bhp-hr	*manufacturer
CO (controlled)	0.19	g/bhp-hr	*manufacturer
SO ₂	5.88E-04	lb/MMBtu	
PM ₁₀ (Filterable)	7.71E-05	lb/MMBtu	
PM _{2.5} (Filterable)	7.71E-05	lb/MMBtu	
PM Condensable	9.91E-03	lb/MMBtu	
PM Total	9.99E-03	lb/MMBtu	
VOC (uncontrolled)	0.63	g/bhp-hr	*manufacturer
VOC (controlled)	0.32	g/bhp-hr	*manufacturer
Formaldehyde (HCHO) (uncontrolled)	0.40	g/bhp-hr	*manufacturer
Formaldehyde (HCHO) (controlled)	0.08	g/bhp-hr	*manufacturer

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions	
	(lb/hr) ^b	(tons/yr) ^c
NO _x	2.61	11.44
CO (uncontrolled)	14.37	62.93
CO (controlled)	0.99	4.35
SO ₂	0.01	0.04
PM ₁₀ (Filterable)	0.001	0.01
PM _{2.5} (Filterable)	0.001	0.01
PM Condensable	0.16	0.68
PM Total	0.16	0.69
VOC (uncontrolled)	3.29	14.42
VOC (controlled)	1.67	7.32
Formaldehyde (HCHO) (uncontrolled)	2.09	9.15
Formaldehyde (HCHO) (controlled)	0.42	1.83

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMBtu) ^a	Potential Emissions	
		(lb/hr) ^b	(tons/yr) ^c
HAPs:			
Acenaphthene	1.25E-06	1.96E-05	8.60E-05
Acenaphthylene	5.53E-06	8.69E-05	3.81E-04
Acetaldehyde	8.36E-03	1.31E-01	5.75E-01
Acrolein	5.14E-03	8.08E-02	3.54E-01
Benzene	4.40E-04	6.91E-03	3.03E-02
Benzo(b)fluoranthene	1.66E-07	2.61E-06	1.14E-05
Benzo(e)pyrene	4.15E-07	6.52E-06	2.86E-05
Benzo(g,h,i)perylene	4.14E-07	6.50E-06	2.85E-05
Biphenyl	2.12E-04	3.33E-03	1.46E-02
1,3-Butadiene	2.67E-04	4.19E-03	1.84E-02
Carbon Tetrachloride	3.67E-05	5.77E-04	2.53E-03
Chlorobenzene	3.04E-05	4.78E-04	2.09E-03
Chloroform	2.85E-05	4.48E-04	1.96E-03
Chrysene	6.93E-07	1.09E-05	4.77E-05
1,3-Dichloropropene	2.64E-05	4.15E-04	1.82E-03
Ethylbenzene	3.97E-05	6.24E-04	2.73E-03
Ethylene Dibromide	4.43E-05	6.96E-04	3.05E-03
Fluoranthene	1.11E-06	1.74E-05	7.64E-05
Fluorene	5.67E-06	8.91E-05	3.90E-04
Methanol	2.50E-03	3.93E-02	1.72E-01
Methylene Chloride	2.00E-05	3.14E-04	1.38E-03
n-Hexane	1.11E-03	1.74E-02	7.64E-02
Phenanthrene	1.04E-05	1.63E-04	7.16E-04
Phenol	2.40E-05	3.77E-04	1.65E-03
Pyrene	1.36E-06	2.14E-05	9.36E-05
Styrene	2.36E-05	3.71E-04	1.62E-03
Toluene	4.08E-04	6.41E-03	2.81E-02
1,1,2,2-Tetrachloroethane	4.00E-05	6.28E-04	2.75E-03
Tetrachloroethane	2.48E-06	3.90E-05	1.71E-04
1,1,2-Trichloroethane	3.18E-05	5.00E-04	2.19E-03
2,2,4-Trimethylpentane	2.50E-04	3.93E-03	1.72E-02
Vinyl Chloride	1.49E-05	2.34E-04	1.03E-03
Xylene	1.84E-04	2.89E-03	1.27E-02
Polycyclic Organic Matter:			
Naphthalene	7.44E-05	1.17E-03	5.12E-03
2-Methylnaphthalene	3.32E-05	5.22E-04	2.28E-03
PAH	2.69E-05	4.23E-04	1.85E-03
Total HAP		0.72	3.17

^a SO₂, PM, and HAP emission factors from AP-42 Section 3.2, Table 3.2-2 "Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines."

