west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25 4
Phone (304) 926-0475
Fax (304) 926-0479
www.dep.wv.gov

G70-D GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

☐CONSTRUCTION
☒MODIFICATION
☐RELOCATION
☐CLASS I ADMINISTRATIVE UPDATE
☐CLASS II ADMINISTRATIVE UPDATE

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Jay-Bee Oil & Gas, Inc.

Federal Employer ID No. (FEIN): 55-073-8862

Applicant's Mailing Address: 3570 Shields Hill Road

City: Cairo | State: West Virginia | ZIP Code: 26337

Facility Name: Dopey Well Pad Production Facility

Operating Site Physical Address: Off Indian Creek Road
If none available, list road, city or town and zip of facility.

City: Middlebourne | Zip Code: 26149 | County: Tyler

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.43806
Longitude: -80.77255

SIC Code: 1311

NAICS Code: 211111

DAQ Facility ID No. (For existing facilities)
095-00070

CERTIFICATION OF INFORMATION

This G70-D General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G70-D Registration Application will be returned to the applicant. Furthermore, if the G70-D forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that Shane Dowell is an Authorized Representative and, in that capacity, shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Division of Air Quality immediately.

I hereby certify that all information contained in this G70-D General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature: Shane M Dowell
Name and Title: Shane Dowell | Phone: 304-628-3119 | Fax:
Email: sdowell@jaybeeoil.com | Date: 7-17-2017

If applicable:
Authorized Representative Signature: _____
Name and Title: | Phone: | Fax:
Email: | Date:

If applicable:
Environmental Contact
Name and Title: | Phone: | Fax:
Email: | Date:

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: Natural gas production and separation of liquids. Then, the facility will dehydrate the gas and inject it into a gather line owned and operated by others. There is no compression at this time.
Directions to the facility: **From Middlebourne, proceed southeast on State Route 18 (Main Street) out of town. Proceed approximately 5.8 miles to the junction with CR 1/3 (Indian Creek Road) on the left. From WV 18 and Indian Creek (CR13) intersection, take Indian Creek Rd east for 4.4 miles. Turn right onto lease road and follow north for 0.2 miles to well pad entrance.**

ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1] ☒$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
☒ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☐ Pneumatic Controllers Data Sheet – Attachment Q	
☐ Pneumatic Pump Data Sheet – Attachment R	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
☒ Facility-wide Emission Summary Sheet(s) – Attachment U	
☒ Class I Legal Advertisement – Attachment V	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

ATTACHMENT A
SINGLE SOURCE DETERMINATION FORM

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term "adjacent" and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

Is there equipment and activities in the same industrial grouping (defined by SIC code)?
Yes ☒ No ☐

Is there equipment and activities under the control of the same person/people?
Yes ☒ No ☐

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?
Yes ☐ No ☒

The closest Jay-Bee facility to the Dopey Well Pad Production Facility is its Doc Well Pad Production Facility that is classified under the same SIC code and may, from time to time, share staff. The two well pads are approximately 4,100 feet (0.78 miles) apart and they are not on contiguous or adjacent parcels. Lastly, there is no interconnection or interdependency between these two facilities and the operation of the well pads is not codependent.

ATTACHMENT B
SITING CRITERIA WAIVER

ATTACHMENT B - SITING CRITERIA WAIVER
Not applicable

ATTACHMENT C
CURRENT BUSINESS CERTIFICATE

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 Commissioner
in accordance with W.Va. Code §11-12

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

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

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

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

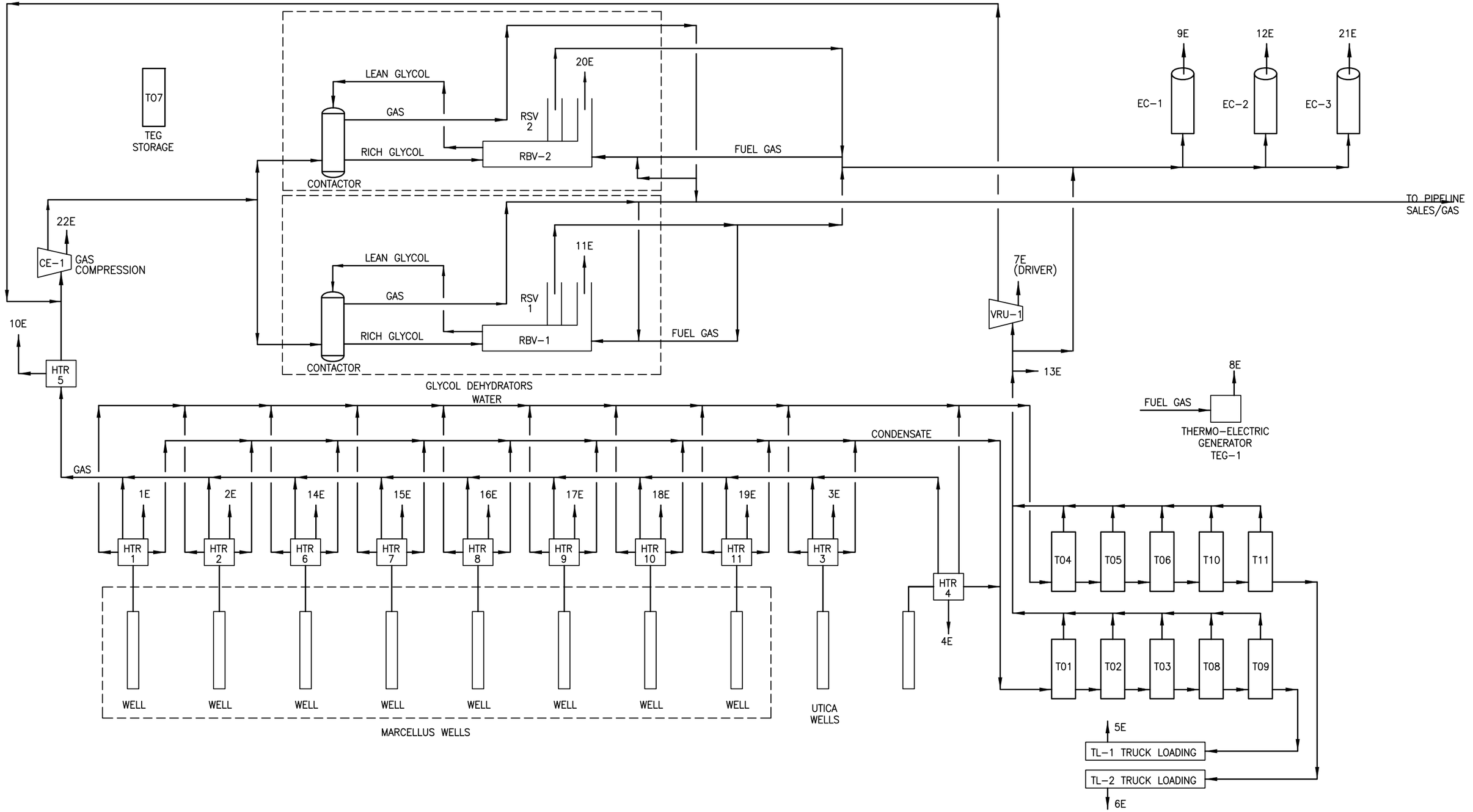
TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

all.006 v.1
L1388190484

SCANNED

JUN 24 2010

ATTACHMENT D
PROCESS FLOW DIAGRAM



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DATE	7/14/17
CHECKED BY	RAD
SET JOB NO.	214054–17
SET DWG FILE	DOPEY FDb01.dwg
DRAWING SCALE	N.T.S.

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

JAY–BEE OIL & GAS, INC.

DOPEY WELL PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
PROCESS FLOW DIAGRAM

DRAWING NAME: FIGURE 1

REV.: 0

ATTACHMENT E
PROCESS DESCRIPTION

Jay-Bee Oil & Gas, Incorporated
Dopey Well Pad Production Facility
Attachment E
Process Description

Current Operations

Jay-Bee Oil & Gas currently operates the Dopey Production Facility under WVDEP General Registration Permit G70-C210. At this facility, natural gas and produced fluids (condensate and water) are received from three unconventional shale gas wells (two Marcellus and one Utica). The products pass through gas processing units (GPU) (one per Marcellus well and two on the Utica well). The materials then pass through a three-way separator where gas, condensate, and water are separated. The facility then dehydrates the gas with a glycol dehydrator that is rated at 40 million standard cubic feet per day (mmscfd) of dry gas production before the gas is transferred to a gathering pipeline owned and operated by others.

Condensate and produced water are currently accumulated in six (6) 210 BBL tanks (three for Condensate and three for Produced Water), pending truck transportation by others. The condensate is transported to a regional processing facility and the produced water is transported to a regional disposal facility. Flash, working, and breathing losses from these tanks is routed to a vapor recovery unit (VRU) that routes the captured vapors back to the dehydration inlet line. An enclosed combustor with a maximum design heat input (MDHI) of 10 million British thermal unit per hour (mmBtu/hr) serves as a backup control device for times when the VRU is not available and also if a large slug of condensate should generate a volume of flash gas that exceeds the capacity of the VRU. A capture and control efficiency of 98% is being claimed for this combination of controls.

The existing 40 mmscfd dehydration unit generates emissions from its still vent and re-boiler. Vapors from the still vent consist of water and various low molecular weight hydrocarbons. Still vent vapors are routed to a second 10-mmBtu/hr enclosed combustor. A capture and control efficiency of 98% is claimed for the combustor. Although needs are minimal, supplemental re-boiler fuel is available from the dehydrated gas stream prior to injection into the sales line. Any water condensing in the still vent column is routed to the produced water tanks.

Jay-Bee also operates a thermo-electric generator to meet the minor electric demands for various monitoring and data tracking equipment.

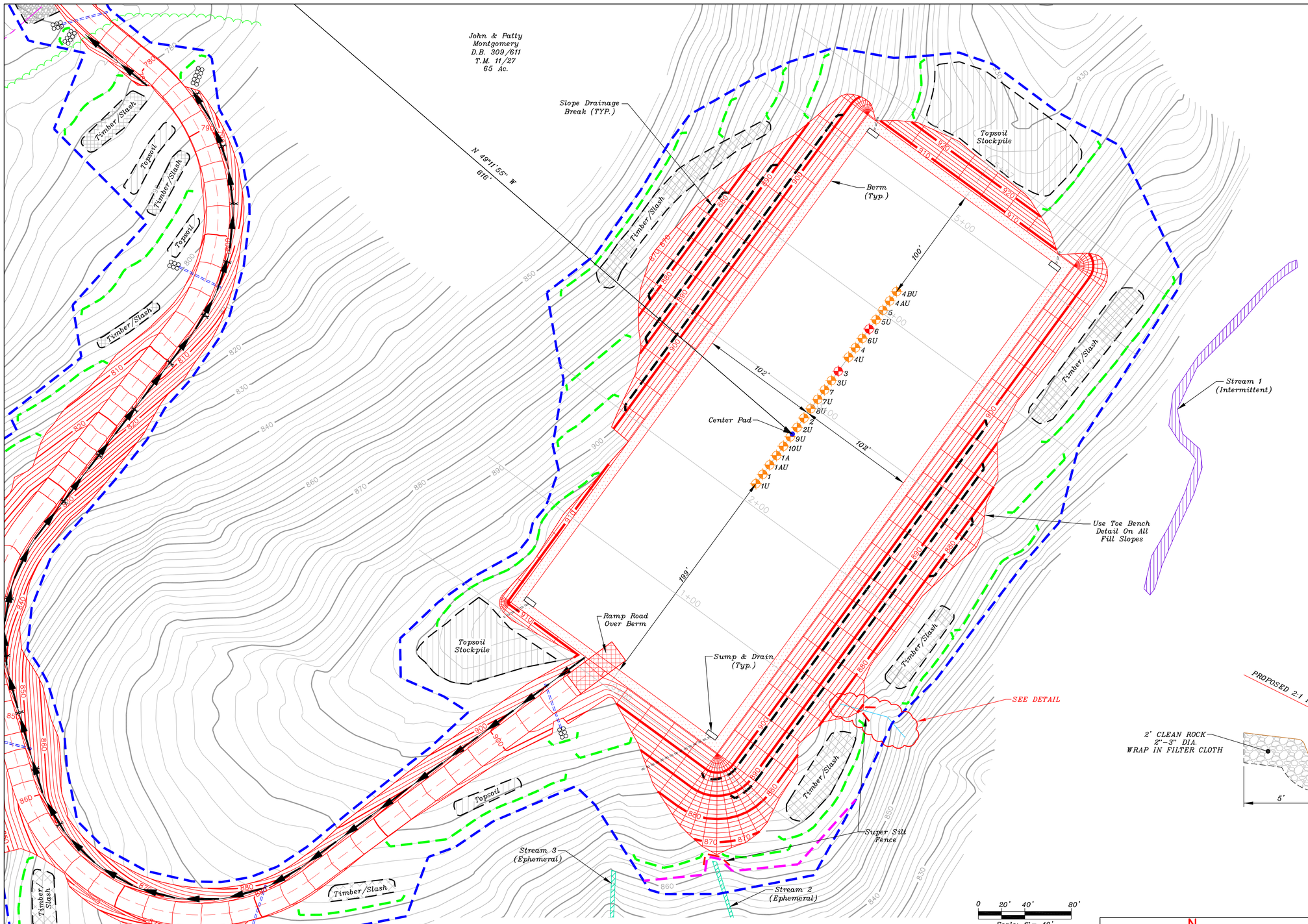
At this site, all gas fired equipment uses natural gas produced on site as fuel.

