



December 22, 2015

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

**RE: Application for Rule 13 Construction Permit
Ascent Resources - Marcellus, LLC
Mason Hill**

Dear Sir/Madam,

Ascent Resources – Marcellus, LLC (Ascent) owns and operates the Mason Hill facility, which is located in Wetzel County, West Virginia (Facility).

To authorize the installation and operation of equipment at the Facility, Ascent is submitting this application for a Rule 13 Construction Permit. The purpose of this application is to obtain authorization to install and operate the identified emissions units at the Facility. The Facility consists of three atmospheric storage tanks that store liquids from pigging events. The storage tanks are controlled by a combustor and liquids are removed from the Facility via truck tanks.

This Application has been prepared in accordance with the requirements set forth in 45CSR6, 45CSR13, and applicable guidance documents. Ascent will operate the Facility in compliance with applicable federal and state air quality regulations. The required attachments are included in addition to the application forms.

Enclosed is the original and two copies of the application, along with the fee in the amount of \$1,000. If you have any questions or need additional information, please feel free to contact me at 405-252-7753.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Evan Foster', is written over a light blue horizontal line.

Evan Foster
EH&S Air Compliance Specialist

Enclosures

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WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

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

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

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

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

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

- ADMINISTRATIVE AMENDMENT** **MINOR MODIFICATION**
 SIGNIFICANT MODIFICATION

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

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

Section I. General

| | | | |
|---|--|---|--|
| 1. Name of applicant (as registered with the WV Secretary of State's Office): Ascent Resources – Marcellus, LLC | | 2. Federal Employer ID No. (FEIN): | |
| 3. Name of facility (if different from above): Mason Hill | | 4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH | |
| 5A. Applicant's mailing address: PO Box 13678 Oklahoma City, OK 73113 | | 5B. Facility's present physical address: 1842 McKimmie Ridge Rd. Reader, WV 26167 | |
| 6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO – If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A . – If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A . | | | |
| 7. If applicant is a subsidiary corporation, please provide the name of parent corporation: | | | |
| 8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, please explain: Lease – If NO, you are not eligible for a permit for this source. | | | |
| 9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Natural gas production | | 10. North American Industry Classification System (NAICS) code for the facility: 211111 | |
| 11A. DAQ Plant ID No. (for existing facilities only): – | | 11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): | |

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

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

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

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

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

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

| | | |
|---|--|--|
| <input checked="" type="checkbox"/> Bulk Liquid Transfer Operations | <input type="checkbox"/> Haul Road Emissions | <input type="checkbox"/> Quarry |
| <input checked="" type="checkbox"/> Chemical Processes | <input type="checkbox"/> Hot Mix Asphalt Plant | <input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities |
| <input type="checkbox"/> Concrete Batch Plant | <input type="checkbox"/> Incinerator | <input checked="" type="checkbox"/> Storage Tanks |
| <input type="checkbox"/> Grey Iron and Steel Foundry | <input type="checkbox"/> Indirect Heat Exchanger | |
| <input type="checkbox"/> General Emission Unit, specify | | |

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

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

| | | |
|--|---|--|
| <input type="checkbox"/> Absorption Systems | <input type="checkbox"/> Baghouse | <input checked="" type="checkbox"/> Flare |
| <input type="checkbox"/> Adsorption Systems | <input type="checkbox"/> Condenser | <input type="checkbox"/> Mechanical Collector |
| <input type="checkbox"/> Afterburner | <input type="checkbox"/> Electrostatic Precipitator | <input type="checkbox"/> Wet Collecting System |
| <input type="checkbox"/> Other Collectors, specify | | |

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

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

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.
 ➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

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

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?
 YES NO
 ➤ If **YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "**Precautionary Notice – Claims of Confidentiality**" guidance found in the **General Instructions** as **Attachment Q**.

Section III. Certification of Information

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

| | |
|--|---|
| <input type="checkbox"/> Authority of Corporation or Other Business Entity | <input type="checkbox"/> Authority of Partnership |
| <input type="checkbox"/> Authority of Governmental Agency | <input type="checkbox"/> Authority of Limited Partnership |

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

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE _____
(Please use blue ink)

DATE: 12/21/15
(Please use blue ink)

| | | |
|--|--------------------------|--|
| 35B. Printed name of signee: Tim Cummings | | 35C. Title: VP-Operations |
| 35D. E-mail: N/A | 36E. Phone: N/A | 36F. FAX: N/A |
| 36A. Printed name of contact person (if different from above): Evan Foster | | 36B. Title: EH&S Air Compliance Specialist |
| 36C. E-mail: evan.foster@ascentresources.com | 36D. Phone: 405-252-7753 | 36E. FAX: N/A |

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

Attachment A: Business Certificate

State of West Virginia



Certificate

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

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

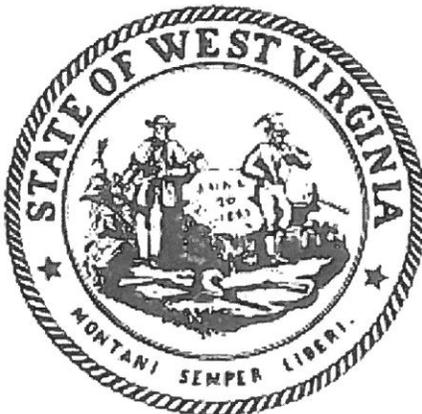
AMERICAN ENERGY-MARCELLUS, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

ASCENT RESOURCES - MARCELLUS, LLC

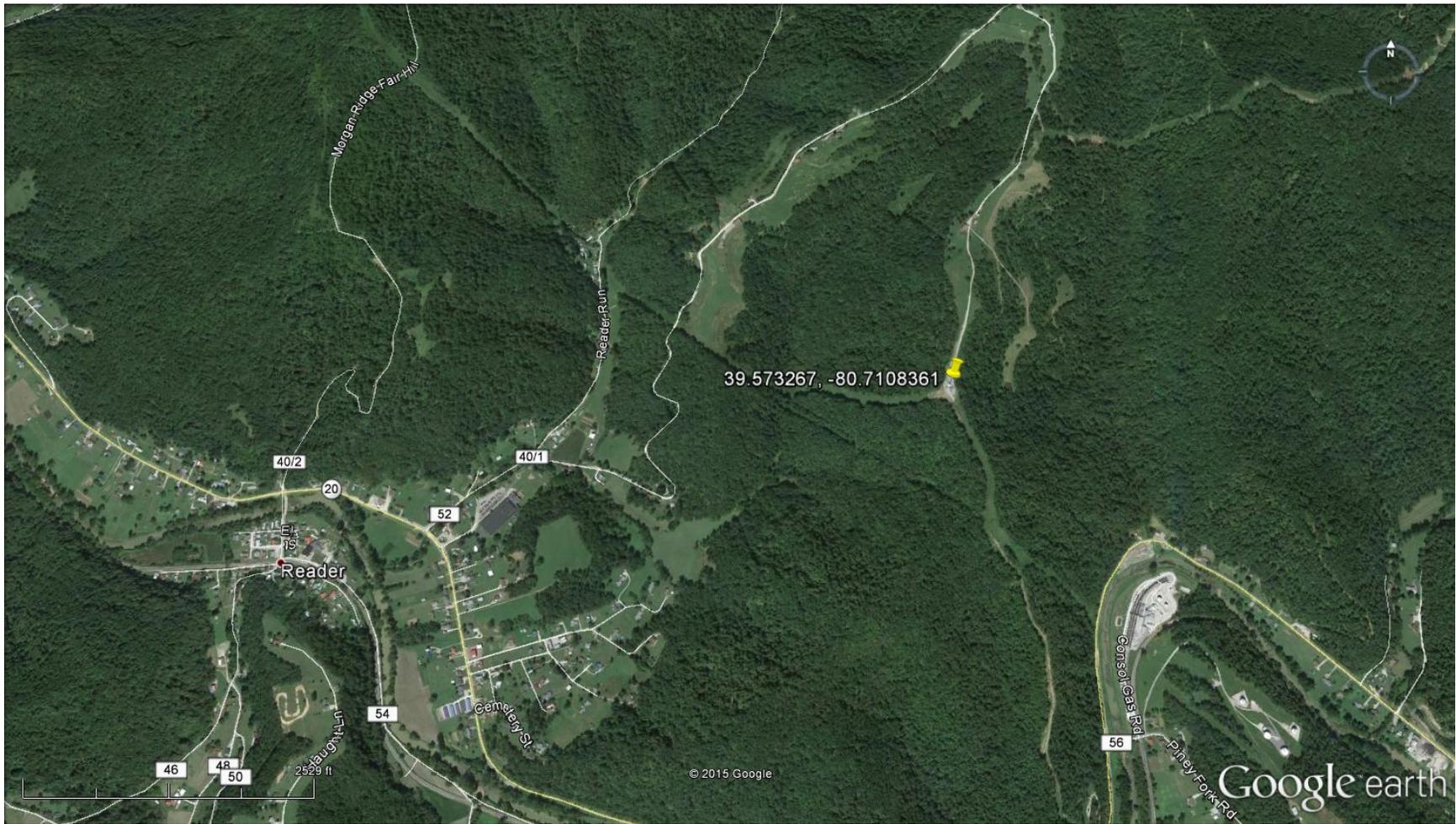


*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
July 9, 2015*

Natalie E. Tennant

Secretary of State

Attachment B: Map(s)



1015 N. BROADWAY
 SUITE 300
 OKLAHOMA CITY, OK 73102

www.envirocleanps.com

| | | |
|---|----------------|--------------|
| FIGURE TITLE AREA MAP | DATE | 12/17/2015 |
| | SCALE | Not to Scale |
| DOCUMENT TITLE RULE 13 | DESIGNED BY | SB |
| | APPROVED BY | LWL |
| CLIENT ASCENT RESOURCES, MARCELLUS, LLC | DRAWN BY | SB |
| | PROJECT NUMBER | |
| LOCATION MASON HILL, WETZEL COUNTY, WEST VIRGINIA | OXYA000001 | |
| | ATTACHMENT | |
| B | | |

Attachment C: Installation and Start-Up Schedule

Installation and Start-up Schedule

| Equipment | Unit ID | Installation Date | Startup Date |
|-------------------------------------|----------------|--------------------------|---------------------|
| Sitewide Fugitive | FUG | 2012 | 2012 |
| Tank 1 - Atmospheric Tank (210-bbl) | TANK 1 | 2012 | 2012 |
| Tank 2 - Atmospheric Tank (210-bbl) | TANK 2 | 2012 | 2012 |
| Tank 3 - Atmospheric Tank (100-bbl) | TANK 3 | 2012 | 2012 |
| Combustor (8 MMBtu/hr) | COMB 1 | 2015 | 2015 |
| Condensate Loading | C LOAD | 2012 | 2012 |
| MSS Activities/Pigging Operations | MSS | 2012 | 2012 |

Attachment D: Regulatory Discussion

Applicable State Requirements

45CSR6 CONTROL OF AIR POLLUTION FROM COMBUSTION OF REFUSE

Ascent is applying for a permit to authorize the installation and operation of the combustor that will be used on site to control the storage tanks. Ascent will comply with all requirements of this rule.

45CSR13 PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

Ascent is submitting this application in accordance with this rule. Ascent will comply with all requirements of this rule.

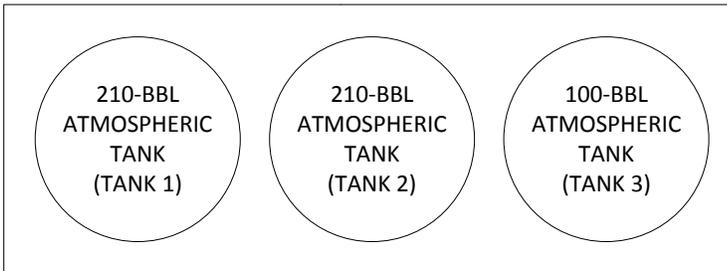
Applicable Federal Requirements

40CFR NEW SOURCE PERFORMANCE STANDARDS (NSPS) SUBPART OOOO

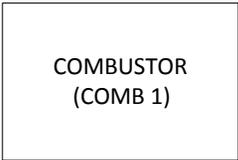
The storage tanks located at this Facility are subject to this subpart as they were constructed after August 23, 2011. Ascent will comply with this subpart as required. There are no other affected equipment at this Facility.

Attachment E: Plot Plan

FUGITIVES
(FUG)



CONDENSATE
LOADING
(C LOAD)



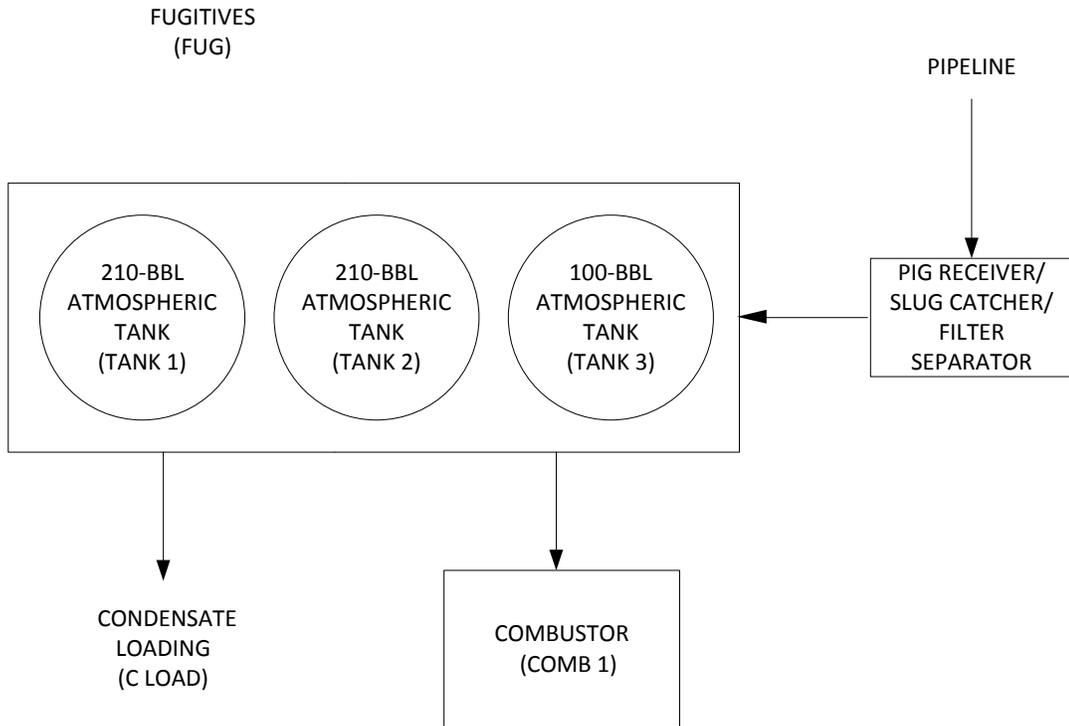
1015 N. BROADWAY
SUITE 300
OKLAHOMA CITY, OK 73102

www.envirocleanps.com

| | |
|----------------|--|
| FIGURE TITLE | PLOT PLAN |
| DOCUMENT TITLE | RULE 13 |
| CLIENT | ASCENT RESOURCES - MARCELLUS, LLC |
| LOCATION | MASON HILL WETZEL COUNTY, WEST VIRGINIA |

| | |
|----------------|--------------|
| DATE | 12/17/2015 |
| SCALE | NOT TO SCALE |
| DESIGNED BY | SB |
| APPROVED BY | LWL |
| DRAWN BY | PH |
| PROJECT NUMBER | ARMAWV0001 |
| ATTACHMENT | E |

Attachment F: Detailed Process Flow Diagram(s)



1015 N. BROADWAY
SUITE 300
OKLAHOMA CITY, OK 73102

www.envirocleanps.com

FIGURE TITLE

PROCESS FLOW DIAGRAM

DOCUMENT TITLE
RULE 13

CLIENT
ASCENT RESOURCES, MARCELLUS, LLC

LOCATION
**MASON HILL
WETZEL COUNTY, WEST VIRGINIA**

DATE 12/17/2015

SCALE NOT TO SCALE

DESIGNED BY SB

APPROVED BY LWL

DRAWN BY PH

PROJECT NUMBER

ARMAWV0001

ATTACHMENT

F

Attachment G: Process Description

Process Description

The process begins when wet production gas flows through a 16" pipeline to Mason Hill. It passes thru a pig receiver and then into a slug catcher. Most free flowing pipeline liquids fall out in the slug catcher due to velocity reduction. The gas stream then passes thru a filter separator where solid particles are removed and any remaining free liquid is removed in a coalescing filter. The fluids collected in the slug catcher and coalescing filter are periodically dumped into atmospheric stock tanks (2 -210 bbl and 1 - 100 bbl tank). The fluid drains from the slug catcher at 450 psi to the atmospheric tanks over a period of 12 hours following each pig run. Vapors are released by this pressure reduction and these vapors are consumed by the combustor.

The enclosed combustor only operates during pigging events. The typical pigging frequency results in the use of the enclosed combustor approximately one day a week in the summer and three days a week in the winter.

Attachment H: Material Safety Data Sheets (MSDS)



AMERICAN ENERGY
PARTNERS

Natural Gas Liquids

Safety Data Sheet

Section 1: Identification of the substance or mixture and of the supplier

Product Name: Natural Gas Liquids
SDS Number: 786340

Synonyms/Other Means of Identification: Natural Gas Liquids, Raw
Natural Gas Liquids, Ethane Free
Plant Condensate
Raw NGL
EPBC Mix
PBC Mix
Y-Grade
Gas Liquids

MARPOL Annex I Category: Naphthas and Condensates
Intended Use: Feedstock

Manufacturer: American Energy Partners
301 N.W. 63rd
Oklahoma City, OK 73116

Emergency Health and Safety Number: Chemtrec: 800-424-9300 (24 Hours)

SDS Information: Phone: 844-210-6000
URL: www.americanenergypartners.com

Section 2: Hazard(s) Identification

Classification

H224 -- Flammable liquids -- Category 1
H315 -- Skin corrosion/irritation -- Category 2
H304 -- Aspiration Hazard -- Category 1
H336 -- Specific target organ toxicity (single exposure) -- Category 3
H350 -- Carcinogenicity -- Category 1B
H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2

Hazards not Otherwise Classified

May contain or release poisonous hydrogen sulfide gas

Label Elements



DANGER

Extremely flammable liquid and vapor. (H224)*

Causes skin irritation. (H315)*

May contain or release poisonous hydrogen sulfide gas

May be fatal if swallowed and enters airways. (H304)*

May cause drowsiness or dizziness. (H336)*

May cause cancer. (H350)*

Toxic to aquatic life with long lasting effects. (H411)*

Precautionary Statement(s):

Obtain special instructions before use. (P201)*
Do not handle until all safety precautions have been read and understood. (P202)*
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. (P210)*
Keep container tightly closed. (P233)*
Ground/bond container and receiving equipment. (P240)*
Use with explosion-proof equipment. (P241)*
Use only non-sparking tools. (P242)*
Take precautionary measures against static discharge. (P243)*
Avoid breathing dust/fume/gas/mist/vapours/spray. (P261)*
Wash thoroughly after handling. (P264)*
Use only outdoors or in a well-ventilated area. (P271)*
Wear protective gloves / protective clothing / eye protection / face protection. (P280)*
IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. (P303+P361+P353)*
In case of fire: Use dry chemical, carbon dioxide, or foam for extinction.(P370+P378)*
If skin irritation occurs: Get medical advice/attention. (P313)*
Take off contaminated clothing and wash before reuse. (P362)*
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. (P301+P310)*
Do NOT induce vomiting. (P331)*
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. (P304+P340)*
Call a POISON CENTER or doctor/physician if you feel unwell. (P312)*
In case of fire: Use dry chemical, carbon dioxide, or foam for extinction.(P370+P378)*
Store in a well-ventilated place. Keep cool.(P403+P235)*
Store locked up. (P405)*
Dispose of contents/container to approved disposal facility. (P501)*

* (Applicable GHS hazard code.)

Section 3: Composition / Information on Ingredients

| Component | CASRN | Concentration ¹ |
|---------------------------------------|------------|----------------------------|
| Natural gas (petroleum), raw liq. mix | 64741-48-6 | 100 |
| n-Hexane | 110-54-3 | 5-25 |
| Benzene | 71-43-2 | 0.1-5 |
| Hydrogen Sulfide | 7783-06-4 | <1 |

Total Sulfur: > 0.5 wt%

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse.

Inhalation (Breathing): If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects

Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue.

Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

Notes to Physician: At high concentrations hydrogen sulfide may produce pulmonary edema, respiratory depression, and/or respiratory paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote, however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of hydrogen sulfide poisoning is confirmed and if the patient does not respond rapidly to supportive care, the use of nitrites may be an effective antidote if delivered within the first few minutes of exposure. For adults the dose is 10 mL of a 3% NaNO₂ solution (0.5 gm NaNO₂ in 15 mL water) I.V. over 2-4 minutes. The dosage should be adjusted in children or in the presence of anemia, and methemoglobin levels, arterial blood gases, and electrolytes should be monitored closely.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

Other Comments: Before attempting rescue, first responders should be alert to the possible presence of hydrogen sulfide, a poisonous gas with the smell of rotten eggs, and should consider the need for respiratory protection (see Section 8). Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Consider whether oxygen administration is needed. Obtain medical advice for further treatment.

