

Jay-Bee Oil & Gas Inc
~~Bunker~~ Bunker Run
095-00019
G35-A065A
Roy Keos

JAY-BEE OIL & GAS, INC.

APPLICATION FOR CLASS I ADMINISTRATIVE UPDATE

**Bunker Run Compressor Station
Tyler County, West Virginia**



98 Vanadium Road
Bridgeville, PA 15017
(412) 221-1100



APPLICATION FOR CLASS I ADMINISTRATIVE UPDATE

Jay-Bee Oil & Gas, Inc.

Bunker Run Compressor Station

Tyler County, West Virginia

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SECTION I

Application Form



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.wvdep.org/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): Jay-Bee Oil & Gas, Inc.		2. Federal Employer ID No. (FEIN): 55-0738862	
3. Name of facility (if different from above): Bunker Run Compressor Station		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: 3570 Shields Hill Road Cairo, WV 26337		5B. Facility's present physical address: No Address. See Directions in Section 12A.	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input 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: N/A			
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: Applicant has a lease agreement with the land owner for installation of all equipment necessary to manage gas and liquids - 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 Gathering Compression Facility		10. North American Industry Classification System (NAICS) code for the facility: 211111	
11A. DAQ Plant ID No. (for existing facilities only): ID No. 095-00019		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): G35-A065	

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

12A.

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

From Clarksburg, take US Route 50 west approximately 25.5 miles to Route 18 north (West Union Exist). Turn right on to Route 18 (north) and travel approximately 20 miles to the community of Alma. Pass through Alma. Continue on Route 18 approximately 1 mile to the intersection with County Route 1/3 (Indian Creek Road). Turn right onto Indian Creek Road and travel approximately 16 miles to Bunker Run Road (CR 13/6) on the right. Proceed up this road 0.5 miles to facility on the left.

12.B. New site address (if applicable):	12C. Nearest city or town: Alvy/Blue	12D. County: Tyler
12.E. UTM Northing (KM): 4366.7658	12F. UTM Easting (KM): 528.8155	12G. UTM Zone: 17
13. Briefly describe the proposed change(s) at the facility: Dehydrate and compress produced natural gas to allow discharge into a gathering line owned by others.		
14A. Provide the date of anticipated installation or change: Already Installed - If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: 06/01/2012	14B. Date of anticipated Start-Up if a permit is granted: After the Fact	
14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).		
15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day 24 Days Per Week 7 Weeks Per Year 52		
16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
17. Risk Management Plans. If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your Risk Management Plan (RMP) to U. S. EPA Region III.		
18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D .		

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).
20. Include a Table of Contents as the first page of your application package.
21. Provide a Plot Plan , e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance) . - Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).
22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F .
23. Provide a Process Description as Attachment G . - Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
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 type="checkbox"/> Bulk Liquid Transfer Operations	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input 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 checked="" type="checkbox"/> Natural Gas Compressors	
<input checked="" type="checkbox"/> Dehydration		

*Leak Source Data Sheet Only

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

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

<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

Other Collectors, specify: **Catalyst**

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  DATE: 6-25-15
(Please use blue ink) (Please use blue ink)

35B. Printed name of signee: **Shane Dowell** 35C. Title: **Office Manager**

35D. E-mail: sdowell@jaybeeoil.com	36E. Phone: 304/628-3119	36F. FAX: 304/628-3119
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36A. Printed name of contact person (if different from above): _____ 36B. Title: _____

36C. E-mail: _____	36D. Phone: _____	36E. FAX: _____
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PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

Attachment A

Attached Current WV Business Certificate

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**JAY-BEE OIL & GAS INC
RR 1 BOX 5
CAIRO, WV 26337-9701**

BUSINESS REGISTRATION ACCOUNT NUMBER 1043-4424

This certificate is issued on: **06/11/2010**

This certificate is issued by
the West Virginia State Tax Commission
in accordance with W. Va. Code § 17-12-12

The person or persons identified on this certificate shall
be the cardholder(s) in the State of West Virginia at the location(s) above.

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

This certificate shall be in effect until cessation of the business for which the certificate of registration was granted, or until it is suspended, revoked or annulled by the Tax Commission.

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

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

SL008 v.1
L1308190424

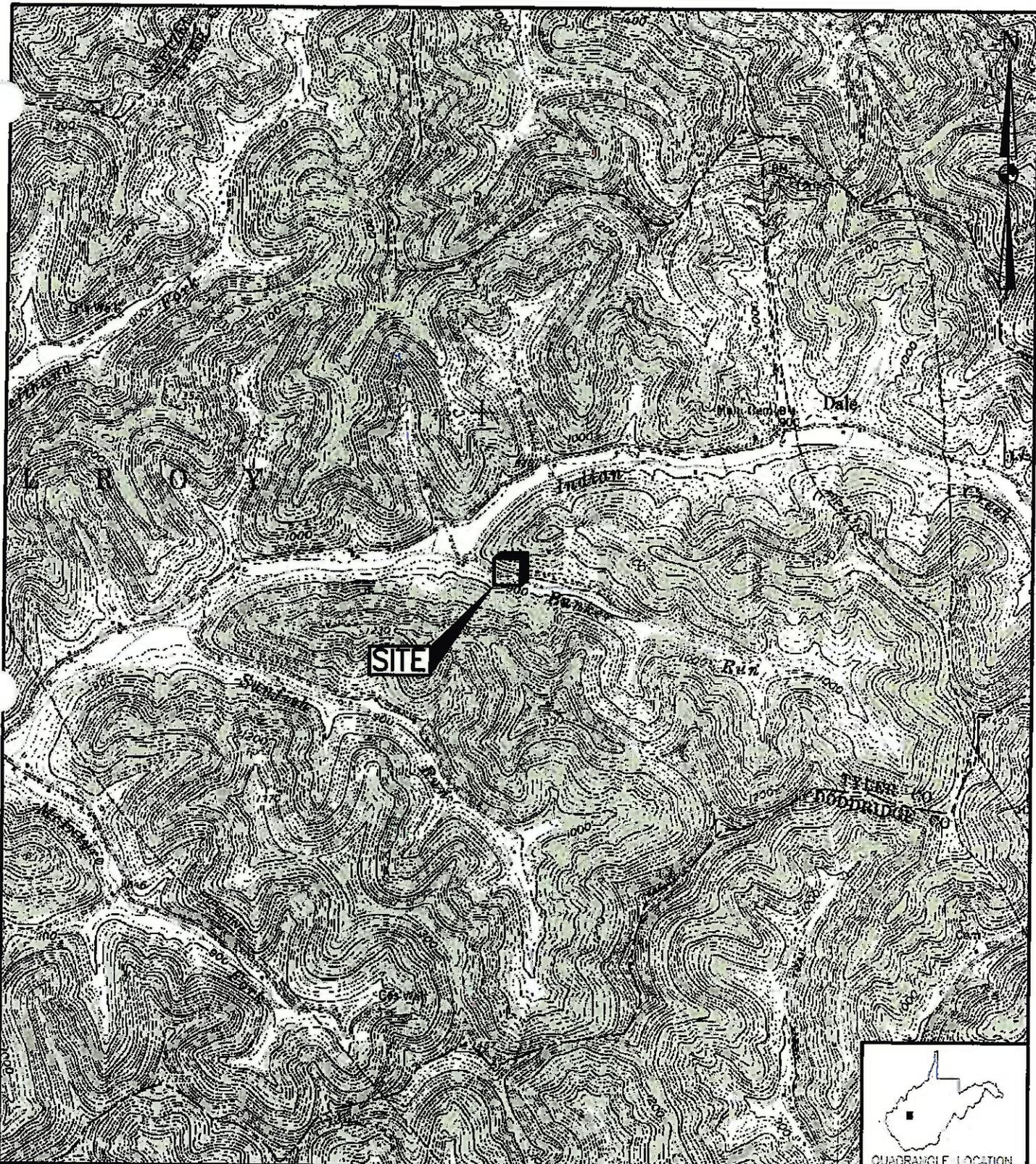
SCANNED

06/11/10

WEST VIRGINIA
STATE TAX DEPARTMENT

ATTACHMENT B

Site Location Map



REFERENCE: USGS 7.5' QUADRANGLE MAP OF: CENTER POINT, WEST VIRGINIA; DATED 1961, PHOTOREVISED 1976.

DRAWN BY	DJF
DATE	6/8/15
CHECKED BY	RAD
SET JOB NO.	214054-11
SET DWG FILE	BUNKER_RUNm01.dwg
DRAWING SCALE	1"=2000'

SE
TECHNOLOGIES

98 Vanadium Road Bridgeville, PA 15017 (412) 221-1100

JAY-BEE OIL & GAS, INC.	
BUNKER RUN COMPRESSOR STATION TYLER COUNTY, WEST VIRGINIA SITE LOCATION MAP	
DRAWING NO.	FIGURE 1
REV.	0

ATTACHMENT C

Construction Schedule

Jay-Bee Oil & Gas, Inc.
Bunker Run Compressor Station
Attachment C – Construction Schedule

The requested permit seeks to correct inaccuracies in the existing permit. No new equipment will be installed with this application.

ATTACHMENT D

Regulatory Analysis

Bunker Run Compressor Station Attachment D Regulatory Analysis

Both State and Federal environmental regulations governing air emissions apply to the planned Bunker Run Compressor Station. The West Virginia Department of Environmental Protection (WVDEP) has been delegated the authority to implement certain federal air quality requirements for the state. Air quality regulations that potentially affect the modification are discussed herein.

1.1 PSD and NSR

The facility will be a minor source with respect to Prevention of Significant Deterioration (PSD) regulations as it will not have the potential to emit more than the annual emission thresholds of any PSD regulated pollutant with the voluntary restrictions (catalytic converters on engines).

The facility is not within any area designated as non-attainment for any criteria pollutants. Consequently, the facility is not subject to the New Source Review (NSR) regulations.

1.2 Title V Operating Permit Program

West Virginia has incorporated provisions of the federal Title V operating permit program. Thresholds for inclusion under the Title V program are 10 tpy of any single Hazardous Air Pollutant (HAP) or 25 tons of any combination of HAP and/or 100 tpy of all other regulated pollutants. Additionally, facilities regulated under certain New Source Performance Standards (NSPS) require facilities to have Title V permits.

The facility will remain a minor source. Additionally, the NSPS regulating this facility does not trigger a Title V permit. Hence, a Title V permit will not be required for the Bunker Run Compressor Station.

1.3 Aggregation

Source aggregation determinations are typically made based on the following criteria:

- Whether the facilities are under common control,
- Whether the facilities belong to the same Major Group (i.e. the first two digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement;
- Whether the facilities are located on one or more contiguous or adjacent properties; and the distance between all pollutant emitting activities,
- Whether the facilities can operate independently

Only if all criteria are met does a permitting authority aggregate the facilities into a single source.

This Jay-Bee Oil & Gas facility currently receives and manages raw natural gas and associated produced fluids from area Jay-Bee well pads. All well pads, other than the T1213 Pad at which this facility is co-located, are greater than 0.5 miles from this facility, with no clear line of sight. After separation of the liquids and dehydration, the gas is injected into a gathering line for transportation to others for further processing or direct sales.

The Bunker Run Compressor Station and the well pads it serves is under the same general SIC Code, is under common ownership and may, from time to time have a sharing of staff. However, the compressor station is remote from the nearest well pad, other than T1213. While there is a dependency between the more remote well pads and this compressor station, the distance between the facilities does not rise to the definition of contiguous or adjacent. Thus, not all of the criteria for aggregation are met. Hence, emissions from the Bunker Run Compressor Station should not be aggregated with those well pads it serves other than Pad T1213. Pad T1213 emissions should be aggregated with the Bunker Run emissions to determine if the combined emissions exceed major source criteria. This aggregation determined that the major source threshold was not exceeded. Bunker Run can continue to operate under a minor source permit.

1.4 New Source Performance Standards

New Source Performance Standards (NSPS) regulations promulgated under 40 CFR 60 require new and reconstructed facilities to control emissions to the level achievable by Best-Available Control Technology (BACT). Specific NSPS requirements potentially applicable to the Bunker Run Compressor Station are as follows:

- 40 CFR 60, Subpart Dc—Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
- 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Stations
- 40 CFR 60, Subpart LLL – Onshore Natural Gas Processing Stations: SO₂ Emissions
- 40 CFR 60, Subpart JJJ – Stationary Spark Ignition Internal Combustion Engines
- 40 CFR 60, Subpart OOOO - Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

1.4.1 Subpart Dc

This subpart limits SO₂ and PM emissions from boilers and heaters fired by various fuels. While the primary thrust of this set of regulations is to control SO_x and PM emissions from coal and oil-fired boilers and heaters, natural gas fired units are also covered under this rule. The existing re-boiler is well below the threshold of coverage for this rule (10 MMBTU/Hr). Thus, this rule does not apply.

1.4.2 Subpart KKK

This subpart limits VOC emissions from equipment at a natural gas processing station. The Bunker Run Compressor Station does not meet the definition of a processing station under this rule. Hence, this rule does not apply.

1.4.3 Subpart LLL

This set of regulations governs emissions from processes used to remove sulfur gases from the field gas stream (sweetening unit) and subsequent sulfur recovery operations. The field gas that is received by the Bunker Run Compressor Station does not contain sufficient sulfur compounds to warrant a sweetening unit. Accordingly, not such equipment will be present. Hence, this rule does not apply.

1.4.4 Subpart IIII

This subpart governs emissions from new compression ignition internal combustion engines (CI ICE) manufactured after July 11, 2005. There are no compression ignition engines (e.g. diesel-fired emergency generator) at this station. Hence, this rule does not apply.

1.4.5 Subpart JJJJ

This subpart governs emissions from new stationary spark ignition internal combustion engines (SI ICE) manufactured after July 1, 2007. The drivers for the compressors are SI ICE units manufactured after this date. Accordingly, this rule applies to those engines.

1.4.6 Subpart OOOO

This subpart governs emissions from a broad spectrum of operations in the oil and natural gas industries, including operations at processing and fractionation plants. The potentially applicable sections of this rule sets restrictions, recordkeeping and reporting requirements on reciprocating compressors and pneumatic controllers present at the Bunker Run Compressor Station, and sets requirements for storage vessels with potential VOC emissions greater than 6 tons per year. This rule applies to the Bunker Run Compressor Station.

Reciprocating compressors are present at the Bunker Run Compressor Station. The facility must meet the requirements of 40 CFR 60.5385, 60.5410 and 60.5420.

Another key components to this rule applicable to the Bunker Run Compressor Station is the requirement that all pneumatic controllers located between the well head and a processing plant must have a bleed rate of less than 6 scfh [40 CFR 60.5390(b)]. All pneumatic controllers installed at Bunker Run Compressor Station meet this criterion.

This rule also stipulates that storage vessels with VOC emissions equal to or greater than 6 tpy must control those emissions by 95% by October 15, 2013. The Produced Fluids tank at Bunker Run has an estimated maximum *uncontrolled* VOC emission rate in excess of this threshold. Thus, emissions from these tanks must be controlled by at least 95%. Jay-Bee Oil & Gas will

meet this requirement through installation of a system that will capture vapors released from the tank and route them to an enclosed combustor. This unit will control VOC emissions to at least 98%, fulfilling this regulatory requirement. The control system proposed in this application will reduce VOC emissions from the tank to rates well below the 6 tpy limit and operation of the control will become part of the permit. As described in 40 CFR 60.5365(e), *...the determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority.* Thus, as proper use and operation of this control system is anticipated to become part of the permit, the Produced Fluids tank at this facility will not be regulated under 40 CFR 60, Subpart OOOO.

1.5 National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAPs) promulgated under 40 CFR 63 regulate the emission of Hazardous Air Pollutants (HAPs) from certain industrial processes. In general, these rules apply to major sources of HAPs with a major source being defined as having the potential to emit more than 10 tpy of any individual HAP or 25 tpy of total HAPs. Emissions standards under these rules have been established as the Maximum Achievable Control Technology (MACT) for each source category. The following NESHAP source category standards are potentially applicable to the planned Bunker Run Compressor Station:

- 40 CFR 63, Subpart HH – NESHAP from Oil and Natural Gas Production Facilities
- 40 CFR 63, Subpart HHH – NESHAP from Natural Gas Transmission and Storage Facilities
- 40 CFR 63, Subpart ZZZZ – NESHAP from Stationary Reciprocating Internal Combustion Engines
- 40 CFR 63, Subpart DDDDD – NESHAP for Industrial, Commercial and Institutional Boilers and Process Heaters

1.5.1 Subpart HH

This Subpart contains MACT standards for major and area source dehydration units located at natural gas production facilities. The Bunker Run Compressor Station contains dehydration operations. Hence, this rule applies. However, as benzene emissions are less than 1 ton per year, the facility is, for all practical purposes, exempt from the rule.

1.5.2 Subpart HHH

This Subpart applies to dehydration units at facilities which are major sources of HAPs that transport or store natural gas in association with transmission pipelines as defined by 40 CFR 63.1271. Equipment at the Bunker Run Compressor Station does not cause the facility to be a major source of HAPs, a transportation source or a storage facility source associated with transmission pipelines. Hence, this rule does not apply.

1.5.3 Subpart ZZZZ

This Subpart governs emissions from a stationary reciprocating internal combustion engine (RICE) located both at major and area source of HAPs. The facility is not a major source of HAPs, but is considered an area source of HAPs. Hence, this rule is potentially applicable to the facility. In accordance with 40 CFR 63.6590(a)(2)(iii), none of the engines at the Bunker Run Compressor Station are considered Existing Stationary RICE. All are considered “new” engines. Thus, the engines meet the requirements of this rule by meeting the requirements of NSPS, Subpart JJJJ as described above.

1.5.4 Subpart DDDDD

This Subpart applies to industrial boilers and process heaters of various sizes and fuel types located at facilities that are classified as a major source of HAPs. As the facility is not a major source of HAPs, this rule does not apply.

1.6 **Chemical Accident Prevention**

Subparts B-D of 40 CFR 68 present the requirements for the assessment and subsequent preparation of a Risk Management Plan (RMP) for a facility that stores more than a threshold quantity of a regulated substance listed in 40 CFR 68.130. If a facility stores, handles or processes one or more regulated substances in an amount greater than its corresponding threshold, the facility must prepare and implement an RMP. The Bunker Run Compressor Station will potentially store more than 10,000 lbs of a flammable mixture containing several of the substances listed in Table 3 in 40 CFR 68.130. However, an RMP is not required as this facility qualifies for the exclusion provided for remote oil and gas production facilities (40 CFR 68.115).

1.7 **West Virginia State Requirements**

1.7.1 45 CSR 2

The purpose of 45CSR2 is to control smoke and particulate matter emissions from fuel burning units. The facility is subject to the opacity requirement of 45 CSR 2. Emissions from the facility cannot exceed 10% over any six minute period.

1.7.2 45 CSR 4

This regulation prohibits the emission of objectionable odors. Jay-Bee Oil & Gas is obligated to run the station in a manner that does not produce objectionable odors.

1.7.3 45 CSR 6

This rule establishes emission standards for particulate matter and other requirements for incineration of refuse not subject to or specifically exempted from federal regulation. The vapor combustor unit (VCU) falls under Section 4.1 of this rule. PM emissions from the VCU must remain below the allowable limit calculated under this rule.

The VCU must also meet the visible emissions requirements of this rule limiting visible emissions to 20% opacity.

1.7.4 45 CSR 10

This regulation limits emissions of sulfur oxides. As the sulfur content of the Inlet Gas contains no measurable sulfur, emissions of sulfur oxides is negligible. Thus, while parts of this rule are applicable to the planned facility, no actions are required on the part of Jay-Bee Oil & Gas to attain compliance. The various non-engine combustion units have a design heat input less than 10 MMBTU/Hr and are therefore exempt from the requirements of this rule. Additionally, other fuel-burning units at the proposed facility (e.g. engines) are not subject to 45 CSR 10, Section 3 as they do not produce power by indirect heat transfer and are therefore not considered "fuel burning units".