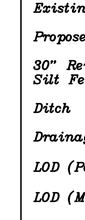
Planned Modifications

In this application, Jay-Bee is seeking to expand this facility to include six additional Marcellus wells and one additional Utica well. Each new well will be equipped with a new GPU. The existing Utica well will have one of its two GPUs removed leaving each of the ten total wells being equipped with a single GPU. Following the GPUs, the gas flow will undergo compression using a new Caterpillar G3608TALE compressor engine. The dehydration system will be modified by adding a 20-mmscfd glycol dehydrator.

Produced fluids will continue to be routed to the onsite tank farm that will be modified by adding two new 201-BBL condensate tanks and two new 210-BBL produced water tanks. Tank flash vapors emissions will be captured by the existing VRU, that will be backed-up by a series of three 10-mmBtu/hr enclosed combustors, which include the two existing units and one new unit. The combustors will also control emissions from the still vents off the two glycol dehydrators. The three combustors will be connected via an inlet manifold to accommodate the total heat load of the flash gases and the still vents.

ATTACHMENT F
PLOT PLAN





LEGEND

- Existing
- Proposed
- 30" Reinforced Silt Fence
- Ditch
- Drainage Feature
- LOD (Permit)
- LOD (Modified)
- Property Line
- Right of Way
- Slope Drainage Break
- Overhead Electric

Notes:
1. No water wells were found within 250' of the well location. One dwelling was found within 616' of the center of the well pad, as shown also on Sheet 6.

2. Stack all marketable timber on the property from which it was cut.

John & Patty
Montgomery
D.B. 309/611
T.M. 11/27
65 Ac.

FRENCH DRAIN DETAIL

NOTE: ALL DRILL PITS & SUMPS SHALL BE LINED WITH HDPE LINER HAVING A MINIMUM THICKNESS OF 60 MILLS.

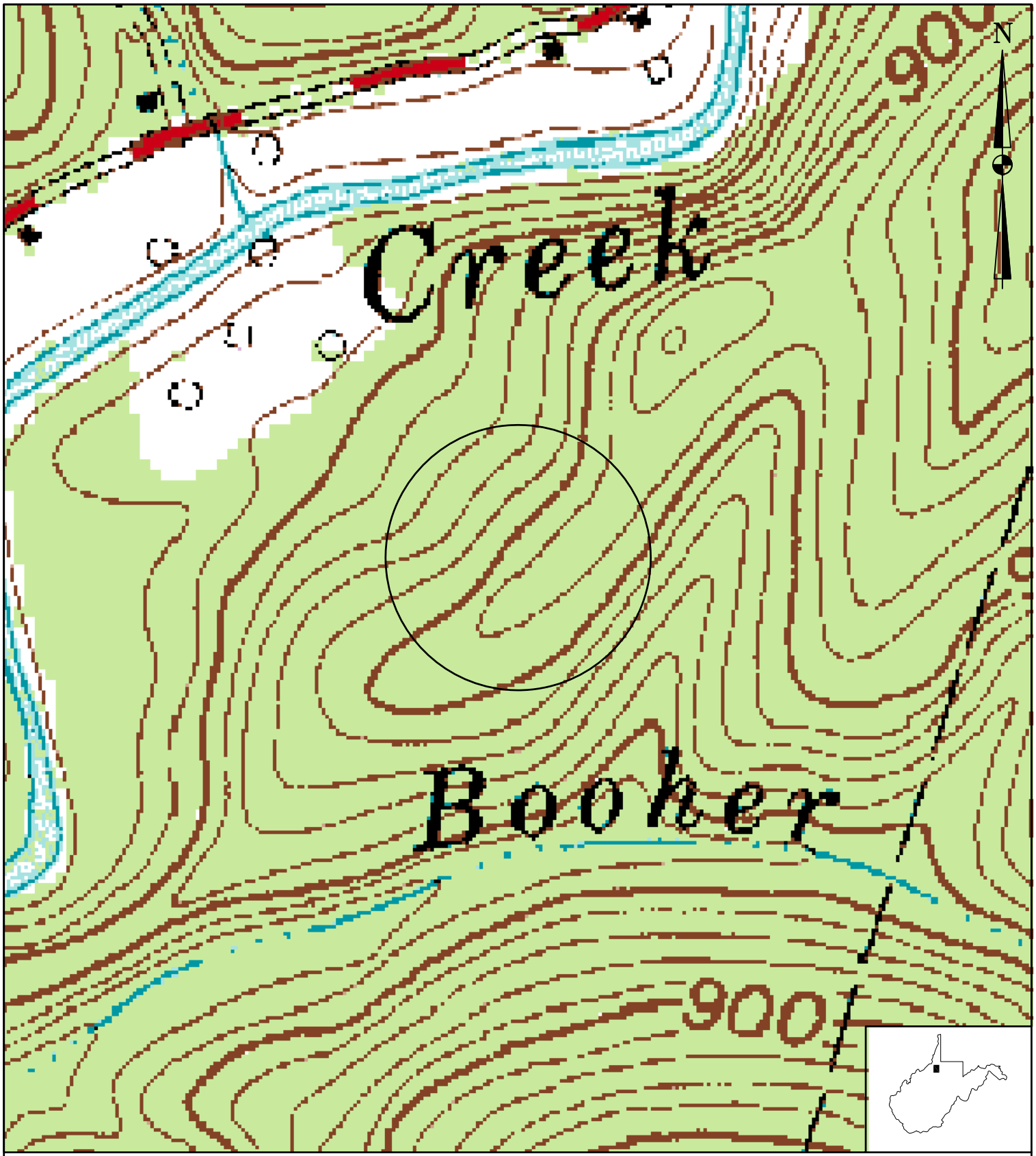
PAD LIMIT OF DISTURBANCE (LOD): 6.50± ACRES

DLF.
Dennis L. Fisher, RPE
PO Box 281
Philippi, WV 26416
Cell: 304-677-4129
E-Mail: Fisher.Engineering@gmx.com

Jackson Surveying Inc.
677 W. Main St.
Clarksburg, Wv 26301
304-623-5851

Proposed Pad Plan
Sheet 7 of 13
DOPEY SITE PLAN
Modification

ATTACHMENT G
AREA MAP



REFERENCE: USGS 7.5' QUADRANGLE MAP OF: SHIRLEY, WEST VIRGINIA; DATED 1961, PHOTOREVISED 1989

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DATE	7/26/16
CHECKED BY	RAD
SET JOB NO.	214054-17
SET DWG FILE	DOPEY 300 RADm01.dwg
DRAWING SCALE	1"=300'

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

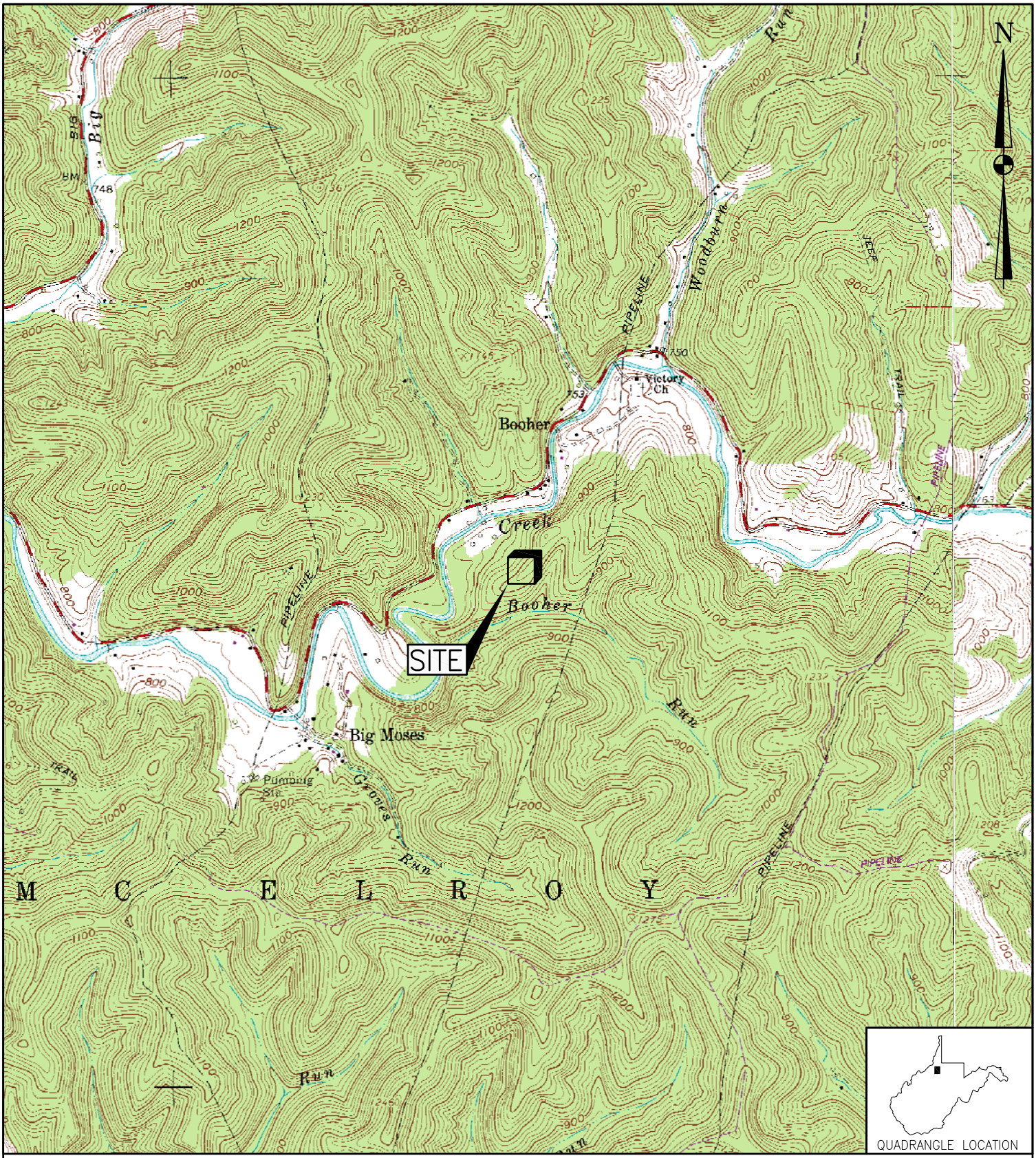
JAY-BEE OIL & GAS, INC.

DOPEY WELL PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
SITE LOCATION MAP
300' RADIUS MAP

DRAWING NO. FIGURE 1A

REV. 0

Plot: env045 07/26/2016 14:29 G:\JAY-BEE OIL&GAS\214054\DOPEY 300 RADm01.dwg



REFERENCE: USGS 7.5' QUADRANGLE MAP OF: SHIRLEY, WEST VIRGINIA; DATED 1961, PHOTOREVISED 1989

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DRAWING SCALE	1"=2000'

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

JAY-BEE OIL & GAS, INC.