^b Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

^c Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant

**Regeneration Heaters
(H-741, H-2741)**

Source Designation:	
Manufacturer:	Heatec
Year Installed	2010/2011
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	5.60
Fuel Consumption (mmscf/hr):	5.49E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf)^{a,b}	Potential Emissions	
		(lb/hr)^c	(tons/yr)^d
NO _x	55	0.302	1.323
CO	84	0.461	2.020
SO ₂	0.6	0.003	0.0144
PM Total	7.6	0.042	0.1828
PM Condensable	5.7	0.031	0.137
PM ₁₀ (Filterable)	1.9	0.010	0.046
PM _{2.5} (Filterable)	1.9	0.010	0.046
VOC	5.5	0.030	0.132

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	9.88E-09	4.33E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	8.78E-08	3.85E-07
Acenaphthene	1.80E-06	9.88E-09	4.33E-08
Acenaphthylene	1.80E-06	9.88E-09	4.33E-08
Anthracene	2.40E-06	1.32E-08	5.77E-08
Benz(a)anthracene	1.80E-06	9.88E-09	4.33E-08
Benzene	2.10E-03	1.15E-05	5.05E-05
Benzo(a)pyrene	1.20E-06	6.59E-09	2.89E-08
Benzo(b)fluoranthene	1.80E-06	9.88E-09	4.33E-08
Benzo(g,h,i)perylene	1.20E-06	6.59E-09	2.89E-08
Benzo(k)fluoranthene	1.80E-06	9.88E-09	4.33E-08
Chrysene	1.80E-06	9.88E-09	4.33E-08
Dibenzo(a,h) anthracene	1.20E-06	6.59E-09	2.89E-08
Dichlorobenzene	1.20E-03	6.59E-06	2.89E-05
Fluoranthene	3.00E-06	1.65E-08	7.21E-08
Fluorene	2.80E-06	1.54E-08	6.73E-08
Formaldehyde	7.50E-02	4.12E-04	1.80E-03
Hexane	1.80E+00	9.88E-03	4.33E-02
Indo(1,2,3-cd)pyrene	1.80E-06	9.88E-09	4.33E-08
Phenanthrene	1.70E-05	9.33E-08	4.09E-07
Pyrene	5.00E-06	2.75E-08	1.20E-07
Toluene	3.40E-03	1.87E-05	8.18E-05
Arsenic	2.00E-04	1.10E-06	4.81E-06
Beryllium	1.20E-05	6.59E-08	2.89E-07
Cadmium	1.10E-03	6.04E-06	2.65E-05
Chromium	1.40E-03	7.69E-06	3.37E-05
Cobalt	8.40E-05	4.61E-07	2.02E-06
Lead	5.00E-04	2.75E-06	1.20E-05
Manganese	3.80E-04	2.09E-06	9.14E-06
Mercury	2.60E-04	1.43E-06	6.25E-06
Nickel	2.10E-03	1.15E-05	5.05E-05
Selenium	2.40E-05	1.32E-07	5.77E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	1.32E-07	5.77E-07
Naphthalene	6.10E-04	3.35E-06	1.47E-05
Total HAP		1.04E-02	4.54E-02

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

**Hot Oil Heater
(H-781)**

Source Designation:	
Manufacturer:	Heatec
Year Installed	2010
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	15.40
Fuel Consumption (mmscf/hr):	1.51E-02
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^{a,b}	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
NO _x	88.4	1.335	5.846
CO	84	1.268	5.555
SO ₂	0.6	0.009	0.0397
PM Total	7.6	0.115	0.5026
PM Condensable	5.7	0.086	0.377
PM ₁₀ (Filterable)	1.9	0.029	0.126
PM _{2.5} (Filterable)	1.9	0.029	0.126
VOC	5.5	0.083	0.364