1.7.5 45 CSR 13

The state regulations applicable to the permitting of the proposed construction are in Title 45 Series 13 of the Code of State Regulations. The proposed Bunker Run Compressor Station has the potential to emit several regulated pollutants in excess of the thresholds that define a Stationary Source.

When taking into consideration the voluntary limit to operate the engines equipped with catalysts only when the catalytic converters are properly functioning, the facility's potential to emit is less than the thresholds that would classify the facility as a Major Source under 45 CSR 14.

1.7.6 45 CSR 16

This series of regulations is an incorporation, by reference, of the New Source Performance Standards codified under 40 CFR 60. As discussed under the federal regulations, the Bunker Run Compressor Station is subject to the emission limitations, monitoring, testing and recordkeeping of Subpart JJJJ. The facility is also subject to Subpart OOOO.

1.7.7 45 CSR 30

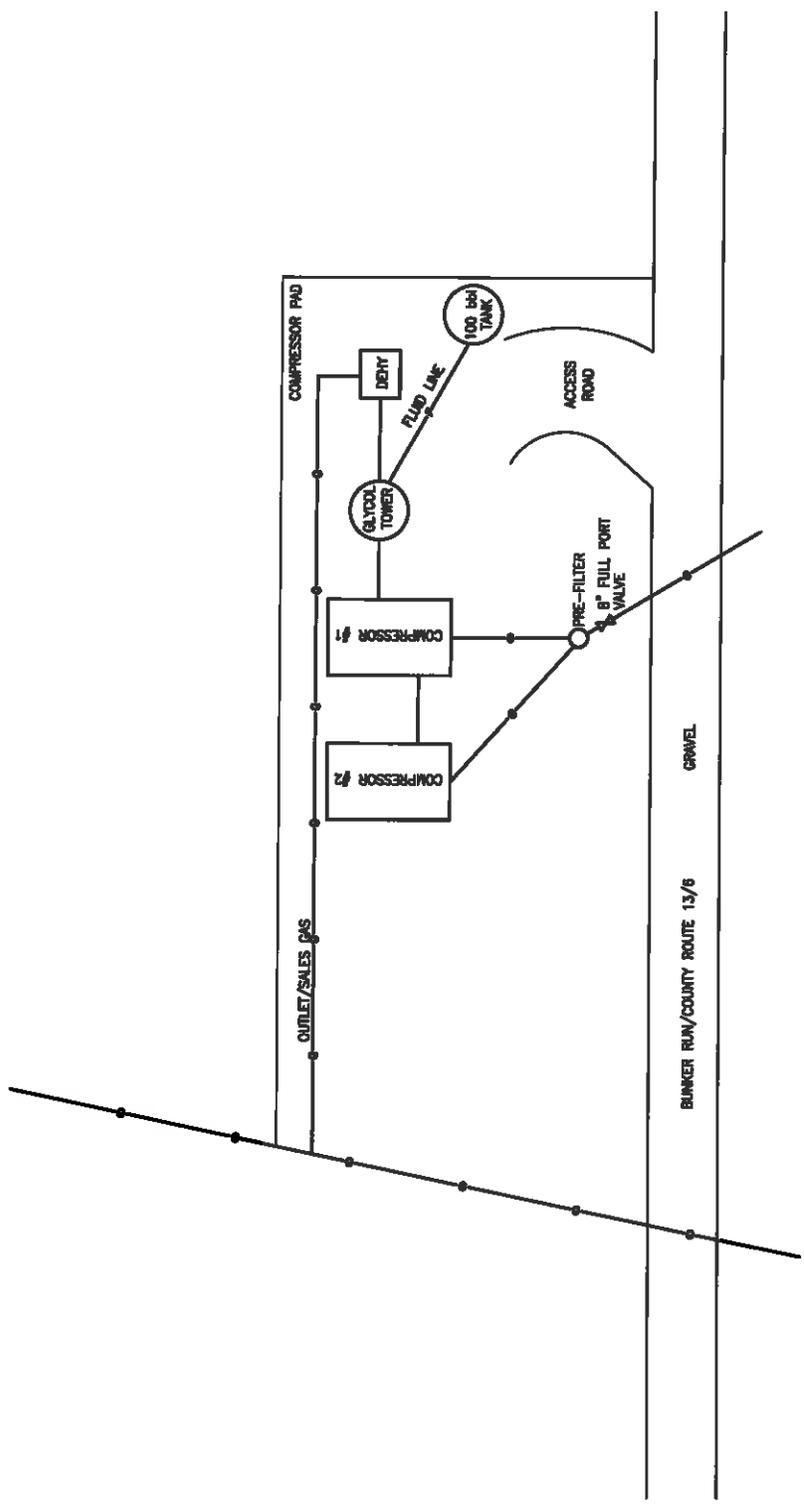
The state regulations applicable to Title V operating permits are in Title 45 Series 30. The Bunker Run Compressor Station, as noted above, does not have the potential to emit any regulated pollutant about the threshold that would define it as a major facility. Additionally, although the facility is subject to certain New Source Performance Standards, the NSPS applicable to this facility do not trigger the need to submit a Title V application and obtain a Title V permit. Hence this rule is not applicable.

1.7.8 Other Applicable Requirements

Through Series 34, WVDEP has adopted the National Emission Standards for Hazardous Air Pollutants for Source Categories. Both of these topics have been addressed above.

ATTACHMENT E

Site Layout Diagram



DRAWN BY	DJF
DATE	6/10/15
CHECKED BY	RAD
SET JOB NO.	214054-11
SET DWG FILE	BUNKER_RUNa01.dwg
DRAWING SCALE	N.T.S.



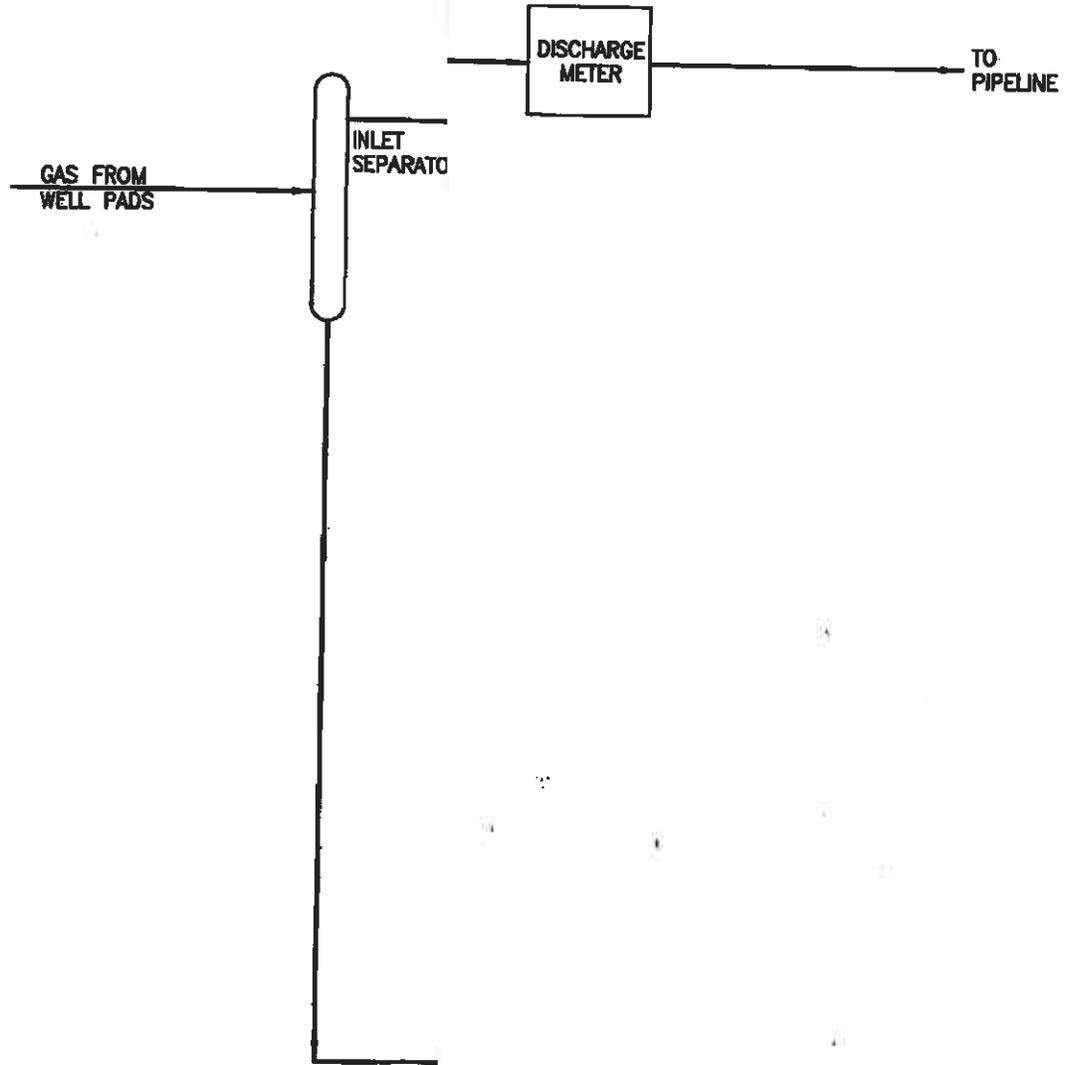
SFE TECHNOLOGIES

 98 Yonodunum Road Bridgeville, PA 15017 (412) 221-1100

JAY-BEE OIL & GAS, INC.	
BUNKER RUN COMPRESSOR STATION	
TYLER COUNTY, WEST VIRGINIA	
SITE LAYOUT	
DRAWING NAME	FIGURE 2
REV.	0

ATTACHMENT F

Process Flow Diagram



LEGEND:

↑ EMISSION POINT

JAY-BEE OIL & GAS, INC.	
BUNKER RUN COMPRESSOR STATION TYLER COUNTY, WEST VIRGINIA PROCESS FLOW DIAGRAM	
DRAWING NAME	FIGURE 2
REV.	0

ATTACHMENT G

Process Description

Jay-Bee Oil & Gas, Inc.
Bunker Run Compressor Station
Attachment G
Process Description

Jay-Bee Oil & Gas, Inc. currently operates the Bunker Run Compressor Station under General Permit Registration No. G35-A065. This station receives, compresses and dehydrates natural gas from area Jay-Bee well pads prior to injection into a transmission line owned and operated by others. During a recent internal review, it has been determined that errors were made in the original application, resulting in errors in the current permit. This submittal seeks to correct those errors. This submittal also seeks to align the permit with certain changes in equipment installation.

First, this submittal seeks to correct potential emissions information for the two CAT 3516 LE compressor driver engines:

- CE-2 was presented as operating without the catalytic emission control device. This submittal presents the correct potential emissions with the catalyst
- CE-3 was presented with incorrect emission factors. This submittal presents the correct potential emissions, aligning with the catalyst warranty.

Secondly, the original engine (CE-1, a CAT 3512) was removed and there are no plans at this time to replace it. Jay-Bee therefore seeks to have this removed from its permit.

Thirdly, a single 20 MMSCFD dehydration unit was installed rather than the two smaller units (10.5 MMSCFD and 13 MMSCFD) presented in the permit. This submittal seeks to obtain approval for this unit and remove the two units described in the initial application from the permit.

Lastly, the original application sought approval for a single 100 BBL waste liquids tank with an annual throughput of 500 gallons. Operational history of this facility has determined that this tank has a maximum throughput of 310 BBL of condensate and 120 BBLs of produced water/dehydration wastewater per year. An enclosed combustor will be installed to control VOC emissions by >98%, thereby dropping emissions to less than the NSPS Subpart OOOO requirement.

In Summary, emission sources at this facility will now include the following:

- Two Inlet Gas Compressor Gas-Fired CAT 3516 TALE Engines (EXISTING)
- One 20 MMSCFD TEG Dehydration Unit (NEW)
- One Thermal Oxidizer for control of tank emissions (NEW)
- Fugitive Emissions – Facility Roadways (EXISTING SOURCE)
- Fugitive Emissions – Component Leaks (EXISTING SOURCES)

Due to the addition of condensate truck loading, the facility is no longer considered eligible for continued operation under the existing G35-A permit. Hence, with this submittal, Jay-Bee is seeking to replace that permit with an R13 NSR permit. However, as overall emissions decrease, this application falls under a Class I Administrative Update. Hence, a public notice is not required.

ATTACHMENT H

MSDS Sheets

Safety Data Sheet: Natural Gas Condensates



1. Identification

Product Name: Natural Gas Condensates

MSDS Number: A0021.sds

Synonyms: Liquids, Natural Gas; Sweet and Sour; (includes natural gasoline component)

Product Use: Natural gas production liquids

EP Energy
1001 Louisiana Street
Houston, Texas 77002

Information: (713) 997-1000 or 855-269-0826
CHEMTREC: (800) 424-9300

2. Hazard(s) Identification

Note: This product has not been tested by EP Energy to determine its specific health hazards. Therefore, the information provided in this section includes health hazard information on the product components.

Potential Health Effects from Overexposure:

Acute Effects:

Eyes: Slight to moderate eye irritation. Contact may cause eye burns or injury. H₂S is irritating and may cause pain and an increased production of tears.

Skin: Harmful if absorbed through skin. Contact may cause irritation and possibly dermatitis.

Inhalation: Irritating to mucous membrane and respiratory tract. Can act as a simple asphyxiant. May cause dizziness or asphyxiation without warning. Overexposure may lead to headache, nausea, drowsiness, fatigue, pneumonitis, pulmonary edema, CNS depression, coma and respiratory arrest. H₂S is a mucous membrane and respiratory tract irritant. High concentrations of H₂S, even briefly, may cause dizziness, drowsiness, tremors, pulmonary edema, and death. H₂S acts as a chemical asphyxiant by paralyzing the respiratory center. Lower concentrations of H₂S will produce symptoms such as headache, dizziness, excitement, staggering gait, diarrhea and dysuria. H₂S is fibrogenic to the lungs following acute exposures complicated by bronchitis obliterans.

Ingestion: Stomach irritation, gastritis, headache, nausea, drowsiness, loss of consciousness, convulsions, cyanosis, pneumonitis, pulmonary edema and CNS depression, capillary hemorrhaging of the lung and internal organs. Aspiration hazard if vomiting occurs.

Chronic Effects:

Cancer hazard. Contains chemicals which may have reproductive toxicity, teratogenic or mutagenic effects. Due to presence of benzene and n-hexane, long-term exposure may increase the risk of anemia, leukemia and nervous system damage. Liver or kidney injury may occur. May cause central nervous system disorders and/or damage. Frequent or prolonged contact may lead to dermatitis. In regards to H₂S exposure, CNS injury can be immediate and significant. Chronic low exposures to H₂S may cause conjunctivitis, photophobia, bronchitis and headaches.

Additional Medical and Toxicological Information:

Contact with full strength or dilute formulations of this product may aggravate pre-existing dermatitis or respiratory disorders in certain individuals. n-butane has been shown to cause mild cardiac sensitization in laboratory test animals. H₂S exposure may aggravate pre-existing lung ailments, gastrointestinal, cardiovascular and nervous disorders.

3. Composition/Information

Note: Composition will vary with geographic location, geologic formation, temperature and pressure.

Components	CAS No.	Wt% ⁽¹⁾
Propane	74-98-6	20-60
Ethane	74-84-0	1-60
n-Pentane	109-66-0	5-25
n-Hexane	110-54-3	2-13
Heptane	142-82-5	1-10
Octane	111-65-9	1-10
n-Butane	106-97-8	2-5
Cyclohexane	110-82-7	1-5
Toluene	108-88-3	0.1-5
Ethyl benzene	100-41-4	0.1-5
Xylenes	1330-20-7	0.1-5
Benzene	71-43-2	0-2
Hydrogen Sulfide	7783-06-4	Varies

Safety Data Sheet: Natural Gas Condensates



⁽¹⁾Normal composition ranges are shown. Exceptions may occur depending upon the source of the condensate.

4. First-Aid Measures

- Eye Contact:** Immediately flush gently with large amounts of luke warm water, holding eyelids open, for at least 15 minutes. Seek medical attention. If eye is exposed to hot liquid, cover eyes with cloth and seek immediate medical attention.
- Skin Contact:** Remove and isolate contaminated clothing and shoes. Flush skin with water. Seek medical attention if irritation persists or there is a large area of contact. Decontaminate clothing before reuse. In case of hot liquid exposure, do not remove clothing or treat, wash only unburned area and seek immediate medical attention.
- Inhalation:** If atmosphere is safe, move victim to fresh air. If breathing has stopped and airway is clear, provide artificial respiration. i. Do not use mouth-to-mouth method if victim ingested or inhaled the substance. Provide artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult, if qualified. Seek immediate medical attention.
- Ingestion:** DO NOT INDUCE VOMITING. If spontaneous vomiting occurs, place on the left side with head down to prevent aspiration of liquid into the lungs. Give 1-2 glasses of water if patient is alert and able to swallow. Have exposed individual rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Do not leave victim unattended. Monitor for breathing difficulties. Seek immediate medical attention.

Medical Providers: Medical providers are urged to contact a Regional Poison Center at 800-222-1222.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents.

At high concentrations, H₂S may produce pulmonary edema, respiratory depression, and/or respiratory paralysis.

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.

5. Fire-Fighting Measures

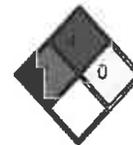
Flammable Properties:

Flash Point: -45 °F to -170 °F

Flammable Limits in Air % by Vol.:

Lower (LFL): 1.4-3.0 % Upper (UFL): 7.6-12.5 %

Auto-ignition Temperature: 495-850 °F



NFPA Ratings: Health: 2 Flammability: 4 Reactivity: 0

General Fire Hazards:

Extremely flammable. Easily ignited by heat, sparks or flames or other sources of ignition. Flowing condensates can be ignited by self-generated static electricity. Containers should be grounded and bonded. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may reach an ignition source, and flashback. Runoff to sewer may create fire or explosion hazard downstream from the source. Gases may form explosive mixtures with air. BLEVE'S (Boiling Liquid Expanding Vapor Explosions) can occur when a liquid in a pressurized container is heated to temperatures beyond its boiling point. This can lead to failure of the container and damage to the surrounding area.

Hazardous combustion/decomposition products may include carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, and sulfur oxides. Hydrogen sulfide may be present. Downwind personnel must be evacuated.

Extinguishing Media:

Suitable extinguishing media: Class B fire extinguisher, dry chemical, foam or carbon dioxide. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. For large fires, use unmanned hoses.

Unsuitable extinguishing media: Water should not be used as an extinguishing media, but should be used as a spray to keep surroundings area cool.

Fire Fighting Instructions: DO NOT extinguish a leaking gas flame unless the leak can be stopped. Allow gas to burn out. Move containers from fire area if you can do it without risk. Use a smothering technique for extinguishing fire of this flammable liquid. Do not use a forced-water stream directly on condensate fires as this will scatter the fire. Use a water spray to cool fire-exposed containers and surrounding areas until well after fire is out. Do not direct water at source of leak or safety devices as icing may occur. Dike fire-control water for later disposal; do not scatter the material. Firefighters should wear self-contained breathing apparatus and full protective clothing. Refer to Section 8 for proper PPE selection.

Precautions for Fire Involving Tanks or Car/Trailer Loads: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions. Consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. If unmanned hose

holders or monitor nozzles cannot be used, withdraw from area and let fire burn.

6. Accidental Release Measures

As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before re-entering.

Remove any ignition sources and protect from ignition. Water spray may reduce vapor, but may not prevent ignition in closed spaces. A vapor suppressing foam may be used to reduce vapors. Provide sufficient ventilation in the affected area(s) and wear appropriate personal protective equipment as indicated in Section 8 when handling spill material.