Section 5: Fire-Fighting Measures



NFPA 704 Hazard Class

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

Unusual Fire & Explosion Hazards: Extremely flammable. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire. Hazardous combustion/decomposition products, including hydrogen sulfide, may be released by this material when exposed to heat or fire. Use caution and wear protective clothing, including respiratory protection.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Hydrogen sulfide and oxides of nitrogen and sulfur may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal Precautions: Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. May contain or release poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H₂S around the spilled product is suspected, additional or special actions may be warranted, including access restrictions and use of protective equipment. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

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

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

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. May contain or release dangerous levels of hydrogen sulfide. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid breathing vapors or mists. Use only outdoors or in well-ventilated area. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Extremely Flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. Electrostatic charge may accumulate and create a hazardous condition when handling or processing this material. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Check atmosphere for oxygen content, H₂S, and flammability prior to entry. Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

| Component | ACGIH | OSHA | Other |
|---------------------------------------|---------------------------------------|--|---|
| Natural gas (petroleum), raw liq. mix | TWA: 300 ppm (as Gasoline) | TWA: 400 mg/m ³ TWA: 100 ppm | 0.5 ppm TWA8hr (as benzene) 0.25 ppm TWA12hr (as benzene) 2.5 ppm STEL (as benzene) (American Energy Guidelines) |
| n-Hexane | TWA: 50 ppm Skin | TWA: 500 ppm TWA: 1800 mg/m ³ | --- |
| Benzene | STEL: 2.5 ppm TWA: 0.5 ppm Skin | Ceiling: 25 ppm STEL: 5 ppm TWA: 10 ppm TWA: 1 ppm | --- |
| Hydrogen Sulfide | STEL: 5 ppm TWA: 1 ppm | Ceiling: 20 ppm | TWA: 5 ppm 8hr TWA: 2.5 ppm 12hr STEL: 15 ppm (American Energy Guidelines) |

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

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

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: A NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used in situations of oxygen deficiency (oxygen content less than 19.5 percent), unknown exposure concentrations, or situations that are immediately dangerous to life or health (IDLH).

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use.

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR1910.1028 - Benzene).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

| | |
|---|---|
| Appearance: | Colorless |
| Physical Form: | Liquid |
| Odor: | Gasoline; Rotten egg / sulfurous |
| Odor Threshold: | No data |
| pH: | Not applicable |
| Vapor Pressure: | 150 - 200 psia (Reid VP) @ 100°F / 37.8°C |
| Vapor Density (air=1): | >1 |
| Initial Boiling Point/Range: | No data |
| Melting/Freezing Point: | No data |
| Solubility in Water: | Negligible |
| Partition Coefficient (n-octanol/water) (Kow): | No data |
| Specific Gravity (water=1): | (estimated) 0.5 - 0.7 @ 68°F / 20°C |
| Percent Volatile: | 100% |
| Evaporation Rate (nBuAc=1): | No data |
| Flash Point: | < -99 °F / < -73 °C |
| Test Method: | (estimate) |
| Lower Explosive Limits (vol % in air): | No data |
| Upper Explosive Limits (vol % in air): | No data |
| Auto-ignition Temperature: | No data |

Section 10: Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

| <u>Acute Toxicity</u> | <u>Hazard</u> | <u>Additional Information</u> | <u>LC50/LD50 Data</u> |
|------------------------|---|--|-----------------------|
| Inhalation | Expected to have a low degree of toxicity by inhalation | May contain or release poisonous hydrogen sulfide gas - see Other Comments. | > 5.2 mg/L (vapor) |
| Skin Absorption | Unlikely to be harmful | | > 2 g/kg |
| Ingestion (Swallowing) | Unlikely to be harmful | | > 5 g/kg |

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation. .

Signs and Symptoms: Effects of overexposure can include slight irritation of the respiratory tract, nausea, vomiting, and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued exposure to high concentrations can result in vomiting, cardiac irregularities and sudden loss of consciousness.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: No information available.

Specific Target Organ Toxicity (Single Exposure): May cause drowsiness and dizziness.

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure.

Carcinogenicity: May cause cancer Based on component information.

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects.

Reproductive Toxicity: Not expected to cause reproductive toxicity.

Other Comments: This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

Information on Toxicological Effects of Components

Natural gas (petroleum), raw liq. mix

Carcinogenicity: Two year inhalation studies of vaporized unleaded gasoline produced an increased incidence of kidney tumors in male rats and liver tumors in female mice. Repeated skin application of various petroleum naphthas in mice for two years resulted in an increased incidence of skin tumors but only in the presence of severe skin irritation. Follow-up mechanistic studies suggest that the occurrence of these tumors may be the consequence of promotional processes and not relevant to human risk assessment. Epidemiology data collected from a study of more than 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer from gasoline exposure. Unleaded gasoline has been identified as a possible carcinogen by the International Agency for Research on Cancer.

Target Organs: Two year inhalation studies of wholly vaporized unleaded gasoline, and 90 days studies of various petroleum naphthas, did not produce significant target organ toxicity in laboratory animals. Nephropathy in male rats, characterized by the accumulation of alpha-2-u-globulin in epithelial cells of the proximal tubules was observed, however follow-up studies suggest that these changes are unique to the male rat.

Reproductive Toxicity: No evidence of developmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to high vapor concentrations of unleaded gasoline and petroleum naphthas via inhalation. A two-generation reproductive toxicity study of vapor recovery gasoline did not adversely affect reproductive function or offspring survival and development.

n-Hexane

Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.

Reproductive Toxicity: Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene

Carcinogenicity: Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.

Target Organs: Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.

Reproductive Toxicity: Some studies in occupationally exposed women have suggested benzene exposure increased risk of miscarriage and stillbirth and decreased birth weight and gestational age. The size of the effects detected in these studies was small, and ascertainment of exposure and outcome in some cases relied on self-reports, which may limit the reliability of these results.

Germ Cell Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells. Exposure has also been associated with chromosomal aberrations in sperm cells in human and animal studies.

Toluene

Carcinogenicity: Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.

Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

Reproductive Toxicity: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

Cyclohexane

Reproductive Toxicity: Two-generation reproduction and developmental toxicity studies using rats and rabbits exposed (whole-body) to atmospheric concentrations up to 7000 ppm cyclohexane did not detect evidence of developmental toxicity in either species.

Section 12: Ecological Information

Toxicity: Acute aquatic toxicity studies on samples of gasoline and naphtha streams show acute toxicity values greater than 1 mg/L and mostly in the range 1-100 mg/L. These tests were carried out on water accommodated fractions, in closed systems to prevent evaporative loss. Results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon composition. These substances should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment. Classification: H411; Chronic Cat 2.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable but are regarded as inherently biodegradable since their hydrocarbon components can be degraded by microorganisms.

Persistence per IOPC Fund definition: Non-Persistent

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material range from 3 to greater than 6 and therefore are regarded as having the potential to bioaccumulate. In practice, metabolic processes or physical properties may prevent this effect or limit bioavailability.

Mobility in Soil: On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant loss is volatilization to air. In air, these hydrocarbons are photodegraded by reaction with hydroxyl radicals with half lives varying from 6.5 days for benzene to 0.5 days for n-dodecane.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic
- D018 - Toxicity characteristic (Benzene)

Section 14: Transport Information

U.S. Department of Transportation (DOT)

| | |
|--------------------------------------|--|
| Shipping Description: | If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) shipping description is: UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., 2.1; ; If vapor pressure is <= 300 kPa (43.5 psia) at 50° C (122° F) shipping description is: UN3295, Hydrocarbons, liquid, n.o.s., 3, I or II [I if BP < 95° F (35° C); II if BP > 95° F] |
| Non-Bulk Package Marking: | Must be consistent with shipping description, either: Hydrocarbon gas mixture, liquefied, n.o.s., UN1965 or Hydrocarbons, liquid, n.o.s., UN3295 |
| Non-Bulk Package Labeling: | For UN1965: Flammable gas For UN3295: Flammable liquid |
| Bulk Package/Placard Marking: | For UN1965: Flammable gas / 1965 For UN3295: Flammable / 3295 |
| Packaging - References: | For UN1965: 49 CFR: 173.306; 173.304; 173.314 & .315 For UN3295: 49 CFR 173.150; 173.201; 173.243 [PG I] -or- 49 CFR 173.150; 173.202; 173.242 [PG II] (Exceptions; Non-bulk; Bulk) |
| Hazardous Substance: | See Section 15 for RQ's |
| Emergency Response Guide: | UN1965 - 115; UN3295 - 128; |
| Note: | The following alternate shipping description order may be used until January 1, 2013: Proper Shipping name, Hazard Class or Division, (Subsidiary Hazard if any), UN or NA number, Packing Group Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable Other shipping description elements may be required for DOT compliance. |

International Maritime Dangerous Goods (IMDG)

| | |
|----------------------------------|--|
| Shipping Description: | If boiling point is < 20° C shipping description is: UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., (Propane , Butane), 2.1 If vapor pressure is <= 300 kPa (43.5 psia) at 50° C (122° F) shipping description is: UN3295, Hydrocarbons, liquid, n.o.s., 3, I or II (FP° C cc), [where FP is the material's flash point in degrees C cc.] [I if BP < 95° F (35° C); II if BP > 95° F]; |
| Non-Bulk Package Marking: | Must be consistent with shipping description, either: Hydrocarbon gas mixture, liquefied, n.o.s., (Propane, Butane), UN1965 or Hydrocarbons, liquid, n.o.s., UN3295 |
| Labels: | For UN1965: Flammable gas For UN3295: Flammable liquid |
| Placards/Marking (Bulk): | For UN1965: Flammable gas / 1965 For UN3295: Flammable / 3295 |
| Packaging - Non-Bulk: | For UN1965: P200 For UN3295: P001 |
| EMS: | For UN1965: F-D, S-U For UN3295: F-E, S-D |
| Note: | If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I. |

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: UN1965 or UN3295

Proper Shipping Name: For UN1965: Hydrocarbon gas mixture, liquefied, n.o.s. (Propane, Butane)
 For UN3295: Hydrocarbons, liquid, n.o.s.

Hazard Class/Division: For UN1965: 2.1
 For UN3295: 3

Subsidiary risk: None
Packing Group: For UN1965: None
 For UN3295: I or II [*Determined by IATA 3.3.2*]

Non-Bulk Package Marking: For UN1965: Hydrocarbon gas mixture, liquefied, n.o.s. (Propane, Butane), UN1965
 For UN3295: Hydrocarbons, liquid, n.o.s., UN3295

Labels: For UN1965: Flammable gas , Cargo Aircraft Only
 For UN3295: Flammable liquid

ERG Code: For UN1965: 10L or For UN3295: 3H
 LTD. QTY

| | | Passenger Aircraft | Cargo Aircraft Only |
|-----------------------------------|---|--|---|
| Packaging Instruction #: | UN1965 - Forbidden UN3295 - Forbidden - [PG I] Y341 - [PG II] | UN1965 - Forbidden UN3295 - 351 - [PG I] 353 - [PG II] | UN1965 - 200 UN3295 - 361 - [PG I] 364 - [PG II] |
| Max. Net Qty. Per Package: | UN3295 - Forbidden - [PG I] 1L - [PG II] | UN3295 - 1L - [PG I] 5 L - [PG II] | UN1965 - 150 kg UN3295 - 30 L - [PG I] 60 L - [PG II] |

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:

| Component | TPQ | EPCRA RQ |
|------------------|--------|----------|
| Hydrogen Sulfide | 500 lb | 100 lb |

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

| Component | Concentration ¹ | de minimis |
|-------------|----------------------------|------------|
| n-Hexane | 5-25 | 1.0% |
| Toluene | 1-5 | 1.0% |
| Benzene | 0.1-5 | 0.1% |
| Cyclohexane | 0-3 | 1.0% |

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

| Component | Type of Toxicity |
|-----------|--|
| Toluene | Developmental Toxicant Female Reproductive Toxicant |
| Benzene | Cancer Developmental Toxicant Male Reproductive Toxicant |

International Hazard Classification

Canada:

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

WHMIS Hazard Class:

B2 - Flammable Liquids
D2A
D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

| | |
|--|--|
| Date of Issue: | 20-Sep-2014 |
| Status: | FINAL |
| Previous Issue Date: | 20-Sep-2014 |
| Revised Sections or Basis for Revision: | Identified Hazards (Section 2) Precautionary Statement(s) (Section 2) First Aid (Section 4)Exposure limits (Section 8) Shipping information (Section 14) Regulatory information (Section 15) |
| SDS Number: | 786340 |

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.



AMERICAN ENERGY
PARTNERS

Crude Condensate

Safety Data Sheet

Section 1: Identification of the substance or mixture and of the supplier

| | |
|--|--|
| Product Name: | Crude Condensate |
| SDS Number: | 730370 |
| Synonyms/Other Means of Identification: | Natural Gas Condensates, Petroleum Crude Oil Condensate Gas Drips |
| MARPOL Annex I Category: | Naphthas and Condensates |
| Intended Use: | Feedstock |
| Manufacturer: | American Energy Partners 301 N.W. 63rd Oklahoma City, OK 73116 |
| Emergency Health and Safety Number: | Chemtrec: 800-424-9300 (24 Hours) |
| SDS Information: | Phone: 844-210-6000 URL: www.americanenergypartners.com |

Section 2: Hazard(s) Identification

Classification

H224 -- Flammable liquids -- Category 1
H304 -- Aspiration Hazard -- Category 1
H315 -- Skin corrosion/irritation -- Category 2
H332 -- Acute toxicity, Inhalation -- Category 4
H336 -- Specific target organ toxicity (single exposure) -- Category 3
H350 -- Carcinogenicity -- Category 1B
H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2

Hazards not Otherwise Classified

May contain or release poisonous hydrogen sulfide gas

Label Elements



DANGER

Extremely flammable liquid and vapor. (H224)*
Causes skin irritation. (H315)*
May be fatal if swallowed and enters airways. (H304)*
Contains poisonous hydrogen sulfide gas
Harmful if inhaled. (H332)*
May cause drowsiness or dizziness. (H336)*
May cause cancer. (H350)*
Toxic to aquatic life with long lasting effects. (H411)*

Precautionary Statement(s):

Obtain special instructions before use. (P201)*
Do not handle until all safety precautions have been read and understood. (P202)*
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. (P210)*
Keep container tightly closed. (P233)*
Keep cool. (P235)*
Ground/bond container and receiving equipment. (P240)*
Use with explosion-proof equipment. (P241)*
Use only non-sparking tools. (P242)*
Take precautionary measures against static discharge. (P243)*
Avoid breathing dust/fume/gas/mist/vapours/spray. (P261)*
Wash thoroughly after handling. (P264)*
Use only outdoors or in a well-ventilated area. (P271)*
Avoid release to the environment. (P273)*
Wear protective gloves / protective clothing / eye protection / face protection. (P280)*
IF ON SKIN: Remove/Take off immediately all contaminated clothing. (P361)* Wash with plenty of soap and water. (P352)*
If skin irritation occurs: Get medical advice/attention. (P313)*
Take off contaminated clothing and wash before reuse. (P362)*
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. (P340)*
Call a POISON CENTER or doctor/physician if you feel unwell. (P312)*
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. (P301+P310)*
Do NOT induce vomiting. (P331)*
In case of fire: Use dry chemical, carbon dioxide, or foam for extinction.(P370+P378)*
Collect spillage. (P391)*
Store locked up. (P405)*
Store in a well-ventilated place. Keep container tightly closed. (P403+P233)*
Dispose of contents/container to approved disposal facility. (P501)*

**(Applicable GHS hazard code.)*

Section 3: Composition / Information on Ingredients

| Component | CASRN | Concentration ¹ |
|--------------------------------|------------|----------------------------|
| Natural Gas Condensate ..C2-20 | 64741-47-5 | 100 |
| Toluene | 108-88-3 | 1-7 |
| Hydrogen Sulfide | 7783-06-4 | 0.1-5 |
| Benzene | 71-43-2 | <5 |

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Crude oil, natural gas and natural gas condensate can contain minor amounts of sulfur, nitrogen and oxygen containing organic compounds as well as trace amounts of heavy metals like mercury, arsenic, nickel, and vanadium. Composition can vary depending on the source of crude.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air in a position comfortable for breathing. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects

Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue.

Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

Notes to Physician: At high concentrations hydrogen sulfide may produce pulmonary edema, respiratory depression, and/or respiratory paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote, however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of hydrogen sulfide poisoning is confirmed and if the patient does not respond rapidly to supportive care, the use of nitrites may be an effective antidote if delivered within the first few minutes of exposure. For adults the dose is 10 mL of a 3% NaNO₂ solution (0.5 gm NaNO₂ in 15 mL water) I.V. over 2-4 minutes. The dosage should be adjusted in children or in the presence of anemia, and methemoglobin levels, arterial blood gases, and electrolytes should be monitored closely.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

Other Comments: Before attempting rescue, first responders should be alert to the possible presence of hydrogen sulfide, a poisonous gas with the smell of rotten eggs, and should consider the need for respiratory protection (see Section 8). Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Consider whether oxygen administration is needed. Obtain medical advice for further treatment.

Section 5: Fire-Fighting Measures



NFPA 704 Hazard Class

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

Unusual Fire & Explosion Hazards: Extremely flammable. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire. Hazardous combustion/decomposition products, including hydrogen sulfide, may be released by this material when exposed to heat or fire. Use caution and wear protective clothing, including respiratory protection.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Hydrogen sulfide and oxides of nitrogen and sulfur may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal Precautions: Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Contains poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H₂S around the spilled product is suspected, additional or special actions may be warranted, including access restrictions and use of protective equipment. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

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

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

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use. Wear protective gloves/clothing and eye/face protection. May contain or release dangerous levels of hydrogen sulfide. Use only outdoors or in well-ventilated area. Avoid breathing vapors or mists. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

Extremely Flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. Electrostatic charge may accumulate and create a hazardous condition when handling or processing this material. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

Mercury and other heavy metals may be present in trace quantities in crude oil, raw natural gas, and condensates. Production and processing of these materials can lead to "drop-out" of elemental mercury in enclosed vessels and pipe work, typically at the low point of any process equipment because of its density. Mercury may also occur in other process system deposits such as sludges, sands, scales, waxes, and filter media. Personnel engaged in work with equipment where mercury deposits might occur (confined space entry, sampling, opening drain valves, draining process lines, etc), may be exposed to a mercury hazard (see sections 3 and 8).

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Check atmosphere for oxygen content, H₂S, and flammability prior to entry. Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

| Component | ACGIH | OSHA | Other |
|--------------------------------|---------------------------------------|--|---|
| Natural Gas Condensate ..C2-20 | TWA: 300 ppm (as Gasoline) | TWA: 400 mg/m ³ TWA: 100 ppm | 0.5 ppm TWA8hr (as benzene) 0.25 ppm TWA12hr (as benzene) 2.5 ppm STEL (as benzene) (American Energy Guidelines) |
| Toluene | TWA: 20 ppm | Ceiling: 300 ppm TWA: 200 ppm | --- |
| Hydrogen Sulfide | STEL: 5 ppm TWA: 1 ppm | Ceiling: 20 ppm | TWA: 5 ppm 8hr TWA: 2.5 ppm 12hr STEL: 15 ppm (American Energy Guidelines) |
| Benzene | STEL: 2.5 ppm TWA: 0.5 ppm Skin | Ceiling: 25 ppm STEL: 5 ppm TWA: 10 ppm TWA: 1 ppm | --- |

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

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

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: A NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used in situations of oxygen deficiency (oxygen content less than 19.5 percent), unknown exposure concentrations, or situations that are immediately dangerous to life or health (IDLH).

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use.

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR1910.1028 - Benzene).

Workplace monitoring plans should consider the possibility that heavy metals such as mercury may concentrate in processing vessels and equipment presenting the possibility of exposure during various sampling and maintenance operations. Implement appropriate respiratory protection and the use of other protective equipment as dictated by monitoring results (See Sections 2 and 7).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

| | |
|---|--|
| Appearance: | Amber to dark brown |
| Physical Form: | Liquid |
| Odor: | Rotten egg / sulfurous; Petroleum. |
| Odor Threshold: | No data |
| pH: | Not applicable |
| Vapor Pressure: | 5-15 psia (Reid VP) @ 100°F / 37.8°C |
| Vapor Density (air=1): | 1 |
| Initial Boiling Point/Range: | -20 to 800 °F / -29 to 427 °C |
| Melting/Freezing Point: | No data |
| Solubility in Water: | Negligible |
| Partition Coefficient (n-octanol/water) (Kow): | No data |
| Specific Gravity (water=1): | 0.6 - 0.8 @ 60°F (15.6°C) |
| Bulk Density: | 6.25 lbs/gal |
| VOC Content(%): | 50 |
| Evaporation Rate (nBuAc=1): | 1 |
| Flash Point: | -51 °F / -46 °C |
| Test Method: | Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010 |
| Lower Explosive Limits (vol % in air): | 1.1 |
| Upper Explosive Limits (vol % in air): | 6.0 |
| Auto-ignition Temperature: | 590 °F / 310 °C |

Section 10: Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

| <u>Acute Toxicity</u> | <u>Hazard</u> | <u>Additional Information</u> | <u>LC50/LD50 Data</u> |
|------------------------|------------------------|--|----------------------------|
| Inhalation | Harmful if inhaled | Contains poisonous hydrogen sulfide gas. See Signs and Symptoms. | 10 mg/L (vapor, estimated) |
| Skin Absorption | Unlikely to be harmful | | > 2 g/kg |
| Ingestion (Swallowing) | Unlikely to be harmful | | > 5 g/kg |

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation. .

Signs and Symptoms: Effects of overexposure can include slight irritation of the respiratory tract, nausea, vomiting, and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued exposure to high concentrations can result in vomiting, cardiac irregularities and sudden loss of consciousness.