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	2.72E-08	1.19E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.42E-07	1.06E-06
Acenaphthene	1.80E-06	2.72E-08	1.19E-07
Acenaphthylene	1.80E-06	2.72E-08	1.19E-07
Anthracene	2.40E-06	3.62E-08	1.59E-07
Benz(a)anthracene	1.80E-06	2.72E-08	1.19E-07
Benzene	2.10E-03	3.17E-05	1.39E-04
Benzo(a)pyrene	1.20E-06	1.81E-08	7.94E-08
Benzo(b)fluoranthene	1.80E-06	2.72E-08	1.19E-07
Benzo(g,h,i)perylene	1.20E-06	1.81E-08	7.94E-08
Benzo(k)fluoranthene	1.80E-06	2.72E-08	1.19E-07
Chrysene	1.80E-06	2.72E-08	1.19E-07
Dibenzo(a,h) anthracene	1.20E-06	1.81E-08	7.94E-08
Dichlorobenzene	1.20E-03	1.81E-05	7.94E-05
Fluoranthene	3.00E-06	4.53E-08	1.98E-07
Fluorene	2.80E-06	4.23E-08	1.85E-07
Formaldehyde	7.50E-02	1.13E-03	4.96E-03
Hexane	1.80E+00	2.72E-02	1.19E-01
Indo(1,2,3-cd)pyrene	1.80E-06	2.72E-08	1.19E-07
Phenanthrene	1.70E-05	2.57E-07	1.12E-06
Pyrene	5.00E-06	7.55E-08	3.31E-07
Toluene	3.40E-03	5.13E-05	2.25E-04
Arsenic	2.00E-04	3.02E-06	1.32E-05
Beryllium	1.20E-05	1.81E-07	7.94E-07
Cadmium	1.10E-03	1.66E-05	7.27E-05
Chromium	1.40E-03	2.11E-05	9.26E-05
Cobalt	8.40E-05	1.27E-06	5.55E-06
Lead	5.00E-04	7.55E-06	3.31E-05
Manganese	3.80E-04	5.74E-06	2.51E-05
Mercury	2.60E-04	3.93E-06	1.72E-05
Nickel	2.10E-03	3.17E-05	1.39E-04
Selenium	2.40E-05	3.62E-07	1.59E-06
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	3.62E-07	1.59E-06
Naphthalene	6.10E-04	9.21E-06	4.03E-05
Total HAP		2.85E-02	1.25E-01

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant

Regeneration Heaters (H-3741, 4741)
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Source Designation:	
Manufacturer:	Heatec
Year Installed	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	7.69
Fuel Consumption (mmscf/hr):	7.54E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^{a,b}	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
NO _x	54.4	0.410	1.796
CO	41.82	0.315	1.381
SO ₂	0.6	0.005	0.0198
PM Total	7.6	0.057	0.2510
PM Condensable	5.7	0.043	0.188
PM ₁₀ (Filterable)	1.9	0.014	0.063
PM _{2.5} (Filterable)	1.9	0.014	0.063
VOC	5.5	0.041	0.182