If the facility has an oil or hazardous substance contingency plan, activate its procedures. For emergency information and procedures to follow in the case of an accidental release, call the Emergency Telephone Number(s) listed in Section 1.

In case of spillage, absorb with inert material and dispose of in accordance with applicable regulations. Use clean, non-sparking tools to collect absorbed materials. Dike far ahead of liquid spill for later disposal. Never discharge releases directly into sewers or surface waters. Advise authorities and the National Response Center (800-424-8802) if the release is to navigable waters. Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handle in accordance with good industrial hygiene and safety practices. These practices include, but are not limited to, avoiding unnecessary exposure and prompt removal of material from eyes, skin, and clothing. If needed, take first aid actions as indicated in Section 4.

Handling: Handle as a flammable liquid. Keep away from heat, sparks and open flame. No smoking. May release or contain dangerous levels of H₂S. Use only with adequate ventilation. Wear appropriate personal protective equipment and use exposure controls as indicated in Section 8. Vent slowly to the atmosphere when opening. Avoid all contact with skin and eyes. Avoid breathing product dust or vapors. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Non-sparking tools should be used. Bond and ground containers before product transfer. Review all operations which have the potential of generating and accumulating electrostatic charge and/or flammable atmosphere including tank and container filling, cleaning, sampling gauging, switch loading, mixing, agitation and vacuum truck operations. Use appropriate mitigating procedures. Do not enter confined spaces without following proper entry procedures. Remove contaminated clothing immediately. Wash with soap and water after working with this product.

Scales, deposits and sludge from equipment associated with this product may have accumulation of Naturally Occurring Radioactive Materials (NORM). Equipment should be assessed for external gamma radiation.

Storage: Keep away from flame, sparks, excessive temperatures and open flame. No smoking. Maintain vessels closed and clearly labeled. Empty vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose these vessels to sources of ignition. This material may contain or release H₂S. In a tank or other closed container, the vapor space above this material may accumulate hazardous concentrations of H₂S. Do not enter confined spaces without following proper entry procedures. Ground all containers during transfer. Store away from incompatible materials. Use appropriate containment to avoid environmental contamination.

Incompatibilities: Keep away from strong oxidizers, ignition sources and heat.

8. Exposure Controls/Personal Protection

Components	CAS No.	Occupational Exposure Limits			Units
		OSHA ⁽¹⁾	ACGIH ⁽¹⁾	NIOSH ⁽²⁾	
Ethane	74-84-0	N/A	1000 ⁽³⁾	N/A	ppm
Propane	74-98-6	1000	1000 ⁽³⁾	1000	ppm
n-Butane	106-97-8	N/A	1000 ⁽³⁾	800	ppm
n-Pentane	109-66-0	1000	600	120 610 ^{Ceiling}	ppm
n-Hexane	110-54-3	500	50 ⁽⁴⁾	50	ppm
Heptane	142-82-5	500	400 500 ^{STEL}	85 440 ^{Ceiling}	ppm
Octane	111-65-9	500	300	75 385 ^{Ceiling}	ppm
Cyclohexane	110-82-7	300	100	300	ppm
Toluene	108-88-3	200 300 ^{Ceiling}	20 ⁽⁴⁾	100 150 ^{STEL}	ppm
Ethyl benzene	100-41-4	100	20 ⁽⁴⁾	100 125 ^{STEL}	ppm
Xylenes	1330-20-7	100	100 ⁽⁴⁾ 150 ^{STEL}	100 150 ^{STEL}	ppm
Petroleum distillates, naphtha	8002-05-9	<1	500 ppm	N/A	350 mg/m ³
Hydrogen Sulfide	7783-06-4	20 ^{Ceiling}	15 ^{STEL}	10 ^{Ceiling}	ppm
Benzene	71-43-2	1 5 ^{STEL}	0.6 ⁽⁵⁾ 2.5 ^{STEL}	0.1 1 ^{STEL}	ppm

⁽¹⁾8-hour TWA unless otherwise specified.

⁽²⁾10-hour TWA unless otherwise specified.

⁽³⁾Exposure limit given as Aliphatic hydrocarbon gases: Alkanes [C₁-C₄].

⁽⁴⁾ACGIH has established a Biological Exposure Index (BEI) for this substance.

N/A: Not Applicable

STEL: 15-minute Short Term Exposure Limit

Ceiling: Concentration not to be exceeded at any time

Eye Protection: Safety glasses are required standard PPE. If contact with liquid condensates is possible, chemical splash goggles or face shield may be required. Ensure that eye wash station is operable and nearby.

Skin Protection: Fire Resistant Clothing (FRC) is required standard PPE. Where contact with liquid condensates is possible, use protective clothing and/or gloves made of nitrile rubber or polyvinyl alcohol (PVA). Wash with soap and water before eating, drinking or smoking. Wash contaminated clothing before reuse.

Inhalation: A NIOSH-approved respirator must be worn where controls do not maintain airborne concentrations below occupational exposure limits. Positive-pressure, full-face, self-contained breathing apparatus (SCBA) should be available for emergency use. HYDROGEN SULFIDE MAY BE PRESENT OR RELEASED. NIOSH-approved respiratory protection should be used when handling crude of high or unknown hydrogen sulfide content and to reduce airborne concentrations to allowable occupational exposure levels.

Engineering Controls: Provide adequate general and local exhaust ventilation to: (1) Maintain airborne chemical concentrations below applicable exposure limits, (2) Prevent accumulation of flammable vapors and formation of explosive atmospheres, and (3) Prevent formation of oxygen deficient atmospheres, especially in confined spaces.

9. Physical and Chemical Properties

Values given are typical of similar products. There are no test results for this mixture.

Appearance:	Brown to clear liquid	% Volatile by Volume:	100
Odor:	Petroleum-like, gasoline-like or rotten eggs	Viscosity:	Not available
Boiling Point:	Varies widely based on hydrocarbon content	Melting Point:	-122 °F
Freezing Point:	Not available	Vapor Density (Air = 1):	3-4 (natural gasoline)
Vapor Pressure:	Not available	pH:	Not available
Solubility in H₂O:	Negligible	Evaporation Rate:	> 1
Specific Gravity @ 60° F & 1 atm:	0.6-0.8	(Ethyl Ether = 1)	
		Molecular Wt.:	Not available

10. Stability and Reactivity

Stability: Stable under normal conditions of use and normal temperature conditions

Hazardous Polymerization: Will not occur.

Conditions to Avoid/Incompatibilities: Strong oxidizing agents, strong acids, chlorine, fluorine, bromine and metal catalysts, heat, sparks, flame and build-up of static electricity.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and sulfur dioxide.

11. Toxicological Information

Toxicological data does not exist for this mixture. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffers Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline. This substance may have a potential for sensitization. Exposure to light hydrocarbons in the same boiling range as this product have been associated in animal studies with effects to the central nervous system, peripheral nervous system, liver, and kidneys. The significance of these animal models to predict similar human response is uncertain. Observing good work practices and personal hygiene procedures can minimize potential risks to humans. Harmful if swallowed. May cause cancer.

BENZENE: This product contains benzene, which can cause degeneration in blood forming bone marrow leading to anemia which may further degrade to leukemia, a type of cancer. Acute benzene poisoning causes central nervous system depression. Chronic exposure affects the hematopoietic system causing blood disorders including anemia and pancytopenia. Mutagenic and clastogenic in mammalian and non-mammalian test systems. Reproductive or developmental toxicant only at doses that are maternally toxic based on tests with animals.

HYDROGEN SULFIDE: This product may contain or release hydrogen sulfide, which may be fatal if inhaled. Greater than 15-20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50-500 ppm can cause headache, nausea, dizziness, loss of reasoning and balance, difficulty breathing, fluid in the lungs and possible loss of consciousness. Greater than 500 ppm can cause rapid or immediate unconsciousness due to respiratory paralysis and death by suffocation unless removed from exposure and successfully resuscitated. Inhalation of a single breath at a concentration of 1000 ppm (0.1%) can cause immediate unconsciousness and death. Hydrogen sulfide is corrosive when moist. Skin contact may cause burns. There is a rapid loss of sense of smell on exposure to gas concentrations above 50 ppm. At high concentrations, individuals may not even recognize the odor before becoming unconscious.

Carcinogenicity:

Component (CAS No.)	ACGIH ⁽¹⁾	IARC Monographs ⁽²⁾	US NTP	OSHA Regulated
Benzene (71-43-2)	A1	1	Yes	Yes
Ethyl benzene (100-41-4)	A3	2B	No	No
Toluene (108-88-3)	A4	3	No	No
Xylene (1330-20-7)	A4	3	No	No

⁽¹⁾ACGIH Carcinogens: A1 = Confirmed human carcinogen, A2 = Suspected human carcinogen, A3 = Confirmed animal carcinogen with unknown relevance to humans, A4 = Not classifiable as a human carcinogen, A5 = Not suspected as a human carcinogen

⁽²⁾IARC Monographs: 1 = Carcinogenic to humans, 2A = Probably carcinogenic to humans, 2B = Possibly carcinogenic to humans, 3 = Not classifiable as to carcinogenicity to humans, 4 = Probably not carcinogenic to humans

12. Ecological information

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations. May be hazardous to waterways/wildlife.

13. Disposal Information

Do not dispose of waste into sewer. Do not allow this material to drain into sewers/water supplies. If discarded, this material meets the criteria of

Safety Data Sheet: Natural Gas Condensates

being an "ignitable" waste. If hydrogen sulfide, benzene, toluene and/or xylene are present in the waste, the waste may be considered a hazardous U-listed waste. Under RCRA, it is the responsibility of the user to determine, at the time of disposal, if the material meets federal, state, or local criteria to be defined as a hazardous waste.

14. Transport Information

Proper Shipping Name: Petroleum products, n.o.s (condensate)
UN/Identification No: UN 1268
Hazard Class: 3
Packing Group: II
ERG#: 128

Proper Shipping Name: Gasoline
UN/Identification No: UN1203
Hazard Class: 3
Packing Group: II
ERG#: 128

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

15. Regulatory Information

EPA SARA TITLE III

Section 302 EPCRA Extremely Hazardous Substances (EHS)

Product Component	CAS No.	WT%	RQ, lb	TPQ, lb
Hydrogen Sulfide	7783-06-4	0.1-2	100	500

Section 304 CERCLA Hazardous Substances

Product Component	CAS No.	WT%	RQ, lb
Benzene	71-43-2	0-5	10
Toluene	108-88-3	0.1-5	1000
Xylene	1330-20-7	0.1-5	100
Cyclohexane	110-82-7	0.1-5	1000
Hydrogen Sulfide	7783-06-4	0.1-2	100
Ethylbenzene	100-41-4	0.1-5	1000
n-Hexane	110-54-3	1-10	5000

Section 311/312 Hazard Categorization

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

Section 313 EPCRA Toxic Substances

Product Component	CAS No.	WT. %
Benzene	71-43-2	0-5
Toluene	108-88-3	0.1-5
Xylene	1330-20-7	0.1-5
Cyclohexane	110-82-7	0.1-5
Hydrogen Sulfide	7783-06-4	0.1-2
Ethylbenzene	100-41-4	0.1-5
N-Hexane	110-54-3	1-10

EPA TSCA

All components are either on the U.S. EPA TSCA Inventory List, or are not regulated under TSCA.

Key: RQ = Reportable Quantity
 TPQ = Threshold Planning Quantity (EHS)

CALIFORNIA PROPOSITION 65 WARNING

Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm may be found in crude oil and petroleum products. Although it is possible to sufficiently refine a crude oil or its end products to remove the potential for cancer, we are advising that one or more of the listed chemicals may be present in some detectable quantities. Read and follow directions and use care when handling crude oil and petroleum products.

16. Other Information

Last Revision: 08/01/2012, Date Prepared: 10/27/1985

THIS INFORMATION RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS. SUCH INFORMATION IS TO THE BEST OF THIS COMPANY'S KNOWLEDGE AND BELIEVED ACCURATE AND RELIABLE AS OF THE DATE INDICATED. HOWEVER, NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO THE ACCURACY, RELIABILITY OR COMPLETENESS. IT IS THE USER'S RESPONSIBILITY TO SATISFY THEMSELVES AS TO THE SUITABILITY AND COMPLETENESS OF SUCH INFORMATION FOR THEIR OWN PARTICULAR USE.

Key/Legend:

ACGIH - American Conference of Governmental Industrial Hygienists
ADR - Agreement on Dangerous Goods by Road
CAA - Clean Air Act
CAS - Chemical Abstracts Service Registry Number
CDG - Carriage of Dangerous Goods By Road and Rail Manual
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
CNS - Central Nervous System
EINECS - European Inventory of Existing Chemical Substances Registry Number
ERG - Emergency Response Guidebook
EPCRA - Emergency Planning and Community Right-to-Know Act
GHS - Globally Harmonized System of Classification and Labeling of Chemicals
IARC - International Agency for Research on Cancer
IATA - International Air Transport Association
ICAO - International Civil Aviation Organization
IMDG - International Maritime Dangerous Goods Code
IMO - International Maritime Organization
MSDS - Material Safety Data Sheet
N/E - Not Established
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
PPE - Personal Protective Equipment
RCRA - Resource Conservation and Recovery Act
RID - Regulations Concerning the International Transport of Dangerous Goods by Rail
RQ - Reportable Quantities
SARA - Superfund Amendments and Reauthorization Act of 1986
SDS - Safety Data Sheet
TCC - Tag Closed Cup
TDG - Transportation of Dangerous Goods
TLV - Threshold Limit Value
TSCA - Toxic Substance Control Act
UN/NA - United Nations / North American Number
UNECE - United Nations Economic Commission for Europe
US DOT - United States Department of Transportation
US EPA - United States Environmental Protection Agency
Vol. - Volume
WHMIS - Workplace Hazardous Materials Information System

This is the end of MSDS A0021.sds



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name Produced water (sweet)
Version # 01
Revision date 04-27-2010
CAS # Mixture
Synonym(s) Crude Oil Separated Water, Salt Water Brine, Salt Water, Formation Water
Manufacturer/Supplier Devon US Operations
20 North Broadway
Oklahoma City, OK 73102-8260
Telephone: (405) 235-3611
-
Devon Canadian Operations
Calgary, AB. T2P 4H2
2000, 400 – 3rd Avenue SW.
Telephone: (403) 232-7100

Emergency Emergency Chemtrec:
Within the USA (800) 424-9300
Outside the USA (703) 527-3887
Devon Canada Emergency Phone:
(403) 232-7100

2. Hazards Identification

Physical state Liquid.
Appearance Dirty colored liquid with a faint hydrocarbon odor.
Emergency overview WARNING! Causes eye irritation.
This product may contain a small amount of hydrocarbons with a trace amount of benzene which may cause cancer and heritable genetic damage.
OSHA regulatory status This preparation is not classified as dangerous according to Directive 1999/45/EC and its amendments. This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects
Routes of exposure Eye contact. Skin contact. Ingestion. Inhalation.
Eyes Causes eye irritation.
Skin Prolonged or repeated skin contact may cause irritation. Human and animal studies show that benzene is absorbed through the skin. However, absorption through the skin is normally low because benzene evaporates rapidly. In most cases, any skin contact would also involve significant inhalation exposure.
Inhalation No inhalation hazard under normal conditions. If misting occurs: may cause mild mucous membrane irritation of the nose, throat, and upper respiratory tract. Produced water may contain benzene which may cause cancer and cause blood disorders.
Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. The product may contain benzene which may cause cancer and cause blood disorders
Chronic effects Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established.
Potential environmental effects Not expected to be harmful to aquatic organisms.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Water	7732-18-5	80-95
Calcium chloride	10043-52-4	0-20
Potassium Chloride	7447-40-7	0-20

Sodium chloride	7647-14-5	0-20
Benzene	71-43-2	<0.1

Composition comments May contain small amounts of condensate or crude oil as a contaminate. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

- Eye contact** In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.
- Skin contact** Remove contaminated clothing and shoes. Wash affected area with mild soap and water. Get medical attention if irritation develops and persists.
- Inhalation** If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.
- Ingestion** Rinse mouth thoroughly. Get medical attention if any discomfort occurs.

General advice If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties This product is not flammable; however sufficient hydrocarbon vapors may accumulate from oil or natural gas condensate floating on the surface of the produced water to cause a flash fire. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water.

Extinguishing media

Suitable extinguishing media Dry chemical powder. Foam. Carbon dioxide (CO2).

Protection of firefighters

Protective equipment and precautions for firefighters A fire would be associated with vapors related to oil or natural gas condensate floating on the surface of the produced water. Water maybe ineffective on flames and may even spread the fire but should be used to cool pressurized containers in the fire.

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

Specific methods

Promptly isolate the scene by removing persons from the vicinity of the incident if there is a fire. Do not extinguish flames at leak because of the possibility of a uncontrolled re-ignition exists. If it is safe to do so, cut off fuel supply and/or allow fire to burn out. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water. If leak or spill has not ignited, water spray or ventilation can be used to disperse the vapors.

Hazardous combustion products

Sodium oxides. Carbon oxides.

6. Accidental Release Measures

Personal precautions Keep away from sources of ignition - No smoking. The vapors should dissipate fairly rapidly depend on the amount of oil and natural gas condensate floating on the surface of the produced water. Stay upwind. Keep unnecessary personnel away. See Section 8 of the MSDS for Personal Protective Equipment.

Environmental precautions Prevent further leakage or spillage if safe to do so. Do not allow to enter drains, sewers or watercourses.

Methods for containment Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.

Methods for cleaning up Recover by pumping (use an explosion-proof motor or hand pump) or by sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Where feasible and appropriate, remove contaminated soil or flush with fresh water. On water spills utilize absorbent material to remove oil and natural gas liquid from the surface of the water.

Other information Avoid excess skin contact with spilled material.

7. Handling and Storage

Handling

Handle as a flammable liquid. Tank headspaces should always be regarded as potentially flammable and care should be taken to avoid static electrical discharge and all ignition sources during filling, discharging and sampling from storage tanks. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion. Keep away from heat, sparks, and open flame. Electrical equipment should be approved for classified area. Wear appropriate personal protective equipment (see section 8). Special precautions should be taken when entering or handling equipment in this type of produced water service because of possible radioactive contamination. All equipment should be checked for radioactivity or opened to the atmosphere and have forced ventilation applied for at least 4 hours prior to entry or handling. Avoid direct skin contact with any surface. Avoid generation of dust, smoke, fumes, etc. in the work area, or if they cannot be avoided, a tested and certified radionuclide dust respirator should be worn. Smoking, eating or drinking should be prohibited when working with the equipment. Workers should wash thoroughly with soap and water and discard contaminated clothing after entering or handling the equipment. Workers should wash hands and face before eating, drinking and smoking.

Storage

Keep containers in well-ventilated area away from flame, sparks, excessive temperatures and open flames. Keep the containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Do not enter storage areas and confined spaces without adequate ventilation. Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s). Vapors containing benzene may accumulate during storage and transport.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components

Benzene (71-43-2)

Type

STEL
TWA

Value

2.5 ppm
0.5 ppm

U.S. - OSHA

Components

Benzene (71-43-2)

Type

Ceiling
STEL
TWA

Value

25 ppm
5 ppm
1 ppm

Canada - Alberta

Components

Benzene (71-43-2)

Type

STEL
TWA

Value

8 mg/m³
2.5 ppm
1.6 mg/m³
0.5 ppm

Canada - British Columbia

Components

Benzene (71-43-2)

Type

STEL
TWA

Value

2.5 ppm
0.5 ppm

Canada - Ontario

Components

Benzene (71-43-2)

Type

STEL
TWA

Value

2.5 ppm
0.5 ppm
5 mg/m³

Calcium chloride (10043-52-4)

TWA

5 mg/m³

Canada - Quebec

Components

Benzene (71-43-2)

Type

STEL
TWA

Value

15.5 mg/m³
5 ppm
3 mg/m³
1 ppm

Engineering controls

Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye / face protection

If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

Skin protection	No special garments required. Wash contaminated clothing prior to reuse. Avoid unnecessary skin contamination with material. Use of chemical resistant gloves is advised to prevent skin contact.
Respiratory protection	No personal respiratory protective equipment normally required.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Handle in accordance with good industrial hygiene and safety practice.