This material contains hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: No information available.

Specific Target Organ Toxicity (Single Exposure): May cause drowsiness and dizziness.

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure.

Carcinogenicity: May cause cancer

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects.

Reproductive Toxicity: Not expected to cause reproductive toxicity.

Information on Toxicological Effects of Components

Natural Gas Condensate .C2-20

Carcinogenicity: Two year inhalation studies of vaporized unleaded gasoline produced an increased incidence of kidney tumors in male rats and liver tumors in female mice. Repeated skin application of various petroleum naphthas in mice for two years resulted in an increased incidence of skin tumors but only in the presence of severe skin irritation. Follow-up mechanistic studies suggest that the occurrence of these tumors may be the consequence of promotional processes and not relevant to human risk assessment. Epidemiology data collected from a study of more than 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer from gasoline exposure. Unleaded gasoline has been identified as a possible carcinogen by the International Agency for Research on Cancer.

Target Organs: Two year inhalation studies of wholly vaporized unleaded gasoline, and 90 days studies of various petroleum naphthas, did not produce significant target organ toxicity in laboratory animals. Nephropathy in male rats, characterized by the accumulation of alpha-2-u- globulin in epithelial cells of the proximal tubules was observed, however follow-up studies suggest that these changes are unique to the male rat.

Reproductive Toxicity: No evidence of developmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to high vapor concentrations of unleaded gasoline and petroleum naphthas via inhalation. A two-generation reproductive toxicity study of vapor recovery gasoline did not adversely affect reproductive function or offspring survival and development.

Xylenes

Target Organs: Rats exposed to xylenes at 800, 1000 or 1200 ppm 14 hours daily for 6 weeks demonstrated high frequency hearing loss. Another study in rats exposed to 1800 ppm 8 hours daily for 5 days demonstrated middle frequency hearing loss.

Reproductive Toxicity: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions, but no evidence of teratogenicity.

Toluene

Carcinogenicity: Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.

Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

Reproductive Toxicity: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

Cyclohexane

Reproductive Toxicity: Two-generation reproduction and developmental toxicity studies using rats and rabbits exposed (whole-body) to atmospheric concentrations up to 7000 ppm cyclohexane did not detect evidence of developmental toxicity in either species.

Benzene

Carcinogenicity: Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.

Target Organs: Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.

Reproductive Toxicity: Some studies in occupationally exposed women have suggested benzene exposure increased risk of miscarriage and stillbirth and decreased birth weight and gestational age. The size of the effects detected in these studies was small, and ascertainment of exposure and outcome in some cases relied on self-reports, which may limit the reliability of these results.

Germ Cell Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells. Exposure has also been associated with chromosomal aberrations in sperm cells in human and animal studies.

n-Hexane

Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.

Reproductive Toxicity: Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Ethyl Benzene

Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.

Target Organs: In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.

Section 12: Ecological Information

Toxicity: Acute aquatic toxicity studies on samples of gasoline and naphtha streams show acute toxicity values greater than 1 mg/L and mostly in the range 1-100 mg/L. These tests were carried out on water accommodated fractions, in closed systems to prevent evaporative loss. Results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon composition. These substances should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment. Classification: H411; Chronic Cat 2.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable but are regarded as inherently biodegradable since their hydrocarbon components can be degraded by microorganisms.

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material range from 3 to greater than 6 and therefore are regarded as having the potential to bioaccumulate. In practice, metabolic processes or physical properties may prevent this effect or limit bioavailability.

Mobility in Soil: On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant loss is volatilization to air. In air, these hydrocarbons are photodegraded by reaction with hydroxyl radicals with half lives varying from 6.5 days for benzene to 0.5 days for n-dodecane.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic
- D018 - Toxicity characteristic (Benzene)

Section 14: Transport Information

U.S. Department of Transportation (DOT)

| | |
|--------------------------------------|--|
| Shipping Description: | <p><i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is > 8.8 molar % shipping description is:</i> UN3160, Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulfide; ; Liquefied Petroleum Gas), 2.3; , (2.1), Inhalation Hazard Zone X <i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., 2.1 <i>If vapor pressure is <= 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1267, Petroleum crude oil, 3, I or II [I if BP < 35° C (95° F); II if BP > 35° C]</p> |
| Non-Bulk Package Marking: | <p><i>Must be consistent with shipping description, either:</i> Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulfide, Liquefied petroleum gas), UN3160 <i>or</i> Hydrocarbon gas mixture, liquefied, n.o.s., UN1965 <i>or</i> Petroleum crude oil, UN1267</p> |
| Non-Bulk Package Labeling: | <p><i>For UN3160:</i> Poison gas and Flammable gas <i>For UN1965:</i> Flammable gas <i>For UN1267:</i> Flammable liquid</p> |
| Bulk Package/Placard Marking: | <p><i>For UN3160:</i> Poison gas / 3160 and Flammable gas <i>For UN1965:</i> Flammable gas / 1965 <i>For UN1267:</i> Flammable / 1267</p> |
| Packaging - References: | <p><i>For UN3160:</i> None; 49 CFR 173.304; 173.314 & .315 <i>For UN1965:</i> 49 CFR: 173.306; 173.304; 173.314 & .315 <i>For UN1267:</i> 49 CFR 173.150; 173.201; 173.243 [PG I] <i>-or-</i> 49 CFR 173.150; 173.202; 173.242 [PG II] <i>(Exceptions; Non-bulk; Bulk)</i></p> |
| Hazardous Substance: | <p>The EPA's Petroleum Exclusion applies to Section 2 and/or 15 components which are listed in 49 CFR 172.101, Table 1 to Appendix A.</p> |
| Emergency Response Guide: | <p>UN3160 - 119; UN1965 - 115; UN1267 - 128;</p> |
| Note: | <p>Replace X in shipping description with: D if Molar % H2S is from 8.8% to 14.8% C if Molar % H2S is from 14.9% to 44.4% B if Molar % H2S is from 44.5% to 100.0% <i>Container(s) greater than 5 liters (liquids) or 5 kilograms (solids), shipped by water mode and ALL bulk shipments may require the shipping description to contain the "Marine Pollutant" notation [49 CFR 172.203(I)] and the container(s) to display the [Marine Pollutant Mark] [49 CFR 172.322].</i></p> <p><i>The following alternate shipping description order may be used until January 1, 2013:</i> Proper Shipping name, Hazard Class or Division, (Subsidiary Hazard if any), UN or NA number, Packing Group <i>Other shipping description elements may be required for DOT compliance.</i> <i>Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable</i></p> |

International Maritime Dangerous Goods (IMDG)

| | |
|--|--|
| Shipping Description: | <i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is > 8.8 molar % shipping description is:</i> UN3160, Liquefied gas, toxic, flammable, n.o.s (Hydrogen sulphide , Liquefied Petroleum Gas), 2.3,; , (2.1) <i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), 2.1; <i>If vapor pressure is <= 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1267, Petroleum crude oil, 3, I or II [I if IBP < 35° C (95° F); II if IBP > 35° C] (-46° C); |
| Non-Bulk Package Marking: | <i>Must be consistent with shipping description, either:</i> Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN3160 <i>or</i> Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN1965 <i>or</i> Petroleum crude oil, UN1267 |
| Labels: | <i>For UN3160:</i> Toxic gas and Flammable gas <i>For UN1965:</i> Flammable gas <i>For UN1267:</i> Flammable liquid |
| Placards/Marking (Bulk): | <i>For UN3160:</i> Toxic gas / 3160 and Flammable gas <i>For UN1965:</i> Flammable gas / 1965 <i>For UN1267:</i> Flammable / 1267 |
| Packaging - Non-Bulk: | <i>For UN3160 & UN1965:</i> P200 <i>For UN1267:</i> P001 |
| EMS: | <i>For UN3160 & UN1965:</i> F-D, S-U <i>For UN1267:</i> F-E, S-E |
| Note: | <i>If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the shipping description to contain the "Marine Pollutant" description [IMDG 5.4.1.4.3.5] and the container(s) to display the Marine Pollutant mark [IMDG 5.2.1.6]. U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25. If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.</i> |
| <u>International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)</u> | |
| UN/ID #: | UN3160 - <i>Forbidden</i> UN1965 <i>or</i> UN1267 |
| Proper Shipping Name: | <i>For UN1965:</i> Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide) <i>For UN1267:</i> Petroleum crude oil |
| Hazard Class/Division: | <i>For UN1965:</i> 2.1 <i>For UN1267:</i> 3 |
| Subsidiary risk: | None |
| Packing Group: | <i>For UN1965:</i> None <i>For UN1267:</i> I or II [<i>Determined by IATA 3.3.2</i>] |
| Non-Bulk Package Marking: | <i>For UN1965:</i> Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide), UN1965 <i>For UN1267:</i> Petroleum crude oil, UN1267 |
| Labels: | <i>For UN1965:</i> Flammable gas , Cargo Aircraft Only <i>For UN1267:</i> Flammable liquid |
| ERG Code: | <i>For UN1965:</i> 10L <i>or For UN1267:</i> 3L LTD. QTY Passenger Aircraft Cargo Aircraft Only |

| | | | |
|-----------------------------------|--|--|---|
| Packaging Instruction #: | <i>UN1965</i> - Forbidden <i>UN1267</i> - Forbidden - [<i>PG I</i>] Y341 - [<i>PG II</i>] | <i>UN1965</i> - Forbidden <i>UN1267</i> - 351 - [<i>PG I</i>] 353 - [<i>PG II</i>] | <i>UN1965</i> - 200 <i>UN1267</i> - 361 - [<i>PG I</i>] 364 - [<i>PG II</i>] |
| Max. Net Qty. Per Package: | <i>UN1267</i> - None (PG I); 1L (PG II) | <i>UN1267</i> - 1L - [<i>PG I</i>] 5 L - [<i>PG II</i>] | <i>UN1965</i> - 150 kg <i>UN1267</i> - 30 L - [<i>PG I</i>] 60 L - [<i>PG II</i>] |

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:

| Component | TPQ | EPCRA RQ |
|------------------|--------|----------|
| Hydrogen Sulfide | 500 lb | 100 lb |

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

| | |
|------------------|-----|
| Acute Health: | Yes |
| Chronic Health: | Yes |
| Fire Hazard: | Yes |
| Pressure Hazard: | No |
| Reactive Hazard: | No |

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

| Component | Concentration ¹ | de minimis |
|---------------|----------------------------|------------|
| Xylenes | 1-8 | 1.0% |
| Toluene | 1-7 | 1.0% |
| Cyclohexane | 1-5 | 1.0% |
| Benzene | <5 | 0.1% |
| n-Hexane | 2-4 | 1.0% |
| Ethyl Benzene | 1-3 | 0.1% |

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

| Component | Type of Toxicity |
|---------------|--|
| Toluene | Developmental Toxicant Female Reproductive Toxicant |
| Benzene | Cancer Developmental Toxicant Male Reproductive Toxicant |
| Ethyl Benzene | Cancer |

International Hazard Classification

Canada:

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

WHMIS Hazard Class:

B2 - Flammable Liquids
 D2A
 D2B

| | |
|--|--|
| Shipping Description: | <i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is > 8.8 molar % shipping description is:</i> UN3160, Liquefied gas, toxic, flammable, n.o.s (Hydrogen sulphide , Liquefied Petroleum Gas), 2.3,; , (2.1) <i>If vapor pressure is > 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), 2.1; <i>If vapor pressure is <= 300 kPa (43.5 psia) at 50° C (122° F) and H2S is < 8.8 molar % shipping description is:</i> UN1267, Petroleum crude oil, 3, I or II [I if IBP < 35° C (95° F); II if IBP > 35° C] (-46° C); |
| Non-Bulk Package Marking: | <i>Must be consistent with shipping description, either:</i> Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN3160 <i>or</i> Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN1965 <i>or</i> Petroleum crude oil, UN1267 |
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| Packaging - Non-Bulk: | <i>For UN3160 & UN1965:</i> P200 <i>For UN1267:</i> P001 |
| EMS: | <i>For UN3160 & UN1965:</i> F-D, S-U <i>For UN1267:</i> F-E, S-E |
| Note: | <i>If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the shipping description to contain the "Marine Pollutant" description [IMDG 5.4.1.4.3.5] and the container(s) to display the Marine Pollutant mark [IMDG 5.2.1.6]. U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25. If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.</i> |
| <u>International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)</u> | |
| UN/ID #: | UN3160 - <i>Forbidden</i> UN1965 <i>or</i> UN1267 |
| Proper Shipping Name: | <i>For UN1965:</i> Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide) <i>For UN1267:</i> Petroleum crude oil |
| Hazard Class/Division: | <i>For UN1965:</i> 2.1 <i>For UN1267:</i> 3 |
| Subsidiary risk: | None |
| Packing Group: | <i>For UN1965:</i> None <i>For UN1267:</i> I or II [<i>Determined by IATA 3.3.2</i>] |
| Non-Bulk Package Marking: | <i>For UN1965:</i> Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide), UN1965 <i>For UN1267:</i> Petroleum crude oil, UN1267 |
| Labels: | <i>For UN1965:</i> Flammable gas , Cargo Aircraft Only <i>For UN1267:</i> Flammable liquid |
| ERG Code: | <i>For UN1965:</i> 10L <i>or For UN1267:</i> 3L LTD. QTY Passenger Aircraft Cargo Aircraft Only |

| | | | |
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| Max. Net Qty. Per Package: | <i>UN1267</i> - None (PG I); 1L (PG II) | <i>UN1267</i> - 1L - [<i>PG I</i>] 5 L - [<i>PG II</i>] | <i>UN1965</i> - 150 kg <i>UN1267</i> - 30 L - [<i>PG I</i>] 60 L - [<i>PG II</i>] |

Section 15: Regulatory Information

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| Hydrogen Sulfide | 500 lb | 100 lb |

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

| | |
|------------------|-----|
| Acute Health: | Yes |
| Chronic Health: | Yes |
| Fire Hazard: | Yes |
| Pressure Hazard: | No |
| Reactive Hazard: | No |

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

| Component | Concentration ¹ | de minimis |
|---------------|----------------------------|------------|
| Xylenes | 1-8 | 1.0% |
| Toluene | 1-7 | 1.0% |
| Cyclohexane | 1-5 | 1.0% |
| Benzene | <5 | 0.1% |
| n-Hexane | 2-4 | 1.0% |
| Ethyl Benzene | 1-3 | 0.1% |

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

| Component | Type of Toxicity |
|---------------|--|
| Toluene | Developmental Toxicant Female Reproductive Toxicant |
| Benzene | Cancer Developmental Toxicant Male Reproductive Toxicant |
| Ethyl Benzene | Cancer |

International Hazard Classification

Canada:

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

WHMIS Hazard Class:

B2 - Flammable Liquids
D2A
D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements

U.S. Export Control Classification Number: 1C981

Section 16: Other Information

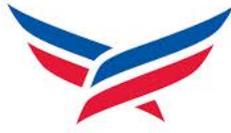
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|--|--|
| Date of Issue: | 20-Sep-2014 |
| Status: | FINAL |
| Previous Issue Date: | 20-Sep-2014 |
| Revised Sections or Basis for Revision: | Identified Hazards (Section 2) Precautionary Statement(s) (Section 2) First Aid (Section 4) Exposure limits (Section 8) Shipping information (Section 14) Regulatory information (Section 15) |
| SDS Number: | 730370 |

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.



AMERICAN ENERGY
PARTNERS

Produced Brine Water

Safety Data Sheet

Section 1: Identification of the substance or mixture and of the supplier

Product Name: Produced Brine Water
SDS Number: 401320
Intended Use: Process Water
Manufacturer: American Energy Partners
301 N.W. 63rd
Oklahoma City, OK 73116
Emergency Health and Safety Number: Chemtrec: 800-424-9300 (24 Hours)
SDS Information: Phone: 844-210-6000
URL: www.americanenergypartners.com

Section 2: Hazard(s) Identification

Classification

H302 -- Harmful if swallowed -- Category 1
H319 -- Eye damage/irritation -- Category 2
H316 -- Causes mild skin irritation -- Category 1
H332 -- Harmful if inhaled -- Category 1
H350 -- Carcinogenicity -- Category 1A
H412 -- May cause chronic harmful effects to aquatic life -- Category 2

Label Elements



DANGER

Causes serious eye irritation. (H319)*
Harmful if swallowed. (H302)*
Harmful if inhaled. (H332)*
May cause cancer. (H350)*
Toxic to aquatic life with long lasting effects. (H412)*

Precautionary Statement(s):

Obtain special instructions before use. (P201)*
Do not handle until all safety precautions have been read and understood. (P202)*
Do not breathe dust/fume/gas/mist/vapours/spray. (P261)
Wash thoroughly after handling. (P264)*
Do not eat, drink, or smoke when using this product. (P270)*
Avoid release to the environment. (P273)*
Use outdoors in a well ventilated space (P271)
Wear protective gloves / protective clothing / eye protection. (P281)*
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. (P305+P351+P338*)
If eye irritation persists: Get medical advice/attention. (P313)*
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. (P301+P312)*
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. (P304 + P340)*
Get medical advice/attention if you feel unwell. (P314)*
Collect spillage. (P391)*
Store locked up. (P405)*
Store in a well-ventilated place. Keep container tightly closed. (P403+P233)*
Dispose of contents/container to approved disposal facility. (P501)*

**(Applicable GHS hazard code.)*

Section 3: Composition / Information on Ingredients

| Component | CAS# | Concentration ¹ |
|-----------------|-----------|----------------------------|
| Water | 7732-18-5 | 80-100% |
| Sodium chloride | 91-20-3 | <20% |
| Benzene | 71-43-2 | <2% |

All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: For direct contact, remove contact lenses if present and easy to do. Immediately hold eyelids apart and flush the affected eye(s) with clean water for at least 20 minutes. Seek immediate medical attention.

Skin Contact: Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If breathing is difficult, oxygen or artificial respiration should be administered by qualified personnel. If symptoms persist, seek medical attention.

Ingestion (Swallowing): First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

Most important symptoms and effects

Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue.

Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

Notes to Physician: Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

Section 5: Fire-Fighting Measures



NFPA 704 Hazard Class

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

Unusual Fire & Explosion Hazards: This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F / 100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Fire Fighting Instructions: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal Precautions: This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

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

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

Section 7: Handling and Storage

Precautions for safe handling: Keep away from flames and hot surfaces. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe vapors or mists. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8).

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

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Check atmosphere for oxygen content, H₂S, and flammability prior to entry. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

| Component | ACGIH | OSHA | NIOSH |
|-----------------------------|---|--|-----------------------------|
| Water (7732-18-5) | Not established | Not established | Not established |
| Sodium chloride (7647-14-5) | Not established | Not established | Not established |
| Benzene (71-43-2) | STEL: 2.5 ppm TWA: 0.5 ppm Skin | Ceiling: 25 ppm STEL: 5 ppm TWA: 1 ppm | STEL: 5 ppm TWA: 0.1 ppm |

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

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

Eye/Face Protection: The use of eye protection (such as splash goggles) that meets or exceeds ANSI Z.87.1 is recommended when there is potential liquid contact to the eye. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR1910.1028 - Benzene).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

| | |
|---|--------------------------------|
| Appearance: | Varies (clear / amber / brown) |
| Physical Form: | Liquid |
| Odor: | Petroleum |
| Odor Threshold: | No data |
| pH: | 4.9-8.5 |
| Vapor Pressure: | No data available |
| Vapor Density (air=1): | >1 |
| Initial Boiling Point/Range: | 212 °F / 100 °C |
| Melting/Freezing Point: | 32 °F / 0 °C |
| Pour Point: | No data |
| Solubility in Water: | Infinintely |
| Partition Coefficient (n-octanol/water) (Kow): | >10 |
| Specific Gravity (water=1): | 1.0 -1.1 °API |
| Viscosity: | No data available |
| Evaporation Rate (nBuAc=1): | No data available |
| Flash Point: | No data available |
| Test Method: | Not applicable |
| Lower Explosive Limits (vol % in air): | 1% |
| Upper Explosive Limits (vol % in air): | 46% |
| Auto-ignition Temperature: | No data available |

Section 10: Stability and Reactivity

Stability: Stable under normal ambient and anticipated conditions of use.

Conditions to Avoid: Avoid all possible sources of ignition. Prevent vapor accumulation.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing and reducing agents.

Hazardous Decomposition Products: Not anticipated under normal conditions of use.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

| <u>Acute Toxicity</u> | <u>Hazard</u> | <u>Additional Information</u> | <u>LC50/LD50 Data</u> |
|------------------------|---|-------------------------------|-----------------------|
| Inhalation | Expected to have a low degree of toxicity by inhalation | | No data |
| Skin Absorption | Unlikely to be harmful | | No data |
| Ingestion (Swallowing) | Unlikely to be harmful | | No data |

Aspiration Hazard: Not expected to be an aspiration hazard.

Skin Corrosion/Irritation: Causes mild skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes serious eye irritation.

Signs and Symptoms: Effects of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: No information available.

Specific Target Organ Toxicity (Single Exposure): May cause drowsiness and dizziness.

Specific Target Organ Toxicity (Repeated Exposure): May cause damage to organs through prolonged or repeated exposure. Laboratory animal studies of hydrocarbon products by the dermal and inhalation exposure routes have demonstrated toxicity to the liver, blood, spleen and thymus

Carcinogenicity: May cause cancer, based on component information.

Germ Cell Mutagenicity: Inadequate information available.

Reproductive Toxicity: Inadequate information available.