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	1.36E-08	5.94E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.21E-07	5.28E-07
Acenaphthene	1.80E-06	1.36E-08	5.94E-08
Acenaphthylene	1.80E-06	1.36E-08	5.94E-08
Anthracene	2.40E-06	1.81E-08	7.93E-08
Benz(a)anthracene	1.80E-06	1.36E-08	5.94E-08
Benzene	2.10E-03	1.58E-05	6.93E-05
Benzo(a)pyrene	1.20E-06	9.05E-09	3.96E-08
Benzo(b)fluoranthene	1.80E-06	1.36E-08	5.94E-08
Benzo(g,h,i)perylene	1.20E-06	9.05E-09	3.96E-08
Benzo(k)fluoranthene	1.80E-06	1.36E-08	5.94E-08
Chrysene	1.80E-06	1.36E-08	5.94E-08
Dibenzo(a,h) anthracene	1.20E-06	9.05E-09	3.96E-08
Dichlorobenzene	1.20E-03	9.05E-06	3.96E-05
Fluoranthene	3.00E-06	2.26E-08	9.91E-08
Fluorene	2.80E-06	2.11E-08	9.25E-08
Formaldehyde	7.50E-02	5.65E-04	2.48E-03
Hexane	1.80E+00	1.36E-02	5.94E-02
Indo(1,2,3-cd)pyrene	1.80E-06	1.36E-08	5.94E-08
Phenanthrene	1.70E-05	1.28E-07	5.61E-07
Pyrene	5.00E-06	3.77E-08	1.65E-07
Toluene	3.40E-03	2.56E-05	1.12E-04
Arsenic	2.00E-04	1.51E-06	6.60E-06
Beryllium	1.20E-05	9.05E-08	3.96E-07
Cadmium	1.10E-03	8.29E-06	3.63E-05
Chromium	1.40E-03	1.06E-05	4.62E-05
Cobalt	8.40E-05	6.33E-07	2.77E-06
Lead	5.00E-04	3.77E-06	1.65E-05
Manganese	3.80E-04	2.86E-06	1.25E-05
Mercury	2.60E-04	1.96E-06	8.59E-06
Nickel	2.10E-03	1.58E-05	6.93E-05
Selenium	2.40E-05	1.81E-07	7.93E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	1.81E-07	7.93E-07
Naphthalene	6.10E-04	4.60E-06	2.01E-05
Total HAP		1.42E-02	6.24E-02

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x and CO emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
 Majorsville Gas Plant

**Hot Oil Heater
 (H-3781)**

Source Designation:	
Manufacturer:	Heatec
Year Installed	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	16.07
Fuel Consumption (mmscf/hr):	1.58E-02
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^{a,b}	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
NO _x	102	1.607	7.039
CO	84	1.323	5.797
SO ₂	0.6	0.009	0.0414
PM Total	7.6	0.120	0.5244
PM Condensable	5.7	0.090	0.393
PM ₁₀ (Filterable)	1.9	0.030	0.131
PM _{2.5} (Filterable)	1.9	0.030	0.131
VOC	5.5	0.087	0.380

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	2.84E-08	1.24E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.52E-07	1.10E-06
Acenaphthene	1.80E-06	2.84E-08	1.24E-07
Acenaphthylene	1.80E-06	2.84E-08	1.24E-07
Anthracene	2.40E-06	3.78E-08	1.66E-07
Benz(a)anthracene	1.80E-06	2.84E-08	1.24E-07
Benzene	2.10E-03	3.31E-05	1.45E-04
Benzo(a)pyrene	1.20E-06	1.89E-08	8.28E-08
Benzo(b)fluoranthene	1.80E-06	2.84E-08	1.24E-07
Benzo(g,h,i)perylene	1.20E-06	1.89E-08	8.28E-08
Benzo(k)fluoranthene	1.80E-06	2.84E-08	1.24E-07
Chrysene	1.80E-06	2.84E-08	1.24E-07
Dibenzo(a,h) anthracene	1.20E-06	1.89E-08	8.28E-08
Dichlorobenzene	1.20E-03	1.89E-05	8.28E-05
Fluoranthene	3.00E-06	4.73E-08	2.07E-07
Fluorene	2.80E-06	4.41E-08	1.93E-07
Formaldehyde	7.50E-02	1.18E-03	5.18E-03
Hexane	1.80E+00	2.84E-02	1.24E-01
Indo(1,2,3-cd)pyrene	1.80E-06	2.84E-08	1.24E-07
Phenanthrene	1.70E-05	2.68E-07	1.17E-06
Pyrene	5.00E-06	7.88E-08	3.45E-07
Toluene	3.40E-03	5.36E-05	2.35E-04
Arsenic	2.00E-04	3.15E-06	1.38E-05
Beryllium	1.20E-05	1.89E-07	8.28E-07
Cadmium	1.10E-03	1.73E-05	7.59E-05
Chromium	1.40E-03	2.21E-05	9.66E-05
Cobalt	8.40E-05	1.32E-06	5.80E-06
Lead	5.00E-04	7.88E-06	3.45E-05
Manganese	3.80E-04	5.99E-06	2.62E-05
Mercury	2.60E-04	4.10E-06	1.79E-05
Nickel	2.10E-03	3.31E-05	1.45E-04
Selenium	2.40E-05	3.78E-07	1.66E-06
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	3.78E-07	1.66E-06
Naphthalene	6.10E-04	9.61E-06	4.21E-05
Total HAP		2.98E-02	1.30E-01