9. Physical & Chemical Properties

Appearance	Dirty colored liquid with a faint hydrocarbon odor.
Color	Varies from clear to dark brown.
Odor	Faint. Hydrocarbon-like.
Odor threshold	Not available.
Physical state	Liquid.
Form	Liquid.
pH	4.9 - 8.5
Melting point	Not available.
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C) Approx.
Flash point	Variable organic oil and dissolved gases are flammable.
Evaporation rate	0.36
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	13.6 mm Hg @ 68°F (20°C)
Vapor density	< 1
Specific gravity	1.1 @ 68°F (20°C)
Solubility (water)	Complete
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Stable.
Conditions to avoid	Keep away from heat, sparks and open flame.
Hazardous decomposition products	Carbon Dioxide. Water vapor. May produce oxides of sulfur. Incomplete combustion may generate carbon monoxide.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components

Calcium chloride (10043-52-4)

Benzene (71-43-2)

Test Results

Acute Oral LD50 Rat: 1000 mg/kg

Acute Other LD50 Mouse: 42 mg/kg

Acute Inhalation LC50 Mouse: 9980 mg/l

Acute Inhalation LC50 Rat: 10000 mg/l 7 Hours

Acute Oral LD50 Mouse: 4700 mg/kg

Acute Oral LD50 Rat: 3306 mg/kg

Acute Other LD50 Mouse: 340 mg/kg

Components

Benzene (71-43-2)

Test Results

Acute Other LD50 Mouse: 0.000001 ml/kg

Acute Other LD50 Rat: 2.89 mg/kg

Potassium Chloride (7447-40-7)

Acute Oral LD50 Rat: 2600 mg/kg

Toxicological information

This product may contain detectable but varying quantities of the naturally occurring radioactive substance radon 222. The amount in the gas itself is not hazardous, but since radon rapidly decays ($t_{1/2} = 3.82$ days) to form other radioactive elements including lead 210, polonium 210, and bismuth 210, equipment may be radioactive. The radon daughters are solids and therefore may attach to dust particles or form films and sludges in equipment. Inhalation, ingestion or skin contact with radon daughters can lead to the deposition of radioactive material in the lungs, bone, blood forming organs, intestinal tract, kidney and colon. Occupational exposure to radon and radon daughters has been associated with an increased risk of lung cancer in underground uranium miners. Follow the special precautions listed in handling and storage section of this document (see section 7).

Local effects

Causes eye irritation. May cause skin irritation. May cause discomfort if swallowed.

Sensitization

Not a skin sensitizer.

Chronic effects

No additional adverse health effects noted.

Carcinogenicity

This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

ACGIH Carcinogens

Benzene (CAS 71-43-2)

A1 Confirmed human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2)

1 Carcinogenic to humans.

US NTP Report on Carcinogens: Known carcinogen

Benzene (CAS 71-43-2)

Known carcinogen.

US OSHA Specifically Regulated Substances: Cancer hazard

Benzene (CAS 71-43-2)

Cancer hazard.

Epidemiology

No epidemiological data is available for this product.

Mutagenicity

No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Neurological effects

No data available.

Reproductive effects

Contains no ingredient listed as toxic to reproduction

Teratogenicity

No known human teratogenic effect.

Further information

This product has no known adverse effect on human health.

12. Ecological Information**Ecotoxicological data****Components****Test Results**

Calcium chloride (10043-52-4)

EC50 Water flea (*Daphnia magna*): 52 mg/l 48 hoursLC50 Fathead minnow (*Pimephales promelas*): 3930 - 5360 mg/l 96 hours

Benzene (71-43-2)

EC50 Water flea (*Daphnia magna*): 8.76 - 15.6 mg/l 48 hoursEC50 Water flea (*Daphnia magna*): 8.76 - 15.6 mg/l 48 HoursLC50 Rainbow trout, donaldson trout (*Oncorhynchus mykiss*): 5 mg/l 96 Hours

Potassium Chloride (7447-40-7)

EC50 Water flea (*Daphnia magna*): 83 mg/l 48 hoursLC50 Western mosquitofish (*Gambusia affinis*): 435 mg/l 96 hours

Sodium chloride (7647-14-5)

EC50 Water flea (*Daphnia magna*): 340.7 - 469.2 mg/l 48 hoursLC50 American eel (*Anguilla rostrata*): 0 - 27260 mg/l 96 hours**Ecotoxicity**

Not expected to be harmful to aquatic organisms.

Environmental effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence and degradability

None known.

Bioaccumulation / Accumulation	No data available.
Partition coefficient (n-octanol/water)	Not available.
Mobility in environmental media	No data available.

13. Disposal Considerations

Disposal instructions	Do not allow this material to drain into sewers/water supplies. This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.
Waste from residues / unused products	Not applicable.
Contaminated packaging	Offer rinsed packaging material to local recycling facilities.

14. Transport Information

DOT	Not regulated as dangerous goods.
IATA	Not regulated as dangerous goods.
IMDG	Not regulated as dangerous goods.
TDG	Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations	This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.	
US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration	Benzene (CAS 71-43-2)	0.1 %
US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance	Benzene (CAS 71-43-2)	Listed.

CERCLA (Superfund) reportable quantity (lbs)
Benzene 10

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No
Drug Enforcement Agency (DEA)	Not controlled
WHMIS status	Controlled
WHMIS classification	D2B - Other Toxic Effects-TOXIC
WHMIS labeling	



State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

- US - California Hazardous Substances (Director's): Listed substance**
Benzene (CAS 71-43-2) Listed.
- US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**
Benzene (CAS 71-43-2) Listed.
- US - California Proposition 65 - CRT: Listed date/Carcinogenic substance**
Benzene (CAS 71-43-2) Listed: February 27, 1987 Carcinogenic.
- US - California Proposition 65 - CRT: Listed date/Developmental toxin**
Benzene (CAS 71-43-2) Listed: December 26, 1997 Developmental toxin.
- US - California Proposition 65 - CRT: Listed date/Male reproductive toxin**
Benzene (CAS 71-43-2) Listed: December 26, 1997 Male reproductive toxin.
- US - Massachusetts RTK - Substance: Listed substance**
Benzene (CAS 71-43-2) Listed.
- US - New Jersey Community RTK (EHS Survey): Reportable threshold**
Benzene (CAS 71-43-2) 500 LBS
- US - New Jersey RTK - Substances: Listed substance**
Benzene (CAS 71-43-2) Listed.
- US - Pennsylvania RTK - Hazardous Substances: Listed substance**
Benzene (CAS 71-43-2) Listed.
- US - Pennsylvania RTK - Hazardous Substances: Special hazard**
Benzene (CAS 71-43-2) Special hazard.

16. Other Information

Further information	HMIS® is a registered trade and service mark of the NPCA.
HMIS® ratings	Health: 1 Flammability: 1 Physical hazard: 0
NFPA ratings	Health: 1 Flammability: 1 Instability: 0
Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available.
Issue date	04-27-2010

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MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBIL DTE OIL EXTRA HEAVY
Product Description: Base Oil and Additives
Product Code: 201560501595, 600205-00, 970010
Intended Use: Circulating oil

COMPANY IDENTIFICATION

Supplier: EXXON MOBIL CORPORATION
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA
24 Hour Health Emergency: 609-737-4411
Transportation Emergency Phone: 800-424-9300
ExxonMobil Transportation No.: 281-834-3296
Product Technical Information: 800-662-4525, 800-947-9147
MSDS Internet Address: <http://www.exxon.com>, <http://www.mobil.com>

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health: 0	Flammability: 1	Reactivity: 0
HMIS Hazard ID:	Health: 0	Flammability: 1	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

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adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >227°C (441°F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

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Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

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ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9

PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid

Form: Clear

Color: Amber

Odor: Characteristic

Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.89

Flash Point [Method]: >227°C (441°F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

Boiling Point / Range: > 316°C (600°F)

Vapor Density (Air = 1): > 2 at 101 kPa

Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C

Evaporation Rate (n-butyl acetate = 1): N/D

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: 146.2 cSt (146.2 mm²/sec) at 40 °C | 14.4 cSt (14.4 mm²/sec) at 100°C

Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -12°C (10°F)

DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10

STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11

TOXICOLOGICAL INFORMATION

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ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC
 2 = NTP SUS

3 = IARC 1
 4 = IARC 2A

5 = IARC 2B
 6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

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PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13

DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. **DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.**

SECTION 14

TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

Product Name: MOBIL DTE OIL EXTRA HEAVY
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SECTION 15	REGULATORY INFORMATION
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OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: AICS, DSL, EINECS, ENCS, IECSC, KECI, PICCS, TSCA

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	15

--REGULATORY LISTS SEARCHED--

- | | | | |
|---------------|------------------|-------------------|-------------|
| 1 = ACGIH ALL | 6 = TSCA 5a2 | 11 = CA P65 REPRO | 16 = MN RTK |
| 2 = ACGIH A1 | 7 = TSCA 5e | 12 = CA RTK | 17 = NJ RTK |
| 3 = ACGIH A2 | 8 = TSCA 6 | 13 = IL RTK | 18 = PA RTK |
| 4 = OSHA Z | 9 = TSCA 12b | 14 = LA RTK | 19 = RI RTK |
| 5 = TSCA 4 | 10 = CA P65 CARC | 15 = MI 293 | |

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16	OTHER INFORMATION
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N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

- Section 06: Notification Procedures - Header was modified.
- Section 13: Disposal Considerations - Disposal Recommendations was modified.
- Section 10 Stability and Reactivity - Header was modified.
- Section 13: Disposal Recommendations - Note was modified.
- Section 09: Phys/Chem Properties Note was modified.
- Section 09: Boiling Point C(F) was modified.
- Section 08: Comply with applicable regulations phrase was modified.
- Section 08: Personal Protection was modified.
- Section 08: Hand Protection was modified.

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Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 07: Handling and Storage - Storage Phrases was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.

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Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0

PPEC: A

DGN: 2007114XUS (1013921)

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ATTACHMENT I

Emission Unit Table

Emission Units Table

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

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
CE-1	---	Residue Gas Compressor Engine (Caterpillar 3512 B)	2009	1005 Hp	REM	1C (SCR)
CE-2	2E	Residue Gas Compressor Engine (Caterpillar 3516TALE)	2010	1340 Hp	EXIST	2C (SCR)
CE-3	3E	Residue Gas Compressor Engine (Caterpillar 3516 TALE)	2011	1340 Hp	EXIST	3C (SCR)
RSV-1	---	Dehy Still	2009	10.5 MMSCFD	REM	None
RBV-1	---	Dehydration Unit Re-Boiler	2009	0.28 MMBTU/Hr	REM	None
RSV-2	---	Dehy Still	Not Installed	13.0 MMSCFD	REM	None
RBV-2	---	Dehydration Unit Re-Boiler	Not Installed	0.35 MMBTU/Hr	REM	None
RSV-3	4E	Dehy Still	2011	20.0 MMSCFD	NEW	None
RBV-3	5E	Dehydration Unit Re-Boiler	2011	0.50 MMBTU/Hr	NEW	None
TD2	6E	Produced Fluids Tank	2009	100 BBL	EXIST	VCU-1
TL-1	7E	Condensate Truck Loading	2012	13,020 Gallons/Yr.	NEW	None
---	---	Fugitive VOC Emissions – Fittings and Connections	2011	N/A	EXIST/NEW	None
---	---	Haul Roads	2011	1 Truck per day max.	EXIST	None

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, ... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C, ... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheets

ATTACHMENT J

**Emission Points Data Summary Sheet
New Equipment Only**

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type	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 (Specify VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
2E	Upward Vertical Stack	CE-2	Driver Engine	1C	NSCR	C	8760	NO _x	5.91	25.88	5.91	25.88	GAS	EE	
								CO	5.61	24.58	0.62	2.72	GAS	EE	
								VOC	1.36	5.95	0.75	3.27	GAS	EE	
								SO ₂	<0.01	0.03	<0.01	0.03	GAS	EE	
								PM/PM10	0.11	0.49	0.11	0.49	Solid	EE	
								Formaldehyde	0.77	3.36	0.16	0.71	Gas	EE	
								CO _{2e}	1558	8622	1558	8622	Gas	EE	
3E	Upward Vertical Stack	CE-3	Driver Engine	2C	NSCR	C	8760	NO _x	5.91	25.88	5.91	25.88	GAS	EE	
								CO	5.61	24.58	0.62	2.72	GAS	EE	
								VOC	1.36	5.95	0.75	3.27	GAS	EE	
								SO ₂	<0.01	0.03	<0.01	0.03	GAS	EE	
								PM/PM10	0.11	0.49	0.11	0.49	Solid	EE	
								Formaldehyde	0.77	3.36	0.16	0.71	Gas	EE	
								CO _{2e}	1558	8622	1558	8622	Gas	EE	

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 & HAPS) (Specify VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)					
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr								
4E	Upward Vertical Vent	RSV-3	Still Vent	None	8760	8760	NO _x						GAS	EE						
							CO										GAS	EE		
							VOC	7.40	32.43			7.40	32.43					GAS	EE	
							PM/PM10											Solid	EE	
							Benzene	0.09	0.41			0.09	0.41			0.09	0.41	Gas	EE	
							Toluene	0.47	2.08			0.47	2.08			0.47	2.08	Gas	EE	
							CO2e	484	2120			484	2120			484	2120	Gas	EE	
							NO _x	0.05	0.22			0.05	0.22			0.05	0.22	GAS	EE	
							CO	0.04	0.18			0.04	0.18			0.04	0.18	GAS	EE	
							VOC	<0.01	0.01			<0.01	0.01			<0.01	0.01	GAS	EE	
5E	Upward Vertical Vent	RBV-3	Re-Boiler Vent	None	8760	8760	PM/PM10	<0.01	0.02			<0.01	0.02	GAS	EE					
							Benzene	<0.01	<0.01			<0.01	<0.01		<0.01	<0.01	Solid	EE		
							Toluene	<0.01	<0.01			<0.01	<0.01		<0.01	<0.01	Gas	EE		
							CO2e	60	265			60	265			60	265	Gas	EE	

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
6E	Upward Vertical Vent	TD2	Produced Fluids Tank	VCU-1	Vapor Combustor	8760		NO _x	0.01	0.05			GAS	EE	
								CO	0.02	0.10			GAS	EE	
								VOC	1.53	6.7			GAS	EE	
								PM/PM10	<0.01	<0.01			Solid	EE	
								Benzene	<0.01	<0.01			Gas	EE	
								Toluene	<0.01	<0.01			Gas	EE	
								CO2e	16.0	69			Gas	EE	
7E	Fugitive	TL-1	Truck Loading	N/A	6		NO _x						GAS	EE	
							CO					GAS	EE		
							VOC	11.09	0.02			GAS	EE		
							PM/PM10					GAS	EE		
							Benzene					Solid	EE		
							Toluene					Gas	EE		
							CO2e					Gas	EE		

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that un-captured 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., un-captured 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 (i.e., 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, etc. DO NOT LIST CO₂, 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).

Emission Points Data Summary Sheet
New Equipment

Table 2: Release Parameter Data

Emission Point ID No. <i>(Must match Emission Units Table)</i>	Inner Diameter (ft.)	Temp. (°F)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
			Volumetric Flow ¹ (acfm) <i>at operating conditions</i>	Velocity (fps)	Ground Level (Height above mean sea level)	Stack Height ² (Release height of emissions above ground level)	Northing	Easting	
1E									
2E	1.67	850	7,651	127	1000	21.7			
3E	1.67	850	7,651	127	1000	21.7			
4E	0.667	220	20	3.5	1000	12			
5E	0.5	1000	75	9	1000	12			
6E	0.5	Ambient	Tank Vent						
7E	0.5	Ambient	Tank Vent						

¹ Give at operating conditions. Include inerts.

² Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Summary Sheet

Jay-Bee Oil & Gas, Inc.
Bunker Run Compressor Station
Attachment K
Fugitive Emissions Data

Equipment Fugitive Emissions

As noted in the process description, Jay Bee is seeking to modify its permit to correct errors in the initial submittal and reflect certain equipment changes at its Bunker Run Compressor Station. Equipment at this facility contains a variety of piping containing natural gas and separated liquids under pressure. During the normal course of operation, minor leaks from valves, pressure release devices and various fittings associated with this piping may occur. A potential emission rate of 0.29 tpy of VOCs and 130 tpy CO_{2e} has been estimated.

Estimates of these emissions are included in the calculations (Attachment N) and summarized on the form included in this section. These calculations are based on emission factors accepted by the American Petroleum Institute and EPA.

Pigging Emission Estimates

There are no pigging operations in association with this facility.

Facility Blowdown Emission Estimates

There are two main gas compressors at this facility that will require blowdowns to allow for routine maintenance. The volume of natural gas released per blowdown event from the two units associated with the CAT 3516 drivers and their associated inlet separator and piping is estimated at 70.1 cubic feet at approximately 61.23 atmospheres pressure (900 psi), yielding approximately 5,043 cubic feet of gas at STP (see calculations at the end of this Attachment). There will be a maximum of 26 blow downs per compressor per year. Thus, with two compressors, there is a potential for 52 events or 262,236 cubic feet of gas emitted from blowdowns per year from these two engines.

The specific gravity of this gas at STP is 0.651 (see the Inlet Gas spreadsheet in the calculations). With the density of air at STP being 0.0806 pounds per cubic foot, the mass of gas released per year is 13,760 pounds (262,236 cf x 0.0806 x 0.651). As the percentage of VOCs in the gas (by weight) is 10.05 percent (see Inlet Gas spreadsheet in the calculations), the VOC (non-methane/non-ethane) emissions from blowdowns are estimated at approximately 1382.8 lbs or 0.69 tons per year. HAPs are estimated to be 0.5 percent of the mass of the blowdown emissions or 68.8 lb/yr (13,760 x 0.005) or 0.03 tpy. As the methane concentration in this gas is 73.05 % (by weight), methane emissions will be 10,051 pounds (13,760 x 0.7305) per year. Using a GHG factor of 25, methane emissions from blowdowns in CO_{2e} will be 125.6 tons CO_{2e} (10,051 x 25[GHG factor] /2000).

Storage Tank and Haul Road Fugitive Emissions

Produced Fluids (water) received by this facility is accumulated in a single 100 BBL tank prior to off-site shipment. Emissions from this tank were determined by using flash gas measurements from pressurized condensate produced at an area Jay-Bee well pad and working/breathing losses using AP-42 methods using condensate vapor data from this same condensate. Uncontrolled emissions from this tank were determined to be 6.7 tons per year of VOCs. These vapors are routed to an enclosed combustor with a minimum efficiency of >98%. Thus, controlled VOC emissions are 0.130 tons per year.

Lastly, there will be a maximum of 6 truck loading trips per year, generating a potential 0.03 tpy of fugitive dust (see calculations section).

Emissions from these sources are summarized in the following fugitive emissions form and the calculations are included in the emissions summary in Attachment N.

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS

1.) Will there be haul road activities?

Yes No

If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.

2.) Will there be Storage Piles?

Yes No

If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.

3.) Will there be Liquid Loading/Unloading Operations?

Yes No

If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.

4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?

Yes No

If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.

5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?

Yes No

If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.

6.) Will there be General Clean-up VOC Operations?

Yes No

If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.

7.) Will there be any other activities that generate fugitive emissions?

Yes No

If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.