Other Comments: This material may contain varying concentrations of polycyclic aromatic hydrocarbons (PAHs) which have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to an exaggerated sunburn, and is temporary in duration if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions (pimples), and possible skin cancers.

Information on Toxicological Effects of Components

Water

Carcinogenicity: No data available

Target Organs: No data available

Reproductive Toxicity: No data available

Germ Cell Mutagenicity: No data available

Sodium chloride

Carcinogenicity: No data available but sodium chloride has not been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.

Target Organs: Eyes, respiratory system, central nervous system

Reproductive Toxicity: No data available

Germ Cell Mutagenicity: No data available

Benzene

Carcinogenicity: Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.

Target Organs: Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.

Reproductive Toxicity: Some studies in occupationally exposed women have suggested benzene exposure increased risk of miscarriage and stillbirth and decreased birth weight and gestational age. The size of the effects detected in these studies was small, and ascertainment of exposure and outcome in some cases relied on self-reports, which may limit the reliability of these results.

Germ Cell Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells. Exposure has also been associated with chromosomal aberrations in sperm cells in human and animal studies.

Section 12: Ecological Information

Toxicity: Not evaluated

Persistence and Degradability: Not evaluated

Persistence per IOPC Fund definition: Not evaluated

Bioaccumulative Potential: Not evaluated although the solubility and log KOW would indicate it has little bioaccumulative potential.

Mobility in Soil: Not evaluated although the solubility properties indicate produced water would be highly mobile throughout a system.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D018 - Toxicity characteristic (Benzene)

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping name: *Not regulated*

Note: Some states may require specific shipping labels. Contact each jurisdiction for more information.

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: No
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

| Component | Concentration ¹ | de minimis |
|-----------|----------------------------|------------|
| Benzene | <2 | 0.1% |

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

Warning: This material may contain detectable quantities of the following chemicals identified on federal and individual state hazardous substances list. Contact each jurisdiction for more information.

| Component | Type of Toxicity |
|-----------|--|
| Benzene | Cancer Developmental Toxicant Male Reproductive Toxicant |

International Hazard Classification:

Canada:

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

WHMIS Hazard Class:

D2A
D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements

U.S. Export Control Classification Number: 1C981

Section 16: Other Information

Date of Issue:
Status:

20-Sep-2014
FINAL

Revised Sections or Basis for Revision:

Identified Hazards (Section 2)
Precautionary Statement(s) (Section 2)
First Aid (Section 4)
Shipping information (Section 14)
Regulatory information (Section 15)
401320

SDS Number:

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Attachment I: Emission Units Table

Attachment J: Emission Points Data Summary Sheet

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

| Table 1: Emissions Data | | | | | | | | | | | | | | | |
|--|----------------------------------|--|--------|---|-------------|--|-------------|---|---|--------|---|--------|--|-------------------------------|---|
| Emission Point ID No. (Must match Emission Units Table & Plot Plan) | Emission Point Type ¹ | Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan) | | Air Pollution Control Device (Must match Emission Units Table & Plot Plan) | | Vent Time for Emission Unit (chemical processes only) | | All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS) | Maximum Potential Uncontrolled Emissions ⁴ | | Maximum Potential Controlled Emissions ⁵ | | Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor) | Est. Method Used ⁶ | Emission Concentration ⁷ (ppmv or mg/m ⁴) |
| | | ID No. | Source | ID No. | Device Type | Short Term ² | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| FUG | Fugitive | FUG | FUG | N/A | N/A | C | 8760 | VOC | 0.67 | 2.93 | 0.67 | 2.93 | Gas/Vapor | EE | |
| TANK 1 | Vent / Combustor Vertical Stack | COMB 1 | COMB 1 | COMB 1 | Combustor | C | 8760 | VOC | 2.41 | 10.56 | 0.05 | 0.21 | Gas/Vapor | O (EP Tank v2.0) | |
| TANK 2 | Vent / Combustor Vertical Stack | COMB 1 | COMB 1 | COMB 1 | Combustor | C | 8760 | VOC | 2.41 | 10.56 | 0.05 | 0.21 | Gas/Vapor | O (EP Tank v2.0) | |

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

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

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

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. **DO NOT LIST** H₂, H₂O, N₂, O₂, and Noble Gases.

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

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

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

⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

| Table 1: Emissions Data | | | | | | | | | | | | | | | |
|--|----------------------------------|--|--------|---|-------------|--|-------------|---|---|---------------------------------------|---|---------------------------------------|--|-------------------------------|---|
| Emission Point ID No. (Must match Emission Units Table & Plot Plan) | Emission Point Type ¹ | Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan) | | Air Pollution Control Device (Must match Emission Units Table & Plot Plan) | | Vent Time for Emission Unit (chemical processes only) | | All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS) | Maximum Potential Uncontrolled Emissions ⁴ | | Maximum Potential Controlled Emissions ⁵ | | Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor) | Est. Method Used ⁶ | Emission Concentration ⁷ (ppmv or mg/m ⁴) |
| | | ID No. | Source | ID No. | Device Type | Short Term ² | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| TANK 3 | Vent / Combustor Vertical Stack | COMB 1 | COMB 1 | COMB 1 | Combustor | C | 8760 | VOC | 2.40 | 10.50 | 0.05 | 0.21 | Gas/Vapor | O (EP Tank v2.0) | |
| COMB 1 | Vertical Stack | COMB 1 | COMB 1 | N/A | N/A | C | 8760 | NOx CO VOC PM10 SO2 | 0.78 0.66 0.18 0.06 <0.01 | 3.42 2.89 0.79 0.26 <0.01 | 0.78 0.66 0.18 0.06 <0.01 | 3.42 2.89 0.79 0.26 <0.01 | Gas/Vapor | EE | |
| C LOAD | Truck Vent | C LOAD | C LOAD | N/A | N/A | C | 8760 | VOC | 46.56 | 0.84 | 46.56 | 0.84 | Gas/Vapor | EE | |

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

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

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

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. **DO NOT LIST** H₂, H₂O, N₂, O₂, and Noble Gases.

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

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

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

⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

| Table 1: Emissions Data | | | | | | | | | | | | | | | |
|--|----------------------------------|--|--------|---|-------------|--|-------------|---|---|--------------|---|--------------|--|-------------------------------|---|
| Emission Point ID No. (Must match Emission Units Table & Plot Plan) | Emission Point Type ¹ | Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan) | | Air Pollution Control Device (Must match Emission Units Table & Plot Plan) | | Vent Time for Emission Unit (chemical processes only) | | All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS) | Maximum Potential Uncontrolled Emissions ⁴ | | Maximum Potential Controlled Emissions ⁵ | | Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor) | Est. Method Used ⁶ | Emission Concentration ⁷ (ppmv or mg/m ⁴) |
| | | ID No. | Source | ID No. | Device Type | Short Term ² | Max (hr/yr) | | lb/hr | ton/yr | lb/hr | ton/yr | | | |
| MSS Activities/ Pigging Operations | Fugitive | MSS | MSS | N/A | N/A | Summer-1x/wk Winter-3x/wk | 8760 | VOC | 2.84 | 0.14 | 2.84 | 0.14 | Gas/Vapor | EE | |
| ROADS | Fugitive | ROADS | ROADS | N/A | N/A | C | 8760 | PM ₁₀ PM _{TOTAL} | 0.002 0.01 | 0.01 0.02 | 0.002 0.01 | 0.01 0.02 | Gas/Vapor | EE | |
| | | | | | | | | | | | | | | | |

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

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

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

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. **DO NOT LIST** H₂, H₂O, N₂, O₂, and Noble Gases.

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

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

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

⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

| Table 2: Release Parameter Data | | | | | | | | |
|---|----------------------|--------------------|---|----------------|--|--|----------------------|---------|
| Emission Point ID No. <i>(Must match Emission Units Table)</i> | Inner Diameter (ft.) | Exit Gas | | | Emission Point Elevation (ft) | | UTM Coordinates (km) | |
| | | Temp. (°F) | Volumetric Flow ¹ (acfm) <i>at operating conditions</i> | Velocity (fps) | Ground Level <i>(Height above mean sea level)</i> | Stack Height ² <i>(Release height of emissions above ground level)</i> | Northing | Easting |
| FUG | N/A | N/A | N/A | N/A | 1149 | N/A | 4380436 | 524836 |
| TANK 1 | N/A | N/A | N/A | N/A | 1149 | 15 | 4380441 | 524841 |
| TANK 2 | N/A | N/A | N/A | N/A | 1149 | 15 | 4380446 | 524846 |
| TANK 3 | N/A | N/A | N/A | N/A | 1149 | 7.5 | 4380451 | 524851 |
| COMB 1 | 4 | Not to exceed 1800 | N/A | N/A | 1149 | 25 | 4380456 | 524856 |
| C LOAD | N/A | N/A | N/A | N/A | 1149 | N/A | 4380461 | 524861 |
| MSS Activities/ Pigging Operations | N/A | N/A | N/A | N/A | 1149 | N/A | 4380466 | 524866 |
| ROADS | N/A | N/A | N/A | N/A | 1149 | N/A | 4380471 | 524871 |

¹ Give at operating conditions. Include inerts.

² Release height of emissions above ground level.

Attachment K: Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

| FUGITIVE EMISSIONS SUMMARY | All Regulated Pollutants - Chemical Name/CAS ¹ | Maximum Potential Uncontrolled Emissions ² | | Maximum Potential Controlled Emissions ³ | | Est. Method Used ⁴ |
|---|--|--|--------------|--|--------------|-------------------------------------|
| | | lb/hr | ton/yr | lb/hr | ton/yr | |
| Haul Road/Road Dust Emissions Paved Haul Roads | N/A | | | | | |
| Unpaved Haul Roads | PM ₁₀ PM _{TOT} | 0.002 0.01 | 0.01 0.02 | 0.002 0.01 | 0.01 0.02 | EE |
| Storage Pile Emissions | N/A | | | | | |
| Loading/Unloading Operations | N/A (Included in C LOAD) | | | | | |
| Wastewater Treatment Evaporation & Operations | N/A | | | | | |
| Equipment Leaks | VOC | 0.67 | 2.93 | 0.67 | 2.93 | EE |
| General Clean-up VOC Emissions | N/A | | | | | |
| Other | VOC | 2.84 | 0.14 | 2.84 | 0.14 | EE |

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

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

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

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

Attachment L: Emissions Unit Data Sheet(s)

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- Emergency Vent Summary Sheet*
- Leak Sources Data Sheet*
- Toxicology Data Sheet*
- Reactor Data Sheet*
- Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
 Sitewide Fugitives (FUG)

2. Standard Industrial Classification Codes (SICs) for process(es)
 1311

3. List raw materials and attach MSDSs
 N/A- fugitive gas emissions only

4. List Products and Maximum Production and attach MSDSs

| Description and CAS Number | Maximum Hourly (lb/hr) | Maximum Annual (ton/year) |
|----------------------------|------------------------|---------------------------|
| | | |
| | | |
| | | |

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.
 Ascent staff will perform AVO walkthroughs during site visits, expected to be at least weekly.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:

Carrier:

Phone:

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

| circle units: | (hrs/day) (hr/batch) | (days), (batches/day), (batches/week) | (days/yr), (weeks/year) |
|---------------|----------------------|---------------------------------------|-------------------------|
| 10A. Maximum | 24 hrs/day | 7 days/week | 52 weeks/year |
| 10B. Typical | 24 hrs/day | 7 days/week | 52 weeks/year |

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

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

REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.

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

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

INFORMATION REQUIRED FOR CHEMICAL PROCESSES

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provide enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

Process Description

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe each process step. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
 - a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
 - b. continuous emissions (in-stack) monitoring plan
 - c. ambient monitoring plan
 - d. emergency response plan

Regulatory Discussion

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
 - a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
 - b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
 - c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60.60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

Emissions Summary and Calculations

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all batch processes provide the following
 - a. Emissions of each pollutant in pound(s) per batch, from each process step
 - b. Annual emissions based on number of batches requested per year
 - c. The total time for each process step and the duration of the emissions during the process step
 - d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

LEAK SOURCE DATA SHEET

| Source Category | Pollutant | Number of Source Components ¹ | Number of Components Monitored by Frequency ² | Average Time to Repair (days) ³ | Estimated Annual Emission Rate (lb/yr) ⁴ |
|------------------------------------|---------------------------------|--|--|--|---|
| Pumps ⁵ | light liquid VOC ^{6,7} | 3 | 0 | 7 | 780 |
| | heavy liquid VOC ⁸ | | | | |
| | Non-VOC ⁹ | | | | |
| Valves ¹⁰ | Gas VOC | 50 | 0 | 7 | 2720 |
| | Light Liquid VOC | 5 | 0 | 7 | 260 |
| | Heavy Liquid VOC | | | | |
| | Non-VOC | | | | |
| Safety Relief Valves ¹¹ | Gas VOC | 16 | 0 | 7 | 1840 |
| | Non VOC | | | | |
| Open-ended Lines ¹² | VOC | | | | |
| | Non-VOC | | | | |
| Sampling Connections ¹³ | VOC | | | | |
| | Non-VOC | | | | |
| Compressors | VOC | | | | |
| | Non-VOC | | | | |
| Flanges | VOC | 61 | 0 | 7 | 260 |
| | Non-VOC | | | | |
| Other | VOC | | | | |
| | Non-VOC | | | | |

¹⁻¹³ See notes on the following page.

Notes for Leak Source Data Sheet

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

Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR 51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₃, etc. DO NOT LIST CO₂, H₂, H₂O, N₂, O₂, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

REACTOR DATA SHEET

Provide the following information for each piece of equipment that is a potential or actual source of emissions as shown on the *Equipment List Form* and other parts of application.

| Identification Number (as shown on <i>Equipment List Form</i>): | | | | | | | |
|--|--------------------|------------------------------------|--------------------------------|-------------|-------------------------------|-------|--|
| 1. Name and type of equipment (e.g. CSTR, plug flow, batch, etc.) | | | | | | | |
| 2. Type of operation <input type="checkbox"/> Batch <input type="checkbox"/> Continuous <input type="checkbox"/> Semi-batch | | | | | | | |
| 3. Projected Actual Equipment Operating Schedule (complete appropriate lines): | | | | | | | |
| hrs/day | | days/week | | | weeks/year | | |
| hrs/batch | | batches/day, weeks (Circle one) | | | day, weeks/yr (Circle one) | | |
| 4. Feed Data Flow In = gal/hr, or gal/batch | | | | | | | |
| Material Name & CAS No. | Phase ^a | Specific Gravity | Vapor Pressure ^b | Charge Rate | | | Fill Time (min/batch, run) ^c |
| | | | | Normal | Max | Units | |
| | | | | | | | |
| <p>a. S = Solid, L = Liquid, G = gas or vapor</p> <p>b. At feed conditions</p> <p>c. Total time that equipment is filling per batch or run (start-up), for tank or vessel-type equipment.</p> | | | | | | | |
| 5. Provide all chemical reactions that will be involved (if applicable), including the residence time and any side reactions that may occur as well as gases that may be generated during these reactions. Indicate if the reaction(s) are exothermic or endothermic. | | | | | | | |

| | | |
|------------------------|----------------------|------|
| 6. Maximum Temperature | 7A. Maximum Pressure | |
| °C | mmHg | mmHg |
| °F | psig | psig |

| 8. Output Data | | Flow Out = | | gal/hr or gal/batch | | |
|---------------------------|-------|------------------|----------------|-----------------------------|---------|-------|
| Material Name and CAS No. | Phase | Specific Gravity | Vapor Pressure | Hourly or Batch Output Rate | | Units |
| | | | | Normal | Maximum | |
| | | | | | | |

9. Complete the following emission data for equipment connected to a header exhaust system, giving emissions levels before entering header system (i.e. before control equipment).

Check here if not applicable

Emission Point ID (exhaust point of header system):

| Material Name and CAS No. | Maximum Potential Emission Rate (lb/hr) | Method ** |
|---------------------------|---|-----------|
| | | |

** MB - material balance; EE - Engineering Estimate; TM - Test Measurement (submit test data); O - other (Explain)

10. Provide the following information pertaining to each condenser that may be attached to this reactor. Attach additional pages as necessary if more than one condenser is used for this reactor. Complete the Condenser Air Pollution Control Device Sheet if necessary.

Check here if not applicable

- 10A. Cooling material
- 10B. Minimum and Maximum flowrate of cooling material (gal/hr)
- 10C. Inlet temperature of cooling material (°F)
- 10D. Outlet temperature of cooling material (°F)
- 10E. Pressure drop of gas to be condensed from inlet to outlet (psig)
- 10F. Inlet temperature of gas stream (°F)
- 10G. Outlet temperature of gas stream (°F)
- 10H. Number of passes
- 10I. Cooling surface area

11. Provide the following pertaining to auxiliary equipment that burns fuel (heaters, dryers, etc.):

Check here if not applicable

11A. Type of fuel and maximum fuel burn rate, per hour:

11B. Provide maximum percent sulfur (S), ash content of fuel, and the energy content using appropriate units:

| | | |
|----|-------|--|
| %S | % Ash | BTU/lb, std. ft ³ /day, gal |
| | | (circle one) |

11C. Theoretical combustion air requirement in SCFD per unit of fuel (circle appropriate unit) @ 70°F and 14.7 PSIA:

SCFD/lb, SCFD, gal (circle one)

11D. Percent excess air: %

11E. Type, amount, and BTU rating of burners and all other firing equipment that are planned to be used:

11F. Total maximum design heat input: ×10⁶ BTU/hr.

12. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

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

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

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

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

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

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this reactor.

DISTILLATION COLUMN DATA SHEET

| | | |
|--|---|-----------------------------------|
| Identification Number (as assigned on <i>Equipment List Form</i>): | | |
| 1. Name and type of equipment | | |
| #. Projected actual equipment operating schedule (complete appropriate lines): | | |
| hrs/day | days/week | weeks/year |
| hrs/batch | batches/day, batches/week (circle one) | days/yr, weeks/yr (circle one) |
| 2. Number of stages (plates), excluding condenser | | |
| 3. Number of feed plates and stage location | | |
| 4. Specify details of any reheating, recycling, or stage conditioning along with the stage locations | | |
| 5. Specify reflux ratio, R (where R is defined as the ratio of the reflux to the overhead product, given symbolically as $R=L/D$, where L = liquid down column, D = distillation product) | | |
| 6. Specify the fraction of feed which is vaporized, f (where f is the molal fraction of the feed that leaves the feed plate continuously as vapor). | | |
| 7A. Type of condenser used: <input type="checkbox"/> total <input type="checkbox"/> partial <input type="checkbox"/> multiple <input type="checkbox"/> other | | |
| 7B. For each condenser provide process operating details including all inlet and outlet temperatures, pressures, and compositions. | | |
| 8. Feed Characteristics | | |
| A. Molar composition | | |
| B. Individual vapor pressure of each component | | |
| C. Total feed stage pressure | | |
| D. Total feed stage temperature | | |
| E. Total mass flow rate of each stream into the system | | |
| 9. Overhead Product | | |
| A. Molar composition of components | | |
| B. Vapor pressure of components | | |
| C. Total mass flow rate of all streams leaving the system as overhead products | | |
| 10. Bottom Product | | |
| A. Molar composition of all components | | |
| B. Total mass flow rate of all streams leaving the system as bottom products | | |

11. General Information

- A. Distillation column diameter
- B. Distillation column height
- C. Type of plates
- D. Plate spacing
- E. Murphree plate efficiency
- F. Any other information necessary of describe the operation of this distillation column.

12. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

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

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

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

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

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

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this distillation column.