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x and CO emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

**Hot Oil Heater
(H-1731)**

Source Designation:	
Manufacturer:	Tulsa Heaters Inc.
Year Installed	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	14.25
Fuel Consumption (mmscf/hr):	1.40E-02
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^{a,b}	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
NO _x	40.8	0.570	2.497
CO	41.82	0.584	2.559
SO ₂	0.6	0.008	0.0367
PM Total	13.26	0.185	0.8114
PM Condensable	5.7	0.080	0.349
PM ₁₀ (Filterable)	1.9	0.027	0.116
PM _{2.5} (Filterable)	1.9	0.027	0.116
VOC	19.38	0.271	1.186

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	2.51E-08	1.10E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.24E-07	9.79E-07
Acenaphthene	1.80E-06	2.51E-08	1.10E-07
Acenaphthylene	1.80E-06	2.51E-08	1.10E-07
Anthracene	2.40E-06	3.35E-08	1.47E-07
Benz(a)anthracene	1.80E-06	2.51E-08	1.10E-07
Benzene	2.10E-03	2.93E-05	1.29E-04
Benzo(a)pyrene	1.20E-06	1.68E-08	7.34E-08
Benzo(b)fluoranthene	1.80E-06	2.51E-08	1.10E-07
Benzo(g,h,i)perylene	1.20E-06	1.68E-08	7.34E-08
Benzo(k)fluoranthene	1.80E-06	2.51E-08	1.10E-07
Chrysene	1.80E-06	2.51E-08	1.10E-07
Dibenzo(a,h) anthracene	1.20E-06	1.68E-08	7.34E-08
Dichlorobenzene	1.20E-03	1.68E-05	7.34E-05
Fluoranthene	3.00E-06	4.19E-08	1.84E-07
Fluorene	2.80E-06	3.91E-08	1.71E-07
Formaldehyde	7.50E-02	1.05E-03	4.59E-03
Hexane	1.80E+00	2.51E-02	1.10E-01
Indo(1,2,3-cd)pyrene	1.80E-06	2.51E-08	1.10E-07
Phenanthrene	1.70E-05	2.38E-07	1.04E-06
Pyrene	5.00E-06	6.99E-08	3.06E-07
Toluene	3.40E-03	4.75E-05	2.08E-04
Arsenic	2.00E-04	2.79E-06	1.22E-05
Beryllium	1.20E-05	1.68E-07	7.34E-07
Cadmium	1.10E-03	1.54E-05	6.73E-05
Chromium	1.40E-03	1.96E-05	8.57E-05
Cobalt	8.40E-05	1.17E-06	5.14E-06
Lead	5.00E-04	6.99E-06	3.06E-05
Manganese	3.80E-04	5.31E-06	2.33E-05
Mercury	2.60E-04	3.63E-06	1.59E-05
Nickel	2.10E-03	2.93E-05	1.29E-04
Selenium	2.40E-05	3.35E-07	1.47E-06
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	3.35E-07	1.47E-06
Naphthalene	6.10E-04	8.52E-06	3.73E-05
Total HAP		2.64E-02	1.16E-01

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x, CO, Pmtotal, and VOC emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
 Majorsville Gas Plant

Hot Oil Heater (H-1782)

Source Designation:	
Manufacturer:	Optimized Process Furnaces
Year Installed	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,020
Heat Input (MMBtu/hr)	119.20
Fuel Consumption (mmscf/hr):	1.17E-01
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^{a,b}	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
NO _x	30.60	3.576	15.663
CO	40.8	4.768	20.884
SO ₂	0.6	0.070	0.3071
PM Total	7.6	0.888	3.8901
PM Condensable	5.7	0.666	2.918
PM ₁₀ (Filterable)	1.9	0.222	0.973
PM _{2.5} (Filterable)	1.9	0.222	0.973
VOC	5.5	0.643	2.815