If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY		All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
			lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads							
Unpaved Haul Roads		PM	2.17	0.01	2.17	0.01	EE
Loading/Unloading Operations		VOCs	11.09	0.02	11.09	0.02	EE
		Total HAPs	0.76	<0.01	0.76	<0.01	EE
Equipment Leaks		VOCs	Does Not Apply	0.29	Does Not Apply	0.29	EE
		Total HAPs	Does Not Apply	<0.01	Does Not Apply	<0.01	EE
Blowdowns		VOCs	N/A	0.69	N/A	0.69	EE
		Total HAPs	N/A	0.03	N/A	0.03	EE
Other:							

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).

COMPRESSOR BLOWDOWN VOLUME - (CAT 3516B Driven Compressors)

Given:

$Q_a =$	70.10 Cubic feet	yields	1.98500768 Cubic Meters	Volume of compressor, scrubbers and piping
$P_f =$	64.60 Atm	yields	6545.60 kPa	Pressure of Pipeline
$T_i =$	25.00 Deg C	yields	298.15 Deg K	Temperature in Pipeline
$P_i =$	1.00 Atm	yields	101.33 kPa	Ambient Pressure (Usually 1 ATM)
$T_f =$	25.00 Deg C	yields	298.15 Deg K	Ambient Temperature (Usually 10-25 Deg. C or Standard Temp -15Deg. C)
$z_i =$	0.85649			See Compressibility spreadsheet
$z_f =$	1.00111			See Compressibility spreadsheet

$Q_t =$ **142.791 Cubic Meters** or **5042.62 Cubic Feet**

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1, Equation 22-23

$$Q_t = Q_a \times (T_f/P_f) \times (P_i/(z_i \times T_i)) - (P_f/(z_f \times T_f))$$

Where :

Q_t = Total volume of gas released in cubic meters at STP (15 Deg C and 1 Atm)

Q_a = Actual volume of gas at process conditions in cubic meters

P_s = Standard Pressure in kPa (101.3)

T_s = Standard Temperature in K (288.1)

z = Compressibility factor for the gas

i = initial pressure and temperature

f = final temperature and pressure (generally STP)

COMPRESSABILITY FACTOR

Given:

Pressure **1.0 Atm.** **101.3 kPa**

Temperature **25 Deg. C**

Compressibility Factor (z) **1.0011085**

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1 , Equation 22.25

$$z = a + bP + cT + dP^2 + eT^2 + fPT$$

where

P = Pressure in kPa

T = Temperature in Deg. C

a = 0.99187

b=-3.3501E-05

c=6.9652E-04

d=6.3134E-10

e=-8.6023E-06

f=2.3290E-07

COMPRESSABILITY FACTOR

Given:

Pressure **61.23 Atm.** **6204.1 kPa** **900.08 PSIG**

Temperature **25 Deg. C**

Compressibility Factor (z) **0.8564851**

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1 , Equation 22.25

$$z = a + bP + cT + dP^2 + eT^2 + fPT$$

where

P = Pressure in kPa

T = Temperature in Deg. C

a = 0.99187

b=-3.3501E-05

c=6.9652E-04

d=6.3134E-10

e=-8.6023E-06

f=2.3290E-07

ATTACHMENT L

Emission Unit Data Sheets

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Source ID # ¹	Status ²	Design Heat Input (mmBtu/hr) ³	Hours of Operation (hrs/yr) ⁴	Fuel Heating Value (Btu/scf) ⁵	
RBV-1	REM	0.28 MMBTU/Hr	8760	1155 BTU/scf (HHV)	
RBV-2	REM	0.35 MMBTU/Hr	8760	1155 BTU/scf (HHV)	
RBV-3	NEW	0.50 MMBTU/Hr	8760	1155 BTU/scf (HHV)	

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit Reboiler Vent data on the *Glycol Dehydration Unit Data Sheet*.
2. Enter the Status for each boiler or line heater using the following:

EXIST	Existing Equipment	NEW	Installation of New Equipment
REM	Equipment Removed		
3. Enter boiler or line heater design heat input in mmBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

STORAGE TANK DATA SHEET

Source ID # ¹	Status ²	Content ³	Volume ⁴	Dia ⁵	Throughput ⁶	Orientation ⁷	Liquid Height ⁸
TD1	REM	Oil	300 Gallons	4.0	500 gallons/yr	HORZ	3 feet
TD2	EXIST	Produced Fluid	100 BBL	8.0	18,000 gallons/yr	VERT	4 feet
TD3	EXIST	OIL	300 Gallons	4.0	500 gallons/yr	HORZ	3 feet
TD4	EXIST	OIL	300 Gallons	4.0	500 gallons/yr	HORZ	3 feet

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:

EXIST	Existing Equipment	NEW	Installation of New Equipment
REM	Equipment Removed		
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:

VERT	Vertical Tank	HORZ	Horizontal Tank
------	---------------	------	-----------------
8. Enter storage tank average liquid height in feet.

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number ¹		CE-1		CE-2		CE-3	
Engine Manufacturer and Model		CAT G3512 TALE		CAT G3516 TALE		CAT G3516 TALE	
Manufacturer's Rated bhp/rpm		1005 @ 1400		1340 @ 1400		1340 @ 1400	
Source Status ²		RS		ES		ES	
Date Installed/Modified/Removed ³		July 2009		October 2010		October 2010	
Engine Manufactured/Reconstruction Date ⁴		9/16/06		11/26/2008		3/13/2009	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) ⁵		No		No		No	
Engine, Fuel and Combustion Data	Engine Type ⁶	LB4S		LB4S		LB4S	
	APCD Type ⁷	A/F		A/F+SCR		A/F+SCR	
	Fuel Type ⁸	RG		RG		RG	
	H ₂ S (gr/100 scf)	<1		<1		<1	
	Operating bhp/rpm	1005 @ 1400		1340 @ 1400		1340 @ 1400	
	BSFC (Btu/bhp-hr)	7394		7548		7548	
	Fuel throughput (ft ³ /hr)	7336		9679		9144	
	Fuel throughput (MMft ³ /yr)	64.2		84.79		84.79	
	Operation (hrs/yr)	8760		8760		8760	
Reference ⁹	Potential Emissions ¹⁰	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
AP	NO _x	4.43	19.39	5.91	25.86	5.91	25.86
AP	CO	3.76	16.48	0.62	2.72	0.62	2.72
AP	VOC	0.66	4.07	0.75	3.27	0.75	3.27
AP	SO ₂	<0.1	<0.1	0.01	0.03	0.01	0.03
AP	PM ₁₀	<1	<1	0.11	0.49	0.11	0.49
AP	Formaldehyde	0.62	2.71	0.16	0.71	0.16	0.71
AP	Total HAPs			0.37	1.61	0.37	1.61
AP	CO _{2e}			1558	6822	1558	6822

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

2. Enter the Source Status using the following codes:

NS Construction of New Source (installation)
MS Modification of Existing Source

ES Existing Source
RS Removal of Source

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

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

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

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

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas
----	------------------------------	----	-----------------

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

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

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

ATTACHMENT M

Air Pollution Control Device Sheets



CONFIDENTIAL

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: R-109-0616 Rev(2)

Engine Data

Number of Engines: 1
 Application: Gas Compression
 Engine Manufacturer: Caterpillar
 Model Number: 3516 TALE AFR
 Power Output: 1,340 bhp
 Lubrication Oil: 0.6 wt% sulfated ash or less
 Type of Fuel: Natural Gas
 Exhaust Flow Rate: 7,651 acfm (cfm)
 Exhaust Temperature: 654°F

NSCR Housing & Catalyst Details (10-26-12-H)

Design Exhaust Flow Rate: 7,651 acfm (cfm)
 Design Exhaust Temperature: 654°F
 Exhaust Temperature Limits: 550 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)
 Material: Carbon Steel
 Paint: Standard High Temperature Black Paint
 Diameter: 26 inches
 Inlet Pipe Size & Connection: 12 inch FF Flange, 150# ANSI standard bolt pattern
 Outlet Pipe Size & Connection: 12 inch FF Flange, 150# ANSI standard bolt pattern
 Overall Length: 43 inches
 Weight Without Catalyst: 300 lbs
 Weight Including Catalyst: 350 lbs
 Instrumentation Ports: 2 Inlet/2 outlet (1/2" NPT)
 Oxygen Sensor Ports: 1 Inlet/1 outlet (18mm)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Warranted Converter Outputs (g/ bhp-hr)	Area Limits
CO	1.90	90%	0.19	90 % Reduction
NMNHC	0.46	50%	0.23	50 % Reduction
CH ₂ O	0.28	80%	0.05	80 % Reduction
Oxygen	8.3%			

MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

G3516 LE

GAS ENGINE SITE SPECIFIC TECHNICAL DATA S/N WFPW01057+



GAS COMPRESSION APPLICATION

ENGINE SPEED (rpm): 1400
 COMPRESSION RATIO: 8:1
 AFTERCOOLER WATER INLET (°F): 130
 JACKET WATER OUTLET (°F): 210
 COOLING SYSTEM: JW+OC, AC
 IGNITION SYSTEM: ADEM3
 EXHAUST MANIFOLD: ASWC
 COMBUSTION: Low Emission
 NOx EMISSION LEVEL (g/bhp-hr NOx): 2.0
 SET POINT TIMING: 33.0

FUEL SYSTEM:

HPG #MPCO
 WITH AIR FUEL RATIO CONTROL

SITE CONDITIONS:

FUEL: Nat Gas
 FUEL PRESSURE RANGE (psig): 35.0-40.0
 FUEL METHANE NUMBER: 84.8
 FUEL LHV (Btu/scf): 905
 ALTITUDE (ft): 1200
 MAXIMUM INLET AIR TEMPERATURE (°F): 105
 NAMEPLATE RATING: 1340 bhp@1400rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITING RATING AT MAXIMUM INLET AIR TEMPERATURE		
			100%	100%	75%	50%
ENGINE POWER	(1)	bhp	1340	1340	1005	670
INLET AIR TEMPERATURE		°F	105	105	105	105

ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	7548	7548	7776	8327
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8373	8373	8626	9237
AIR FLOW	(3)(4)	b/hr	12622	12622	9522	6567
AIR FLOW WET (77°F, 14.7 psia)	(3)(4)	scfm	2847	2847	2147	1481
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	70.9	70.9	55.9	39.8
EXHAUST STACK TEMPERATURE	(6)	°F	873	873	873	876
EXHAUST GAS FLOW (@ stack temp, 14.5 psia)	(7)(4)	ft ³ /min	7663	7663	5767	4012
EXHAUST GAS MASS FLOW	(7)(4)	b/hr	13132	13132	9916	6849

EMISSIONS DATA						
NOx (as NO ₂)	(8)	g/bhp-hr	2.00	2.00	2.00	2.00
CO	(8)	g/bhp-hr	1.86	1.86	1.94	2.09
THC (mol. wt. of 15.84)	(8)	g/bhp-hr	2.64	2.64	2.77	2.98
NMHC (mol. wt. of 15.84)	(8)	g/bhp-hr	0.40	0.40	0.42	0.44
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	0.26	0.26	0.28	0.30
HCHO (Formaldehyde)	(8)	g/bhp-hr	0.26	0.26	0.27	0.29
CO ₂	(8)	g/bhp-hr	471	471	480	505
EXHAUST OXYGEN	(10)	% DRY	8.1	8.1	8.0	7.8

HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(11)	Btu/min	42122	42122	35063	28980
HEAT REJ. TO ATMOSPHERE	(11)	Btu/min	5313	5313	4428	3543
HEAT REJ. TO LUBE OIL (OC)	(11)	Btu/min	6282	6282	5232	4323
HEAT REJ. TO AFTERCOOLER (AC)	(11)(12)	Btu/min	12009	12009	7777	2711

HEAT EXCHANGER SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(12)	Btu/min	53873
TOTAL AFTERCOOLER CIRCUIT (AC)	(12)(13)	Btu/min	12609

A cooling system safety factor of 0% has been added to the heat exchanger sizing criteria.

CONDITION AND DEFINITIONS

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

For notes information consult page three.

G3516 LE

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA S/N WPW01057+

CATERPILLAR

ENGINE SPEED (rpm): 1400
 COMPRESSION RATIO: 8:1
 AFTERCOOLER WATER INLET (°F): 130
 JACKET WATER OUTLET (°F): 210
 COOLING SYSTEM: JWH+OC, AC
 IGNITION SYSTEM: ADEM3
 EXHAUST MANIFOLD: ASWC
 COMBUSTION: Low Emission
 NOx EMISSION LEVEL (g/bhp-hr NOx): 2.0
 SET POINT TIMING: 33.0

FUEL SYSTEM:

HPG IMPCO
 WITH AIR FUEL RATIO CONTROL

SITE CONDITIONS:

FUEL: Nat Gas
 FUEL PRESSURE RANGE(psig): 35.0-40.0
 FUEL METHANE NUMBER: 84.8
 FUEL LHV (Btu/scf): 905
 ALTITUDE(ft): 1200
 MAXIMUM INLET AIR TEMPERATURE(°F): 105
 NAMEPLATE RATING: 1340 bhp@1400rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
			100%	100%	75%	50%
ENGINE POWER	(1)	bhp	1340	1340	1005	870
INLET AIR TEMPERATURE		°F	106	105	105	105

ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	7548	7548	7776	8327
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8373	8373	8628	9237
AIR FLOW	(3)(4)	ft ³ /hr	12622	12622	9522	8667
AIR FLOW WET (77°F, 14.7 psia)	(3)(4)	scfm	2847	2847	2147	1481
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	70.9	70.9	55.9	39.8
EXHAUST STACK TEMPERATURE	(6)	°F	873	873	873	876
EXHAUST GAS FLOW (@ stack temp, 14.5 psia)	(7)(4)	ft ³ /min	7663	7663	5787	4012
EXHAUST GAS MASS FLOW	(7)(4)	lb/hr	13132	13132	9916	6849

EMISSIONS DATA						
NOx (as NO2)	(8)	g/bhp-hr	2.00	2.00	2.00	2.00
CO	(8)	g/bhp-hr	1.86	1.86	1.84	2.09
THC (mol. wt. of 15.84)	(8)	g/bhp-hr	2.64	2.64	2.77	2.98
NMHC (mol. wt. of 15.84)	(8)	g/bhp-hr	0.40	0.40	0.42	0.44
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	0.26	0.26	0.28	0.30
HCHO (Formaldehyde)	(8)	g/bhp-hr	0.26	0.26	0.27	0.29
CO2	(8)	g/bhp-hr	471	471	480	506
EXHAUST OXYGEN	(10)	% DRY	8.1	8.1	8.0	7.8

HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(11)	Btu/min	42122	42122	35083	28990
HEAT REJ. TO ATMOSPHERE	(11)	Btu/min	5313	5313	4428	3543
HEAT REJ. TO LUBE OIL (OC)	(11)	Btu/min	6282	6282	5232	4323
HEAT REJ. TO AFTERCOOLER (AC)	(11)(12)	Btu/min	12009	12009	7777	2711

HEAT EXCHANGER SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(12)	Btu/min	53873
TOTAL AFTERCOOLER CIRCUIT (AC)	(12)(13)	Btu/min	12609

A cooling system safety factor of 0% has been added to the heat exchanger sizing criteria.

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3049/1, adjusted for fuel, site altitude and site inlet air temperature.
 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature.
 Max. rating is the maximum capability for the specified fuel at site altitude and reduced inlet air temperature.
 Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

AIR POLLUTION CONTROL DEVICE Vapor Combustion Control Device Sheet

Complete this vapor combustion control device sheet for each enclosed combustion device, flare, thermal oxidizer, or completion combustion device that is located at the natural gas production pad for the purpose of thermally destructing waste gas to control emissions of regulated pollutants to the atmosphere.

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.			
General Information			
1. Control Device ID#: EC-1		2. Installation Date: Upon receipt of Permit <input checked="" type="checkbox"/> New	
3. Maximum Rated Total Flow Capacity: 22,100 scfd	4. Maximum Design Heat Input: 2.38 MMBtu/hr	5. Design Heat Content: No limit. Only limit on total BTU/hr	
Control Device Information			
6. Select the type of vapor combustion control device being used: <input checked="" type="checkbox"/> Enclosed Combustion Device <input type="checkbox"/> Elevated Flare <input type="checkbox"/> Ground Flare <input type="checkbox"/> Thermal Oxidizer <input type="checkbox"/> Completion Combustion Device			
7. Manufacturer: Hy-Bon Engineering, Inc. Model No. Abutec 20		8. Hours of operation per year: 8760 Potential.	
9. List the emission units whose emissions are controlled by this vapor combustion control device: (Emission Point ID#: 6e-7e)			
10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
TD2	Produced Fluids Tank		
<i>If this vapor combustor controls emissions from more than six emission units, please attach additional pages.</i>			
11. Assist Type		12. Flare Height	13. Tip Diameter
<input type="checkbox"/> Steam - <input type="checkbox"/> Air - <input type="checkbox"/> Pressure - <input checked="" type="checkbox"/> Non -		11 ft	0.25 ft
14. Was the design per §60.18? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Waste Gas Information			
15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft ³)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
10	1257-2345	1400-2100	78.4 (at max flow)
19. Provide an attachment with the characteristics of the waste gas stream to be burned. See Calculations (Condensate Tank Vapor Combustion and Water Tank Vapor Combustion) in Attachment I - Calculations			

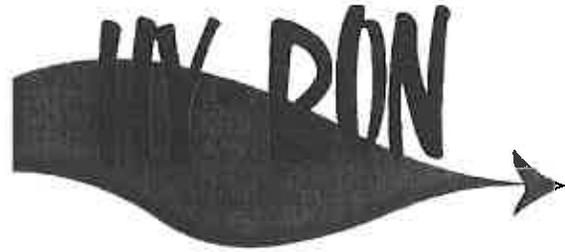
Pilot Information				
20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Natural Gas	1	63	80,000	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
25. If automatic re-ignition will be used, describe the method: The unit will try to reignite up to 25 times. After that it will go into manual mode which means someone will need to come out and start it up again.				
26. Describe the method of controlling flame: Ignition module located in the combustor control panel				
27. Is pilot flame equipped with a monitor to detect the presence of the flame? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		28. If yes, what type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input type="checkbox"/> Other, describe:		

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
Tank VOCs	>99 (hard piped)	99
32. Has the control device been tested by the manufacturer and certified? Yes		
33. Describe all operating ranges and maintenance procedures required by the manufacturer to maintain warranty: Combustor burner, pilot, and air inlet arrestor must be checked for foreign debris (dust, sand, etc.) and cleaned at least quarterly.		
34. Additional Information Attached? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
<i>Please attach a copy of manufacturer's data sheet.</i> <i>Please attach a copy of manufacturer's drawing.</i> <i>Please attach a copy of the manufacturer's performance testing.</i>		

If any of the requested information is not available, please contact the manufacturer.



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www.ediplungerlift.com



(423) 697-2292 (423) 520-2292 Fax (432)697-2310
P.O. Box 4185 MIDLAND, TEXAS 79704
2404 COMMERCE MIDLAND, TEXAS 79703
www.hy-bon.com

DATE: 11/4/2013
TO: Shane Dowell
QUOTE NO.: N/A (VALID FOR 30 DAYS)
REFERENCE: (N/A)
MODEL: The Abutec 20 & Abutec 100 Vapor Combustor Unit

Shane:

In response to your inquiry, HY-BON Engineering, Co. is pleased to offer the following proposal for a HY-BON enclosed Vapor Combustor Unit (VCU). There are two models: **Abutec 20** (up to 22 mcf) and **Abutec 100** (up to 100 mcf) Medium Temperature Flares (MTF). Our VCU design incorporates HY-BON's 60+ years' experience with tank vapors with a combustor design which is highly effective, tested and certified "99% plus" for destruction of vent emissions from oil and condensate tank batteries, loading operations and storage facilities. The following items will show the advantages and benefits of incorporating this equipment into the Storage Tank facility:

ADVANTAGES OF USING HY-BON's UNIQUE Combustor Technology:

- **Operating Temperatures** up to 2100 degrees Fahrenheit
- **Compact & Easy to Install Design** (UNIT ARRIVES FULLY ASSEMBLED AND TESTED)
- **Completely Enclosed Combustion** prevents the environment from being exposed to IR radiation, heat and light. Low risk of fire.