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

| | |
|--|---|
| 1. Bulk Storage Area Name | 2. Tank Name Atmospheric Tank |
| 3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TANK 1 | 4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TANK 1 |
| 5. Date of Commencement of Construction (for existing tanks) 2012 | |
| 6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification | |
| 7. Description of Tank Modification (if applicable) | |
| 7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?) | |
| 7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). | |
| 7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): | |

II. TANK INFORMATION (required)

| | |
|--|--|
| 8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: center;">210-bbl</div> | |
| 9A. Tank Internal Diameter (ft) <div style="text-align: center;">10</div> | 9B. Tank Internal Height (or Length) (ft) <div style="text-align: center;">15</div> |
| 10A. Maximum Liquid Height (ft) <div style="text-align: center;">14</div> | 10B. Average Liquid Height (ft) <div style="text-align: center;">10.5</div> |
| 11A. Maximum Vapor Space Height (ft) <div style="text-align: center;">1</div> | 11B. Average Vapor Space Height (ft) <div style="text-align: center;">4.5</div> |
| 12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: center;">8,820 gal</div> | |

| | |
|--|--|
| 13A. Maximum annual throughput (gal/yr) 119,574 | 13B. Maximum daily throughput (gal/day) 327.6 |
| 14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 13.56 | |
| 15. Maximum tank fill rate (gal/min) N/A | |
| 16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading | |
| 17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply | |
| 17A. Volume Expansion Capacity of System (gal) | 17B. Number of transfers into system per year |
| 18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe) | |

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

| | | |
|---|-----------------------|--|
| 19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunitite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe) | | |
| 20A. Shell Color White | 20B. Roof Color White | 20C. Year Last Painted |
| 21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable | | |
| 22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | |
| 22B. If YES, provide the operating temperature (°F) | | |
| 22C. If YES, please describe how heat is provided to tank. | | |
| 23. Operating Pressure Range (psig): 14.7to 14.7 | | |
| 24. Complete the following section for Vertical Fixed Roof Tanks | | <input type="checkbox"/> Does Not Apply |
| 24A. For dome roof, provide roof radius (ft) | | |
| 24B. For cone roof, provide slope (ft/ft) 0.06 | | |
| 25. Complete the following section for Floating Roof Tanks | | <input checked="" type="checkbox"/> Does Not Apply |
| 25A. Year Internal Floaters Installed: | | |
| 25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal (check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe): | | |
| 25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |
| 25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe): | | |
| 25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |

| | | |
|---|--|--|
| 25F. Describe deck fittings; indicate the number of each type of fitting: | | |
| ACCESS HATCH | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| AUTOMATIC GAUGE FLOAT WELL | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| COLUMN WELL | | |
| BUILT-UP COLUMN – SLIDING COVER, GASKETED: | BUILT-UP COLUMN – SLIDING COVER, UNGASKETED: | PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL: |
| LADDER WELL | | |
| PIP COLUMN – SLIDING COVER, GASKETED: | PIPE COLUMN – SLIDING COVER, UNGASKETED: | |
| GAUGE-HATCH/SAMPLE PORT | | |
| SLIDING COVER, GASKETED: | SLIDING COVER, UNGASKETED: | |
| ROOF LEG OR HANGER WELL | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA) |
| VACUUM BREAKER | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| RIM VENT | | |
| WEIGHTED MECHANICAL ACTUATION GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| DECK DRAIN (3-INCH DIAMETER) | | |
| OPEN: | 90% CLOSED: | |
| STUB DRAIN | | |
| 1-INCH DIAMETER: | | |
| OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY) | | |

| | |
|---|--------------------------------------|
| 26. Complete the following section for Internal Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply | |
| 26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded | |
| 26B. For Bolted decks, provide deck construction: | |
| 26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 12 feet wide <input type="checkbox"/> Other (describe) | |
| 26D. Deck seam length (ft) | 26E. Area of deck (ft ²) |
| For column supported tanks: | 26G. Diameter of each column: |
| 26F. Number of columns: | |

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

| | |
|---|------|
| 27. Provide the city and state on which the data in this section are based. Charleston, WV | |
| 28. Daily Average Ambient Temperature (°F) | 75 |
| 29. Annual Average Maximum Temperature (°F) | 65.5 |
| 30. Annual Average Minimum Temperature (°F) | 44 |
| 31. Average Wind Speed (miles/hr) | N/A |
| 32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day)) | 1123 |
| 33. Atmospheric Pressure (psia) | 14.7 |

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

| | | | |
|--|--------------------|--|-----|
| 34. Average daily temperature range of bulk liquid: 55 | | | |
| 34A. Minimum (°F) | 55 | 34B. Maximum (°F) | 55 |
| 35. Average operating pressure range of tank: 170 | | | |
| 35A. Minimum (psig) | 170 | 35B. Maximum (psig) | 170 |
| 36A. Minimum Liquid Surface Temperature (°F) 41.75 | | 36B. Corresponding Vapor Pressure (psia) 3.5931 | |
| 37A. Average Liquid Surface Temperature (°F) 56.67 | | 37B. Corresponding Vapor Pressure (psia) 4.8598 | |
| 38A. Maximum Liquid Surface Temperature (°F) 72.31 | | 38B. Corresponding Vapor Pressure (psia) 6.5478 | |
| 39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary. | | | |
| 39A. Material Name or Composition | See EP Tank Output | | |
| 39B. CAS Number | | | |
| 39C. Liquid Density (lb/gal) | | | |
| 39D. Liquid Molecular Weight (lb/lb-mole) | | | |
| 39E. Vapor Molecular Weight (lb/lb-mole) | | | |

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

| | |
|--|---|
| 1. Bulk Storage Area Name | 2. Tank Name Atmospheric Tank |
| 3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TANK 2 | 4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TANK 2 |
| 5. Date of Commencement of Construction (for existing tanks) 2012 | |
| 6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification | |
| 7. Description of Tank Modification (if applicable) | |
| 7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?) | |
| 7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). | |
| 7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): | |

II. TANK INFORMATION (required)

| | |
|--|--|
| 8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: center;">210-bbl</div> | |
| 9A. Tank Internal Diameter (ft) <div style="text-align: center;">10</div> | 9B. Tank Internal Height (or Length) (ft) <div style="text-align: center;">15</div> |
| 10A. Maximum Liquid Height (ft) <div style="text-align: center;">14</div> | 10B. Average Liquid Height (ft) <div style="text-align: center;">10.5</div> |
| 11A. Maximum Vapor Space Height (ft) <div style="text-align: center;">1</div> | 11B. Average Vapor Space Height (ft) <div style="text-align: center;">4.5</div> |
| 12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: center;">8,820 gal</div> | |

| | |
|--|--|
| 13A. Maximum annual throughput (gal/yr) 119,574 | 13B. Maximum daily throughput (gal/day) 327.6 |
| 14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 13.56 | |
| 15. Maximum tank fill rate (gal/min) N/A | |
| 16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading | |
| 17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply | |
| 17A. Volume Expansion Capacity of System (gal) | 17B. Number of transfers into system per year |
| 18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe) | |

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

| | | |
|---|-----------------------|--|
| 19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunitite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe) | | |
| 20A. Shell Color White | 20B. Roof Color White | 20C. Year Last Painted |
| 21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable | | |
| 22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | |
| 22B. If YES, provide the operating temperature (°F) | | |
| 22C. If YES, please describe how heat is provided to tank. | | |
| 23. Operating Pressure Range (psig): 14.7to 14.7 | | |
| 24. Complete the following section for Vertical Fixed Roof Tanks | | <input type="checkbox"/> Does Not Apply |
| 24A. For dome roof, provide roof radius (ft) | | |
| 24B. For cone roof, provide slope (ft/ft) 0.06 | | |
| 25. Complete the following section for Floating Roof Tanks | | <input checked="" type="checkbox"/> Does Not Apply |
| 25A. Year Internal Floaters Installed: | | |
| 25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal (check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe): | | |
| 25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |
| 25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe): | | |
| 25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |

| | | |
|---|--|--|
| 25F. Describe deck fittings; indicate the number of each type of fitting: | | |
| ACCESS HATCH | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| AUTOMATIC GAUGE FLOAT WELL | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| COLUMN WELL | | |
| BUILT-UP COLUMN – SLIDING COVER, GASKETED: | BUILT-UP COLUMN – SLIDING COVER, UNGASKETED: | PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL: |
| LADDER WELL | | |
| PIP COLUMN – SLIDING COVER, GASKETED: | PIPE COLUMN – SLIDING COVER, UNGASKETED: | |
| GAUGE-HATCH/SAMPLE PORT | | |
| SLIDING COVER, GASKETED: | SLIDING COVER, UNGASKETED: | |
| ROOF LEG OR HANGER WELL | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA) |
| VACUUM BREAKER | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| RIM VENT | | |
| WEIGHTED MECHANICAL ACTUATION GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| DECK DRAIN (3-INCH DIAMETER) | | |
| OPEN: | 90% CLOSED: | |
| STUB DRAIN | | |
| 1-INCH DIAMETER: | | |
| OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY) | | |

| | | |
|--|--------------------------------------|--|
| 26. Complete the following section for Internal Floating Roof Tanks | | <input checked="" type="checkbox"/> Does Not Apply |
| 26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded | | |
| 26B. For Bolted decks, provide deck construction: | | |
| 26C. Deck seam: | | |
| <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 12 feet wide <input type="checkbox"/> Other (describe) | | |
| 26D. Deck seam length (ft) | 26E. Area of deck (ft ²) | |
| For column supported tanks: | 26G. Diameter of each column: | |
| 26F. Number of columns: | | |

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

| | |
|---|------|
| 27. Provide the city and state on which the data in this section are based. Charleston, WV | |
| 28. Daily Average Ambient Temperature (°F) | 75 |
| 29. Annual Average Maximum Temperature (°F) | 65.5 |
| 30. Annual Average Minimum Temperature (°F) | 44 |
| 31. Average Wind Speed (miles/hr) | N/A |
| 32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day)) | 1123 |
| 33. Atmospheric Pressure (psia) | 14.7 |

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

| | | | |
|--|--------------------|--|--------|
| 34. Average daily temperature range of bulk liquid: 55 | | | |
| 34A. Minimum (°F) | 55 | 34B. Maximum (°F) | 55 |
| 35. Average operating pressure range of tank: 170 | | | |
| 35A. Minimum (psig) | 170 | 35B. Maximum (psig) | 170 |
| 36A. Minimum Liquid Surface Temperature (°F) | 41.75 | 36B. Corresponding Vapor Pressure (psia) | 3.5931 |
| 37A. Average Liquid Surface Temperature (°F) | 56.67 | 37B. Corresponding Vapor Pressure (psia) | 4.8598 |
| 38A. Maximum Liquid Surface Temperature (°F) | 72.31 | 38B. Corresponding Vapor Pressure (psia) | 6.5478 |
| 39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary. | | | |
| 39A. Material Name or Composition | See EP Tank Output | | |
| 39B. CAS Number | | | |
| 39C. Liquid Density (lb/gal) | | | |
| 39D. Liquid Molecular Weight (lb/lb-mole) | | | |
| 39E. Vapor Molecular Weight (lb/lb-mole) | | | |

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

| | |
|--|---|
| 1. Bulk Storage Area Name | 2. Tank Name Atmospheric Tank |
| 3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TANK 3 | 4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TANK 3 |
| 5. Date of Commencement of Construction (for existing tanks) 2012 | |
| 6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification | |
| 7. Description of Tank Modification (if applicable) | |
| 7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?) | |
| 7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). | |
| 7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): | |

II. TANK INFORMATION (required)

| | |
|--|---|
| 8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <div style="text-align: right; margin-right: 100px;">100-bbl</div> | |
| 9A. Tank Internal Diameter (ft) <div style="text-align: center;">10</div> | 9B. Tank Internal Height (or Length) (ft) <div style="text-align: center;">7.5</div> |
| 10A. Maximum Liquid Height (ft) <div style="text-align: center;">6</div> | 10B. Average Liquid Height (ft) <div style="text-align: center;">5</div> |
| 11A. Maximum Vapor Space Height (ft) <div style="text-align: center;">1.5</div> | 11B. Average Vapor Space Height (ft) <div style="text-align: center;">2.5</div> |
| 12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. <div style="text-align: right; margin-right: 100px;">4,200 gal</div> | |

| | |
|--|--|
| 13A. Maximum annual throughput (gal/yr) 119,574 | 13B. Maximum daily throughput (gal/day) 327.6 |
| 14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 28.47 | |
| 15. Maximum tank fill rate (gal/min) N/A | |
| 16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading | |
| 17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply | |
| 17A. Volume Expansion Capacity of System (gal) | 17B. Number of transfers into system per year |
| 18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe) | |

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

| | | |
|---|-----------------------|--|
| 19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunitite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe) | | |
| 20A. Shell Color White | 20B. Roof Color White | 20C. Year Last Painted |
| 21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable | | |
| 22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | |
| 22B. If YES, provide the operating temperature (°F) | | |
| 22C. If YES, please describe how heat is provided to tank. | | |
| 23. Operating Pressure Range (psig): 14.7to 14.7 | | |
| 24. Complete the following section for Vertical Fixed Roof Tanks | | <input type="checkbox"/> Does Not Apply |
| 24A. For dome roof, provide roof radius (ft) | | |
| 24B. For cone roof, provide slope (ft/ft) 0.06 | | |
| 25. Complete the following section for Floating Roof Tanks | | <input checked="" type="checkbox"/> Does Not Apply |
| 25A. Year Internal Floaters Installed: | | |
| 25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal (check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe): | | |
| 25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |
| 25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe): | | |
| 25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO | | |

| | | |
|---|--|--|
| 25F. Describe deck fittings; indicate the number of each type of fitting: | | |
| ACCESS HATCH | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| AUTOMATIC GAUGE FLOAT WELL | | |
| BOLT COVER, GASKETED: | UNBOLTED COVER, GASKETED: | UNBOLTED COVER, UNGASKETED: |
| COLUMN WELL | | |
| BUILT-UP COLUMN – SLIDING COVER, GASKETED: | BUILT-UP COLUMN – SLIDING COVER, UNGASKETED: | PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL: |
| LADDER WELL | | |
| PIP COLUMN – SLIDING COVER, GASKETED: | PIPE COLUMN – SLIDING COVER, UNGASKETED: | |
| GAUGE-HATCH/SAMPLE PORT | | |
| SLIDING COVER, GASKETED: | SLIDING COVER, UNGASKETED: | |
| ROOF LEG OR HANGER WELL | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA) |
| VACUUM BREAKER | | |
| WEIGHTED MECHANICAL ACTUATION, GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| RIM VENT | | |
| WEIGHTED MECHANICAL ACTUATION GASKETED: | WEIGHTED MECHANICAL ACTUATION, UNGASKETED: | |
| DECK DRAIN (3-INCH DIAMETER) | | |
| OPEN: | 90% CLOSED: | |
| STUB DRAIN | | |
| 1-INCH DIAMETER: | | |
| OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY) | | |

| | | |
|--|--------------------------------------|--|
| 26. Complete the following section for Internal Floating Roof Tanks | | <input checked="" type="checkbox"/> Does Not Apply |
| 26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded | | |
| 26B. For Bolted decks, provide deck construction: | | |
| 26C. Deck seam: | | |
| <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 x 12 feet wide <input type="checkbox"/> Other (describe) | | |
| 26D. Deck seam length (ft) | 26E. Area of deck (ft ²) | |
| For column supported tanks: | 26G. Diameter of each column: | |
| 26F. Number of columns: | | |

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

| | |
|---|------|
| 27. Provide the city and state on which the data in this section are based. Charleston, WV | |
| 28. Daily Average Ambient Temperature (°F) | 75 |
| 29. Annual Average Maximum Temperature (°F) | 65.5 |
| 30. Annual Average Minimum Temperature (°F) | 44 |
| 31. Average Wind Speed (miles/hr) | N/A |
| 32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day)) | 1123 |
| 33. Atmospheric Pressure (psia) | 14.7 |

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

| | | | |
|--|--------------------|--|--------|
| 34. Average daily temperature range of bulk liquid: 55 | | | |
| 34A. Minimum (°F) | 55 | 34B. Maximum (°F) | 55 |
| 35. Average operating pressure range of tank: 170 | | | |
| 35A. Minimum (psig) | 170 | 35B. Maximum (psig) | 170 |
| 36A. Minimum Liquid Surface Temperature (°F) | 41.75 | 36B. Corresponding Vapor Pressure (psia) | 3.5931 |
| 37A. Average Liquid Surface Temperature (°F) | 56.67 | 37B. Corresponding Vapor Pressure (psia) | 4.8598 |
| 38A. Maximum Liquid Surface Temperature (°F) | 72.31 | 38B. Corresponding Vapor Pressure (psia) | 6.5478 |
| 39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary. | | | |
| 39A. Material Name or Composition | See EP Tank Output | | |
| 39B. CAS Number | | | |
| 39C. Liquid Density (lb/gal) | | | |
| 39D. Liquid Molecular Weight (lb/lb-mole) | | | |
| 39E. Vapor Molecular Weight (lb/lb-mole) | | | |

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

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

| | | | | |
|--|----------------|-------------|--------------|-------------|
| Identification Number (as assigned on <i>Equipment List Form</i>): | | | | |
| 1. Loading Area Name: C LOAD | | | | |
| 2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): <input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input checked="" type="checkbox"/> Tank Trucks | | | | |
| 3. Loading Rack or Transfer Point Data: | | | | |
| Number of pumps | 1 | | | |
| Number of liquids loaded | 1 - Condensate | | | |
| Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time | 1 | | | |
| 4. Does ballasting of marine vessels occur at this loading area? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Does not apply | | | | |
| 5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point: N/A | | | | |
| 6. Are cargo vessels pressure tested for leaks at this or any other location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, describe: | | | | |
| 7. Projected Maximum Operating Schedule (for rack or transfer point as a whole): | | | | |
| Maximum | Jan. - Mar. | Apr. - June | July - Sept. | Oct. - Dec. |
| hours/day | 1 | 1 | 1 | 1 |
| days/week | 3 | 1 | 1 | 3 |

| | | | | |
|---------------|----|----|----|----|
| weeks/quarter | 13 | 13 | 13 | 13 |
|---------------|----|----|----|----|

| 8. Bulk Liquid Data (add pages as necessary): | | | | | | |
|---|-----------------|-------|--|--|--|--|
| Pump ID No. | 1 | | | | | |
| Liquid Name | Condensate | | | | | |
| Max. daily throughput (1000 gal/day) | 8 gal/hr | | | | | |
| Max. annual throughput (1000 gal/yr) | 358.7 gal/yr | | | | | |
| Loading Method ¹ | SUB | | | | | |
| Max. Fill Rate (gal/min) | 133.3 | | | | | |
| Average Fill Time (min/loading) | 60 | | | | | |
| Max. Bulk Liquid Temperature (°F) | 95 | | | | | |
| True Vapor Pressure ² | 6.55 | | | | | |
| Cargo Vessel Condition ³ | U | | | | | |
| Control Equipment or Method ⁴ | N/A | | | | | |
| Minimum control efficiency (%) | | | | | | |
| Maximum Emission Rate | Loading (lb/hr) | 46.56 | | | | |
| | Annual (lb/yr) | 1680 | | | | |
| Estimation Method ⁵ | EPA | | | | | |
| ¹ BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill | | | | | | |
| ² At maximum bulk liquid temperature | | | | | | |
| ³ B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe) | | | | | | |
| ⁴ List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets</i>): CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) O = other (describe) | | | | | | |
| ⁵ EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance | | | | | | |

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

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

Ascent will monitoring loading volume to ensure emissions do not exceed those listed in this application.

RECORDKEEPING

Ascent will keep records loading volume to ensure emissions do not exceed those listed in this application.

REPORTING

Ascent will submit reports as required.

TESTING

N/A

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

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

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

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

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

N/A

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

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

| |
|--|
| <p>1. Name or type and model of proposed affected source:</p> <p>MSS Pigging Operations</p> |
| <p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p> |
| <p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>N/A</p> |
| <p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>2.84 lb/hr VOC</p> |
| <p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>N/A</p> |

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

| | | |
|---|--------|---------------------------|
| 6. Combustion Data (if applicable): | | |
| (a) Type and amount in appropriate units of fuel(s) to be burned: | | |
| N/A | | |
| (b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash: | | |
| (c) Theoretical combustion air requirement (ACF/unit of fuel): | | |
| @ | °F and | psia. |
| (d) Percent excess air: | | |
| (e) Type and BTU/hr of burners and all other firing equipment planned to be used: | | |
| (f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired: | | |
| (g) Proposed maximum design heat input: | | × 10 ⁶ BTU/hr. |
| 7. Projected operating schedule: | | |
| Hours/Day | 24 | Days/Week |
| | | 1 to 3 days/week |
| | | Weeks/Year |
| | | 52 |

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

| @ | N/A | °F and | psia |
|---------------------|------|--------|------------|
| a. NO _x | | lb/hr | grains/ACF |
| b. SO ₂ | | lb/hr | grains/ACF |
| c. CO | | lb/hr | grains/ACF |
| d. PM ₁₀ | | lb/hr | grains/ACF |
| e. Hydrocarbons | | lb/hr | grains/ACF |
| f. VOCs | 2.84 | lb/hr | grains/ACF |
| g. Pb | | lb/hr | grains/ACF |
| h. Specify other(s) | | lb/hr | grains/ACF |
| | | lb/hr | grains/ACF |

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING
 N/A

RECORDKEEPING
 Records will be kept to document the number of pigging events that occur

REPORTING
 N/A

TESTING
 N/A

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

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

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

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

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

Attachment L FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

| | | PM | PM-10 |
|-----|--|------|-------|
| k = | Particle size multiplier | 0.80 | 0.36 |
| s = | Silt content of road surface material (%) | 10 | 10 |
| p = | Number of days per year with precipitation >0.01 in. | 150 | 150 |

| Item Number | Description | Number of Wheels | Mean Vehicle Weight (tons) | Mean Vehicle Speed (mph) | Miles per Trip | Maximum Trips per Hour | Maximum Trips per Year | Control Device ID Number | Control Efficiency (%) |
|-------------|----------------|------------------|----------------------------|--------------------------|----------------|------------------------|------------------------|--------------------------|------------------------|
| 1 | Light Vehicles | 4 | 2.5 | 10 | 1 | 0.005 | 47.5 | 1 | 55 |
| 2 | Heavy Trucks | 18 | 23.5 | 10 | 1 | 0.005 | 47.5 | 1 | 55 |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |

Source: AP-42 Fifth Edition – 13.2.2 Unpaved Roads

$$E = k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365) = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

| | | PM | PM-10 |
|-----|--|------|-------|
| k = | Particle size multiplier | 0.80 | 0.36 |
| s = | Silt content of road surface material (%) | 10 | 10 |
| S = | Mean vehicle speed (mph) | 10 | 10 |
| W = | Mean vehicle weight (tons) | 13 | 13 |
| w = | Mean number of wheels per vehicle | 5 | 5 |
| p = | Number of days per year with precipitation >0.01 in. | 150 | 150 |

For lb/hr: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] = \text{lb/hr}$

For TPY: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

SUMMARY OF UNPAVED HAULROAD EMISSIONS

| Item No. | PM | | | | PM-10 | | | |
|----------|--------------|------|------------|------|--------------|------|------------|------|
| | Uncontrolled | | Controlled | | Uncontrolled | | Controlled | |
| | lb/hr | TPY | lb/hr | TPY | lb/hr | TPY | lb/hr | TPY |
| 1 | 0.01 | 0.04 | 0.005 | 0.02 | 0.005 | 0.02 | 0.002 | 0.01 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| TOTALS | | | | | | | | |