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^c	(tons/yr) ^d
HAPs:			
3-Methylchloranthrene	1.80E-06	2.10E-07	9.21E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.87E-06	8.19E-06
Acenaphthene	1.80E-06	2.10E-07	9.21E-07
Acenaphthylene	1.80E-06	2.10E-07	9.21E-07
Anthracene	2.40E-06	2.80E-07	1.23E-06
Benz(a)anthracene	1.80E-06	2.10E-07	9.21E-07
Benzene	2.10E-03	2.45E-04	1.07E-03
Benzo(a)pyrene	1.20E-06	1.40E-07	6.14E-07
Benzo(b)fluoranthene	1.80E-06	2.10E-07	9.21E-07
Benzo(g,h,i)perylene	1.20E-06	1.40E-07	6.14E-07
Benzo(k)fluoranthene	1.80E-06	2.10E-07	9.21E-07
Chrysene	1.80E-06	2.10E-07	9.21E-07
Dibenzo(a,h) anthracene	1.20E-06	1.40E-07	6.14E-07
Dichlorobenzene	1.20E-03	1.40E-04	6.14E-04
Fluoranthene	3.00E-06	3.51E-07	1.54E-06
Fluorene	2.80E-06	3.27E-07	1.43E-06
Formaldehyde	7.50E-02	8.76E-03	3.84E-02
Hexane	1.80E+00	2.10E-01	9.21E-01
Indo(1,2,3-cd)pyrene	1.80E-06	2.10E-07	9.21E-07
Phenanthrene	1.70E-05	1.99E-06	8.70E-06
Pyrene	5.00E-06	5.84E-07	2.56E-06
Toluene	3.40E-03	3.97E-04	1.74E-03
Arsenic	2.00E-04	2.34E-05	1.02E-04
Beryllium	1.20E-05	1.40E-06	6.14E-06
Cadmium	1.10E-03	1.29E-04	5.63E-04
Chromium	1.40E-03	1.64E-04	7.17E-04
Cobalt	8.40E-05	9.82E-06	4.30E-05
Lead	5.00E-04	5.84E-05	2.56E-04
Manganese	3.80E-04	4.44E-05	1.95E-04
Mercury	2.60E-04	3.04E-05	1.33E-04
Nickel	2.10E-03	2.45E-04	1.07E-03
Selenium	2.40E-05	2.80E-06	1.23E-05
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	2.80E-06	1.23E-05
Naphthalene	6.10E-04	7.13E-05	3.12E-04
Total HAP		2.21E-01	9.67E-01

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

^b NO_x and CO emission factors from vendor guarantee.

^c Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf) × (Actual Fuel HHV/1020).

^d Annual Emissions (tons/yr)_{Potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

**Emergency Flare
(FL-991/FL-1991)**

Source Designation:	
Manufacturer:	Callidus
Year Installed	2010/2013
Operating Hours: (hr/yr)	8,760
Flow Rate per Pilot (scfm)	1.39
Number of Pilots	5.00
Pilot Gas Volume (scfm)	6.95
Purge Gas Volume (scfm)	0.00
Annual Fuel Use (MMBtu/yr)	3,726
Annual Fuel Use (mmscf/yr)	3.7
Fuel Consumption (mmscf/hr):	4.2E-04
Fuel HHV (Btu/scf)	1,020

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf) ^a	Potential Emissions	
		(lb/hr) ^b	(tons/yr) ^c
NO _x	100	0.042	0.183
CO	84	0.035	0.153
SO ₂	0.6	0.000	0.001
PM Total	7.6	0.003	0.014
PM Condensable	1.9	0.001	0.003
PM ₁₀ (Filterable)	5.7	0.002	0.010
PM _{2.5} (Filterable)	5.7	0.002	0.010
VOC	5.5	0.002	0.010

^a Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1.