Economically Efficient Vapor Elimination:

- Our enclosed VCU is a stainless steel enclosed flare design capable of meeting industry's regulations while offering you significant cost savings. This flare is proven throughout the world and is scalable to your application.

CUSTOMER: Jay Bee Oil

QUOTE #: 20962SB

- Highest Destruction Removal Efficiency (DRE) in the industry
- Our Combustors are tested and certified according to EPA 40 CFR 60, Quad O. The MTF model achieves 99%+ DRE
- Offers "Alternate Operating Scenario" for Permit Compliance during maintenance of Vapor Recovery Units and other site operations.

Other relative points to note for the *Abutec 20* and *Abutec 100*:

- CDM Compliant
- EPA 40 CFR 60, Quad O Compliant
- Completely Enclosed Combustion
- Low Capital and Operating Costs
- Meets 40 CFR 60.18 regulations
- 99%+ Destruction Efficiency (third party verified)
- Very High Turndown Ratio
- Only requires 220 btu/ft³ gas to maintain combustion
- Fully automated system based on pressure, with data logging on temperature, pressure, run time (additional parameters optional).
- Output via thumb drive, to a SCADA system, or wireless connection to company computer or IPHONE.
- High Temperature Flares (HTF) with 99.99% DRE are also available

Stack/Vent Height

- Stack/Vent height is important in dispersion of emissions and permitting.
- Effective stack height shall be calculated by the equation specified in 30 TAC §111.151(c) http://www.tceq.state.tx.us/assets/public/permitting/air/Announcements/og_pro_0_10018106.pdf
- The *Abutec 20* stack height is normally 12 ft. and *Abutec 100* is normally 16 ft. stack height but both come with an extension option of 20 ft. stack height.

Technical Summary:

Flare Gas Stream: *Abutec 20 Mscfd*

Type: Enclosed Tank Battery Flare Composition: 2200 btu/ft³ gas

Temperature: Ambient to 100°F +/- 20 deg°F

Flow Rate: up to 22,110 scfd (standard cubic feet per day) or 15 scfm

Auxiliary Fuel Requirements: Propane or Site Gas

Burner Size: 2.39 million BTU/hr (0.7 MW)

Inlet Pressure Requirements: 2-4 oz/in² (3.5-7.0 "w.c.")

Turndown Ratio: 2:1

Mechanical

Design Wind Speed: 100 mph

Ambient Temperature: -30 deg°F up to 120 deg°F

Electrical Area Classification: General Area Classification (non-hazardous)

CUSTOMER: Jay Bee Oil
QUOTE #: 20962SB

Elevation: Up to 3,000 ft ASL – please advise if higher elevation

Process

Smokeless Capacity: 100% Operating Temperature 1400 deg°F to 2100 deg°F (1500 deg°F Nominal); Retention Time 0.3 sec Flare Inlet Pressure 2-4 oz/in2 (3.5-7.0 "w.c.")

Utilities

Pilot Gas Process Gas

Electricity 1 Phase, 60 Hz, 120V / 10A (Solar Option) Auxiliary Fuel N/A

Emissions

Destruction Efficiency: 99% DRE

Flare Gas Stream: Abutec 100 Mscfd

Type: Enclosed Tank Battery Flare

Composition: 2200 btu/ft3 gas

Temperature: Ambient to 100°F +/- 20 deg°F

Flow Rate: up to 100,000 scfd (standard cubic feet per day) or 69.5 scfm

Auxiliary Fuel Requirements: Propane or Site Gas

Burner Size: 9.21 million BTU/hr (2.7 MW), Inlet Pressure Requirements 2-4 oz/in2 (3.5-7.0 "w.c.")
Turndown Ratio 5:1

Mechanical

Design Wind Speed: 100 mph

Ambient Temperature: -30 deg°F up to 120 deg°F

Electrical Area Classification: General Area Classification (non-hazardous)

Elevation: Up to 3,000 ft ASL – please advise if higher elevation

Process

Smokeless Capacity: 100%

Operating Temperature: 1400 deg°F to 2100 deg°F (1500 deg°F Nominal); Retention Time 0.3 sec

Flare Inlet Pressure: 2-4 oz/in2 (3.5-7.0 "w.c.")

Utilities

Pilot Gas Process Gas

Electricity 1 Phase, 60 Hz, 120V / 10A (Solar Option) Auxiliary Fuel N/A

Emissions

Destruction Efficiency: 99% DRE

EPA Federal Environmental Compliance:

- The recent publication of the Federal Register applies the Quad O New Point Source regulations that state that all Storage Tank facilities constructed on or after August 23, 2011 will need to be at or below 6 Tons of VOC's per year.
 - Includes new source performance standards for VOC's and sulfur dioxide and new air toxics standards for oil and natural gas production and natural gas transmission.
 - "Condensate & crude oil storage tanks – Effects every tank battery (and all major modifications) installed since August 2011 with the "potential to emit" 6 tons or more of VOC's. This equates to 20 to 50 barrels of oil a day throughput, or 1 to 10 barrels of condensate – *basically every new tank battery in the United States.*
 - Requires all crude oil and condensate tanks to control their air toxics by at least 95 percent. In addition, emissions from these tanks will be counted towards determining whether a facility is a major source.
 - These new regulations require, by federal statute, a VRU, Combustor or a Flare on every new or modified oil and condensate tank battery across the United States installed or

CUSTOMER: Jay Bee Oil
 QUOTE #: 20962SB

modified between August 23, 2011 and April 12, 2013. Each site must be in compliance by April 15, 2015 for Group 1 Tanks. New Tanks (Group 2) installed after April 12, 2013 must be in compliance after April 15, 2014.

- o The use of a HY-BON Enclosed Vapor Combustor, when combined with a HY-BON Vapor Recovery Tower and/or, HY-BON Vapor Recovery Unit (VRU) is considered a "Total Solutions Approach" to reducing emissions.

Commercial Summary:

<u>Quantity</u>	<u>Model/Description</u>	<u>Pricing</u>
One (1)	Abutec 20 Vapor Combustor Unit Handling up to 22 mcf (includes basic automation package)	\$10,250.00
One (1)	Abutec 100 Vapor Combustor Unit Handling up to 100 mcf (includes basic automation package)	\$20,525.00
Options	1 Year Service Package (Tuning of unit at site, Field Maintenance, Spare Parts, and 24/6 support)	\$2,250.00 Price per Unit (depending on location)
Pricing based on unit location within 150 miles from Hy-Bon Service Center. If not, pricing to be determined and quoted separately.		
Options	Solar Package (when site power is not Available)	\$7,800.00 Price per Unit
Options	Stainless Steel Knock Out pot with Manual drain valve (20 model)	\$815.00 Price per Unit
Options	Stainless Steel Knock Out pot with Manual drain valve (100 model)	\$1,190.00 Price per Unit
Options	Transport to Site (FOB Destination) 10% service charge added for coordination / handling	Prepay and add
Options	Stainless Steel Bird Screen (20-100) Wind Guards for air intakes (20-100)	\$525.00-\$725.00 \$285.00 -\$365.00
Options	Extended Stack Abutec 20 & 100 Stack extension to achieve a total system height of 20 ft.	\$1,400.00

CUSTOMER: Jay Bee Oil
QUOTE #: 20962SB

Delivery

Typical Spare Parts List

The following is a list of spare parts suggested for the system being specified. The prices are net unit prices and represent FOB Kennesaw, GA (ABUTEK Facility). Typical lead-time is 2-4 weeks.

75-00750014	Thermocouple, Type K (QTY: 1)	\$115.00
75-00750013	Pressure Transmitter, (QTY: 1)	\$535.00
75-00750016	Ignition Transformer (QTY: 1)	\$448.75
75-00750015	Ignition Electrode (QTY: 1)	\$25.00

Our field Engineering and Technical Staff are available to make a site visit to make recommendations to insure the proper installation and construction procedures.

We look forward to this opportunity to provide our equipment and services.

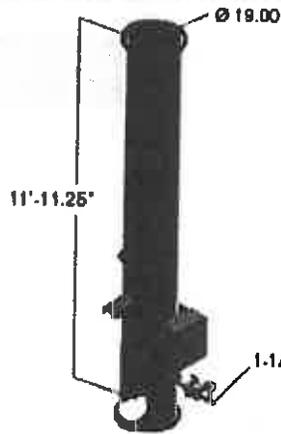
Highest Regards,

Wes Allen

HY-BON/EDI
Mobile: 304-679-6077
Office: 740-401-4000
wallen@hy-bon.com

CUSTOMER: Jay Bee Oil
QUOTE #: 20962SB

QUAD O COMPLIANT ENCLOSED VAPOR COMBUSTORS

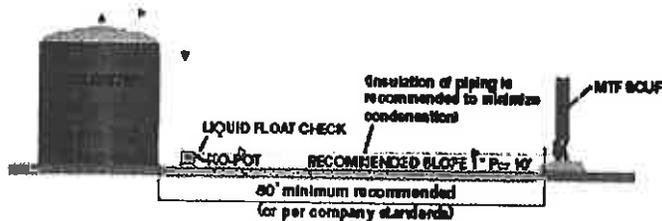
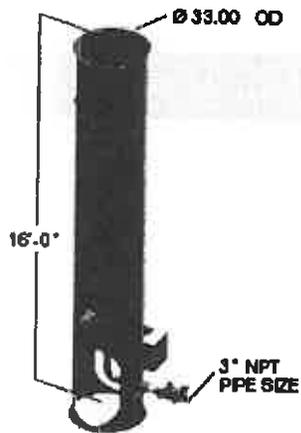


ABUTEC 20

- Flow - 0 - 20MSCFD
- Inlet pressure - as low as 2oz/in² and up to 120psig

ABUTEC 100

- Flow - 20 - 100MSCFD
- Inlet pressure - as low as 2oz/in² and up to 120psig



ATTACHMENT N

Supporting Calculations

Jay-Bee Oil & Gas, LLC

Bunker Run Compressor Station
Tyler County, WV

Source	Description	NOx lb/hr	CO lb/hr	CO2e lb/hr	VOC lb/hr	SO2 lb/hr	PM lb/hr	n-Hexane lb/hr	benzene lb/hr	formaldehyde lb/hr	Total HAPs lb/hr
CE-1	Compressor Engine # CE-2	5.91	0.62	1,557.6	0.75	0.007	0.11	0.012	0.005	0.162	0.367
CE-2	Compressor Engine # CE-3	5.91	0.62	1,557.6	0.75	0.007	0.11	0.012	0.005	0.162	0.367
RBV-1	750 MBTU/Hr Reboiler (NEW)	0.05	0.04	60.4	0.00	0.000	0.00	0.001	0.002	0.000	0.001
RSV-1	Dehy Still Vent (NEW)			484.0	7.40			0.123	0.094		1.347
---	Blowdowns ¹			N/A	N/A						N/A
T02	Tank Emissions (NEW)	0.01	0.02	16.0	0.03		0.00	0.005	0.005	0.000	0.002
---	Fugitive Dust (NEW)						2.17				
TL-1	Truck Loading Emissions (NEW)				N/A						N/A
---	Fittings Fugitive Emissions			29.7	0.07						0.002
Total		11.88	1.31	3,705	9.00	0.01	2.40	0.15	0.11	0.33	2.09

Source		NOx tpy	CO tpy	CO2e tpy	VOC tpy	SO2 tpy	PM tpy	n-Hexane TPY	benzene tpy	formaldehyde tpy	Total HAPs tpy
CE-1	Compressor Engine # CE-2	25.88	2.72	6,822	3.27	0.029	0.49	0.05	0.02	0.71	1.606
CE-2	Compressor Engine # CE-3	25.88	2.72	6,822	3.27	0.029	0.49	0.05	0.02	0.71	1.606
RBV-1	750 MBTU/Hr Reboiler (NEW)	0.22	0.18	265	0.01	0.001	0.02	0.00	0.00	0.00	0.004
RSV-1	Dehy Still Vent (NEW)			2,120	32.43			0.54	0.41		5.899
---	Blowdowns ¹			201	1.48						0.060
T02	Tank Emissions (NEW)	0.05	0.10	68.91	0.14		0.00	0.00	0.00	0.00	0.003
---	Fugitive Dust (NEW)						0.01				
TL-1	Truck Loading Emissions (NEW)				0.02						0.014
---	Fittings Fugitive Emissions			130	0.29						0.008
Total	Proposed	52.02	5.72	16,429	40.91	0.06	1.01	0.65	0.46	1.42	9.20
	Permitted	71.30	41.86	21,241	44.54	0.09	1.64	0.45	0.51	6.72	12.98
	Change	-19.28	-36.14	-4,812	-3.63	-0.03	-0.63	0.20	-0.05	-5.30	-3.78

¹ See Attachment C for Blowdown Calculations

² CO_{2e} was not calculated in the original permit application. This is an estimate, based on current calculations.

Jay-Bee Oil & Gas, LLC
ENGINE EMISSIONS

Bunker Run Compressor Station
Tyler County, WV

Proposed Emission Rates

Sources CE-2 and CE-3

Engine Data:

Engine Manufacturer	CAT	
Engine Model	3516B	
Type (Rich-burn or Low Emission)	Low Emissions	
Aspiration (Natural or Turbocharged)	Natural	
Turbocharge Cooler Temperature	130	deg. F
Manufacturer Rating	1,340	hp
Speed at Above Rating	1,400	rpm
Configuration (In-line or Vee)	V-16	
Number of Cylinders	16	
Engine Bore	6.700	inches
Engine Stroke	7.500	inches
Fuel Heat Content	1,155	BTU/scf
Engine Displacement	4,231	cu. in.
Fuel Consumption (HHV)	8,373	Btu/bhp-hr

Emission Rates:

	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	lb/mon/yr	
Oxides of Nitrogen, NOx	2.00	5.91	25.88	2,680	141.80		Comment
Carbon Monoxide CO	0.21	0.62	2.72	281	14.89		453.59 grams = 1 pound
VOC (NMNEHC)	0.25	0.75	3.27	339	17.94		2,000 pounds = 1 ton
CO2e		1558	6822.09				Catalyst Spec +10% Used for CO or
CO2	471	1391	6094.45	631,140	33394.24		Emission factors

Total Annual Hours of Operation

Total Annual Hours of Operation	8,760						
SO2		0.0067	0.0295			0.0003	
PM (Condensable+ Filterable)		0.1121	0.4909			0.0099	
CH ₄ as CO _{2e}	2.24	165.43	724.6			0.0022	Mfg. Spec Used
N ₂ O as CO _{2e}		0.6956	3.0469			0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0577	0.2526			0.00514	
acetaldehyde		0.0938	0.4108			0.00836	
formaldehyde	0.0550	0.1625	0.7117			0.0528	Catalyst Spec + 10% Used
biphenyl		0.0002	0.0010			0.000212	
benzene		0.0049	0.0216			0.00044	
toluene		0.0046	0.0201			0.000406	
ethylbenzene		0.0004	0.0020			3.97E-05	
xylene		0.0021	0.0090			0.000164	
methanol		0.028	0.1229			0.0025	
n-hexane		0.0125	0.0545			0.00111	
total HAPs		0.3667	1.6062			0.071194	

Exhaust Parameters:

Exhaust Gas Temperature	854	deg. F
Exhaust Gas Flow Rate	7651	acfm
Total Exhaust Gas Volume Flow, wet	7,651	acfm
Total Exhaust Gas Volume Flow, dry	127.5	acf per sec
Exhaust Stack Height	260	inches
	21.67	feet
Exhaust Stack Inside Diameter	20	inches
	1.667	feet
Exhaust Stack Velocity	58.4	ft/sec
	3,507.0	ft/min

$$3.1416 \times \frac{4}{x} \times \frac{\text{acfm}}{(\text{stack diameter})^2}$$

Jay-Bee Oil & Gas, LLC

Bunker Run Compressor Station
Tyler County, WV

Dehy Still Vent Emissions

SOURCE RSV-1

Still Vent Emissions (Un-Controlled)

From Gri GlyCalc 4.0

Dry Gas Rate 20 MMSCFD
Glycol Circulation Rate 3.0 gal/lb H2O
Treating Temperature 85 Deg F
Operating Pressure 900 psi

Data From GLYCalc:

Total HC	31.9585	lbs/hr	139.978	TPY
Methane	19.3617	lbs/hr	84.804	TPY
Total VOC	7.4038	lbs/hr	32.429	TPY
Total HAP	1.3468	lbs/hr	5.899	TPY
benzene	0.0943	lbs/hr	0.413	TPY
toluene	0.4740	lbs/hr	2.076	TPY
ethyl benzene	0.0000	lbs/hr	0.000	TPY
xylene	0.6556	lbs/hr	2.872	TPY
n-hexane	0.1229	lbs/hr	0.538	TPY

Jay-Bee Oil & Gas, LLC

**Bunker Run Compressor Station
Tyler County, WV**

Potential Emission Rates

Source RBV-1

Burner Duty Rating	500.0 Mbtu/hr
Burner Efficiency	98.0 %
Gas Heat Content (HHV)	1155.2 Btu/scf
Total Gas Consumption	10,599 scfd
H2S Concentration	0.000 Mole %
Hours of Operation	8760

NOx	0.0500	lbs/hr	0.219	TPY
CO	0.0420	lbs/hr	0.184	TPY
CO2	60.0	lbs/hr	262.9	TPY
CO2e	60	lbs/hr	265	tpy
VOC	0.0028	lbs/hr	0.012	TPY
SO2	0.0003	lbs/hr	0.001	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0038	lbs/hr	0.017	TPY
CHOH	0.0000	lbs/hr	0.000	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hexane	0.0009	lbs/hr	0.004	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0009	lbs/hr	0.004	TPY

AP-42 Factors Used

NOx	100 Lbs/MMCF	
CO	84 Lbs/MMCF	
CO ₂	120,000 Lbs/MMCF	Global Warming Potential = 1
VOC	5.5 Lbs/MMCF	
PM	7.6 Lbs/MMCF	
SO ₂	0.6 Lbs/MMCF	
CH ₄	2.3 Lbs/MMCF	Global Warming Potential = 25
N ₂ O	2.2 Lbs/MMCF	Global Warming Potential = 310
HCOH	0.075 Lbs/MMCF	
Benzene	0.0021 Lbs/MMCF	
n-Hexane	1.8 Lbs/MMCF	
Toluene	0.0034 Lbs/MMCF	

**Bunker Run Compressor Station
Tyler County, WV**

Potential Emission Rate

Enclosed Combustor Pilot

Burner Duty Rating 80.0 Mbtu/hr
 Burner Efficiency 99.0 %
 Gas Heat Content (HHV) 1155.2 Btu/scf
 Total Gas Consumption 1678.8 scfd
 H2S Concentration 0.000 Mole %
 Hours of Operation 8760

NOx	0.0079	lbs/hr	0.035	TPY
CO	0.0067	lbs/hr	0.029	TPY
CO2	9.5	lbs/hr	41.6	TPY
CO2e	10	lbs/hr	42	TPY
VOC	0.0004	lbs/hr	0.002	TPY
SO2	0.0000	lbs/hr	0.000	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0006	lbs/hr	0.003	TPY
CHOH	0.0000	lbs/hr	0.000	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hexane	0.0001	lbs/hr	0.001	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0001	lbs/hr	0.001	TPY

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	100 Lbs/MMCF	
CO	84 Lbs/MMCF	
CO ₂	120,000 Lbs/MMCF	Global Warming Potential = 1
VOC	5.5 Lbs/MMCF	
PM	7.6 Lbs/MMCF	
SO ₂	0.6 Lbs/MMCF	
CH ₄	2.3 Lbs/MMCF	Global Warming Potential = 25
N ₂ O	2.2 Lbs/MMCF	Global Warming Potential =310
HCOH	0.075 Lbs/MMCF	
Benzene	0.0021 Lbs/MMCF	
n-Hexane	1.8 Lbs/MMCF	
Toluene	0.0034 Lbs/MMCF	

**Bunker Run Compressor Station
Tyler County, WV**

Potential Emission Rates

Source VCU-1

Enclosed Vapor Combustor - Control of Tank Emissions

Destruction Efficiency 98.0 %
 Gas Heat Content (HHV) 2844.5 Btu/scf
 Max Flow to T-E 0.0004 MMSCFD 0.135 MMCF/Yr
 Max BTUs to Flare 0.043 MMBTU/Hr 384 MMBTU/Yr

NOx	0.00	lbs/hr	0.01	tpy
CO	0.02	lbs/hr	0.07	tpy
CO2	4.99	lbs/hr	22.4	tpy
CO2e	6.40	lb/hr	27.0	tpy
VOC	0.03	lb/hr	0.13	tpy
CH4	0.03	lbs/hr	0.1800	tpy
N2O	0.0000	lbs/hr	0.0000	tpy
PM	0.0001	lb/hr	0.0005	tpy
Benzene	0.0000	lb/hr	0.0000	tpy
CHOH	0.0000	lb/hr	0.0000	tpy
n-Hexane	0.0050	lb/hr	0.0030	tpy
Toluene	0.0000	lb/hr	0.0000	tpy
Total HAP	0.0023	lb/hr	0.0005	tpy

- Notes:
1. VOC, Total HAP, N-Hexane and CH4 emissions are taken from the Condensate and Produced Water Tank Emissions sheet in the Calculations Section.
 2. HAP emissions are based on AP-42 factors for combustion.