FUGITIVE EMISSIONS FROM PAVED HAULROADS

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

| | | |
|-----|--|-----|
| I = | Industrial augmentation factor (dimensionless) | N/A |
| n = | Number of traffic lanes | |
| s = | Surface material silt content (%) | |
| L = | Surface dust loading (lb/mile) | |

| Item Number | Description | Mean Vehicle Weight (tons) | Miles per Trip | Maximum Trips per Hour | Maximum Trips per Year | Control Device ID Number | Control Efficiency (%) |
|-------------|-------------|----------------------------|----------------|------------------------|------------------------|--------------------------|------------------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |

Source: AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads

$$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7} = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

| | | |
|-----|--|--|
| I = | Industrial augmentation factor (dimensionless) | |
| n = | Number of traffic lanes | |
| s = | Surface material silt content (%) | |
| L = | Surface dust loading (lb/mile) | |
| W = | Average vehicle weight (tons) | |

For lb/hr: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] = \text{lb/hr}$

For TPY: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

SUMMARY OF PAVED HAULROAD EMISSIONS

| Item No. | Uncontrolled | | Controlled | |
|---------------|--------------|-----|------------|-----|
| | lb/hr | TPY | lb/hr | TPY |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| TOTALS | | | | |

Attachment M: Air Pollution Control Device Sheet(s)

Attachment M
Air Pollution Control Device Sheet
 (FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): COMB 1

Equipment Information

| | |
|--|---|
| 1. Manufacturer: MRW Model No. TBF-4-25-61000 | 2. Method: <input type="checkbox"/> Elevated flare <input type="checkbox"/> Ground flare <input checked="" type="checkbox"/> Other Describe Enclosed Vapor Combustor |
| 3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. | |
| 4. Method of system used: <input type="checkbox"/> Steam-assisted <input type="checkbox"/> Air-assisted <input type="checkbox"/> Pressure-assisted <input checked="" type="checkbox"/> Non-assisted | |
| 5. Maximum capacity of flare: <div style="text-align: right;">scf/min</div> <div style="text-align: right;">scf/hr</div> | 6. Dimensions of stack: <div style="text-align: right;">Diameter 4 ft.</div> <div style="text-align: right;">Height 25 ft.</div> |
| 7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: 98 % Minimum guaranteed: 98 % | 8. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number <input type="checkbox"/> Other, Specify: |
| 9. Number of burners: Rating: 8 MM BTU/hr | 11. Describe method of controlling flame: Two flame arrestors |
| 10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | |
| 12. Flare height: 25 ft | 14. Natural gas flow rate to flare pilot flame per pilot light: <div style="text-align: right;">49.01961 scf/hr</div> |
| 13. Flare tip inside diameter: 0.75 ft | |
| 15. Number of pilot lights: Total 0.05 MM BTU/hr | 16. Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| 17. If automatic re-ignition will be used, describe the method: The flare pilot switches shall automatically trigger the ignition transformers to ignite the flare tip pilot. | |
| 18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type? <input type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input checked="" type="checkbox"/> Other, Describe: Flame Rod | |
| 19. Hours of unit operation per year: 8760 | |

44. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

Operator to check during routine walkthroughs.

RECORDKEEPING:

Operator will keep records if combustor is found non-operational.

REPORTING:

Notifications will be made as required.

TESTING:

Testing will be conducted as required.

MONITORING:

Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING:

Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING:

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

TESTING:

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

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
98% VOC

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
98% VOC

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
N/A



August 24, 2012

Vavco, LLC

Attention: Stacey Brown

Subject: Enclosed Vapor Combustor for HG Energy

Dear Stacey:

Thank you for the opportunity to present our proposal for the supply of an MRW Enclosed Vapor Combustor System. This proposal is based upon the waste gas flow rates shown in Table 1 of this proposal.

Each system described herein includes the following:

-  *One (1) MRW Vapor Combustor System* – Durable and reliable, the stack will be for combustion of the off gas.
-  *One (1) MRW Pilot* - MRW pilots are designed for fast, reliable ignition and extended life.
-  *One (1) MRW Burner Assemblies* – MRW's burners will efficiently mix the air and fuel for efficient combustion and provide nearly infinite range of turndown. Our burner is designed to minimize backpressure at high rates, allowing for a very low pressure vent system that is less likely to cause vapors to escape through the tank battery relief systems.
-  *Refractory Lining for Stack* – 2" of 2300°F refractory installed in the flare will increase stack life and improve combustion in the flame zone.
-  *One (1) Automatic Ignition System* – The flexible ignition system will automatically monitor and ignite the MRW pilot.
-  *Two (2) Flame Arrestors* designed to prevent flame propagation into the upstream piping header in the unlikely event of a flashback.
-  *Optional Waste Gas Block Valve and powered solenoid valve* for the waste gas line going to the flare.
-  *Optional High Temperature Shutdown/Alarm* – The shutdown/alarm will be triggered by a thermocouple located in the stack when a high temperature is reached.
-  *Optional Finish Paint* on the stack with high temperature paint.
-  *Optional conduit spool* which will include conduit from the high temperature shutdown thermocouple to the burner management

C O M B U S T I O N S Y S T E M S

2301 West 171st Street S., Glenpool, OK 74033 • tel: 918.827.6030 • fax: 918.827.6034 • email: mrw@mrw-tech.com

panel. This spool will reduce field installation labor.

MRW is an Oklahoma company and we manufacture the best flares built. We have over 100 years of combustion system design and fabrication experience. Building flares is all we do. We have successfully designed and installed similar units in the past. Our designs are proven with successful systems in operation worldwide. We believe our experience and dedication to customer satisfaction are unmatched in the industry. We offer you the confidence of hundreds of successful systems and a team dedicated to meeting your requirements.

The principals of MRW have spent our entire careers designing and building flare systems. Our reputations are impeccable and we have always met the customer's requirements. We will maintain this record as we continue to provide the most current combustion technology to meet customer needs.

If you have any questions please feel free to contact our local representative Mr. Sam Wiley at 281-352-8006.

We look forward to meeting with you further to discuss the supply of this flare system.

Best Regards,

Bob Rawlings

PROCESS SPECIFICATIONS

Design Basis:

Table 1: Process Design Basis

| Case | Heating Value Btu/ft ³ | Total Heat Release MMBtu/hr | Flare Size Ft |
|------|--------------------------------------|-----------------------------------|------------------|
| 3 | 2682 | 8.0 | 4 x 25 |

- The expected destruction efficiency of the non-methane hydrocarbons is 98%.
- The design pressure drop will be less than 10oz.

UTILITIES

Table 2: Flare System Utilities

| <i>SERVICE</i> | <i>UTILITIES (PER PILOT)</i> |
|-----------------------|---|
| Pilot Fuel Gas | 0.05 MMBTU/HR or less at 15 psig |
| Power | Solar Panels |

EQUIPMENT DESCRIPTION

1. **Vapor Combustor Stack** → One (1) MRW Vapor Combustor complete with the following features:
 - 1.1. Vertical, cylindrical, and self-supported combustor.
 - 1.2. The firebox shell will be of A-36 or equal material welded to AWS standards.
 - 1.3. The stack will be lined with 2" of ceramic blanket on pins and keepers. All seams are overlapped in all directions to compensate for shrinkage of the blanket after exposure to high temperatures.
 - 1.4. One (1) burner access opening.
 - 1.5. One 2-inch site port with glass opening.
 - 1.6. Nozzles as follows:
 - 1.6.1. Sight port.
 - 1.7. MRW pilot assembly as described in Item 2 below.
 - 1.8. One MRW Burner Assembly to allow stable combustion, proper air and fuel mixing and nearly infinite turndown.
 - 1.9. The flare stack will be sandblasted and painted with a high temperature primer.

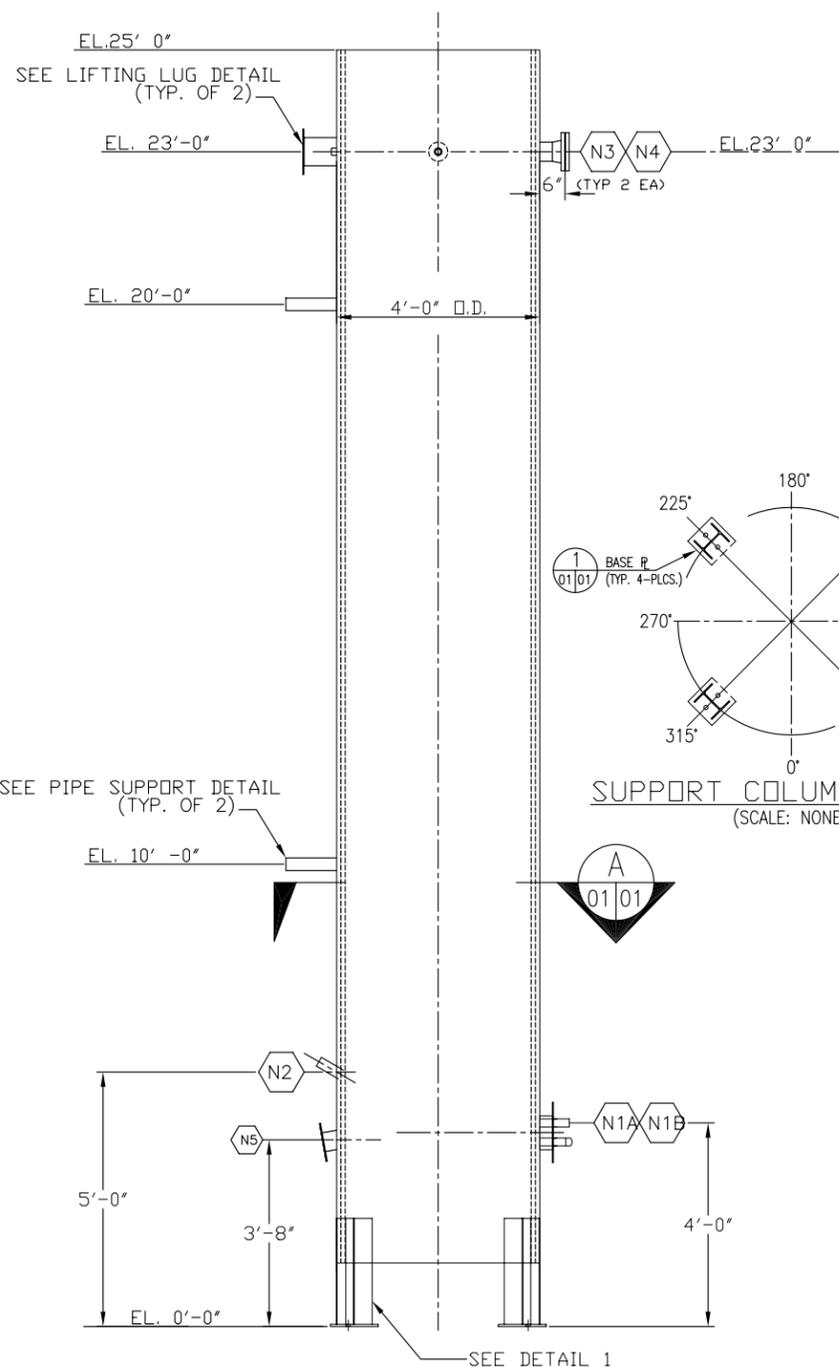
2. **Pilot Burner** → One (1) Continuous and energy efficient pilot burner assembly, complete with the following features:
 - 2.1. Designed for reliable flame stability in any operating conditions.
 - 2.2. Pilot burner tip shall be fabricated from stainless steel, adding extended life to the pilot burner assembly.
 - 2.3. Air/Fuel Gas mixer attached to pilot burner assembly to allow for a combustible mixture at the pilot burner tip.
 - 2.4. The pilot will be able to utilize gas from the heater treater.
 - 2.5. Equipped with sight port for visual indication of pilot flame.
 - 2.6. Easily accessible from outside the unit to prevent confined space access.

3. **Control/Ignition System** → One MRW Control/Ignition system complete with the following components:
 - 3.1. One (1) Carbon Steel ignition panel.
 - 3.2. Strategically placed spark ignition rod in the tip for rapid ignition of

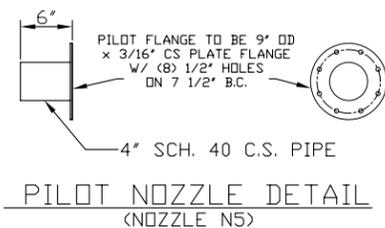
- pilot fuel gas.
- 3.3. The MRW local control panel shall power the ignition transformer for automatic ignition/re-ignition of pilot.
 - 3.4. Electrical classification is unclassified.
 - 3.5. Electric Spark Ignition Pilot (EFG).
 - 3.6. The control system will be capable of sending a signal to indicate loss of pilot or high temperature shutdown.
 - 3.7. One pilot shutoff solenoid valve.
 - 3.8. Necessary contacts to provide a remote shutdown alarm to go to the customer supplied Sat Alarm.
 - 3.9. **Ignition:**
 - 3.9.1. Auto Ignition - The flare pilot switches shall automatically trigger the ignition transformers to ignite the flare tip pilot.
 - 3.9.2. **Pilot Monitoring Device:**
 - 3.9.2.1. Flame Scanner – UV Scanner to monitor pilot status.
 - 3.9.2.2. Thermocouple - The flare tip pilots will be equipped with Type K thermocouples for monitoring the pilot flame.
 - 3.9.2.3. Flame Rod - The pilot located below the MRW flare stack shall be equipped with a flame rod to accurately
4. **Flame Arrestor**→ Two Flame Arrestors designed to prevent flame propagation into the waste gas piping in the unlikely event of a flashback:
- 4.1. Designed for Group D Gasses.
 - 4.2. Sized to minimize backpressure on tanks.
5. **(OPTIONAL) Block Valve**→ One (1) Automatic Kimray Electric Block Valve with the following features:
- 5.1. One (1) automatic valve and continuously powered solenoid valve to be installed on the tank vent vapor line.
 - 5.2. Designed to automatically shutoff flow to the flare upon shutdown of the flare system.
 - 5.3. Vapor valve to be shipped loose for field installation.

6. **(OPTIONAL) High Temperature Shutdown/Alarm** → One (1) High Temperature Shutdown/Alarm with the following features:
 - 6.1. One (1) Type K thermocouple to be located on the upper portion of the stack.
 - 6.2. One set of alarm contacts located in the control panel for sending the shutdown/alarm signal to the customer control system.
7. **(OPTIONAL) High Temperature Paint**→ The combustor will be painted with a high temperature finish coat of paint.
8. **(OPTIONAL) Thermocouple Conduit Spool**→ The conduit spool will connect the high temperature shutdown thermocouple to the burner management panel. The spool will be shop installed to help reduce field labor.

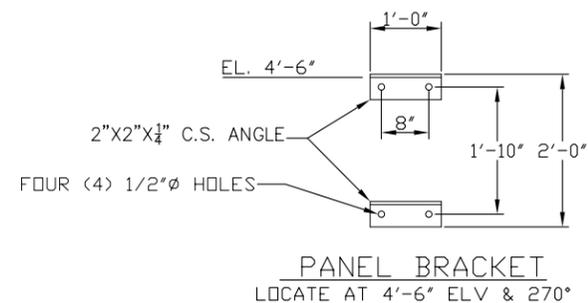
| NOZZLE LEGEND | | |
|---------------|------|---|
| MK. | QTY. | DESCRIPTION |
| N1A | 1 | BURNER # 1 CONNECTION |
| N1B | 1 | BURNER # 2 CONNECTION |
| N2 | 1 | 2" CS PIPE w/ 150# RF Flange Sight Port |
| N3 | 2 | 4" CS PIPE, 150 # RF FLANGE W/ BLIND |
| N4 | 2 | 1" CS COUPLING W/ PLUG |
| N5 | 1 | 4" PIPE W/ PLATE FLANGE - PILOT NOZZLE |



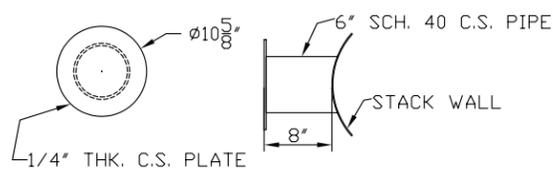
PART SECTIONAL ELEVATION
(NOT TRUE ORIENTATION)



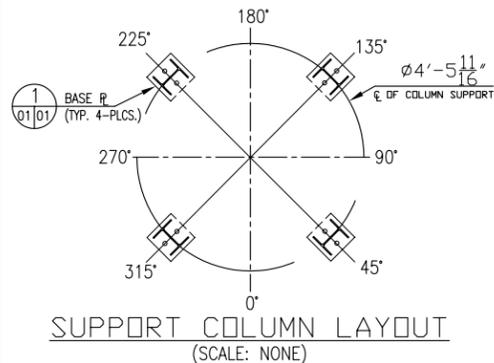
PILOT NOZZLE DETAIL
(NOZZLE N5)



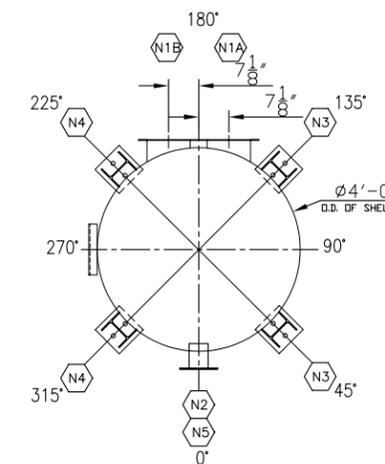
PANEL BRACKET
LOCATE AT 4'-6" ELV & 270°



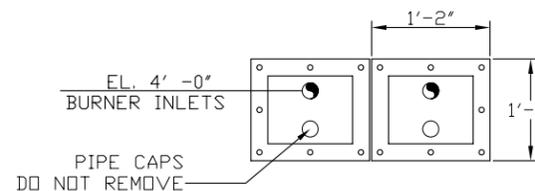
LIFTING LUG DETAIL
(2 - REQ'D EQUALLY SPACED)
LOCATE AT 90° & 270°



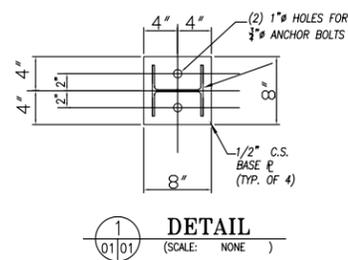
SUPPORT COLUMN LAYOUT
(SCALE: NONE)



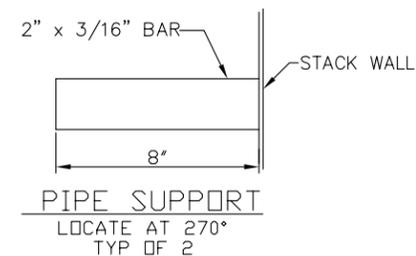
DETAIL
(SCALE: NONE)



BURNER NOZZLE DETAIL
(TYP. OF 2 - N1A AND N1B)



DETAIL
(SCALE: NONE)



PIPE SUPPORT
LOCATE AT 270°
TYP OF 2

GENERAL NOTES:

- BOLT HOLES TO STRADDLE NORM. CL'S UNLESS NOTED.
- FLARE ASS'Y IS NOT TO BE USED AS AN ANCHOR POINT FOR CUSTOMER PIPING
- FINISH EXTERIOR: SANDBLAST PER SSPC-SP6, 2 MIL PROFILE, AND PRIME W/ SHERWIN WILLIAMS ZINC CLAD II ETHYL SILICATE INDRGANC ZINC-RICH COATING, 3 - 5 DRY MIL THICKNESS TOP COAT TO BE KEM-HI TEMP 450 NEW TONED WHITE
- MAIN CRANE AT TOP REQUIRES SPREADER BAR (BY OTHERS)
- PILOT PIPING & CONDUIT BY OTHERS.
- REMOVE PLASTIC/WOODEN COVERS AFTER INITIAL INSTALLATION. DO NOT TRANSPORT WITHOUT COVERS.
- ALL PLATE TO BE A-36 OR EQUIV; ALL PIPE TO BE C.S. UNLESS NOTED OTHERWISE
- ALL NOZZLES TO BE COPED FLUSH WITH THE INSIDE OF THE SHELL
- FOLLOW REFRACTORY MANUFACTURERS RECOMMENDATIONS FOR PIN LOCATION AND OVERLAPPING OF SEAMS.
- USE TWO (2) 3/4" A-307 OR BETTER ANCHOR BOLTS PER LEG
- SECURELY GROUND FLARE STACK IN A MINIMUM OF TWO (2) PLACES.
- COVER ONE (1) END OF STACK AND BURNER/PILOT OPENINGS WITH 7/16" OSB COVERS FOR SHIPPING. COVER OSB W/ INDUSTRIAL SHRINK WRAP FOR SHIPPING TO PREVENT DAMAGE TO REFRACTORY.

| No. | Date | By | Chk'd | App'd | Description | Dwg. No. | Subject |
|--------------------|----------|-----|-------|-------|------------------|----------|---------|
| 0 | 10/22/12 | ABR | MDS | | FOR CONSTRUCTION | | |
| Revisions | | | | | | | |
| Reference Drawings | | | | | | | |

| | |
|--|----------|
| This drawing is the property of and intended only for the private use of MRW Technologies, Inc. and may not be reproduced or given to third parties without prior written consent. | |
| Drawn | ABR |
| Date | 10/22/12 |
| Scale | NTS |
| Checked | MDS |
| App'd | |
| Customer VAVCO/HG ENERGY | |

| | | |
|---|--------------|----------------------|
| 4' x 25' COMBUSTOR ELEVATION AND DETAILS | P.D. No. | 1139 |
| | Jobsite | NEW MARTINSVILLE, WV |
| | Revision No. | 0 |
| | Drawing No. | 081202-S1 |
| | Sheet | 1 of 1 |