^b Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

^c Annual Emissions (tons/yr)_{potential} = (lb/hr)_{Emissions} × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

VOC and HAP Vented Blowdown Emissions

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year	Total Volume NG Emitted (scf/yr)	Flare Control Efficiency (%)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)
Engines	3	2,200	36	237,600	0	1.0	0.049
Majorsville I&II	2	182,525	4	1,460,200	98	0.1	0.006
Majorsville III & IV	2	250,000	4	2,000,000	98	0.2	0.008
Deethanizer	1	459,000	4	1,836,000	98	0.2	0.008
Total						1.5	0.072

Density of natural gas: 0.05 lb/ft³ @ STP (www.engineeringtoolbox.com)

GHG Vented Blowdown Emissions

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year	Total Volume NG Emitted (scf/yr)	Potential CH ₄ Emissions ¹ (tpy)	Potential CO ₂ Emissions ¹ (tpy)	Potential CO ₂ e Emissions (tpy)
Engines	3	2,200	36	237,600	3.1	0.018	65
Majorsville I&II	2	182,525	4	1,460,200	19.0	0.000	400
Majorsville III & IV	2	250,000	4	2,000,000	26.1	0.000	548
Deethanizer	1	459,000	4	1,836,000	74.4	0.000	1563
Total					122.7	0.018	2576

i. Calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98.

MarkWest Liberty Midstream & Resources L.L.C.
Majorsville Gas Plant

Fugitive Emissions from Component Leaks

Component	Service Type	Component Count ²	TOC Emission Factor ³ (kg/hr/component)	Average NG Leak Rate (lb/hr)	Max NG Leak Rate ⁴ (lpy)	VOC Wt-% ⁵	HAP Wt-%	Potential VOC Emissions (lpy)	Potential HAP Emissions (lpy)
Connectors	Gas	1,066	2.00E-04	4.70E-01	2.47E+00	17.39%	0.83%	4.30E-01	2.06E-02
Flanges	Gas	0	3.90E-04	0.00E+00	0.00E+00	17.39%	0.83%	0.00E+00	0.00E+00
Open-Ended Lines	Gas	0	2.00E-03	0.00E+00	0.00E+00	17.39%	0.83%	0.00E+00	0.00E+00
Pump Seals	Gas	0	2.40E-03	0.00E+00	0.00E+00	17.39%	0.83%	0.00E+00	0.00E+00
Valves	Gas	722	4.50E-03	7.10E+00	3.76E+01	17.39%	0.83%	6.55E+00	3.14E-01
Other ¹	Gas	35	8.80E-03	6.79E-01	3.57E+00	17.39%	0.83%	6.21E-01	2.97E-02
Connectors	Light Oil	698	2.10E-04	3.23E-01	1.70E+00	17.39%	0.83%	2.95E-01	1.42E-02
Flanges	Light Oil	1,143	1.10E-04	2.77E-01	1.46E+00	17.39%	0.83%	2.53E-01	1.21E-02
Open-Ended Lines	Light Oil	0	1.40E-03	0.00E+00	0.00E+00	17.39%	0.83%	0.00E+00	0.00E+00
Pump Seals	Light Oil	10	1.30E-02	2.87E-01	1.51E+00	17.39%	0.83%	2.62E-01	1.26E-02
Valves	Light Oil	1,345	2.50E-03	7.41E+00	3.90E+01	17.39%	0.83%	6.78E+00	3.25E-01
Other ¹	Light Oil	0	7.50E-03	0.00E+00	0.00E+00	17.39%	0.83%	0.00E+00	0.00E+00
Total					87.3	15.184			0.728

1. "Other" equipment types include compressor seals, relief valves, diaphragms, drains, meters, etc.

2. The component count is a preliminary estimate based on the proposed design of the Mobley Gathering Station.

3. Table 2-4: Oil & Gas Production Operations Average Emission Factors, Pretest for Equipment Leak Emission Estimates. EPA 453/R-95-017, November 1995. Emission factors based on average measured VOC from component types indicated in gas service at O&G Production Operations.

4. Assumes maximum leak rate 20% greater than measured average leak rate.

5. VOC and HAP weight percent based on representative gas analysis dated 9-9-09. All C6+ components assumed to be hazardous air pollutants for a conservative emissions estimate.