DOPEY WELL PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
SITE LOCATION MAP

DRAWING NO.	REV.
FIGURE 1	0

Plot: env045 05/10/2016 11:04 G:\JAY-BEE OIL&GAS\214054\DOPEYODOPEYm01.dwg

ATTACHMENT H
G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

General Permit G70-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, pneumatic pumps, reciprocating internal combustion engines (RICEs), tank truck/rail car loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

GENERAL PERMIT G70-D APPLICABLE SECTIONS	
☒Section 5.0	Gas and Oil Well Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐Section 11.0	Pneumatic Pump Affected Facility (NSPS, Subpart OOOOa)
☒Section 12.0	Fugitive Emissions GHG and VOC Standards (NSPS, Subpart OOOOa)
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines
☒Section 14.0	Tanker Truck/Rail Car Loading[2]
☒Section 15.0	Glycol Dehydration Units[3]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subparts OOOO or OOOOa control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

3 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

ATTACHMENT I
EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
HTR-1	1E	Gas Processing Unit	2016		1.5 mmBtu/hr	Existing	None	None
HTR-2	2E	Gas Processing Unit	2016		1.5 mmBtu/hr	Existing	None	None
HTR-3	3E	Gas Processing Unit	2016		1.5 mmBtu/hr	Existing	None	None
HTR-4	4E	Gas Processing Unit	2016		1.5 mmBtu/hr	Existing	None	None
HTR-6	14E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
HTR-7	15E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
HTR-8	16E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
HTR-9	17E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
HTR-10	18E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
HTR-11	19E	Gas Processing Unit	TBD		1.5 mmBtu/hr	New	None	None
T01	7E or 9E/12E/21E	Condensate Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T02	7E or 9E/12E/21E	Condensate Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T03	7E or 9E/12E/21E	Condensate Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T04	7E or 9E/12E/21E	Produce Water Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T05	7E or 9E/12E/21E	Produced Water Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T06	7E or 9E/12E/21E	Produced Water Tank	2016		210 BBL	Existing	EC-1/2/3	VRU-1
T08	7E or 9E/12E/21E	Condensate Tank	TBD		210 BBL	New	EC-1/2/3	VRU-1
T09	7E or 9E/12E/21E	Condensate Tank	TBD		210 BBL	New	EC-1/2/3	VRU-1
T10	7E or 9E/12E/21E	Produced Water Tank	TBD		210 BBL	New	EC-1/2/3	VRU-1
T11	7E or 9E/12E/21E	Produced Water Tank	TBD		210 BBL	New	EC-1/2/3	VRU-1
TL-1	5E	Condensate Truck Loading	2016		182,500 BBL/yr	Existing	None	None
TL-2	6E	Produced Water Truck Loading	2016		220,000 BBL/yr	Existing	None	None
VRU-1	7E	VRU Driver	2016	3/19/12	84 HP	Existing	1C	None

TEG-1	8E	Thermoelectric Generator	2016		4.4 KW/hr	Existing	None	None
EC-1	9E	Enclosed Combustor	2016		10.0 mmBtu/hr	Existing	N/A	None
HTR-5	10E	Line Heater	2016		0.5 mmBtu/hr	Existing	None	None
RBV-1	11E	Dehydration Unit Reboiler Vent	2016		0.500 mmBtu/hr	Existing	None	None
RBV-2	20E	Dehydration Unit Reboiler Vent	TBD		0.300 mmBtu/hr	New	None	None
RSV-1	9E/12E/21E	Dehydration Unit Still Vent	2016		40 mmscfd	Existing	EC-1/2/2	None
RSV-2	9E/12E/21E	Dehydration Unit Still Vent	TBD		20 mmscfd	New	EC-1/2/3	None
EC-2	12E	Enclosed Combustor	2016		10.0 mmBtu/hr	Existing	None	None
EC-3	21E	Enclosed Combustor	TBD		10.0 mmBtu/hr	New	None	None
CE-1	22E	Compressor Engine	TBD		2,370 HP	New	2C	None
T01-06, T08-11	13E	Un-captured/Un-controlled VRU-1 Emissions	2016			Existing/New	None	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] When required by rule
[4] New, modification, removal, existing
[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

ATTACHMENT J
FUGITIVE EMISSIONS SUMMARY SHEET

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc.
Use extra pages for each associated source or equipment if necessary.

Source/Equipment: Jay-Bee Dopey Production Facility

Leak Detection Method Used	☒ Audible, visual, and olfactory (AVO) inspections	☐ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO_2e)
Pumps	☐ Yes ☒ No	1	API	☒ Gas ☐ Liquid ☐ Both	0.004	0.0001	0.344
Valves	☐ Yes ☒ No	272	EPA	☐ Gas ☐ Liquid ☒ Both	1.45	0.0087	20.56
Safety Relief Valves	☐ Yes ☒ No	5	EPA	☐ Gas ☐ Liquid ☒ Both	0.009	0.0003	0.754
Open Ended Lines	☐ Yes ☒ No	11	EPA	☒ Gas ☐ Liquid ☐ Both	0.031	0.0011	2.53
Sampling Connections	☐ Yes ☒ No	135	TECQ	☐ Gas ☐ Liquid ☒ Both	8.90	0.0812	193.0
Connections (Not sampling)	☐ Yes ☒ No	800	EPA	☐ Gas ☐ Liquid ☒ Both	0.473	0.0033	7.84
Compressors	☐ Yes ☒ No	1	API	☒ Gas ☐ Liquid ☐ Both	0.016	0.0005	1.26
Flanges	☐ Yes ☒ No	200	API	☐ Gas ☐ Liquid ☒ Both	0.142	0.0035	8.38
Other[1]	☐ Yes ☒ No	1	Compressor Blowdown/Startup	☒ Gas ☐ Liquid ☐ Both	7.85	0.006	196.3

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):
Venting

Please indicate if there are any closed vent bypasses (include component):
None

Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck/rail car loading, etc.)
Thief Hatch, VRU, and Enclosed Combustors

ATTACHMENT K
GAS WELL AFFECTED FACILITY DATA SHEET

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
047-095-02239	11/26/16	11/26/16	Flow to separator and into gathering line as soon as practical	Yes
047-095-02240	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02311	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02458	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02459	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02460	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02465	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02466	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes
047-095-02467	TBD	TBD	Flow to separator and into gathering line as soon as practical	Yes

Note: If future wells are planned and no API number is available please list as PLANNED. If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.

This is the same API (American Petroleum Institute) well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,

047 = State code. The state code for WV is 047.

001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).

00001= Well number. Each well will have a unique well number.

ATTACHMENT L
STORAGE VESSEL DATA SHEET

ATTACHMENT L – STORAGE VESSEL DATA SHEET

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for ***each*** new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**

The following information is REQUIRED:

□ Composition of the representative sample used for the simulation
□ For each stream that contributes to flashing emissions:
  □ Temperature and pressure (inlet and outlet from separator(s))
  □ Simulation-predicted composition
  □ Molecular weight
  □ Flow rate
□ Resulting flash emission factor or flashing emissions from simulation
□ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **Dopey Condensate Tank Farm**	2. Tank Name **T01-T03, T08, T09**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 9E, 12E, 21E**	4. Emission Point ID number **9E, 12E, 21E**
5. Date Installed, Modified, or Relocated *(for existing tanks)* **Pending Permit Approval** Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* **Addition of Condensate Tanks T08 & T09**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft.)	9B. Tank Internal Height (ft.)
10A. Maximum Liquid Height (ft.)	10B. Average Liquid Height (ft.)
11A. Maximum Vapor Space Height (ft.)	11B. Average Vapor Space Height (ft.)
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume".	
13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of tank turnovers per year	15. Maximum tank fill rate (gal/min)
16. Tank fill method ☐ Submerged ☐ Splash ☐ Bottom Loading	

17. Is the tank system a variable vapor space system? ☐ Yes ☐ No

If yes, (A) What is the volume expansion capacity of the system (gal)?

(B) What are the number of transfers into the system per year?

18. Type of tank (check all that apply):

☐ Fixed Roof ☐ vertical ☐ horizontal ☐ flat roof ☐ cone roof ☐ dome roof ☐ other (describe)

☐ External Floating Roof ☐ pontoon roof ☐ double deck roof

☐ Domed External (or Covered) Floating Roof

☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting

☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm

☐ Pressurized ☐ spherical ☐ cylindrical

☐ Other (describe)

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]

☐ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION

21. Tank Shell Construction:

☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

21A. Shell Color:	21B. Roof Color:	21C. Year Last Painted:

22. Shell Condition (if metal and unlined):

☐ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ Yes ☐ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

Must be listed for tanks using VRUs with closed vent system.

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☐

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No

25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings:

26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply

26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:

26C. Deck seam. Continuous sheet construction:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:

27. Closed Vent System with VRU? ☐ Yes ☐ No

28. Closed Vent System with Enclosed Combustor? ☐ Yes ☐ No

SITE INFORMATION

29. Provide the city and state on which the data in this section are based:

30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	35. Atmospheric Pressure (psia):

LIQUID INFORMATION

36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):

38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):

41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.

41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name **Dopey Produced Water Tank Farm**	2. Tank Name **T04-T06, T10, T11**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 9E, 12E, 21E**	4. Emission Point ID number **9E, 12E, 21E**
5. Date Installed, Modified, or Relocated *(for existing tanks)* **Pending Permit Approval** Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☒ New construction ☐ New stored material ☐ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* **Addition of Produced Water Tanks T10 & T11**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

TANK INFORMATION

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft.)	9B. Tank Internal Height (ft.)
10A. Maximum Liquid Height (ft.)	10B. Average Liquid Height (ft.)
11A. Maximum Vapor Space Height (ft.)	11B. Average Vapor Space Height (ft.)
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume".	
13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of tank turnovers per year	15. Maximum tank fill rate (gal/min)
16. Tank fill method ☐ Submerged ☐ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☐ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☐ Fixed Roof ☐ vertical ☐ horizontal ☐ flat roof ☐ cone roof ☐ dome roof ☐ other (describe) ☐ External Floating Roof ☐ pontoon roof ☐ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ☐ vertical column support ☐ self-supporting ☐ Variable Vapor Space ☐ lifter roof ☐ diaphragm ☐ Pressurized ☐ spherical ☐ cylindrical ☐ Other (describe)	

PRESSURE/VACUUM CONTROL DATA

19. Check as many as apply:

☐ Does Not Apply ☐ Rupture Disc (psig)

☐ Inert Gas Blanket of _____ ☐ Carbon Adsorption[1]

☐ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers, enclosed combustors)

☐ Conservation Vent (psig) ☐ Condenser[1]

Vacuum Setting Pressure Setting

☐ Emergency Relief Valve (psig)

Vacuum Setting Pressure Setting

☐ Thief Hatch Weighted ☐ Yes ☐ No

[1] Complete appropriate Air Pollution Control Device Sheet

20. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

TANK CONSTRUCTION AND OPERATION INFORMATION			
21. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)			
21A. Shell Color:	21B. Roof Color:	21C. Year Last Painted:	
22. Shell Condition (if metal and unlined): ☐ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable			
22A. Is the tank heated? ☐ Yes ☐ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?	
23. Operating Pressure Range (psig): **Must be listed for tanks using VRUs with closed vent system.**			
24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):	
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☐			
25A. Year Internal Floaters Installed:			
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):			
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No			
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):			
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☐ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
27. Closed Vent System with VRU? ☐ Yes ☐ No			
28. Closed Vent System with Enclosed Combustor? ☐ Yes ☐ No			
SITE INFORMATION			
29. Provide the city and state on which the data in this section are based:			
30. Daily Avg. Ambient Temperature (°F):	31. Annual Avg. Maximum Temperature (°F):		
32. Annual Avg. Minimum Temperature (°F):	33. Avg. Wind Speed (mph):		
34. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	35. Atmospheric Pressure (psia):		
LIQUID INFORMATION			
36. Avg. daily temperature range of bulk liquid (°F):	36A. Minimum (°F):	36B. Maximum (°F):	
37. Avg. operating pressure range of tank (psig):	37A. Minimum (psig):	37B. Maximum (psig):	
38A. Minimum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):		
39A. Avg. liquid surface temperature (°F):	39B. Corresponding vapor pressure (psia):		
40A. Maximum liquid surface temperature (°F):	40B. Corresponding vapor pressure (psia):		
41. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
41A. Material name and composition:			
41B. CAS number:			
41C. Liquid density (lb/gal):			
41D. Liquid molecular weight (lb/lb-mole):			
41E. Vapor molecular weight (lb/lb-mole):			
41F. Maximum true vapor pressure (psia):			
41G. Maximum Reid vapor pressure (psia):			
41H. Months Storage per year. From: To:			
42. Final maximum gauge pressure and temperature prior to transfer into tank used as inputs into flashing emission calculations.			