Attachment N: Supporting Emissions Calculations

**TABLE N-1
EMISSIONS SUMMARY
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

| FIN/EPN Number | Description | NO_x (TPY) | PM₁₀ (TPY) | PM_{TOT} (TPY) | SO₂ (TPY) | CO (TPY) | VOC (TPY) |
|---------------------------|-------------------------------------|---------------------------------|----------------------------------|-----------------------------------|---------------------------------|---------------------|----------------------|
| FUG | Sitewide Fugitive | -- | -- | -- | -- | -- | 2.93 |
| TANK 1 | Tank 1 - Atmospheric Tank (210-bbl) | -- | -- | -- | -- | -- | 0.21 |
| TANK 2 | Tank 2 - Atmospheric Tank (210-bbl) | -- | -- | -- | -- | -- | 0.21 |
| TANK 3 | Tank 3 - Atmospheric Tank (100-bbl) | -- | -- | -- | -- | -- | 0.21 |
| COMB 1 | Combustor (8 MMBtu/hr) | 3.42 | 0.26 | 0.26 | <0.01 | 2.89 | 0.79 |
| C LOAD | Condensate Loading | -- | -- | -- | -- | -- | 0.84 |
| MSS | MSS Activities/Pigging Operations | -- | -- | -- | -- | -- | 0.14 |
| ROADS | Unpaved Road Sources | -- | 0.01 | 0.02 | -- | -- | -- |
| Total | | 3.42 | 0.27 | 0.28 | <0.01 | 2.89 | 5.33 |

| FIN/EPN Number | Description | NO_x (lb/hr) | PM₁₀ (lb/hr) | PM_{TOT} (lb/hr) | SO₂ (lb/hr) | CO (lb/hr) | VOC (lb/hr) |
|---------------------------|-------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|-----------------------------------|-----------------------|------------------------|
| FUG | Sitewide Fugitive | -- | -- | -- | -- | -- | 0.67 |
| TANK 1 | Tank 1 - Atmospheric Tank (210-bbl) | -- | -- | -- | -- | -- | 0.05 |
| TANK 2 | Tank 2 - Atmospheric Tank (210-bbl) | -- | -- | -- | -- | -- | 0.05 |
| TANK 3 | Tank 3 - Atmospheric Tank (100-bbl) | -- | -- | -- | -- | -- | 0.05 |
| COMB 1 | Combustor (8 MMBtu/hr) | 0.78 | 0.06 | 0.06 | <0.01 | 0.66 | 0.18 |
| C LOAD | Condensate Loading | -- | -- | -- | -- | -- | 46.56 |
| MSS | MSS Activities/Pigging Operations | -- | -- | -- | -- | -- | 2.84 |
| ROADS | Unpaved Road Sources | -- | 0.002 | 0.01 | -- | -- | -- |
| Total | | 0.78 | 0.06 | 0.07 | <0.01 | 0.66 | 50.40 |

**TABLE N-2
GAS ANALYSIS
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

| Component | Mole % | Molecular Weight | lb/100 mole | Wt % Total | Wt % Hydrocarbon | Wt % VOC |
|------------|--------|------------------|-------------|------------|------------------|----------|
| H2S | 0.000 | 34.08 | 0.00 | 0.00 | -- | -- |
| O2 | 0.391 | 16.00 | 6.26 | 0.18 | -- | -- |
| N2 | 3.359 | 28.01 | 94.09 | 2.72 | -- | -- |
| CO2 | 0.106 | 44.01 | 4.67 | 0.14 | -- | -- |
| Methane | 33.745 | 16.04 | 541.27 | 15.65 | 15.65 | -- |
| Ethane | 24.574 | 30.07 | 738.94 | 21.37 | 21.37 | -- |
| Propane | 19.911 | 44.10 | 878.08 | 25.39 | 25.39 | 26.18% |
| Isobutane | 4.126 | 58.12 | 239.80 | 6.93 | 6.93 | 7.15% |
| n-Butane | 7.466 | 58.12 | 433.92 | 12.55 | 12.55 | 12.94% |
| Isopentane | 2.210 | 72.15 | 159.45 | 4.61 | 4.61 | 4.75% |
| n-Pentane | 1.772 | 72.15 | 127.85 | 3.70 | 3.70 | 3.82% |
| Hexanes+ | 2.34 | 100.00 | 234.00 | 6.77 | 6.77 | 6.98% |
| Total | 100.00 | -- | 3458.33 | 100.01 | 96.97 | 61.82% |

Notes:

1. Gas analysis provided by Legacy Measurement Solutions, sampled 4/15/2014. This gas analysis is from the site.
2. Wt % VOC is the VOC % in the hydrocarbon portion of the gas.

Legacy Measurement Solutions

Good

Shreveport, LA

318-226-7237

| | | | |
|--------------------|----------------------------|-----------------------|--------------|
| Customer | : 2314 - ELECTRONIC DESIGN | Date Sampled | : 04/15/2014 |
| Station ID | : 4203 | Date Analyzed | : 05/20/2014 |
| Cylinder ID | : rc2122 | Effective Date | : 05/01/2014 |
| Producer | : | Cyl Pressure | : 50 |
| Lease | : MASON HILL PAD | Temp | : 64 |
| Area | : 910 - UNKNOWN | Cylinder Type | : Spot |
| State | : WV | Sample By | : |

| <u>COMPONENT</u> | <u>MOL%</u> | <u>GPM@14.73(Psia)</u> |
|--|-------------|------------------------|
| Oxygen | 0.3911 | 0.000 |
| Nitrogen | 3.3585 | 0.000 |
| Methane | 33.7449 | 0.000 |
| Carbon-Dioxide | 0.1057 | 0.000 |
| Ethane | 24.5744 | 6.640 |
| Propane | 19.9106 | 5.542 |
| Iso-Butane | 4.1261 | 1.364 |
| Normal-Butane | 7.4660 | 2.378 |
| Iso-Pentane | 2.2101 | 0.817 |
| Normal-Pentane | 1.7722 | 0.649 |
| 2,2-Dimethylbutane | 0.0862 | 0.036 |
| 2,3-Dimethylbutane/CycloC5 | 0.1163 | 0.040 |
| 2-methylpentane | 0.4736 | 0.198 |
| 3-methylpentane | 0.2938 | 0.121 |
| Normal-Hexane | 0.5085 | 0.211 |
| 2,2-Dimethylpentane | 0.0201 | 0.010 |
| Methylcyclopentane | 0.0745 | 0.027 |
| BENZENE | 0.0113 | 0.003 |
| 3,3-Dimethylpentane | 0.0000 | 0.000 |
| CYCLOHEXANE | 0.0560 | 0.019 |
| 2-Methylhexane | 0.2151 | 0.101 |
| 2,3-Dimethylpentane | 0.0000 | 0.000 |
| 3-Methylhexane | 0.1438 | 0.067 |
| 1,t2-DMCYC5 / 2,2,4-TMC5 | 0.0000 | 0.000 |
| 1,t3-Dimethylcyclopentane | 0.0020 | 0.001 |
| N-Heptane | 0.1584 | 0.074 |
| METHYLCYCLOHEXANE | 0.1067 | 0.049 |
| 2,5-Dimethylhexane | 0.0000 | 0.000 |
| 2,3-Dimethylhexane | 0.0000 | 0.000 |
| TOLUENE | 0.0229 | 0.008 |
| 2-Methylheptane | 0.0000 | 0.000 |
| 4-Methylheptane | 0.0000 | 0.000 |
| 3-Methylheptane | 0.0187 | 0.010 |
| 1,t4-Dimethylcyclohexane | 0.0000 | 0.000 |
| N-OCTANE / 1,T2-DMCYC6 | 0.0212 | 0.010 |
| 1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5 | 0.0000 | 0.000 |
| 2,4,4 TMC6 | 0.0000 | 0.000 |

| | | |
|-----------------------------------|-----------------|---------------|
| 2,6-Dimethylheptane / 1,C2-DMCYC6 | 0.0000 | 0.000 |
| Ethylcyclohexane | 0.0019 | 0.001 |
| ETHYLBENZENE | 0.0000 | 0.000 |
| M-XYLENE | 0.0042 | 0.002 |
| P-XYLENE | 0.0036 | 0.001 |
| O-XYLENE | 0.0004 | 0.000 |
| NONANE | 0.0013 | 0.001 |
| N-DECANE | 0.0000 | 0.000 |
| N-UNDECANE | 0.0000 | 0.000 |
| TOTAL | 100.0001 | 18.380 |

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9895

C5+ GPM : 1.47673

Ideal Gravity: 1.1887

Real Gravity: 1.2007

C5+ Mole % : 6.3228

| BTU @ (PSIA) | @14.65 | @14.696 | @14.73 | @15.025 |
|---------------|----------|----------|----------|----------|
| Ideal GPM | 18.089 | 18.146 | 18.188 | 18.552 |
| Ideal BTU Dry | 1,923.51 | 1,929.55 | 1,934.02 | 1,972.75 |
| Ideal BTU Sat | 1,889.85 | 1,895.89 | 1,900.35 | 1,939.09 |
| Real GPM | 18.279 | 18.337 | 18.380 | 18.752 |
| Real BTU Dry | 1,943.75 | 1,949.92 | 1,954.47 | 1,994.04 |
| Real BTU Sat | 1,910.76 | 1,916.93 | 1,921.49 | 1,961.07 |

Comments:

Gas Analysis performed in accordance with GPA 2261

Sample Count : 210000025

Analytical Calculations performed in accordance with GPA 2172

COC :

Lab Technician: _____

**DEBORAH J
MURPHY**

**TABLE N-3
EQUIPMENT FUGITIVE EMISSIONS
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

| Equipment Type | Estimated Equipment At Site ^a | Emission Factor lb/hr/component ^b | % VOC ^c | VOC Emissions | |
|---------------------|--|--|--------------------|---------------|-----------|
| | | | | (lb/hr) | (tons/yr) |
| Flanges | | | | | |
| Gas | 55 | 0.00086 | 61.82% | 0.03 | 0.13 |
| Light Liquid | 6 | 0.000243 | 100.00% | 0.001 | 0.004 |
| Valves | | | | | |
| Gas | 50 | 0.00992 | 61.82% | 0.31 | 1.36 |
| Light Liquid | 5 | 0.0055 | 100.00% | 0.03 | 0.13 |
| Other Relief Valves | | | | | |
| Gas | 13 | 0.0194 | 61.82% | 0.16 | 0.70 |
| Light Liquid | 3 | 0.0165 | 100.00% | 0.05 | 0.22 |
| Pump Seals | | | | | |
| Light Liquid | 3 | 0.02866 | 100.00% | 0.09 | 0.39 |
| | | | Total VOC | 0.67 | 2.93 |

^a Number of each component and type of service estimated based on a similar site.

^b Emission factors based on TCEQ's oil and gas production operations factors for process piping fugitive emissions.

^c Percent VOC for Gas/Vapor service based on representative gas analysis from facility (see Table 2).

**TABLE N-4
ESTIMATED EMISSIONS FROM STORAGE TANKS
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

| Identification - Pressurized Bullet Tank | TANK 1-2 - Condensate/Water | TANK 3 - Condensate/Water |
|---|-----------------------------|---------------------------|
| Tank ID | West Virginia | West Virginia |
| State | 210 BBL Tanks | 100 BBL Tank |
| Description | 2847 | 2847 |
| Throughput (Total Annual Barrels) | | |
| Tank Dimensions | | |
| Shell Height (ft) | 15 | 7.5 |
| Diameter (ft) | 10 | 10 |
| Volume (gal) | 8,820 | 4,200 |
| Turnovers | 13.56 | 28.47 |
| Net Throughput (gal/yr) | 119,574 | 119,574 |
| Other Inputs | | |
| Shell & Roof Color/Shade | White | White |
| Shell & Roof Condition | Good | Good |
| Meteorological Data | West Virginia | West Virginia |
| Tank Contents | | |
| Mixture/Component | Condensate | Condensate |
| Tank VOC Emissions | | |
| Uncontrolled VOC Losses (T/yr) ^a | 10.56 | 10.50 |
| Uncontrolled VOC Losses (lb/hr) ^a | 2.41 | 2.40 |
| Control Device Collection Efficiency (%) ^b | 98% | 98% |
| Controlled VOC Losses (T/yr) ^c | 0.21 | 0.21 |
| Controlled VOC Losses (lb/hr) ^c | 0.05 | 0.05 |

^a VOC Flashing, Standing & Working Losses (lb/hr) were determined using E&P Tanks V2.0 using a representative regional geographical database case, and a maximum throughput.

^b It is estimated that 98% of the tank emissions are captured and sent to the combustor.

^c Controlled VOC Losses = Uncontrolled VOC Losses x (100% - 98%)

* Project Setup Information *

Project File : C:\Documents and Settings\Administrator\My Documents\EP-Tanks\AmericanEnergyPartners
 Flowsheet Selection : Oil Tank with Separator
 Calculation Method : AP42
 Control Efficiency : 100.0%
 Known Separator Stream : Geographical Region
 Geographical Region : All Regions in US
 Entering Air Composition : No

 Filed Name : Ascent Resources
 Well Name : Mason Hills- West Virginia
 Well ID : (1) 100-bbl Tank
 Permit Number : Northeast Region Case 5
 Date : 12/2/2015

* Data Input *

Separator Pressure : 170.00[psig]
 Separator Temperature : 75.00[F]
 Ambient Pressure : 14.70[psia]
 Ambient Temperature : 75.00[F]
 C10+ SG : 0.8010
 C10+ MW : 196.00

-- Low Pressure Oil -----

| No. | Component | mol % |
|-----|---------------|---------|
| 1 | H2S | 0.0000 |
| 2 | O2 | 0.0000 |
| 3 | CO2 | 0.0100 |
| 4 | N2 | 0.0100 |
| 5 | C1 | 4.9300 |
| 6 | C2 | 2.5800 |
| 7 | C3 | 3.4200 |
| 8 | i-C4 | 3.4300 |
| 9 | n-C4 | 3.7300 |
| 10 | i-C5 | 5.5500 |
| 11 | n-C5 | 3.6500 |
| 12 | C6 | 8.0700 |
| 13 | C7 | 14.6500 |
| 14 | C8 | 13.2600 |
| 15 | C9 | 7.8000 |
| 16 | C10+ | 19.6300 |
| 17 | Benzene | 0.5400 |
| 18 | Toluene | 1.9200 |
| 19 | E-Benzene | 0.1700 |
| 20 | Xylenes | 2.2200 |
| 21 | n-C6 | 4.4300 |
| 22 | 224Trimethylp | 0.0000 |

-- Sales Oil -----

Production Rate : 7[bbl/day]
 Days of Annual Operation : 365 [days/year]
 API Gravity : 68.0
 Reid Vapor Pressure : 12.50[psia]
 Bulk Temperature : 80.00[F]

-- Tank and Shell Data -----

Diameter : 10.00[ft]
 Shell Height : 7.50[ft]
 Cone Roof Slope : 0.06
 Average Liquid Height : 5.00[ft]

Vent Pressure Range : 0.06[psi]
 Solar Absorbance : 0.17

--- Meteorological Data -----
 City : Charleston, WV
 Ambient Pressure : 14.70[psia]
 Ambient Temperature : 75.00[F]
 Min Ambient Temperature : 44.00[F]
 Max Ambient Temperature : 65.50[F]
 Total Solar Insolation : 1123.00[Btu/ft^2*day]

 * Calculation Results *

--- Emission Summary -----

| Item | Uncontrolled [ton/yr] | Uncontrolled [lb/hr] |
|------------|--------------------------|-------------------------|
| Total HAPs | 0.320 | 0.073 |
| Total HC | 13.725 | 3.134 |
| VOCs, C2+ | 11.402 | 2.603 |
| VOCs, C3+ | 9.451 | 2.158 |

Uncontrolled Recovery Info.
 Vapor 771.6900 x1E-3 [MSCFD]
 HC Vapor 770.4900 x1E-3 [MSCFD]
 GOR 110.24 [SCF/bbl]

--- Emission Composition -----

| No | Component | Uncontrolled [ton/yr] | Uncontrolled [lb/hr] |
|----|---------------|--------------------------|-------------------------|
| 1 | H2S | 0.000 | 0.000 |
| 2 | O2 | 0.000 | 0.000 |
| 3 | CO2 | 0.012 | 0.003 |
| 4 | N2 | 0.008 | 0.002 |
| 5 | C1 | 2.323 | 0.530 |
| 6 | C2 | 1.951 | 0.445 |
| 7 | C3 | 2.559 | 0.584 |
| 8 | i-C4 | 1.927 | 0.440 |
| 9 | n-C4 | 1.598 | 0.365 |
| 10 | i-C5 | 1.295 | 0.296 |
| 11 | n-C5 | 0.640 | 0.146 |
| 12 | C6 | 0.567 | 0.129 |
| 13 | C7 | 0.394 | 0.090 |
| 14 | C8 | 0.127 | 0.029 |
| 15 | C9 | 0.028 | 0.006 |
| 16 | C10+ | 0.001 | 0.000 |
| 17 | Benzene | 0.025 | 0.006 |
| 18 | Toluene | 0.029 | 0.007 |
| 19 | E-Benzene | 0.001 | 0.000 |
| 20 | Xylenes | 0.011 | 0.003 |
| 21 | n-C6 | 0.249 | 0.057 |
| 22 | 224Trimethylp | 0.000 | 0.000 |
| | Total | 13.745 | 3.138 |

--- Stream Data -----

| No. | Component | MW | LP Oil mol % | Flash Oil mol % | Sale Oil mol % | Flash Gas mol % | W&S Gas mol % | Total Emissions mol % |
|-----|-----------|-------|-----------------|--------------------|-------------------|--------------------|------------------|--------------------------|
| 1 | H2S | 34.80 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | O2 | 32.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3 | CO2 | 44.01 | 0.0100 | 0.0012 | 0.0002 | 0.0764 | 0.0170 | 0.0741 |
| 4 | N2 | 28.01 | 0.0100 | 0.0001 | 0.0000 | 0.0848 | 0.0001 | 0.0815 |
| 5 | C1 | 16.04 | 4.9300 | 0.2295 | 0.0000 | 40.5928 | 0.0001 | 38.9722 |
| 6 | C2 | 30.07 | 2.5800 | 0.5927 | 0.2259 | 17.6576 | 12.6696 | 17.4585 |
| 7 | C3 | 44.10 | 3.4200 | 1.8651 | 1.4085 | 15.2169 | 25.1762 | 15.6145 |
| 8 | i-C4 | 58.12 | 3.4300 | 2.7565 | 2.4942 | 8.5399 | 18.0789 | 8.9207 |
| 9 | n-C4 | 58.12 | 3.7300 | 3.2926 | 3.0885 | 7.0488 | 15.8295 | 7.3994 |

| | | | | | | | | |
|----|----------------------|-----------|---------|---------|---------|---------|---------|---------|
| 10 | i-C5 | 72.15 | 5.5500 | 5.6805 | 5.6172 | 4.5601 | 11.3126 | 4.8297 |
| 11 | n-C5 | 72.15 | 3.6500 | 3.8346 | 3.8250 | 2.2492 | 5.7418 | 2.3886 |
| 12 | C6 | 86.16 | 8.0700 | 8.9095 | 9.0376 | 1.7007 | 4.6299 | 1.8177 |
| 13 | C7 | 100.20 | 14.6500 | 16.4469 | 16.7794 | 1.0169 | 2.9348 | 1.0935 |
| 14 | C8 | 114.23 | 13.2600 | 14.9703 | 15.3037 | 0.2843 | 0.8681 | 0.3076 |
| 15 | C9 | 128.28 | 7.8000 | 8.8206 | 9.0227 | 0.0564 | 0.1814 | 0.0614 |
| 16 | C10+ | 166.00 | 19.6300 | 22.2172 | 22.7340 | 0.0008 | 0.0032 | 0.0009 |
| 17 | Benzene | 78.11 | 0.5400 | 0.6005 | 0.6106 | 0.0811 | 0.2239 | 0.0868 |
| 18 | Toluene | 92.13 | 1.9200 | 2.1626 | 2.2089 | 0.0794 | 0.2335 | 0.0855 |
| 19 | E-Benzene | 106.17 | 0.1700 | 0.1921 | 0.1965 | 0.0023 | 0.0070 | 0.0024 |
| 20 | Xylenes | 106.17 | 2.2200 | 2.5092 | 2.5663 | 0.0255 | 0.0798 | 0.0277 |
| 21 | n-C6 | 86.18 | 4.4300 | 4.9182 | 4.9982 | 0.7261 | 2.0125 | 0.7775 |
| 22 | 224Trimethylp | 114.24 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | MW | | 106.20 | 115.44 | 116.55 | 36.16 | 57.08 | 36.99 |
| | Stream Mole Ratio | | 1.0000 | 0.8835 | 0.8787 | 0.1165 | 0.0048 | 0.1213 |
| | Heating Value | [BTU/SCF] | | | | 2081.33 | 3194.89 | 2125.78 |
| | Gas Gravity | [Gas/Air] | | | | 1.25 | 1.97 | 1.28 |
| | Bubble Pt. @ 100F | [psia] | 182.14 | 21.07 | 10.84 | | | |
| | RVP @ 100F | [psia] | 316.85 | 85.54 | 63.20 | | | |
| | Spec. Gravity @ 100F | | 0.681 | 0.692 | 0.693 | | | |