Factors Used

AP-42 Table 13.5-1	NOx	0.068 Lbs/MMBTU
AP-42 Table 13.5-1	CO	0.37 Lbs/MMBTU
40 CFR 98 Table C-1	CO2	116.89 Lbs/MMBTU
40 CFR 98 Table C-2	CH4	0.0022 Lbs/MMBTU
40 CFR 98 Table C-2	N2O	0.00022 Lbs/MMBTU
AP-42 Table 1.4-2	PM	7.6 lb/MMSCF
AP-42 Table 1.4-3	Benzene	0.0021 lb/MMSCF
AP-42 Table 1.4-3	Toluene	0.0034 lb/MMSCF
AP-42 Table 1.4-3	Hexane	1.8 lb/MMSCF
AP-42 Table 1.4-3	CHOH	0.075 lb/MMSCF

Jay-Bee Oil & Gas, LLC

Bunker Run Compressor Station
Tyler County, WV

Fugitive VOC Emissions

Volatile Organic Compounds, NMNEHC from gas analysis:	10.05	weight percent
Methane from gas analysis:	73.05	weight percent
Total HAPs from Gas Analysis	0.050	weight percent
Total HAP from Condensate Analysis	10.080	weight percent
Carbon Dioxide from gas analysis:	0.299	weight percent
Gas Density	0.0524	lb/scf

Emission Source:	Number	Oil & Gas Production*	VOC %	VOC, lb/hr	VOC TPY	HAP, lb/Hr	HAP TPY	CO2 lb/Hr	CO2 TPY	CH4 lb/hr	CH4 TPY	CO2e
Valves:												
Gas/Vapor:	170	0.02700 scf/hr	10.0	0.024	0.106	0.0001	0.001	0.001	0.003	0.176	0.7702	19.257
Light Liquid:	4	0.05000 scf/hr	100.0	0.010	0.046	0.0011	0.005					0.000
Heavy Liquid (Oil):	-	0.00050 scf/hr	100.0	0.000	0.000							0.000
Low Bleed Pneumatic	16	1.39000 scf/hr	10.0	0.117	0.513	0.0006	0.003	0.852	3.732	0.852	3.7317	97.023
Relief Valves:	8	0.04000 scf/hr	10.0	0.002	0.007	0.0000	0.000	0.000	0.000	0.012	0.0537	1.343
Open-ended Lines, gas:		0.06100 scf/hr	10.0	0.000	0.000	0.0000	0.000					0.000
Open-ended Lines, liquid:	-	0.05000 lb/hr	100.0	0.000	0.000							0.000
Pump Seals:												
Gas:	-	0.00529 lb/hr	10.0	0.000	0.000			0.000	0.000	0.000	0.0000	0.000
Light Liquid:	-	0.02866 lb/hr	100.0	0.000	0.000							0.000
Heavy Liquid (Oil):	-	0.00133 lb/hr	100.0	0.000	0.000							0.000
Compressor Seals, Gas:	6	0.01940 lb/hr	10.0	0.012	0.051	0.0000	0.000	0.000	0.002	0.004	0.0195	0.490
Connectors:												
Gas:	630	0.00300 scf/hr	10.0	0.010	0.044	0.0000	0.000	0.000	0.001	0.072	0.3171	7.929
Light Liquid:	0	0.00700 scf/hr	100.0	0.000	0.000	0.0000	0.000					0.000
Heavy Liquid (Oil):	-	0.00030 scf/hr	100.0	0.000	0.000							0.000
Flanges:												
Gas:	58	0.00086 lb/hr	10.0	0.005	0.022	0.0000	0.000	0.000	0.001	0.036	0.1596	3.991
Light Liquid:	16	0.00300 scf/hr	100.0	0.003	0.011	0.0000	0.000					0.000
Heavy Liquid:		0.0009 scf/hr	100.0	0.000	0.000							0.000

	lb/hr	t/y
VOC	0.066	0.287
HAP	0.002	0.008
CH4	0.301	1.320
CO2	0.002	0.007
CO2e	29.688	130.03

Notes: *Factors are from 40 CFR 98, Table W-1A (scf/hr), where available. Remaining are API (lb/hr)

Jay-Bee Oil & Gas, LLC

**Bunker Run Compressor Station
Tyler County, WV**

Engine Fuel (Inlet) Gas Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N2	0.365	0.102	0.004	0.542			-		0.0036	
Carbon Dioxide, CO2	0.128	0.056	0.002	0.299			-		0.0013	
Hydrogen Sulfide, H2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	85.879	13.778	0.476	73.054	781.0	867.4	8.184		0.8571	
Ethane, C2H6	10.072	3.029	0.105	16.059	163.0	178.2	1.680		0.0999	2.679
Propane	2.300	1.014	0.035	5.378	53.2	57.9	0.548	5.378	0.0226	0.630
Iso-Butane	0.313	0.182	0.006	0.965	9.4	10.2	0.097	0.965	0.0030	0.102
Normal Butane	0.436	0.253	0.009	1.344	13.1	14.2	0.135	1.344	0.0042	0.137
Iso Pentane	0.132	0.095	0.003	0.505	4.9	5.3	0.050	0.505	0.0013	0.048
Normal Pentane	0.092	0.066	0.002	0.352	3.4	3.7	0.035	0.352	0.0009	0.033
Hexane	0.119	0.119	0.004	0.631	5.2	5.7	0.054	0.631	0.0012	0.049
Heptane+	0.164	0.164	0.006	0.871	8.4	9.0	0.086	0.871	0.0016	0.075
	100.000	18.859	0.651		1,041.7	1,151.5	10.869	10.046	0.9968	3.753

Gas Density (STP) = 0.052

Ideal Gross (HHV)	1,151.5
Ideal Gross (sat'd)	1,132.3
GPM	-
Real Gross (HHV)	1,155.2
Real Net (LHV)	1,045.0

Jay-Bee Oil & Gas, Incorporated
Bunker Run Compressor Station
Condensate and Produced Water Tank Emissions

Utilizing direct measurements of the Gas to Oil (GOR) ratio and flash gas composition from a nearby Jay-Bee well pad, the attached calculation spreadsheet was used to determine uncontrolled VOC and HAP flash emissions from the accumulation tank of 6.0 tpy and 0.19 tpy respectively for the maximum annual throughput of 310 BBL/Yr of condensate. In a similar manner, flash emissions from the 120 BBL/Yr of produced water were projected to be 0.02 tpy of VOCs and less than 0.01 tpy of HAPs. Thus, total uncontrolled tank flash emissions are projected to be 6.0 tpy of VOCs and 0.195 tpy of HAPs.

Additionally, working and breathing losses from the condensate were determined utilizing EPA's Tanks 4.0.9 software using RVP 13 gasoline as a surrogate for condensate. Annual emissions (assumed to be 100% VOCs) were calculated at 1,424 lb/yr or 0.70 tpy (see Tanks report in the calculations). HAP emissions are assumed to be negligible, given the negligible HAP emissions in the flash gas. Thus, total annual un-controlled potential VOC emissions are estimated at 6.7 tpy (6.0 + 0.7) or 1.53 lb/hr. Total un-controlled HAP emissions are estimated at 0.195 tpy.

Methane will also be emitted at a maximum rate of 0.85 tpy from the condensate and less than 0.01 tpy from the produced water. Using the GHG factor of 25 for Methane, the CO_{2e} uncontrolled emission rate is 0.85 x 25 or 21.25 tpy of CO_{2e}

Organic emissions will be controlled at a minimum of 98% via an enclosed combustor. Actual control efficiency is anticipated to be higher, but only 98% is conservatively claimed. Thus, when in operation, VOC emissions will be controlled to 0.03 pounds per hour and 0.13 tpy. HAPs will be controlled to less than 0.01 pounds per hour and less than 0.01 tpy.

Loading to the combustor will be a combination of the flash gas and working/breathing losses or 9.28 tpy [8.54 tpy condensate flash gas + 0.03 tpy produced water flash gas + working/breathing losses of 0.71 tpy]. As shown in the calculation spreadsheet, the anticipated composition of this tank vapor has a density of 0.138 lb/scf. Thus, 368 SCFD and 0.135 MMSCF/yr [9.28x2000/0.138] are routed to the combustor. As this gas is estimated to have a HHV of 2844 BTU/scf, maximum heat loading to the combustor is estimated at 0.0436 MMBTU/hr and 384 MMBTU/yr. Emissions from the combustor are shown in the combustor worksheet.

Flash Emission Calculations

Using Gas-Oil Ratio Method

Un-Controlled

Site specific data

Gas-Oil-ratio	=	500 scf/bbl Using Actual GOR from RPT-8
Throughput	=	310 bbl/yr
Stock tank gas molecular weight	=	39.56 g/mole

Conversions

1 lb	=	453.6 g
1 mole	=	22.4 L
1 scf	=	28.32 L
1 ton	=	2000 lb

Equations

$$E_{TOT} = Q \frac{(bbl)}{(yr)} \times R \frac{(scf)}{(bbl)} \times \frac{28.32(L)}{1(scf)} \times \frac{1(mole)}{22.4(L)} \times MW \frac{(g)}{(mole)} \times \frac{1(lb)}{453.6(g)} \times \frac{1(ton)}{2000(lb)}$$

- E_{TOT} = Total stock tank flash emissions (TPY)
- R = Measured gas-oil ratio (scf/bbl)
- Q = Throughput (bbl/yr)
- MW = Stock tank gas molecular weight (g/mole)

$$E_{spec} = E_{TOT} \times X_{spec}$$

- E_{spec} = Flash emission from constituent
- X_{spec} = Weight fraction of constituent in stock tank gas

Flash Emissions

Constituent	TPY	
Total	8.5454	
VOC	5.9962	
Nitrogen	2.14E-03	
Carbon Dioxide	1.34E-02	
Methane	8.49E-01	
Ethane	1.69E+00	
Propane	2.21E+00	
Isobutane	5.99E-01	
n-Butane	1.38E+00	
2,2 Dimethylpropane	1.68E-02	
Isopentane	4.72E-01	
n-Pentane	4.95E-01	
2,2 Dimethylbutane	1.79E-02	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	2.59E-02	
2 Methylpentane	1.37E-01	
3 Methylpentane	8.21E-02	
n-Hexane	1.79E-01	HAP
Methylcyclopentane	1.31E-02	
Benzene	3.08E-03	HAP
Cyclohexane	1.85E-02	
2-Methylhexane	3.98E-02	
3-Methylhexane	3.91E-02	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	3.73E-02	
n-Heptane	5.76E-02	
Methylcyclohexane	3.58E-02	
Toluene	7.01E-03	HAP
Other C8's	5.85E-02	
n-Octane	1.95E-02	
Ethylbenzene	4.27E-04	HAP
M & P Xylenes	5.04E-03	HAP
O-Xylene	6.84E-04	HAP
Other C9's	2.43E-02	
n-Nonane	5.81E-03	
Other C10's	9.14E-03	
n-Decane	1.20E-03	
Undecanes (11)	1.28E-03	

E_{TOT}
Sum of C3+



FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

April 24, 2014

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Date Sampled: 04/07/14

Date Analyzed: 04/21/14

Sample: RPT 8-1

Job Number: J42794

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	Stock Tank
Pressure, psig	340	0
Temperature, °F	65	70
Gas Oil Ratio (1)	---	500
Gas Specific Gravity (2)	---	1.387
Separator Volume Factor (3)	1.2987	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.7700
Oil API Gravity at 60 °F	70.79
Reid Vapor Pressure, psi (5)	5.28

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	---	W-2408*	W-2423
Pressure, psig	340	299	297
Temperature, °F	65	66	66

(1) - Scf of flashed vapor per barrel of stock tank oil

(2) - Air = 1.000

(3) - Separator volume / Stock tank volume

(4) - Fraction of first stage separator liquid

(5) - Absolute pressure at 100 deg F

Analyst: M. G.

* Sample used for flash study

Base Conditions: 14.85 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-881-7015

April 23, 2014

FESCO, Ltd.
1160 Fesco Ave. - Alice, Texas 76332

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Gas Evolved from Hydrocarbon Liquid Fished
From 340 psig & 65 °F to 0 psig & 70 °F

Date Sampled: 04/07/14

Job Number: 42794.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.036	
Carbon Dioxide	0.141	
Methane	24.485	
Ethane	25.943	6.993
Propane	23.253	6.467
Isobutane	4.773	1.574
n-Butane	10.980	3.489
2-2 Dimethylpropane	0.106	0.042
Isopentane	3.027	1.116
n-Pentane	3.175	1.160
Hexanes	2.378	0.988
Heptanes Plus	<u>1.701</u>	<u>0.761</u>
Totals	100.000	22.579

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity _____ 3.699 (Air=1)

Molecular Weight _____ 102.69

Gross Heating Value _____ 8488 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity _____ 1.387 (Air=1)

Compressibility (Z) _____ 0.9850

Molecular Weight _____ 39.68

Gross Heating Value

Dry Basis _____ 2321 BTU/CF

Saturated Basis _____ 2282 BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)

Results: <0.013 Gr/100 CF, <0.2 FPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Analyst: MR
Processor: AL
Cylinder ID: 9TH# 20

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-881-7016

**CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2288**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.038		0.028
Carbon Dioxide	0.141		0.167
Methane	24.485		9.930
Ethane	25.943	6.993	19.719
Propane	23.253	6.457	25.920
Isobutane	4.773	1.574	7.013
n-Butane	10.960	3.489	16.132
2,2 Dimethylpropane	0.109	0.042	0.197
Isopentane	3.027	1.116	5.521
n-Pentane	3.175	1.180	5.791
2,2 Dimethylbutane	0.098	0.040	0.209
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.139	0.057	0.303
2 Methylpentane	0.736	0.309	1.608
3 Methylpentane	0.441	0.181	0.891
n-Hexane	0.964	0.400	2.100
Methylcyclopentane	0.072	0.025	0.153
Benzene	0.018	0.005	0.039
Cyclohexane	0.102	0.035	0.217
2-Methylhexane	0.184	0.069	0.466
3-Methylhexane	0.181	0.063	0.458
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.174	0.076	0.436
n-Heptane	0.266	0.124	0.674
Methylcyclohexane	0.189	0.069	0.419
Toluene	0.035	0.012	0.082
Other C8's	0.248	0.115	0.685
n-Octane	0.079	0.041	0.228
Ethylbenzene	0.002	0.001	0.005
M & P Xylenes	0.022	0.009	0.059
O-Xylene	0.003	0.001	0.008
Other C9's	0.089	0.046	0.284
n-Nonane	0.021	0.012	0.069
Other C10's	0.030	0.018	0.107
n-Decane	0.004	0.002	0.014
Undecanes (11)	0.004	0.002	0.015
Totals	100.000	22.579	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity _____	1.387	(Air=1)
Compressibility (Z) _____	0.9950	
Molecular Weight _____	38.68	
Gross Heating Value _____		
Dry Basis _____	2321	BTU/CF
Saturated Basis _____	2282	BTU/CF

Flash Emission Calculations - Produced Water

Using Gas-Water Ratio Method

Un-Controlled

Site specific data

Gas-Water-ratio	=	5 scf/bbl Using GOW from well pads
Throughput	=	120 bbl/yr
Stock tank gas molecular weight	=	39.56 g/mole

Conversions

1 lb	=	453.6 g
1 mole	=	22.4 L
1 scf	=	28.32 L
1 ton	=	2000 lb

Equations

$$E_{TOT} = Q \frac{(bbl)}{(yr)} \times R \frac{(scf)}{(bbl)} \times \frac{28.32(L)}{1(scf)} \times \frac{1(mole)}{22.4(L)} \times MW \frac{(g)}{(mole)} \times \frac{1(lb)}{453.6(g)} \times \frac{1(ton)}{2000(lb)}$$

- E_{TOT} = Total stock tank flash emissions (TPY)
- R = Measured gas-oil ratio (scf/bbl)
- Q = Throughput (bbl/yr)
- MW = Stock tank gas molecular weight (g/mole)

$$E_{spec} = E_{TOT} \times X_{spec}$$

- E_{spec} = Flash emission from constituent
- X_{spec} = Weight fraction of constituent in stock tank gas

Flash Emissions

Constituent	TPY	
Total	0.0331	
VOC	0.0232	
Nitrogen	8.27E-06	
Carbon Dioxide	5.19E-05	
Methane	3.28E-03	
Ethane	6.52E-03	
Propane	8.57E-03	
Isobutane	2.32E-03	
n-Butane	5.34E-03	
2,2 Dimethylpropane	6.52E-05	
Isopentane	1.83E-03	
n-Pentane	1.92E-03	
2,2 Dimethylbutane	6.91E-05	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	1.00E-04	
2 Methylpentane	5.32E-04	
3 Methylpentane	3.18E-04	
n-Hexane	6.95E-04	HAP
Methylcyclopentane	5.06E-05	
Benzene	1.19E-05	HAP
Cyclohexane	7.18E-05	
2-Methylhexane	1.54E-04	
3-Methylhexane	1.52E-04	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	1.44E-04	
n-Heptane	2.23E-04	
Methylcyclohexane	1.39E-04	
Toluene	2.71E-05	HAP
Other C8's	2.27E-04	
n-Octane	7.54E-05	
Ethylbenzene	1.65E-06	HAP
M & P Xylenes	1.95E-05	HAP
O-Xylene	2.65E-06	HAP
Other C9's	9.39E-05	
n-Nonane	2.25E-05	
Other C10's	3.54E-05	
n-Decane	4.63E-06	
Undecanes (11)	4.96E-06	

E_{TOT}
Sum of C3+

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

Identification	
User Identification:	Bunker Run Compressor Station
City:	Huntington
State:	West Virginia
Company:	Jay-Bee Oil & Gas
Type of Tank:	Vertical Fixed Roof Tank
Description:	Bunker Run 100 BBL Produced Fluids Tank
Tank Dimensions	
Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	7.00
Avg. Liquid Height (ft):	3.00
Volume (Gallons):	3,711.66
Turnovers:	3.51
Net Throughput(gal/yr):	13,027.93
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Light
Shell Condition:	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	0.10
Slope (ft/ft) (Cone Roof)	0.02
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03
Meteorological Data used in Emissions Calculations: Huntington, West Virginia (Avg Atmospheric Pressure = 14.33 psia)	

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

Bunker Run Compressor Station - Vertical Fixed Roof Tank
Huntington, West Virginia

Mixture/Component	Month			Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
	Avg.	Min.	Max.	Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 13)	61.42	53.10	69.74	7.1329	6.0961	8.3049	57.08	62.0000	62.0000	92.00	Option 4: RVP=13, ASTM Slope=3				

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

Emissions Report for: Annual

Bunker Run Compressor Station - Vertical Fixed Roof Tank
Huntington, West Virginia

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 13)	137.18	1,286.52	1,423.70

Condensate Truck Loading Lost Emissions Per AP-42

Per AP-42, Chapter 5.2.2.1.1, the uncontrolled loading loss emission factor L_L can be estimated as follows:

$$L_L = 12.46[SPM/T]$$

Where:

L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded

S= saturation factor (0.6)

P=true vapor pressure of liquid loaded: 3.1 psia (see attached condensate analysis report)

M= Molecular weight of vapor in lb/lb-mole 66.64(see attached condensate analysis report)

T= temperature of bulk liquid loaded in deg R or 460+deg F (70 Deg F)

Thus, $L_L = 12.46[0.6 \times 3.1 \times 66.64]/[460+60]$

$L_L = 2.97$ lb/1000 gallons loaded

Based on sample data of breathing vapor at a nearby Jay-Bee facility (attached), these emissions are 99.6% VOCs. It is assumed that vapor composition from truck loading is the same as that from the tank breathing vapors.