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
T07	Existing	Tri-ethylene Glycol (TEG)	200
T12	NEW	Compressor Engine Oil	500
T13	NEW	Compressor Oil	500
T14	NEW	Norkool™ Engine Coolant	500

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the well site. 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, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

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

Identification

User Identification:	Dopey Condensate
City:	Middlebourne
State:	West Virginia
Company:	Jay-Bee Oil & Gas
Type of Tank:	Vertical Fixed Roof Tank
Description:	Single, 210 BBL Condensate W&B Emissions

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	10.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	8,225.29
Turnovers:	187.00
Net Throughput(gal/yr):	1,538,128.86
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)	0.25
Slope (ft/ft) (Cone Roof)	0.05

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Huntington, West Virginia (Avg Atmospheric Pressure = 14.33 psia)

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

Dopey Condensate - Vertical Fixed Roof Tank
Middlebourne, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Condensate	All	61.42	53.10	69.74	57.09	5.2800	4.5000	4.7500	39.5600			202.30	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Dopey Condensate - Vertical Fixed Roof Tank
Middlebourne, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	190.7243
Vapor Space Volume (cu ft):	399.2441
Vapor Density (lb/cu ft):	0.0374
Vapor Space Expansion Factor:	0.0849
Vented Vapor Saturation Factor:	0.4128
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	399.2441
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	5.0833
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.0833
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0833
Roof Height (ft):	0.2500
Roof Slope (ft/ft):	0.0500
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0374
Vapor Molecular Weight (lb/lb-mole):	39.5600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.2800
Daily Avg. Liquid Surface Temp. (deg. R):	521.0866
Daily Average Ambient Temp. (deg. F):	54.8458
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.7558
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,246.2101
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0849
Daily Vapor Temperature Range (deg. R):	33.2847
Daily Vapor Pressure Range (psia):	0.2500
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.2800
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.5000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.7500
Daily Avg. Liquid Surface Temp. (deg R):	521.0866
Daily Min. Liquid Surface Temp. (deg R):	512.7654
Daily Max. Liquid Surface Temp. (deg R):	529.4077
Daily Ambient Temp. Range (deg. R):	20.0583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.4128
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	5.2800
Vapor Space Outage (ft):	5.0833

Working Losses (lb):	2,502.1126
Vapor Molecular Weight (lb/lb-mole):	39.5600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.2800
Annual Net Throughput (gal/yr.):	1,538,128.8562
Annual Turnovers:	187.0000
Turnover Factor:	0.3271
Maximum Liquid Volume (gal):	8,225.2880
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,692.8368

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

Emissions Report for: Annual

Dopey Condensate - Vertical Fixed Roof Tank
Middlebourne, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Condensate	2,502.11	190.72	2,692.84

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

Identification

User Identification:	Dopey Produced Water
City:	Middlebourne
State:	West Virginia
Company:	Jay-Bee Oil & Gas
Type of Tank:	Vertical Fixed Roof Tank
Description:	Single, 210 BBL Produced Water W&B Emissions

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	10.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	8,225.29
Turnovers:	225.00
Net Throughput(gal/yr):	1,850,689.80
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)	0.25
Slope (ft/ft) (Cone Roof)	0.05

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Huntington, West Virginia (Avg Atmospheric Pressure = 14.33 psia)

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

Dopey Produced Water - Vertical Fixed Roof Tank
Middlebourne, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Produced Water	All	61.42	53.10	69.74	57.09	0.3000	0.2000	0.4000	30.6800			202.30	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Dopey Produced Water - Vertical Fixed Roof Tank
Middlebourne, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	16.3906
Vapor Space Volume (cu ft):	399.2441
Vapor Density (lb/cu ft):	0.0016
Vapor Space Expansion Factor:	0.0739
Vented Vapor Saturation Factor:	0.9252
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	399.2441
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	5.0833
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.0833
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0833
Roof Height (ft):	0.2500
Roof Slope (ft/ft):	0.0500
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0016
Vapor Molecular Weight (lb/lb-mole):	30.6800
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3000
Daily Avg. Liquid Surface Temp. (deg. R):	521.0866
Daily Average Ambient Temp. (deg. F):	54.8458
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.7558
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,246.2101
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0739
Daily Vapor Temperature Range (deg. R):	33.2847
Daily Vapor Pressure Range (psia):	0.2000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.2000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.4000
Daily Avg. Liquid Surface Temp. (deg R):	521.0866
Daily Min. Liquid Surface Temp. (deg R):	512.7654
Daily Max. Liquid Surface Temp. (deg R):	529.4077
Daily Ambient Temp. Range (deg. R):	20.0583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9252
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.3000
Vapor Space Outage (ft):	5.0833
Working Losses (lb):	121.6696
Vapor Molecular Weight (lb/lb-mole):	30.6800
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3000
Annual Net Throughput (gal/yr.):	1,850,689.8002
Annual Turnovers:	225.0000
Turnover Factor:	0.3000
Maximum Liquid Volume (gal):	8,225.2880
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	138.0602

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

Emissions Report for: Annual

Dopey Produced Water - Vertical Fixed Roof Tank
Middlebourne, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Produced Water	121.67	16.39	138.06

ATTACHMENT M

SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART D_c DATA SHEET

ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART DC
DATA SHEET

Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. ***The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.***

Emission Unit ID#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
HTR-1	1E	Gas Processing Unit	2016	Existing	1.5	1257.7
HTR-2	2E	Gas Processing Unit	2016	Existing	1.5	1257.7
HTR-3	3E	Gas Processing Unit	2016	Existing	1.5	1257.7
HTR-4	4E	Gas Processing Unit	2016	Existing	1.5	1257.7
HTR-5	10E	Line Heater	2016	Existing	0.5	1257.7
HTR-6	14E	Gas Processing Unit	TBD	New	1.5	1257.7
HTR-7	15E	Gas Processing Unit	TBD	New	1.5	1257.7
HTR-8	16E	Gas Processing Unit	TBD	New	1.5	1257.7
HTR-9	17E	Gas Processing Unit	TBD	New	1.5	1257.7
HTR-10	18E	Gas Processing Unit	TBD	New	1.5	1257.7
HTR-11	19E	Gas Processing Unit	TBD	New	1.5	1257.7
TEG-1	8E	Thermoelectric Generator	2016	Existing	0.013	1257.7
RBV-1	11E	Reboiler	2016	Existing	0.500	1257.7
RBV-2	20E	Reboiler	TBD	New	0.300	1257.7

1 Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2 Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

5 Enter the fuel heating value in BTU/standard cubic foot.

Model 5120 Thermoelectric Generators

Global Thermoelectric's Model 5120 Thermoelectric Generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

Power Specifiations

Power Rating at 20°C
120 Watts at 6.7 Volts
108 Watts at 12 Volts
108 Watts at 24 Volts
108 Watts at 48 Volts

Electrical

Adjustment:	6.7V	up to 11 Volts
	12 V	12 -18 Volts
	24 V	24 - 30 Volts
	48 V	48 - 60 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 8 AWG wire. Opening for 3/4" conduit in the base of the cabinet.

Fuel

Natural Gas:	8.8 m^3/day (311 ft^3/day) of Std. 1000 BTU/SCF (37.7 MJ/SM^3) gas
Propane:	11.4 l/day (3.0 US gal/day)
Max. Supply Pressure:	1724 kPa (250 psi)
Min. Supply Pressure:	103 kPa (15 psi)
Fuel Connection:	1/4" MNPT

Environmental

Ambient Operation Temperature: Max. 55°C (130°F) Min. -55°C (-67°F)
Operating Conditions: Unsheltered operation

Materials of Construction

Cabinet:	304 SS
Cooling Type:	Natural Convection
Thermopile:	Hermetically Sealed Lead Tin-Telluride (PbSnTe)
Burner:	Meeker Type/Inconel 600
Fuel System:	Brass, Aluminum & SS

Standard Features

- Automatic Spark Ignition (SI)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meter

Optional Features

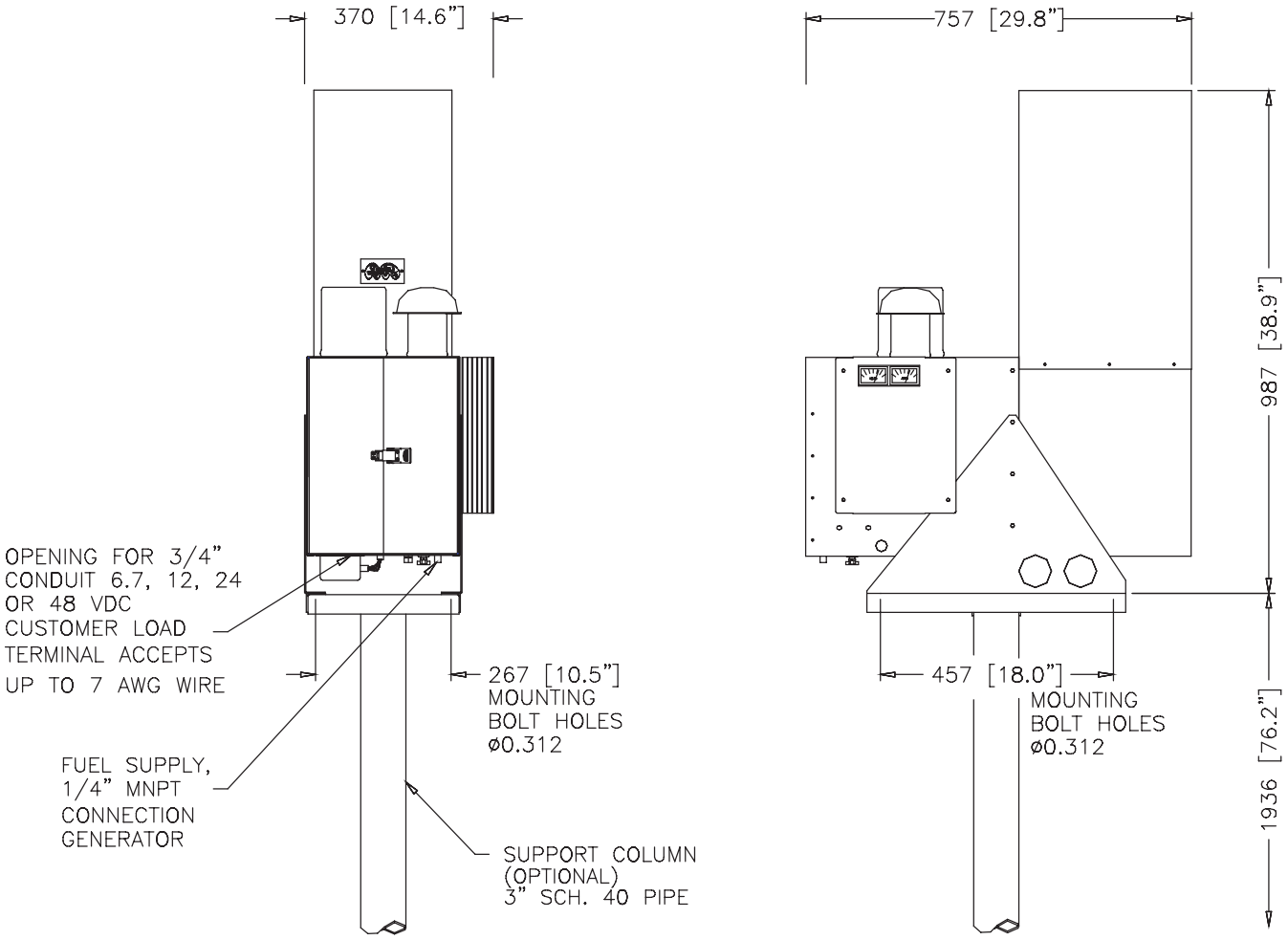
- Cathodic Protection Interface
- Pole Mount or bench stand
- Automatic Fuel Shut-off (SO)
- Corrosive Environmental Fuel System
- Flame Arrestor

Note: Specifications shown are for standard configurations. Global Thermoelectric's Applications Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Global Thermoelectric

Power where you need it.

Typical Installation



NOTES:
1. GENERATOR WEIGHT: 60 kg [132 lb].
2. DIMENSIONS IN mm [INCHES].

Global Thermoelectric

Power where you need it.