 * Project Setup Information *

Project File : Untitled.Ept
 Flowsheet Selection : Oil Tank with Separator
 Calculation Method : AP42
 Control Efficiency : 100.0%
 Known Separator Stream : Geographical Region
 Geographical Region : All Regions in US
 Entering Air Composition : No

 Filed Name : Ascent Resources
 Well Name : Mason Hills- West Virginia
 Well ID : (2) 210-bbl tanks
 Permit Number : Northeast Region Case 5
 Date : 12/2/2015

 * Data Input *

Separator Pressure : 170.00[psig]
 Separator Temperature : 75.00[F]
 Ambient Pressure : 14.70[psia]
 Ambient Temperature : 75.00[F]
 C10+ SG : 0.8010
 C10+ MW : 196.00

-- Low Pressure Oil -----

| No. | Component | mol % |
|-----|---------------|---------|
| 1 | H2S | 0.0000 |
| 2 | O2 | 0.0000 |
| 3 | CO2 | 0.0100 |
| 4 | N2 | 0.0100 |
| 5 | C1 | 4.9300 |
| 6 | C2 | 2.5800 |
| 7 | C3 | 3.4200 |
| 8 | i-C4 | 3.4300 |
| 9 | n-C4 | 3.7300 |
| 10 | i-C5 | 5.5500 |
| 11 | n-C5 | 3.6500 |
| 12 | C6 | 8.0700 |
| 13 | C7 | 14.6500 |
| 14 | C8 | 13.2600 |
| 15 | C9 | 7.8000 |
| 16 | C10+ | 19.6300 |
| 17 | Benzene | 0.5400 |
| 18 | Toluene | 1.9200 |
| 19 | E-Benzene | 0.1700 |
| 20 | Xylenes | 2.2200 |
| 21 | n-C6 | 4.4300 |
| 22 | 224Trimethylp | 0.0000 |

-- Sales Oil -----

Production Rate : 7[bbl/day]
 Days of Annual Operation : 365 [days/year]
 API Gravity : 68.0
 Reid Vapor Pressure : 12.50[psia]
 Bulk Temperature : 80.00[F]

-- Tank and Shell Data -----

Diameter : 10.00[ft]
 Shell Height : 15.00[ft]
 Cone Roof Slope : 0.06
 Average Liquid Height : 10.50[ft]

Vent Pressure Range : 0.06[psi]
 Solar Absorbance : 0.17

--- Meteorological Data ---
 City : Charleston, WV
 Ambient Pressure : 14.70[psia]
 Ambient Temperature : 75.00[F]
 Min Ambient Temperature : 44.00[F]
 Max Ambient Temperature : 65.50[F]
 Total Solar Insolation : 1123.00[Btu/ft^2*day]

 * Calculation Results *

--- Emission Summary ---

| Item | Uncontrolled [ton/yr] | Uncontrolled [lb/hr] |
|------------|--------------------------|-------------------------|
| Total HAPs | 0.320 | 0.073 |
| Total HC | 13.785 | 3.147 |
| VOCs, C2+ | 11.462 | 2.617 |
| VOCs, C3+ | 9.513 | 2.172 |

Uncontrolled Recovery Info.
 Vapor 773.5100 x1E-3 [MSCFD]
 HC Vapor 772.3100 x1E-3 [MSCFD]
 GOR 110.50 [SCF/bbl]

--- Emission Composition ---

| No | Component | Uncontrolled [ton/yr] | Uncontrolled [lb/hr] |
|----|---------------|--------------------------|-------------------------|
| 1 | H2S | 0.000 | 0.000 |
| 2 | O2 | 0.000 | 0.000 |
| 3 | CO2 | 0.012 | 0.003 |
| 4 | N2 | 0.008 | 0.002 |
| 5 | C1 | 2.323 | 0.530 |
| 6 | C2 | 1.949 | 0.445 |
| 7 | C3 | 2.568 | 0.586 |
| 8 | i-C4 | 1.939 | 0.443 |
| 9 | n-C4 | 1.609 | 0.367 |
| 10 | i-C5 | 1.305 | 0.298 |
| 11 | n-C5 | 0.646 | 0.147 |
| 12 | C6 | 0.572 | 0.131 |
| 13 | C7 | 0.398 | 0.091 |
| 14 | C8 | 0.128 | 0.029 |
| 15 | C9 | 0.028 | 0.006 |
| 16 | C10+ | 0.001 | 0.000 |
| 17 | Benzene | 0.025 | 0.006 |
| 18 | Toluene | 0.030 | 0.007 |
| 19 | E-Benzene | 0.001 | 0.000 |
| 20 | Xylenes | 0.011 | 0.003 |
| 21 | n-C6 | 0.251 | 0.057 |
| 22 | 224Trimethylp | 0.000 | 0.000 |
| | Total | 13.804 | 3.152 |

--- Stream Data ---

| No. | Component | MW | LP Oil mol % | Flash Oil mol % | Sale Oil mol % | Flash Gas mol % | W&S Gas mol % | Total Emissions mol % |
|-----|-----------|-------|-----------------|--------------------|-------------------|--------------------|------------------|--------------------------|
| 1 | H2S | 34.80 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | O2 | 32.00 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3 | CO2 | 44.01 | 0.0100 | 0.0012 | 0.0001 | 0.0764 | 0.0127 | 0.0737 |
| 4 | N2 | 28.01 | 0.0100 | 0.0001 | 0.0000 | 0.0848 | 0.0001 | 0.0812 |
| 5 | C1 | 16.04 | 4.9300 | 0.2295 | 0.0000 | 40.5928 | 0.0001 | 38.8673 |
| 6 | C2 | 30.07 | 2.5800 | 0.5927 | 0.2020 | 17.6576 | 11.6877 | 17.4039 |
| 7 | C3 | 44.10 | 3.4200 | 1.8651 | 1.3682 | 15.2169 | 25.0650 | 15.6355 |
| 8 | i-C4 | 58.12 | 3.4300 | 2.7565 | 2.4688 | 8.5399 | 18.3073 | 8.9550 |
| 9 | n-C4 | 58.12 | 3.7300 | 3.2926 | 3.0682 | 7.0488 | 16.0822 | 7.4328 |

| | | | | | | | | |
|----|----------------------|-----------|---------|---------|---------|---------|---------|---------|
| 10 | i-C5 | 72.15 | 5.5500 | 5.6805 | 5.6099 | 4.5601 | 11.5474 | 4.8571 |
| 11 | n-C5 | 72.15 | 3.6500 | 3.8346 | 3.8235 | 2.2492 | 5.8654 | 2.4029 |
| 12 | C6 | 86.16 | 8.0700 | 8.9095 | 9.0490 | 1.7007 | 4.7358 | 1.8297 |
| 13 | C7 | 100.20 | 14.6500 | 16.4469 | 16.8101 | 1.0169 | 3.0032 | 1.1014 |
| 14 | C8 | 114.23 | 13.2600 | 14.9703 | 15.3347 | 0.2843 | 0.8884 | 0.3099 |
| 15 | C9 | 128.28 | 7.8000 | 8.8206 | 9.0416 | 0.0564 | 0.1857 | 0.0619 |
| 16 | C10+ | 166.00 | 19.6300 | 22.2172 | 22.7823 | 0.0008 | 0.0033 | 0.0009 |
| 17 | Benzene | 78.11 | 0.5400 | 0.6005 | 0.6116 | 0.0811 | 0.2290 | 0.0874 |
| 18 | Toluene | 92.13 | 1.9200 | 2.1626 | 2.2132 | 0.0794 | 0.2389 | 0.0861 |
| 19 | E-Benzene | 106.17 | 0.1700 | 0.1921 | 0.1969 | 0.0023 | 0.0072 | 0.0025 |
| 20 | Xylenes | 106.17 | 2.2200 | 2.5092 | 2.5716 | 0.0255 | 0.0816 | 0.0279 |
| 21 | n-C6 | 86.18 | 4.4300 | 4.9182 | 5.0054 | 0.7261 | 2.0589 | 0.7828 |
| 22 | 224Trimethylp | 114.24 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | MW | | 106.20 | 115.44 | 116.63 | 36.16 | 57.50 | 37.06 |
| | Stream Mole Ratio | | 1.0000 | 0.8835 | 0.8784 | 0.1165 | 0.0052 | 0.1216 |
| | Heating Value | [BTU/SCF] | | | | 2081.33 | 3217.39 | 2129.62 |
| | Gas Gravity | [Gas/Air] | | | | 1.25 | 1.98 | 1.28 |
| | Bubble Pt. @ 100F | [psia] | 182.14 | 21.07 | 10.58 | | | |
| | RVP @ 100F | [psia] | 316.85 | 85.54 | 62.05 | | | |
| | Spec. Gravity @ 100F | | 0.681 | 0.692 | 0.694 | | | |

**TABLE N-5
ESTIMATED EMISSIONS FROM COMB 1
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

Input Parameters for Emission Calculations

| | | |
|---|--------------|----------|
| Design Maximum Firing Rate ^a | <u>8.00</u> | MMBtu/hr |
| Average Heating Value of Gas Burned | <u>1020</u> | Btu/scf |
| Operating Hours per Year | <u>8,760</u> | Hrs/Yr |

Calculated Inputs

| | | |
|--|----------------|----------|
| Estimated Natural Gas Usage ^b | <u>0.00784</u> | MMscf/hr |
| VOC from Storage Tanks ^d | <u>7.08</u> | lb/hr |

| POLLUTANT | EMISSION FACTOR | HOURLY FIRING RATE | HOURLY EMISSIONS | ANNUAL OPERATING HOURS | WEIGHT CONVERSION | ANNUAL EMISSIONS |
|-------------------|--|---|---|---|--|--|
| CO ^c | 84.00 $\frac{\text{lb CO}}{\text{MM cu.ft. Natural Gas Burned}}$ x | 0.0078 $\frac{\text{MM Cubic Feet}}{\text{Hr}}$ | = 0.66 $\frac{\text{lb CO}}{\text{hr}}$ | 8760 $\frac{\text{Hours}}{\text{yr}}$ x | $\frac{1 \text{ ton}}{2000 \text{ lbs}}$ | = 2.89 $\frac{\text{tons CO}}{\text{yr}}$ |
| NOx ^c | 100.00 $\frac{\text{lb NOx}}{\text{MM cu.ft. Natural Gas Burned}}$ x | 0.0078 $\frac{\text{MM Cubic Feet}}{\text{Hr}}$ | = 0.78 $\frac{\text{lb NOx}}{\text{hr}}$ | 8760 $\frac{\text{Hours}}{\text{yr}}$ x | $\frac{1 \text{ ton}}{2000 \text{ lbs}}$ | = 3.42 $\frac{\text{tons NOx}}{\text{yr}}$ |
| PM10 ^c | 7.60 $\frac{\text{lb PM10}}{\text{MM cu.ft. Natural Gas Burned}}$ x | 0.0078 $\frac{\text{MM Cubic Feet}}{\text{Hr}}$ | = 0.06 $\frac{\text{lb PM10}}{\text{Hr}}$ | 8760 $\frac{\text{Hours}}{\text{yr}}$ x | $\frac{1 \text{ ton}}{2000 \text{ lbs}}$ | 0.26 $\frac{\text{tons PM10}}{\text{yr}}$ |
| VOC ^c | 5.50 $\frac{\text{lb VOC}}{\text{MM cu.ft. Natural Gas Burned}}$ x | 0.0078 $\frac{\text{MM Cubic Feet}}{\text{Hr}}$ | = 0.04 $\frac{\text{lb VOC}}{\text{Hr}}$ | 8760 $\frac{\text{Hours}}{\text{yr}}$ x | $\frac{1 \text{ ton}}{2000 \text{ lbs}}$ | 0.18 $\frac{\text{tons VOC}}{\text{yr}}$ |
| VOC ^d | 7.08 $\frac{\text{lb VOC}}{\text{hr}}$ x | 98% Destruction Efficiency | = 0.14 $\frac{\text{lb VOC}}{\text{Hr}}$ | 8760 $\frac{\text{Hours}}{\text{yr}}$ x | $\frac{1 \text{ ton}}{2000 \text{ lbs}}$ | 0.61 $\frac{\text{tons VOC}}{\text{yr}}$ |
| | | Total | 0.18 $\frac{\text{lb VOC}}{\text{Hr}}$ | | Total | 0.79 $\frac{\text{tons VOC}}{\text{yr}}$ |

^a From manufacturer's data.

^b Natural gas usage per hour = MMBtu/hr / Btu/scf.

Estimated Heat Input = 8.0 MMBtu/hr / 1020 Btu/scf = 0.0078 MMscf/hr

^c Criteria Pollutant Emission Factors obtained from AP-42 Nat Gas Combustion, Table 1.4-1, (7/98) < 100 MMBtu/hr heat input; & Table 1.4-2, (7/98).

CO Emission Factor = 84 lb/MM Cubic Feet
 NOx Emission Factor = 100 lb/MM Cubic Feet
 PM10 Emission Factor = 7.6 lb/MM Cubic Feet
 VOC Emission Factor = 5.5 lb/MM Cubic Feet

^d Captured VOC emissions from storage tanks. Assumes 98% destruction efficiency of vapors sent to the combustor.

**TABLE N-6
ESTIMATED EMISSIONS FROM CONDENSATE LOADING
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

| Material Name | Saturation Factor ^a (S) | True Vapor Pressure ^b (P) | | Molecular Weight of Vapors ^b (M) (lb/lb-mole) | Temp of Loaded Liquid ^b (F) | | Emission Factor ^a (lb VOC/10 ³ gal) | | Annual Throughput ^c (gals) | Estimated Hourly Throughput ^c (gal) | Total Annual VOC Emissions ^d (T/yr) | Total Hourly VOC Emissions ^e (lb/hr) |
|---------------|------------------------------------|--------------------------------------|------|--|--|-----|---|------|---------------------------------------|--|--|---|
| | | Avg | Max | | Avg | Max | Avg | Max | | | | |
| Condensate | 0.6 | 4.86 | 6.55 | 66 | 55 | 95 | 4.66 | 5.82 | 358,722 | 8,000 | 0.84 | 46.56 |

^a Per AP-42, 5th Edition (6/08), Section 5.2, Equation 1

$$\text{Emission Factor (lb VOC/10}^3\text{gal)} = \frac{S \times P \times M \times 12.46}{F + 460}$$

Saturation Factor = 0.6 for submerged loading: dedicated normal service

^b True vapor pressure, weight of vapors and temp of loaded liquid obtained from TANKS 4.0.9d run using Condensate RVP-10.

^c Throughput is the amount of condensate loaded out from tanks.

^d Uncontrolled Annual VOC Emissions = Annual Throughput / 1000 x Emission Factor / 2000 lb/T

^e Uncontrolled Hourly Emissions = Hourly Throughput / 1000 x Emission Factor

**TABLE N-7
 POTENTIAL EMISSIONS FROM MSS ACTIVITIES
 ASCENT RESOURCES - MARCELLUS, LLC
 MASON HILL
 WEST VIRGINIA**

MSS - Pigging Operations

| Description | Pigging |
|-----------------------------------|---------|
| Number of Events per Year | 96 |
| Number of Events per hour | 1 |
| Volume per Event, scf | 50.00 |
| Stream Specific Gravity | 1.2007 |
| Air MW, lb/mole | 28.96 |
| Fuel Stream Density, lb/scf | 0.092 |
| VOC Percentage in Gas Stream, wt% | 61.82% |
| VOC Hourly Emission Rate (lb/hr): | 2.84 |
| VOC Annual Emission Rate (T/yr): | 0.14 |

It is estimated that pigging will occur approximately once per week during the summer (May through November) and up to three times per week during the winter (December through April).

**TABLE N-8
UNPAVED ROADS EMISSION CALCULATION WORKSHEET
ASCENT RESOURCES - MARCELLUS, LLC
MASON HILL
WEST VIRGINIA**

*Facility Data*¹

| Vehicle Type | Light Vehicles (Pick-up Trucks and Cars) | Heavy Trucks (Tanker Trucks ²) |
|--|--|---|
| Average vehicle weight ((empty+load)/2) (tons) | 2.5 | 23.5 |
| Number of wheels per vehicle type (w) | 4 | 18 |
| Average number of round trips/day/vehicle type | 0.13 | 0.13 |
| Distance per round trip (miles/trip) | 1 | 1 |
| Vehicle miles travelled (miles/day) | 0.13 | 0.13 |
| Number of days operational (days/yr) | 365 | 365 |
| Vehicle miles travelled VMT (miles/yr) | 47.5 | 47.5 |
| Average vehicle speed S (mph) | 10 | 10 |

Formula & Calculation Inputs

$$E = k(s/12)^a * (W/3)^b * ((365 - P) / 365)$$

where:

Days per year

k = PM Particle Size Multiplier

k = PM10 Particle Size Multiplier

s = Surface Material Silt Content

P = Number of days > 0.01 inch of rain

a = PM Constant

a = PM10 Constant

b = PM & PM10 Constant

Total hourly fleet vehicle miles travelled (miles/hr)

Total annual fleet vehicle miles travelled (miles/yr)³

Average wheels⁴

Average vehicle weight of the fleet (W)⁵

Moisture Ratio

Natural Control Efficiency (CF)⁶

Reference : AP-42, Section 13.2.2 (11/06), Equation 1a and 2

| | Rate | Units | Comment |
|--|-------|-----------|--|
| Days per year | 365 | | |
| k = PM Particle Size Multiplier | 0.80 | lb/VMT | Based on Attachment L default value |
| k = PM10 Particle Size Multiplier | 0.36 | lb/VMT | Based on Attachment L default value |
| s = Surface Material Silt Content | 10 | % | |
| P = Number of days > 0.01 inch of rain | 150 | days/year | AP-42 Section 13.2.2 (11/06), Figure 13.2.2-1 for West Virginia |
| a = PM Constant | 0.70 | unitless | AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM) |
| a = PM10 Constant | 0.90 | unitless | AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM ₁₀) |
| b = PM & PM10 Constant | 0.45 | unitless | AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 |
| Total hourly fleet vehicle miles travelled (miles/hr) | 0.01 | VMT/hr | |
| Total annual fleet vehicle miles travelled (miles/yr) ³ | 95 | VMT/yr | |
| Average wheels ⁴ | 5 | | |
| Average vehicle weight of the fleet (W) ⁵ | 13.00 | tons | |
| Moisture Ratio | 2 | | Estimated based on 0.4% controlled and 0.2% uncontrolled surface water content |
| Natural Control Efficiency (CF) ⁶ | 55 | % | Based on Moisture ratio and Figure 13.2.2-2 control |

Emission Calculations

| Emission Factors | | Total Vehicle Miles Travelled | | Control Efficiency | Controlled Emission Rates | | Controlled Emission Rates | |
|-----------------------|-------------------------------|----------------------------------|----------|-----------------------|---------------------------|-----------------------------------|---------------------------|-------------------------------------|
| Total PM (lbs/VMT) | PM ₁₀ (lbs/VMT) | (VMT/hr) | (VMT/yr) | | Total PM (lb/hr) | Total PM ₁₀ (lb/hr) | Total PM (Tons/Yr) | Total PM ₁₀ (Tons/Yr) |
| 0.80 | 0.35 | 0.01 | 95.00 | 55% | 0.005 | 0.002 | 0.02 | 0.01 |

Notes:

- 1) Facility vehicle data based on estimates, GP5.1 and AP 42 13.2.2-2 defaults for industrial unpaved roads.
- 2) Tank trucker average vehicle weight as $(W_{(empty)} + W_{(full)})/2 = (7 + 40)/2 = 23.5$ tons.
- 3) Average vehicle miles travelled (VMT/yr) as (No. of round trip/vehicle * No. of vehicles/type * Roundtrip miles/trip) * 365 day/yr * No. of vehicle type
- 4) Average wheels calculated as average of (No. of wheels per vehicle type * No. of vehicle/type)
- 5) Average vehicle fleet calculated as (Average Weight of Vehicle type * Percentage of each vehicle type on the unpaved surface). Percentage of each vehicle type = $VMT_{vehicle\ type} / VMT$
- 6) Controlled emissions are based on the natural rainfall cycles and no plant control

Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans

Monitoring/Recordkeeping/Reporting/Testing Plans

Ascent will monitor, record, report, and test as required by 45CSR6, 45CSR13, and 40CFR NSPS Subpart OOOO.

Attachment P: Public Notice

AIR QUALITY PERMIT NOTICE

Notice of Application

Notice is given that Ascent Resources – Marcellus, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit for a the Mason Hill facility located on McKimmie Ridge Road, in Reader, in Wetzel County, West Virginia. The latitude and longitude coordinates are: 39.5733°N, 80.7108°W

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

NO_x = 3.42 TPY
CO = 2.89 TPY
VOC = 5.33 TPY
PM₁₀ = 0.26 TPY
SO₂ = <0.01 TPY

Startup of operation is planned to begin on or about the 1 day of January, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

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

Dated this the **XX** day of December, 2015.

By: Ascent Resources – Marcellus, LLC
Tim Cummings
VP - Operations
PO Box 13678
Oklahoma City, OK 73113

Attachment Q: Business Confidential Claims (Not Applicable)

Attachment R: Authority Forms (Not Applicable)

Attachment S: Title V Permit Revision Information (Not Applicable)

Application Fee