Given a maximum loading of 85 BBL (3750 gallons) a day, uncontrolled VOC emissions are estimated at 11.09 lb of VOC per day $[3.75 \times 2.97 \times .996]$. There is no control on tank truck loading. With all daily loading taking place within 1 hour, the average hourly un-controlled emission rate is therefore estimated at 11.09 lb/hr.

Maximum annual throughput is 13,020 gallons (310 barrels) of condensate per year. Thus, un-captured/un-controlled VOC emissions are conservatively estimated at 38.5 pounds per year $[13.02 \times 2.97 \times .996]$ or 0.02 tons per year.

Based on the attached analysis of a representative tank's breathing emissions, HAPs represent 6.8 percent of the emissions. Thus, daily HAPs emissions equal $3.75 \times 2.97 \times 0.068$ or 0.76 lb/hr. Annual maximum HAPs emissions are estimated at 2.62 lb/yr $[13.02 \times 2.97 \times 0.068]$ or 0.0013 tpy.

There are no significant VOC or HAP emissions anticipated from the loading of produced water.

May 2, 2014

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Breathing Vapor
From 0 psig & 70 °F to 0 psig & 100 °F

Date Sampled: 04/07/14

Job Number: 42794.011

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2285

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.185	
Carbon Dioxide	0.018	
Methane	0.000	
Ethane	0.202	0.054
Propane	10.137	2.815
Isobutane	8.852	2.920
n-Butane	30.167	9.586
2-2 Dimethylpropane	0.370	0.142
Isopentane	15.123	5.574
n-Pentane	17.412	6.361
Hexanes	13.180	5.468
Heptanes Plus	4.374	1.881
Totals	100.000	34.799

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity _____ 3.547 (Air=1)
Molecular Weight _____ 88.01
Gross Heating Value _____ 8251 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity _____ 2.412 (Air=1)
Compressibility (Z) _____ 0.9539
Molecular Weight _____ 66.84
Gross Heating Value _____
Dry Basis _____ 8921 BTU/CF
Saturated Basis _____ 3858 BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Analyst: MR
Processor: AL
Cylinder ID: 8TW 21

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

**CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2298**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.185		0.078
Carbon Dioxide	0.018		0.012
Methane	0.000		0.001
Ethane	0.202	0.054	0.091
Propane	10.137	2.815	6.708
Isobutane	8.852	2.920	7.721
n-Butane	30.167	9.588	28.312
2,2 Dimethylpropane	0.370	0.142	0.401
Isopentane	15.123	5.574	16.574
n-Pentane	17.412	6.381	18.862
2,2 Dimethylbutane	0.570	0.240	0.737
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.805	0.332	1.041
2 Methylpentane	4.259	1.782	5.508
3 Methylpentane	2.477	1.019	3.203
n-Hexane	5.049	2.093	6.529
Methylcyclopentane	0.358	0.124	0.450
Benzene	0.078	0.022	0.081
Cyclohexane	0.432	0.148	0.545
2-Methylhexane	0.808	0.284	0.911
3-Methylhexane	0.589	0.261	0.858
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.849	0.285	0.988
n-Heptane	0.558	0.306	0.989
Methylcyclohexane	0.408	0.165	0.801
Toluene	0.071	0.024	0.088
Other C8's	0.379	0.178	0.827
n-Octane	0.082	0.042	0.141
Ethylbenzene	0.002	0.001	0.003
M & P Xylenes	0.020	0.008	0.032
O-Xylene	0.002	0.001	0.003
Other C9's	0.048	0.025	0.091
n-Nonane	0.007	0.004	0.013
Other C10's	0.005	0.003	0.011
n-Decane	0.002	0.001	0.004
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	34.798	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.412	(At=1)
Compressibility (Z)	0.9539	
Molecular Weight	66.84	
Gross Heating Value		
Dry Basis	3921	BTU/GF
Saturated Basis	3853	BTU/GF

Case Name: Jay-Bee - Bunker Run
 File Name: C:\Rogers_Files\Misc\Jay-Bee Oil & Gas\Bunker Run\20 MMSCFD Un-Controlled
 6-05-15.ddf
 Date: June 05, 2015

DESCRIPTION:

 Description: 20 MMSCFD
 No Flash Tank
 TEG REcirc Ratio of 3.0 gal/lb H2O
 No Controls

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

 Temperature: 85.00 deg. F
 Pressure: 900.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1280
Nitrogen	0.3650
Methane	85.8790
Ethane	10.0720
Propane	2.3000
Isobutane	0.3130
n-Butane	0.4360
Isopentane	0.1320
n-Pentane	0.0920
n-Hexane	0.0360
Cyclohexane	0.0050
Other Hexanes	0.0770
Heptanes	0.0640
Benzene	0.0010
Toluene	0.0030
Xylenes	0.0020
C8+ Heavies	0.0910

DRY GAS:

 Flow Rate: 20.0 MMSCF/day
 Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

 Glycol Type: TEG
 Water Content: 1.5 wt% H2O
 Recirculation Ratio: 3.0 gal/lb H2O

PUMP:

 Glycol Pump Type: Gas Injection

Case Name: Jay-Bee - Bunker Run
 File Name: C:\Rogers_Files\Misc\Jay-Bee Oil & Gas\Bunker Run\20 MMSCFD Un-Controlled
 6-05-15.ddf
 Date: June 05, 2015

DESCRIPTION:

Description: 20 MMSCFD
 No Flash Tank
 TEG Recirc Ratio of 3.0 gal/lb H2O
 No Controls

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	19.3617	464.680	84.8041
Ethane	5.1931	124.634	22.7457
Propane	2.0277	48.666	8.8815
Isobutane	0.4126	9.903	1.8074
n-Butane	0.6573	15.776	2.8791
Isopentane	0.2437	5.850	1.0676
n-Pentane	0.1959	4.702	0.8582
n-Hexane	0.1229	2.949	0.5382
Cyclohexane	0.0563	1.350	0.2465
Other Hexanes	0.2204	5.289	0.9652
Heptanes	0.3895	9.347	1.7059
Benzene	0.0943	2.264	0.4132
Toluene	0.4740	11.376	2.0762
Xylenes	0.6556	15.733	2.8713
C8+ Heavies	1.8535	44.483	8.1182
Total Emissions	31.9585	767.004	139.9783
Total Hydrocarbon Emissions	31.9585	767.004	139.9783
Total VOC Emissions	7.4038	177.690	32.4284
Total HAP Emissions	1.3468	32.323	5.8989
Total BTEX Emissions	1.2239	29.373	5.3607

EQUIPMENT REPORTS:

ABSORBER

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

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 3.10 lbs. H₂O/MMSCF

Temperature: 85.0 deg. F
 Pressure: 900.0 psig
 Dry Gas Flow Rate: 20.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.1597 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 40.44 lbs. H₂O/MMSCF
 Specified Lean Glycol Recirc. Ratio: 3.00 gal/lb H₂O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.67%	92.33%
Carbon Dioxide	99.90%	0.10%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%
Propane	99.97%	0.03%
Isobutane	99.95%	0.05%
n-Butane	99.94%	0.06%
Isopentane	99.94%	0.06%
n-Pentane	99.92%	0.08%
n-Hexane	99.88%	0.12%
Cyclohexane	99.45%	0.55%
Other Hexanes	99.91%	0.09%
Heptanes	99.78%	0.22%
Benzene	94.56%	5.44%
Toluene	92.25%	7.75%
Xylenes	86.00%	14.00%
C8+ Heavies	99.51%	0.49%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	27.40%	72.60%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.25%	99.75%
n-Pentane	0.29%	99.71%
n-Hexane	0.34%	99.66%
Cyclohexane	2.91%	97.09%

Other Hexanes	0.62%	99.38%
Heptanes	0.40%	99.60%
Benzene	4.95%	95.05%
Toluene	7.85%	92.15%
Xylenes	12.89%	87.11%
C8+ Heavies	10.91%	89.09%

STREAM REPORTS:

WET GAS STREAM

Temperature: 85.00 deg. F
 Pressure: 914.70 psia
 Flow Rate: 8.34e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.52e-002	3.37e+001
Carbon Dioxide	1.28e-001	1.24e+002
Nitrogen	3.65e-001	2.25e+002
Methane	8.58e+001	3.03e+004
Ethane	1.01e+001	6.65e+003
Propane	2.30e+000	2.23e+003
Isobutane	3.13e-001	4.00e+002
n-Butane	4.36e-001	5.57e+002
Isopentane	1.32e-001	2.09e+002
n-Pentane	9.19e-002	1.46e+002
n-Hexane	3.60e-002	6.81e+001
Cyclohexane	5.00e-003	9.24e+000
Other Hexanes	7.69e-002	1.46e+002
Heptanes	6.39e-002	1.41e+002
Benzene	9.99e-004	1.72e+000
Toluene	3.00e-003	6.07e+000
Xylenes	2.00e-003	4.66e+000
C8+ Heavies	9.09e-002	3.40e+002
Total Components	100.00	4.15e+004

DRY GAS STREAM

Temperature: 85.00 deg. F
 Pressure: 914.70 psia
 Flow Rate: 8.33e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.54e-003	2.59e+000
Carbon Dioxide	1.28e-001	1.24e+002
Nitrogen	3.65e-001	2.25e+002
Methane	8.59e+001	3.03e+004

Ethane	1.01e+001	6.65e+003
Propane	2.30e+000	2.23e+003
Isobutane	3.13e-001	3.99e+002
n-Butane	4.36e-001	5.56e+002
Isopentane	1.32e-001	2.09e+002
n-Pentane	9.19e-002	1.46e+002
n-Hexane	3.60e-002	6.81e+001
Cyclohexane	4.97e-003	9.19e+000
Other Hexanes	7.69e-002	1.46e+002
Heptanes	6.39e-002	1.41e+002
Benzene	9.46e-004	1.62e+000
Toluene	2.77e-003	5.60e+000
Xylenes	1.72e-003	4.01e+000
C8+ Heavies	9.06e-002	3.39e+002

Total Components	100.00	4.15e+004

LEAN GLYCOL STREAM

 Temperature: 85.00 deg. F
 Flow Rate: 1.39e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	7.72e+002
Water	1.50e+000	1.18e+001
Carbon Dioxide	1.57e-012	1.23e-011
Nitrogen	2.18e-013	1.71e-012
Methane	8.71e-018	6.83e-017
Ethane	8.32e-008	6.53e-007
Propane	3.90e-009	3.06e-008
Isobutane	7.03e-010	5.51e-009
n-Butane	1.07e-009	8.40e-009
Isopentane	7.94e-005	6.23e-004
n-Pentane	7.20e-005	5.65e-004
n-Hexane	5.37e-005	4.21e-004
Cyclohexane	2.15e-004	1.68e-003
Other Hexanes	1.76e-004	1.38e-003
Heptanes	1.98e-004	1.55e-003
Benzene	6.27e-004	4.91e-003
Toluene	5.15e-003	4.04e-002
Xylenes	1.24e-002	9.70e-002
C8+ Heavies	2.89e-002	2.27e-001

Total Components	100.00	7.84e+002

RICH GLYCOL AND PUMP GAS STREAM

 Temperature: 85.00 deg. F
 Pressure: 914.70 psia
 Flow Rate: 1.53e+000 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.11e+001	7.72e+002
Water	5.07e+000	4.29e+001
Carbon Dioxide	2.29e-002	1.94e-001
Nitrogen	1.72e-002	1.46e-001
Methane	2.28e+000	1.94e+001
Ethane	6.13e-001	5.19e+000
Propane	2.39e-001	2.03e+000
Isobutane	4.87e-002	4.13e-001
n-Butane	7.76e-002	6.57e-001
Isopentane	2.88e-002	2.44e-001
n-Pentane	2.32e-002	1.96e-001
n-Hexane	1.46e-002	1.23e-001
Cyclohexane	6.84e-003	5.80e-002
Other Hexanes	2.62e-002	2.22e-001
Heptanes	4.61e-002	3.91e-001
Benzene	1.17e-002	9.92e-002
Toluene	6.07e-002	5.14e-001
Xylenes	8.88e-002	7.53e-001
C8+ Heavies	2.45e-001	2.08e+000
Total Components	100.00	8.47e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
 Pressure: 14.70 psia
 Flow Rate: 1.22e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.37e+001	3.12e+001
Carbon Dioxide	1.37e-001	1.94e-001
Nitrogen	1.61e-001	1.46e-001
Methane	3.75e+001	1.94e+001
Ethane	5.36e+000	5.19e+000
Propane	1.43e+000	2.03e+000
Isobutane	2.20e-001	4.13e-001
n-Butane	3.51e-001	6.57e-001
Isopentane	1.05e-001	2.44e-001
n-Pentane	8.43e-002	1.96e-001
n-Hexane	4.43e-002	1.23e-001
Cyclohexane	2.07e-002	5.63e-002
Other Hexanes	7.94e-002	2.20e-001
Heptanes	1.21e-001	3.89e-001
Benzene	3.75e-002	9.43e-002
Toluene	1.60e-001	4.74e-001
Xylenes	1.92e-001	6.56e-001
C8+ Heavies	3.38e-001	1.85e+000
Total Components	100.00	6.35e+001



Certificate of Analysis
 Number: 2030-14090166-004A

Carencro Laboratory
 4790 NE Evangeline Thruway
 Carencro, LA 70520

Gary Vermillion
 Gas Analytical Services
 PO Box 1028
 Bridgeport, WV 26330

Sep. 17, 2014

Field: Jay Bee Oil & Gas
 Station Name: FG2/Bunker Run Fuel Gas
 Station Number:
 Sample Point: Submeter
 Analyzed: 09/16/2014 16:23:04 by CC39

Sampled By: TD-GAS
 Sample Of: Gas Spot
 Sample Date: 08/28/2014 14:30
 Sample Conditions: 179 psig
 Method: GPA 2286
 Cylinder No: 0143

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.73 psia	
Nitrogen	0.365	0.542		
Carbon Dioxide	0.128	0.299		
Methane	85.879	73.047		GPM TOTAL C2+ 3.780
Ethane	10.072	16.058	2.700	
Propane	2.300	5.377	0.635	
Iso-Butane	0.313	0.965	0.102	
n-Butane	0.436	1.344	0.137	
Iso-Pentane	0.132	0.505	0.048	
n-Pentane	0.092	0.352	0.033	
i-Hexanes	0.077	0.338	0.030	
n-Hexane	0.036	0.168	0.015	
Benzene	0.001	0.006	NIL	
Cyclohexane	0.005	0.024	0.002	
i-Heptanes	0.046	0.246	0.021	
n-Heptane	0.018	0.098	0.008	
Toluene	0.003	0.015	0.001	
i-Octanes	0.044	0.263	0.020	
n-Octane	0.010	0.062	0.005	
Ethylbenzene	NIL	0.002	NIL	
Xylenes	0.002	0.016	0.001	
i-Nonanes	0.019	0.112	0.009	
n-Nonane	0.006	0.040	0.003	
Decane Plus	0.016	0.131	0.010	
	100.000	100.000	3.780	

Physical Properties	Total	C10+
Calculated Molecular Weight	18.86	140.65
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft ³ @ 14.73 psia & 60°F		
Real Gas Dry BTU	1158.1	7430.5
Water Sat. Gas Base BTU	1138.0	7301.2
Relative Density Real Gas	0.8527	4.8540
Compressibility Factor	0.9971	

Patricia L. Peters

Hydrocarbon Laboratory Manager

Quality Assurance:

The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

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	3
p =	Number of days per year with precipitation >0.01 in.	157	157

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	Produced Fluids Tanker Truck	14	27	10	0.34	1	6	None	0
2									
3									
4									
5									
6									
7									
8									

Source: AP-42 Fifth Edition – 13.2.2 Unpaved Roads

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

Where:

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	10	3
S =	Mean vehicle speed (mph)	10	10
W =	Mean vehicle weight (tons)	27	27
w =	Mean number of wheels per vehicle	18	18
p =	Number of days per year with precipitation >0.01 in.	157	157

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	2.17	0.01	2.17	0.01	0.29	<0.01	0.29	<0.01
2								
3								
4								
5								
6								
7								
8								
TOTALS	2.17	0.01	2.17	0.01	0.29	<0.01	0.29	<0.01

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 =	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	None						
2							
3							
4							
5							
6							
7							
8							

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

$$E = 0.077 \times I \times (4 + n) \times (s + 10) \times (L + 1000) \times (W + 3)^{0.7} =$$

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: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] =$ lb/hr

For TPY: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] \times [Ton \div 2000 lb] =$ 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 O
Monitoring, Recordkeeping, Reporting and
Testing Plan

ATTACHMENT O

JAY-BEE OIL & GAS, Inc.

Bunker Run Compressor Station

Monitoring, Recordkeeping, Reporting and Testing Plan

I. Monitoring

Engines

Jay-Bee Oil & Gas (Jay-Bee) will monitor and record engine hours of operation on a daily basis. Additionally, Jay-Bee will monitor the amount of gas managed by the station on a daily basis as well as gas consumed in operating the compressor engines on a daily basis. Together, this information will allow the company to determine emissions for each engine, utilizing the catalyst manufacturer's warranted emission factors.

The air to fuel ratio will be monitored on a weekly basis to ensure proper operation of the catalytic converters. Additionally, the catalytic converters will be inspected and maintained in accordance with the manufacturer's specifications.

Dehydration Unit

Jay-Bee will monitor and record the throughput of wet gas to the dehydration unit on a daily basis.

Waste Liquids Tank

Jay-Bee will monitor and record the volume of dehydration water and separator dump liquids being loading out on a monthly basis.

II. Recordkeeping

Jay-Bee will maintain accurate operating records of all engines and the dehydration unit for each calendar year. Records will include monthly fuel consumption (facility-wide), hours of operation for each engine and the amount of gas managed by the facility. These records will be signed and dated by an authorized representative.

All inspections, preventive maintenance, failures, duration of failure events, replacements and/or repair of catalytic converters will be recorded, signed and dated by an authorized representative.

All inspections, maintenance, failures, replacements and/or repair of valves and non-welded connections will be recorded, signed and dated by an authorized representative.

All records will be kept either on site or at the nearest office location for a period of at least five (5) years.

III. Testing

Jay-Bee will continue to conduct emissions testing of the engines as stipulated under Subpart JJJJ to demonstrate compliance with the emission rates set forth in the permit application. No routine testing of the dehydration unit is anticipated.

IV. Reporting

Jay-Bee will submit certified emission statements on an annual basis in accordance with WVDEP, Division of Air Quality requirements.