Corporate Office
#9, 3700 - 78 Avenue SE
Calgary, Alberta T2C 2L8
CANADA
Phone: (403) 236-5556
Fax: (403) 236-5575

US Sales
P.O. Box 38624
Houston, TX 77238
Phone: (281) 445-1515
Fax: (281) 445-6060
Toll Free: 1 800 848-4113

ATTACHMENT N
INTERNAL COMBUSTION ENGINE DATA SHEET

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID#[1]	VRU-1	CE-1	
Engine Manufacturer/Model	Cummins G5.9	Caterpillar G3608TALE	
Manufacturers Rated bhp/rpm	84 @ 1800	2,370 bhp @ 1,000 rpm	
Source Status[2]	ES	NS	
Date Installed/ Modified/Removed/Relocated[3]	2016	TBD	
Engine Manufactured /Reconstruction Date[4]	After 3/1/2013	After 3/1/2013	
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☒IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SRB	4SLB	
APCD Type[7]	NSCR	OxCat	
Fuel Type[8]	RG	RG	
H_2S (gr/100 scf)	<1	<1	
Operating bhp/rpm	84 @ 1800	2,370 bhp @ 1,000 rpm	
BSFC (BTU/bhp-hr)	7,914	7,560	
Hourly Fuel Throughput	526.4 ft^3/hr gal/hr	14,243 ft^3/hr gal/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	4.62 $MMft^3$/yr gal/yr	134 $MMft^3$/yr gal/yr	$MMft^3$/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☐

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
AP	NO_x	0.19	0.81	2.61	11.4		
AP	CO	0.37	1.62	1.01	4.41		
AP	VOC	0.04	0.18	2.45	10.7		
AP	SO_2	<0.01	<0.01	0.011	0.047		
AP	PM_{10}	0.013	0.06	0.179	0.784		
AP	Formaldehyde	0.015	0.065	0.246	1.08		
AP	Total HAPs	0.022	0.10	0.572	2.50		
AP	GHG (CO_2e)	89.7	393	2,889	12,655		

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

2 Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Relocated Source

REM Removal of Source

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation 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 IIII/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 as appropriate.

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

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

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

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	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

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*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Engine Air Pollution Control Device
(Emission Unit ID# VRU-1, use extra pages as necessary)

Air Pollution Control Device Manufacturer's Data Sheet included?
Yes ☒ No ☐

☒ NSCR	☐ SCR	☐ Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream: N/A

Manufacturer: **Miratech**	Model #: **VXC-1408-04-HSG**
Design Operating Temperature: 1000 °F	Design gas volume: **430 + scfm**
Service life of catalyst: **2+ years, depending on site conditions**	Provide manufacturer data? ☒Yes ☐ No
Volume of gas handled: **430 acfm at 1078 °F**	Operating temperature range for NSCR/Ox Cat: **From 750 °F to 1250 °F**
Reducing agent used, if any: **None**	Ammonia slip (ppm): **NA**

Pressure drop against catalyst bed (delta P): **3.0 inches of H_2O**

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions: **Part of the routine maintenance inspection to warn or alert operations of emissions control degradation is a task called the post-PM emissions check.**

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?
☐ Yes ☒ No

How often is catalyst recommended or required to be replaced (hours of operation)?
Because there are so many factors that impact life of a catalyst, the vendor does not recommend "hours of operation prior to replacement." The routine post-PM emissions check task (every 60 days or 1440 hrs of operation, whichever comes first) determines when the catalyst needs to be serviced or replaced.

How often is performance test required?
☐ Initial
☐ Annual
☐ Every 8,760 hours of operation
☐ Field Testing Required
☒ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT**: Per 40 CFR 60.4243(a)(iii), an owner or operator of a stationary SI internal combustion engine less than 100 HP, must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions, but no performance testing is required for an owner or operator**

Engine Air Pollution Control Device
(Emission Unit ID# CE-1, use extra pages as necessary)

Air Pollution Control Device Manufacturer's Data Sheet included?
Yes ☒ No ☐

☐ NSCR	☐ SCR	☒ Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream: N/A

Manufacturer: **DCL America Inc**	Model #: **DC64L3-20/24HGS+**
Design Operating Temperature: **857 °F**	Design gas volume: **16,198 scfm**
Service life of catalyst: **2+ years, depending on site conditions**	Provide manufacturer data? ☒Yes ☐ No
Volume of gas handled: **16,198 acfm at 857 °F**	Operating temperature range for NSCR/Ox Cat: From **750** °F to **1000** °F
Reducing agent used, if any: **None**	Ammonia slip (ppm): **NA**

Pressure drop against catalyst bed (delta P): **3.0 inches of H_2O**

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions: **Part of the routine maintenance inspection to warn or alert operations of emissions control degradation is a task called the post-PM emissions check.**

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?
☐ Yes ☒ No

How often is catalyst recommended or required to be replaced (hours of operation)?
Because there are so many factors that impact life of a catalyst, the vendor does not recommend "hours of operation prior to replacement." The routine post-PM emissions check task (every 60 days or 1440 hrs of operation, whichever comes first) determines when the catalyst needs to be serviced or replaced.

How often is performance test required?
☒ Initial
☐ Annual
☒ Every 8,760 hours of operation
☐ Field Testing Required
☐ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT**:**

USA COMPRESSION

USA Compression Partners, LLC

Unit Information Sheet

Date: May 27, 2014
Unit #: 6041
Customer: To Be Determined

To:

Lease Location: To Be Determined

Please find the below information for the USA Compression unit number listed above:

Package Information	
Compressor Manufacturer:	Arrow
Compressor Model:	VRC2
Compressor Serial Number:	12095
Compressor Cylinders:	6.5" x 4.0" x 2.25"
Driver Manufacturer:	Cummins
Driver Model:	G5.9
Rated HP & Speed	84 HP @ 1800 RPM
Driver Type:	4-stroke Rich Burn
Engine Serial Number:	73364060
Engine Manufacturing Date:	3/19/2012
Engine Catalyst Model:	VXC-1408-04-HSG
Engine Catalyst Element:	VX-RE-08XC
Engine AFR Model:	AFR-1RD-10-TK2
Engine Stack Height:	9' 5"
Engine Stack Diameter:	4"
Operating Information	
Suction Pressure:	N/A psig
Discharge Pressure:	N/A psig
Design Capacity:	N/A MSCFD
Gas Specific Gravity:	N/A

Emission Output informtion included in the attached catalyst specification sheet.

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: TJ-14-0081 Rev(1)

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cummins
Model Number:	G 5.9
Power Output:	84 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	430 acfm (cfm)
Exhaust Temperature:	1,078°F

System Details

Housing Model Number:	VXC-1408-04-HSG
Element Model Number:	VX-RE-08XC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	3.0 inches of WC (Fresh)
Sound Attenuation:	28-32 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	VXC-1408-04-XC1
Material:	Carbon Steel
Approximate Diameter:	14 inches
Inlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	53 inches
Weight Without Catalyst:	152 lbs
Weight Including Catalyst:	162 lbs
Instrumentation Ports:	1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Warranted Converter Outputs (g/ bhp-hr)	Requested Emissions Targets
NOx	11.41	91%	1.00	1.00 g/bhp-hr
CO	14.64	86%	2.00	2.00 g/bhp-hr
NMNEHC	0.22	0%	0.70	0.70 g/bhp-hr
CH_2O	0.08	0%	1.00	1.00 g/bhp-hr
Oxygen	0.5%			

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

Engine Performance Data

Cummins Inc

Columbus, Indiana 47202-3005
http://www.cummins.com

Industrial

G5.9

FR 9961

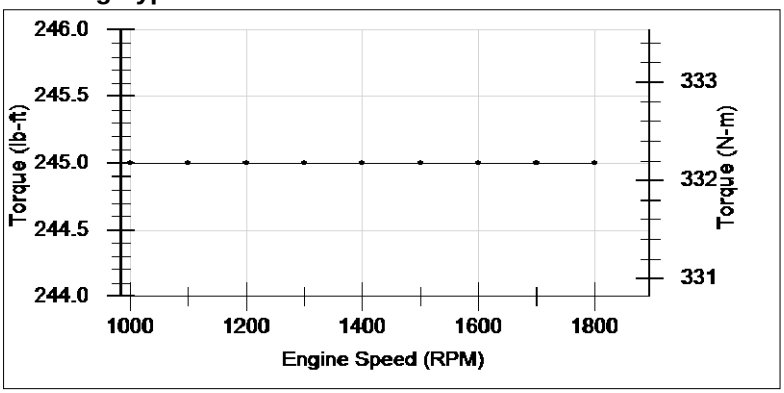
84 BHP (63 kW) @ 1800 RPM
245 lb-ft (332 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D491010CX02	**8655**	**12-May-2011**

Compression Ratio: **10.5:1**
Fuel System: **Field Gas, Dry Processed Nat Gas**
Emission Certification: **Non-certified**
Displacement: **359 in3 (5.9 L)**
Aspiration: **Naturally Aspirated**

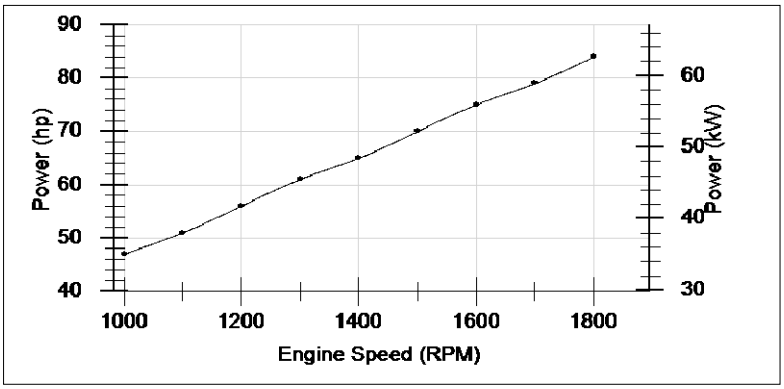
All data is based on the engine operating with fuel system, water pump, and 7 in H2O (1.74 kPa) inlet air restriction with 3.5 in (89 mm) inner diameter, and with 1 in Hg (3 kPa) exhaust restriction with 3 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR



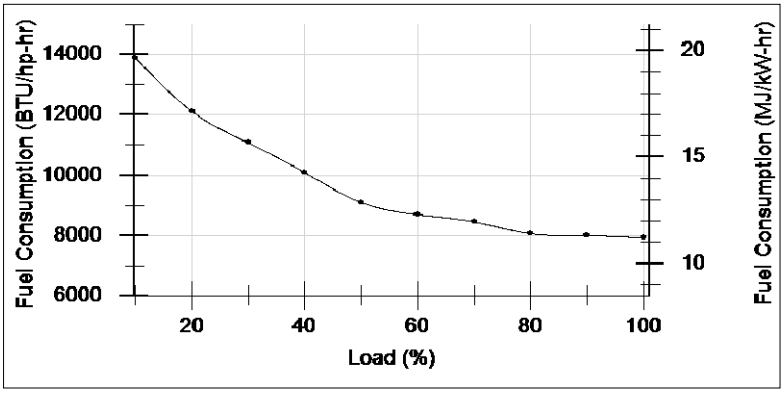
Torque Output

RPM	lb-ft	N-m
1,000	245	332
1,100	245	332
1,200	245	332
1,300	245	332
1,400	245	332
1,500	245	332
1,600	245	332
1,700	245	332
1,800	245	332



Power Output

RPM	hp	kW
1,000	47	35
1,100	51	38
1,200	56	42
1,300	61	45
1,400	65	48
1,500	70	52
1,600	75	56
1,700	79	59
1,800	84	63



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
84	63	100	7,914	11.2
76	57	90	7,987	11.3
67	50	80	8,056	11.4
59	44	70	8,452	11.96
50	37	60	8,689	12.29
42	31	50	9,094	12.87
34	25	40	10,083	14.27
25	19	30	11,069	15.66
17	13	20	12,116	17.14
8	6	10	13,889	19.65

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 905 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering for operation above this altitude.

STATUS FOR CURVES AND DATA: Limited-(measured data)
TOLERANCE: Within +/- 5 %

CHIEF ENGINEER:
Alfred S Weber

Bold entries revised after 1-Mar-2010

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Intake Air System

Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability)	15 delta deg F	8.3 delta deg C

Cooling System

Maximum coolant temperature for engine protection controls	215 deg F	102 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	212 deg F	100 deg C

Exhaust System

Maximum exhaust back pressure:	2 in-Hg	7 kPa
Recommended exhaust piping size (inner diameter):	3 in	76 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	10 psi	69 kPa
@ maximum rated speed	50 psi	345 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	10 psi	69 kPa

Fuel System

Maximum fuel inlet pressure:	1 psi	5 kPa

Performance Data

Engine low idle speed:	900 RPM
Maximum low idle speed:	1,800 RPM
Minimum low idle speed:	800 RPM
Engine high idle speed	1,800 RPM
Governor break speed:	
Maximum torque available at closed throttle low idle speed:	50 lb-ft 68 N-m

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	84 hp	63 kW	63 hp	47 kW	42 hp	31 kW
Torque	245 lb-ft	332 N-m	184 lb-ft	249 N-m	123 lb-ft	167 N-m
Intake Manifold Pressure	-1 in-Hg	-3 kPa	-5 in-Hg	-17 kPa	-9 in-Hg	-30 kPa
Inlet Air Flow	121 ft3/min	57 L/s	101 ft3/min	48 L/s	82 ft3/min	39 L/s
Exhaust Gas Flow	430 ft3/min	203 L/s	360 ft3/min	170 L/s	292 ft3/min	138 L/s
Exhaust Gas Temperature	1,078 deg F	581 deg C	999 deg F	537 deg C	902 deg F	483 deg C
Heat Rejection to Coolant	3,824 BTU/min	67 kW	3,244 BTU/min	57 kW	2,596 BTU/min	46 kW
Heat Rejection to Ambient	1,194 BTU/min	21 kW	784 BTU/min	14 kW	613 BTU/min	11 kW
Heat Rejection to Exhaust	2,523 BTU/min	44 kW	1,916 BTU/min	34 kW	1,371 BTU/min	24 kW
Fuel Consumption	7,914 BTU/hp-hr	11 MJ/kW-hr	8,214 BTU/hp-hr	12 MJ/kW-hr	9,094 BTU/hp-hr	13 MJ/kW-hr
Air Fuel Ratio (dry)	16.52 vol/vol		16.51 vol/vol		16.52 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	1.48 g/hp-hr		1.3 g/hp-hr		1.62 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	11.41 g/hp-hr	15.3 g/kW-hr	13.7 g/hp-hr	18.37 g/kW-hr	12.85 g/hp-hr	17.23 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	14.64 g/hp-hr	19.63 g/kW-hr	0.82 g/hp-hr	1.1 g/kW-hr	1.38 g/hp-hr	1.85 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO2	449 g/hp-hr	602 g/kW-hr	489 g/hp-hr	656 g/kW-hr	540 g/hp-hr	724 g/kW-hr
O2	0.45 %		1.66 %		3.67 %	

Bold entries revised after 1-Mar-2010

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Cranking System (Cold Starting Capability)

Unaided Cold Start:	
Minimum cranking speed	250 RPM
Cold starting aids available	Block Heater, Oil Pan Heater
Maximum parasitic load at 10 deg F @	

Noise Emissions

Top	89.9 dBa
Right Side	90.1 dBa
Left Side	89.8 dBa
Front	90.5 dBa
Exhaust noise emissions	103.1 dBa

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed
(Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)

Aftercooler Heat Rejection - Heat Load on Aftercooler
BTU/min (kW)

Ambient Temp deg F (deg C)

Altitude ft (m)	**120 (49)**	**110 (43)**	**100 (38)**	**90 (32)**	**80 (27)**	**70 (21)**
0 (0)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
1000 (305)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
2000 (610)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
3000 (914)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
4000 (1219)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
5000 (1524)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
6000 (1829)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
7000 (2134)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
8000 (2438)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
9000 (2743)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
10000 (3048)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)

End of Report

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Gas/Site Analysis & Engine Selection/Derate

Cummins Stationary Natural Gas Engines

Date: 4/10/2014

Industrial	NG
G5.9	**84 HP (63 kW) @1800 RPM & 10.5:1 Compression Ratio**
Available FR Number(s) From Selection: FR9936, FR9961	**Catalyst Fuel Rating**
	Industrial Continuous

Engine (as entered by user)		
Application:	Industrial	
Fuel Type:	NG	
Engine:	G5.9	
Fuel Rating:	Catalyst	
Compression Ratio:	10.5:1	
RPM:	1800	
HP (Natural Gas):	84 HP (63 kW)	
HP (Propane):	NA HP (NA kW)	
Site (as entered by user)		
Ambient Air Temperature:	90° F	
Relative Humidity:	30%	
Altitude:	1200 ft	
Cooling Fan Load:	8 HP	
Generator Efficiency:	93%	
Vapor Pressure (Calculated from Site Conditions Entered):	0.427 inHg	
Dew Point (Calculated from Site Conditions Entered):	54.4° F	
Dry Barometer (Calculated from Site Conditions Entered):	28.22 inHg	
Derate (Natural Gas)		
Advertised NG Rating:	84 HP (63 kW)	
Engine Derate Due to Site Altitude and Temperature:	2%	
Engine Derate Due to Gas Composition:		
Derate Due to Low BTU Fuel:	0%	⚠ **The sample percentage for "Name Sample" is 99.991%. Results are based on the input sample normalized to 100%.**
Derate Due to Methane Number:	0%	
Total Power Available (%) After All Applicable Derates:	98% of rated	
Total Site Derate due to Altitude, Temperature, and Gas Composition:	2 HP (1 kW)	
Total Available Horsepower from Selected Engine Running on Specified Fuel Composition at Specified Site (includes 8 HP reduction for for cooling fan load):	74 HP (55 kW)	
Derate (Propane)		
Advertised Propane Rating:	NA HP (NA kW)	
Engine Derate Due to Site Altitude and Temperature:	NA%	
Total Power Available (%) After All Applicable Derates:	NA% of rated	
Total Site Derate due to Altitude and Temperature:	NA HP (NA kW)	
Total Available Horsepower from Selected Engine Running on Propane at Specified Site (includes 8 HP reduction for for cooling fan load):	NA HP (NA kW)	

Intake Manifold Requirements for Turbocharged Engines

Maximum Allowed Intake Manifold Temperature for Selected Engine is na °F with a Maximum Aftercooler Water Inlet (CAC air inlet) of na °F based on FR9936

Factory Set Points	**Factory Supplied**	**Recommended**
Engine Speed Target:	1800 rpm	⚠ **NOTICE: A Change to Ignition Timing Is Recommended Due to Methane Number of Fuel**
Spark Plug Gap:	0.020 in	
Excess Oxygen Target-PV:	na %O2	
Propane Engine Timing Target:	na °BTDC	
Propane Gas over air Press at Carb Low:	na inH2O	
Propane Gas Press at Sec Reg Target:	na inH2O	
Excess Oxygen Target-NG:	0.45% O_2	
Natural Gas Engine Timing Target:	**Factory: 26 °BTDC**	**Recommended Timing: 25 ° BTDC**
Natural Gas over air Press at Carb Target:	5 inH2O	
Natural Gas Press at Sec Reg Target:	15 inH2O	

FR9936 Created/Revised On: 4/30/2013. Data Files Updated On: 12/12/2013

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Gas Sample Analysis			
			The sample percentage for "Name Sample" is 99.991%. Results are based on the input sample normalized to 100%.
Sample Name: Name Sample			
Gas Compound:		**Volume Fraction % (User Input)**	**Mass Fraction % (Calculated)**
Methane:		77.09	59.36
Ethane:		14.83	21.41
Propane:		4.97	10.51
i-Butane:		0.62	1.72
n-Butane:		1.21	3.38
i-Pentane:		0.27	0.92
n-Pentane:		0.26	0.91
n-Hexane:		0.15	0.62
n-Heptane:		0.04	0.2
n-Octane:		0.02	0.09
n-Nonane:		0	0
n-Decane:		0	0.02
Hydrogen:		0	0
Hydrogen Sulfide (H_2S):		0 ppm	0 ppm
Carbon Dioxide:		0.15	0.32
Carbon Monoxide:		0	0
Nitrogen:		0.39	0.53
Oxygen:		0	0
Total Percent: (Sample Input Percentage: 99.991%)		**Normalized Percentage: 100%**	
Performance Parameters:		**Standard Units**	**Metric Units**
Lower Heating Value (LHV): Standard Conditions (60F/14.696psia)	by volume	1140.6 Btu/scf	42.5 MJ/scm
	by mass	20776 Btu/lbm	48.326 MJ/kg
Higher Heating Value (HHV): Standard Conditions (60F/14.696psia)	by volume	1257.5 Btu/scf	46.85 MJ/scm
	by mass	22906 Btu/lbm	53.280 MJ/kg
Methane Number:		56.1	56.1
Specific Gravity (SG):		0.7193	0.7193
Wobbe Index :	LHV/$\sqrt{SG}$	1345 Btu/scf	50.11 MJ/scm
	HV/$\sqrt{SG}$	1483 Btu/scf	55.24 MJ/scm
Molecular Weight:		20.83 g/mol	20.83 g/mol
Specific Heat (Cp):		0.473 BTU/lbm-R	1.979 kJ/kg-K
Specific Heat Ratio (Cp/Cv):		1.253	1.253
Ideal Gas Density:		0.0549 lbm/ft3	0.8788 kg/m3 std
H/C Ratio:		3.492	3.492
Gas Constant (R_{GAS}):		95.3 BTU/lbm-°R	399.1 kJ/kg-°K
Stoich Air Fuel Ratio (Dry):		16.54	16.54
Fuel Flow Data			
BTU/HP-HR:		7914	
Maximum Fuel Flow (SCFH):		583	
Maximum Fuel Flow Calculation is Based on 100% Continuous Rating of 84 HP at 1800 RPM and 10.5:1 Compression Ratio from FR9936			
Gas Regulator Details			
The Industrial G5.9 uses a Maxitrol Regulator			Notes:

FR Differences for Selected Engine

Description of FR Differences for Selected Engine

	FR9936	FR9961
Exhaust Manifold	Dry	Wet
Exhaust Stack Temp High	1300	1220

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Gas Analysis Tool
References & Standards

Date: 4/10/2014

Tool Revision Date: 3/27/2014

Performance Parameters:		Reference Standard or Document	
		Standard Units	**Metric Units**
Lower Heating Value (LHV): Standard Conditions	by volume	ASTM D 3588-91 @ 60F/14.696psia	ASTM D 3588-91 @ 15.5C/101.3kPa
	by mass	ASTM D 3588-91 @ 60F/14.696psia	ASTM D 3588-91 @ 15.5C/101.3kPa
Lower Heating Value (LHV): Normal Conditions	by volume	ASTM D 3588-91 @ 32F/14.696psia	ASTM D 3588-91 @ 0C/101.3kPa
Higher Heating Value (HHV): Standard Conditions	by volume	ASTM D 3588-91 @ 60F/14.696psia	ASTM D 3588-91 @ 15.5C/101.3kPa
	by mass	ASTM D 3588-91 @ 60F/14.696psia	ASTM D 3588-91 @ 15.5C/101.3kPa
Higher Heating Value (HHV): Normal Conditions	by volume	ASTM D 3588-91 @ 32F/14.696psia	ASTM D 3588-91 @ 0C/101.3kPa
Methane Number:		Cummins Methane Number	Cummins Methane Number
Specific Gravity (SG) (Ideal Rel. Density):		–	–
Wobbe Index :	LHV/√ SG	Ideal gas @ 60F/14.696psia	Ideal gas @ 15.5C/101.3kPa
	HV/√ SG	Ideal gas @ 60F/14.696psia	Ideal gas @ 15.5C/101.3kPa
Molecular Weight:		–	–
Specific Heat (Cp):		@ 60F/14.696psia	@ 15.5C/101.3kPa
Specific Heat Ratio (Cp/Cv):		@ 60F/14.696psia	@ 15.5C/101.3kPa
Ideal Gas Density:		ASTM D 3588-91 @ 60F/14.696psia	ASTM D 3588-91 @ 15.5C/101.3kPa
H/C Ratio:		–	–
Gas Constant (R_{GAS}):		@ 60F/14.696psia	@ 15.5C/101.3kPa
Stoich Air Fuel Ratio (Dry):		–	–

Conversion Factors			
		Standard Units	**Metric Units**
Notes			

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USA COMPRESSION

USA Compression Unit TBD Caterpillar G3608TALE Engine Emissions

Date of Manufacture	TBD	Engine Serial Number	TBD	Date Modified/Reconstructed	Not Any
Driver Rated HP	2370	Rated Speed in RPM	1000	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	8	Compression Ratio	9:1	Combustion Setting	Ultra Lean Burn
Total Displacement, in^3	10350	Fuel Delivery Method	Fuel Injection	Combustion Air Treatment	T.C./Aftercooled

Raw Engine Emissions (customer supplied fuel gas with little to no H2S)

Fuel Consumption 6840 *LHV BTU/bhp-hr or* 7560 *HHV BTU/bhp-hr*
Altitude 1200 *ft*
Maximum Air Inlet Temp 90 *F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		2.61	11.44
Carbon Monoxide (CO)	2.75		14.37	62.93
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	1.04		5.43	23.80
Formaldehyde (CH2O)	0.26		1.36	5.95
Particulate Matter (PM) Filterable+Condensable		9.99E-03	1.79E-01	7.84E-01
Sulfur Dioxide (SO2)		5.88E-04	1.05E-02	4.61E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	441	2304	9154
Methane (CH4)	4.47	23.36	92.79

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) with customer supplied fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For air permitting, it is recommended to use a 20% safety margin for CO, VOC and other organic compounds to allow for variation in operating parameters and fuel gas quality.

[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

Catalytic Converter Emissions

Catolytic Converter Make and Model: *DCL*
Element Type: *Oxidation*
Number of Elements in Housing: *3*
Air/Fuel Ratio Control *Coterpillor ADEM3*

	% Reduction	g/bhp-hr	lb/hr	TPY
Nitrogen Oxides (NOx)	0	0.5	**2.61**	**11.44**
Carbon Monoxide (CO)	93	0.19	**1.01**	**4.41**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	55	0.47	**2.45**	**10.71**
Formaldehyde (CH2O)	82	0.05	**0.24**	**1.07**
Particulate Matter (PM)	0		**1.79E-01**	**7.84E-01**
Sulfur Dioxide (SO2)	0		**1.05E-02**	**4.61E-02**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**2304**	**9154**
Methane (CH4)	0	**23.36**	**92.79**

DCL America Inc.
12620 FM 1960 W, Ste A4 Box # 560, Houston, TX 77065
Tel.: 877-897-9759 Fax: 281-605-5858 E-mail: info@dclamerica.com

To	Chris Magee	**Phone**	
	USA Compression	**Fax**	
Date	April 3, 2017	**Email**	cmagee@usacompression.com

RE: Emissions Statement – JAYBEE PLEASANTS/ MADDIE MAE

ENGINE DATA

Engine model	**Cat 3608TALE**
Power	2370 bhp
Fuel	Per supplied GERP
Exhaust Flow	28353 lb/hr
Exhaust Temperature	857 ° F

CATALYST SYSTEM DATA

Catalyst Model	DC64L3-20/24HGS+
Catalyst Type	Oxidation A Coat
Element Diameter	24.23"x3.5"
Number of Elements	3
Cell Density	300 cpsi

SILENCER SYSTEM DATA

Silencer Grade	Hospital +
Approx. Attenuation	42-50 dBA

EMISSION REQUIREMENTS

Exhaust Gas Component	Engine Output g/bhp-hr	Converter Output g/bhp-hr	Converter Output % Reduction
NOx	.50	--	--
CO	2.75	.19	93
VOC (NMNEHC)	1.04	.47	55
HCHO	.26	.05	82

Regards,

Sam Kirk
Sales Manager – Gas Compression
DCL America
281-253-3091

G3608

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
JAYBEE PLEASANTS/ MADDIE MAE 3-29-17

CATERPILLAR®

ENGINE SPEED (rpm):	1000	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	9.2	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	GAV
AFTERCOOLER WATER INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
JACKET WATER OUTLET (°F):	190	**SITE CONDITIONS:**	
ASPIRATION:	TA	FUEL:	JayBee Blend 3-29-17
COOLING SYSTEM:	JW, OC+AC	FUEL PRESSURE RANGE(psig):	42.8-47.0
CONTROL SYSTEM:	CIS/ADEM3	FUEL METHANE NUMBER:	63.5
EXHAUST MANIFOLD:	DRY	FUEL LHV (Btu/scf):	1060
COMBUSTION:	LOW EMISSION	ALTITUDE(ft):	1200
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	MAXIMUM INLET AIR TEMPERATURE(°F):	90
		STANDARD RATED POWER:	2370 bhp@1000rpm

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	2370	2370	1777	1185
INLET AIR TEMPERATURE			°F	90	90	90	90
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	6840	6840	7083	7785
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	7560	7560	7828	8604
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft3/min	6371	6371	4886	3371
AIR FLOW	(WET)	(3)(4)	lb/hr	27582	27582	21154	14594
FUEL FLOW (60°F, 14.7 psia)			scfm	255	255	198	145
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	75.2	75.2	57.6	40.9
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	857	857	897	978
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	16198	16198	12802	9390
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	28353	28353	21753	15034
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(8)(9)	g/bhp-hr	2.75	2.75	2.75	2.75
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	6.31	6.31	6.57	6.81
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	1.84	1.84	1.91	1.98
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	1.04	1.04	1.09	1.13
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.26	0.26	0.28	0.31
CO2		(8)(9)	g/bhp-hr	441	441	460	506
EXHAUST OXYGEN		(8)(11)	% DRY	12.0	12.0	11.8	11.4
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	25047	25047	20969	17408
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	9456	9456	8813	8457
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	12158	12158	11541	11532
HEAT REJ. TO AFTERCOOLER (AC)		(12)(13)	Btu/min	20564	20564	9580	1933

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW)	(13)	Btu/min	27552
TOTAL AFTERCOOLER CIRCUIT (OC+AC)	(13)(14)	Btu/min	36183
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

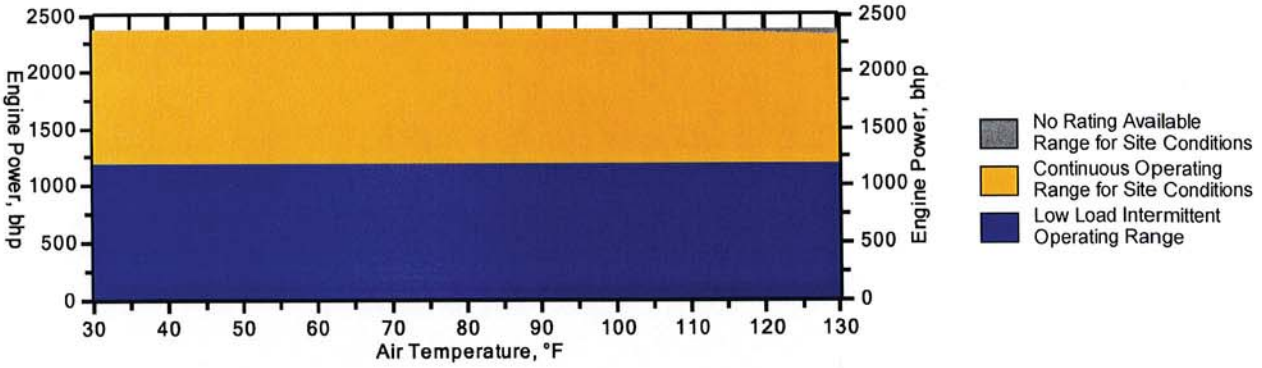
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature 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.

PREPARED BY: Chris Magee, USAC
Data generated by Gas Engine Rating Pro Version 6.04.00
Ref. Data Set DM8606-07-001, Printed 29Mar2017

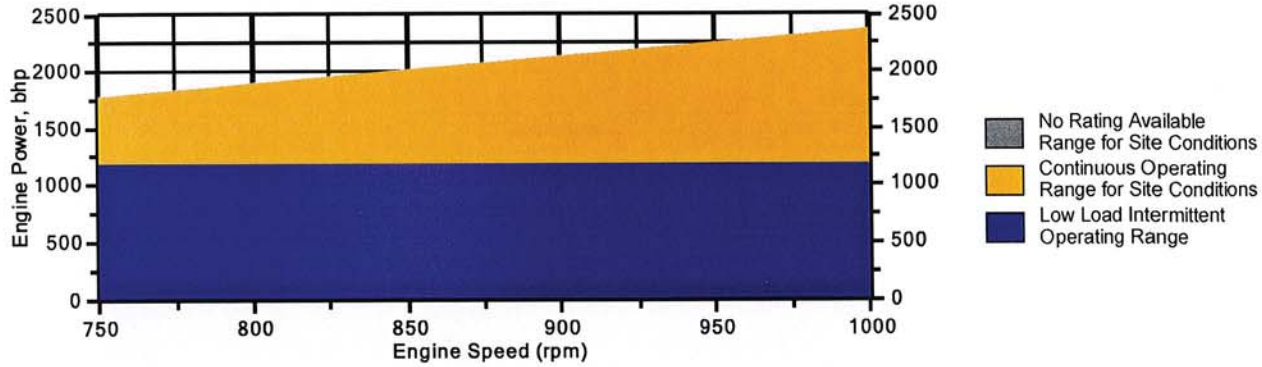
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1200 ft and 1000 rpm



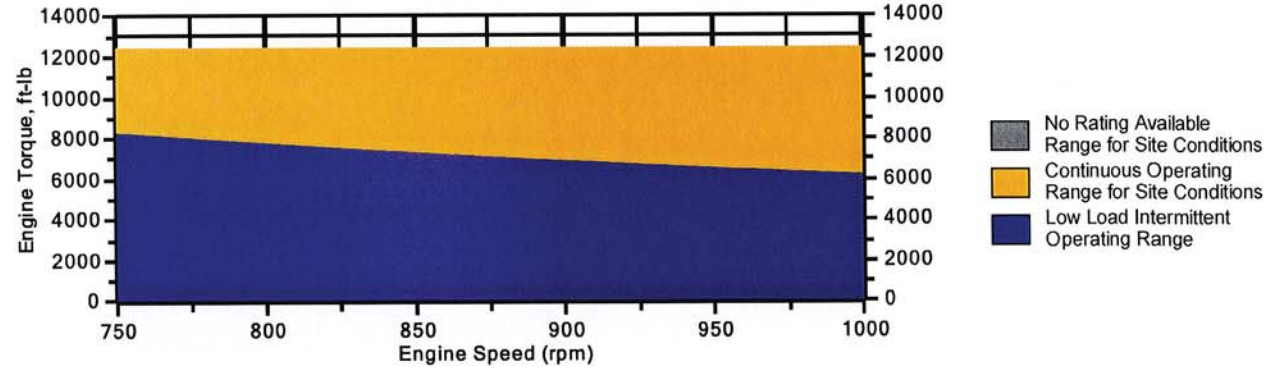
Engine Power vs. Engine Speed

Data represents speed sweep at 1200 ft and 90 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 1200 ft and 90 °F



Note: At site conditions of 1200 ft and 90°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

NOTES

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

2. Fuel consumption tolerance is ± 2.5% of full load data.

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

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

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

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

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

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

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

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

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

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

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

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

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	85.9110	85.9119
Ethane	C2H6	7.6160	7.6161
Propane	C3H8	4.5040	4.5040
Isobutane	iso-C4H1O	0.2880	0.2880
Norbutane	nor-C4H1O	0.5910	0.5910
Isopentane	iso-C5H12	0.1380	0.1380
Norpentane	nor-C5H12	0.1460	0.1460
Hexane	C6H14	0.1310	0.1310
Heptane	C7H16	0.1110	0.1110
Nitrogen	N2	0.3370	0.3370
Carbon Dioxide	CO2	0.2250	0.2250
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0010	0.0010
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.9990	100.0000

Fuel Makeup:	JayBee Blend 3-29-17
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	63.5
Lower Heating Value (Btu/scf):	1060
Higher Heating Value (Btu/scf):	1172
WOBBE Index (Btu/scf):	1302
THC: Free Inert Ratio:	178.13
Total % Inerts (% N2, CO2, He):	0.56%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	11.03
Stoich A/F Ratio (Mass/Mass):	16.64
Specific Gravity (Relative to Air):	0.663
Fuel Specific Heat Ratio (K):	1.294

CONDITIONS AND DEFINITIONS

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

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

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

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

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

FUEL LIQUIDS

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

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

ATTACHMENT O
TANKER TRUCK/RAIL CAR LOADING DATA SHEET

ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks/rail cars. Use extra pages if necessary.

Truck/Rail Car Loadout Collection Efficiencies

The following applicable capture efficiencies of a truck/rail car loadout are allowed:

- For tanker trucks/rail cars passing the MACT level annual leak test – 99.2%
- For tanker trucks/rail cars passing the NSPS level annual leak test – 98.7%
- For tanker trucks/rail cars not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for ***every*** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking/rail car company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application.

Emission Unit ID#: **TL-1 & TL-2**	Emission Point ID#: **5E & 6E**	Year Installed/Modified: **2016**
Emission Unit Description: **Condensate/Produced Water Truck Loading**		
Loading Area Data		
Number of Pumps: **2**	Number of Liquids Loaded: **2**	Max number of trucks/rail cars loading at one (1) time: **2**
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☐ No ☒ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. **None**		
Are any of the following truck/rail car loadout systems utilized? None ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

Projected Maximum Operating Schedule (for rack or transfer point as a whole)

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	**24**	**24**	**24**	**24**
Days/week	**7**	**7**	**7**	**7**

Bulk Liquid Data (use extra pages as necessary)

Liquid Name	Condensate	Produced Water	
Max. Daily Throughput (1000 gal/day)	**8.4**	**25.4**	
Max. Annual Throughput (1000 gal/yr)	**73**	**9,240**	
Loading Method[1]	**SUB**	**SP**	
Max. Fill Rate (gal/min)	**50**	**50**	
Average Fill Time (min/loading)	**120**	**120**	
Max. Bulk Liquid Temperature (°F)	**75**	**75**	
True Vapor Pressure[2]	**3.6**	**NA**	
Cargo Vessel Condition[3]	**None**	**None**	
Control Equipment or Method[4]	**NA**	**NA**	

Max. Collection Efficiency (%)		**NA**	**NA**	
Max.VOC Emission Rate	Loading (lb/hr)	**1.98**	**0.10**	
	Annual (ton/yr)	**2.90**	**0.22**	
Max.HAP Emission Rate	Loading (lb/hr)	**0.11**	**0.011**	
	Annual (ton/yr)	**0.16**	**0.02**	
Estimation Method[5]		**EPA**	**EPA**	

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill

2 At maximum bulk liquid temperature

3 B Ballasted Vessel C Cleaned U Uncleaned (dedicated service)
O Other (describe)

4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

ATTACHMENT P
GLYCOL DEHYDRATION UNIT DATA SHEET

ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET

Complete this data sheet for each Glycol Dehydration Unit, Reboiler, Flash Tank and/or Regenerator at the facility. Include gas sample analysis and GRI- GLYCalc™ input and aggregate report. Use extra pages if necessary.

Manufacturer: **Exterran**	Model:
Max. Dry Gas Flow Rate: **40** mmscf/day	Reboiler Design Heat Input: **0.500** MMBTU/hr
Design Type: ☒ TEG ☐ DEG ☐ EG	Source Status[1]: **ES**
Date Installed/Modified/Removed[2]: **2016**	Regenerator Still Vent APCD/ERD[3]: **TO**
Control Device/ERD ID#[3]: **EC-1/2/3**	Fuel HV (BTU/scf): **1257.7**
H_2S Content (gr/100 scf): **<0.001%**	Operation (hours/year): **8760**
Pump Rate (gpm): **7.5**	
Water Content (wt %) in: Wet Gas: **Saturated**	Dry Gas: **7 lb/MMscf**

Is the glycol dehydration unit exempt from 40CFR63 Section 764(d)? ☒ Yes ☐ No: If Yes, answer the following:

The actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters per day, as determined by the procedures specified in §63.772(b)(1) of this subpart. ☐ Yes ☒ No

The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this subpart.
☒ Yes ☐ No

Is the glycol dehydration unit located within an Urbanized Area (UA) or Urban Cluster (UC)? ☐ Yes ☒ No

Is a lean glycol pump optimization plan being utilized? ☐ Yes ☒ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler.
☐ Yes ☒ No
Recycling the glycol dehydration unit back to the flame zone of the reboiler and mixed with fuel.
☒ Yes ☐ No

What happens when temperature controller shuts off fuel to the reboiler? **Still vent to enclosed combustor.**
☐ Still vent emissions to the atmosphere.
☐ Still vent emissions stopped with valve.
☐ Still vent emissions to glow plug.

Please indicate if the following equipment is present.
☐ Flash Tank
☐ Burner management system that continuously burns condenser or flash tank vapors

Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)
Hydrocarbons	**99+% (Note: 98% used for calculations)**

Emissions Data

Emission Unit ID / Emission Point ID[4]	Description	Calculation Methodology[5]	PTE[6]	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)
RBV-1/11E	Reboiler Vent	AP-42	NO_x	**0.05**	**0.22**
		AP-42	CO	**0.04**	**0.18**
		AP-42	VOC	**<0.01**	**0.01**
		AP-42	SO_2	**<0.01**	**<0.01**
		AP-42	PM_{10}	**<0.01**	**0.02**
		AP-42	GHG (CO_2e)	**60.4**	**264.5**

RSV-1 / 11E	Glycol Regenerator Still Vent	GRI-GlyCalc™	VOC	**2.01**	**8.79**
		GRI-GlyCalc™	Benzene	**0.024**	**0.107**
		GRI-GlyCalc™	Toluene	**0.210**	**0.922**
		GRI-GlyCalc™	Ethylbenzene	**0.028**	**0.122**
		GRI-GlyCalc™	Xylenes	**0.193**	**0.847**
		GRI-GlyCalc™	n-Hexane	**0.045**	**0.199**
	Glycol Flash Tank	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		

1 Enter the Source Status using the following codes:
NS Construction of New Source ES Existing Source
MS Modification of Existing Source

2 Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.

3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:
NA None CD Condenser FL Flare
CC Condenser/Combustion Combination TO Thermal Oxidizer O Other (please list)

4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the well site incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

5 Enter the Potential Emissions Data Reference designation using the following codes:
MD Manufacturer's Data AP AP-42
GR GRI-GLYCalc™ OT Other (please list)

6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET

Complete this data sheet for each Glycol Dehydration Unit, Reboiler, Flash Tank and/or Regenerator at the facility. Include gas sample analysis and GRI- GLYCalc™ input and aggregate report. Use extra pages if necessary.

Manufacturer: **Exterran**	Model:
Max. Dry Gas Flow Rate: **20** mmscf/day	Reboiler Design Heat Input: **0.300** MMBTU/hr
Design Type: ☒ TEG ☐ DEG ☐ EG	Source Status[1]: **NS**
Date Installed/Modified/Removed[2]: **TBD**	Regenerator Still Vent APCD/ERD[3]: TO
Control Device/ERD ID#[3]: **EC-1/2/3**	Fuel HV (BTU/scf): **1257.7**
H_2S Content (gr/100 scf): **<0.001%**	Operation (hours/year): **8760**
Pump Rate (gpm): **7.5**	
Water Content (wt %) in: Wet Gas: **Saturated**	Dry Gas: **7** lb/MMscf

Is the glycol dehydration unit exempt from 40CFR63 Section 764(d)? ☒ Yes ☐ No: If Yes, answer the following:

The actual annual average flowrate of natural gas to the glycol dehydration unit is less than 85 thousand standard cubic meters per day, as determined by the procedures specified in §63.772(b)(1) of this subpart. ☐ Yes ☒ No

The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this subpart.
☒ Yes ☐ No

Is the glycol dehydration unit located within an Urbanized Area (UA) or Urban Cluster (UC)? ☐ Yes ☒ No

Is a lean glycol pump optimization plan being utilized? ☐ Yes ☒ No

Recycling the glycol dehydration unit back to the flame zone of the reboiler.
☐ Yes ☒ No
Recycling the glycol dehydration unit back to the flame zone of the reboiler and mixed with fuel.
☒ Yes ☐ No

What happens when temperature controller shuts off fuel to the reboiler? **Still vent to enclosed combustor.**
☐ Still vent emissions to the atmosphere.
☐ Still vent emissions stopped with valve.
☐ Still vent emissions to glow plug.

Please indicate if the following equipment is present.
☐ Flash Tank
☐ Burner management system that continuously burns condenser or flash tank vapors

Control Device Technical Data

Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)
Hydrocarbons	**99+% (Note: 98% used for calculations)**

Emissions Data

Emission Unit ID / Emission Point ID[4]	Description	Calculation Methodology[5]	PTE[6]	Controlled Maximum Hourly Emissions (lb/hr)	Controlled Maximum Annual Emissions (tpy)
RBV-1/11E	Reboiler Vent	AP-42	NO_x	**0.03**	**0.13**
		AP-42	CO	**0.03**	**0.11**
		AP-42	VOC	**<0.01**	**<0.01**
		AP-42	SO_2	**<0.01**	**<0.01**
		AP-42	PM_{10}	**<0.01**	**0.01**
		AP-42	GHG (CO_2e)	**36.2**	**158.7**

RSV-1 / 11E	Glycol Regenerator Still Vent	GRI-GlyCalc™	VOC	**0.938**	**4.11**
		GRI-GlyCalc™	Benzene	**0.011**	**0.050**
		GRI-GlyCalc™	Toluene	**0.099**	**0.433**
		GRI-GlyCalc™	Ethylbenzene	**0.013**	**0.058**
		GRI-GlyCalc™	Xylenes	**0.092**	**0.403**
		GRI-GlyCalc™	n-Hexane	**0.021**	**0.093**
	Glycol Flash Tank	GRI-GlyCalc™	VOC		
		GRI-GlyCalc™	Benzene		
		GRI-GlyCalc™	Toluene		
		GRI-GlyCalc™	Ethylbenzene		
		GRI-GlyCalc™	Xylenes		
		GRI-GlyCalc™	n-Hexane		

1 Enter the Source Status using the following codes:
NS Construction of New Source ES Existing Source
MS Modification of Existing Source

2 Enter the date (or anticipated date) of the glycol dehydration unit's installation (construction of source), modification or removal.

3 Enter the Air Pollution Control Device (APCD)/Emission Reduction Device (ERD) type designation using the following codes and the device ID number:
NA None CD Condenser FL Flare
CC Condenser/Combustion Combination TO Thermal Oxidizer O Other (please list)

4 Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the well site incorporates multiple glycol dehydration units, a Glycol Dehydration Emission Unit Data Sheet shall be completed for each, using Source Identification RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

5 Enter the Potential Emissions Data Reference designation using the following codes:
MD Manufacturer's Data AP AP-42
GR GRI-GLYCalc™ OT Other (please list)

6 Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). **Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc™ Aggregate Calculations Report (shall include emissions reports, equipment reports, and stream reports) to this Glycol Dehydration Emission Unit Data Sheet(s). Backup pumps do not have to be considered as operating for purposes of PTE.** This PTE data shall be incorporated in the Emissions Summary Sheet.

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Dope20
File Name: C:\Program Files (x86)\GRI-GLYCalc4\Dope20.ddf
Date: July 17, 2017

DESCRIPTION:

Description: Dopey Pad 20 mmscfd Dehy
Still Vent fuel for Reboiler
Excess to enclosed combustors
No Flash Tank

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 85.00 deg. F
Pressure: 500.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1691
Nitrogen	0.3727
Methane	76.3707
Ethane	14.8261
Propane	4.9931
Isobutane	0.6331
n-Butane	1.2761
Isopentane	0.3403
n-Pentane	0.3427
n-Hexane	0.1293
Other Hexanes	0.1905
Heptanes	0.1826
Benzene	0.0025
Toluene	0.0125
Ethylbenzene	0.0010
Xylenes	0.0053
C8+ Heavies	0.1465

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
Flow Rate: 3.5 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Combustion Device
Destruction Efficiency: 98.0 %
Excess Oxygen: 5.0 %
Ambient Air Temperature: 60.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Dope20
File Name: C:\Program Files (x86)\GRI-GLYCalc4\Dope20.ddf
Date: July 17, 2017

DESCRIPTION:

Description: Dopey Pad 20 mmscfd Dehy
Still Vent fuel for Reboiler
Excess to enclosed combustors
No Flash Tank

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.4757	11.417	2.0836
Ethane	0.2261	5.425	0.9901
Propane	0.1436	3.446	0.6289
Isobutane	0.0296	0.710	0.1296
n-Butane	0.0716	1.718	0.3136
Isopentane	0.0251	0.603	0.1101
n-Pentane	0.0303	0.726	0.1326
n-Hexane	0.0211	0.507	0.0925
Other Hexanes	0.0247	0.593	0.1083
Heptanes	0.0633	1.518	0.2770
Benzene	0.0114	0.274	0.0501
Toluene	0.0990	2.376	0.4336
Ethylbenzene	0.0131	0.315	0.0575
Xylenes	0.0921	2.211	0.4034
C8+ Heavies	0.3131	7.515	1.3716
Total Emissions	1.6399	39.357	7.1826

Total Hydrocarbon Emissions	1.6399	39.357	7.1826
Total VOC Emissions	0.9381	22.514	4.1089
Total HAP Emissions	0.2368	5.683	1.0372
Total BTEX Emissions	0.2157	5.176	0.9446

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	23.7850	570.839	104.1782
Ethane	11.3027	271.266	49.5060
Propane	7.1794	172.305	31.4457
Isobutane	1.4797	35.512	6.4810
n-Butane	3.5799	85.917	15.6799
Isopentane	1.2571	30.171	5.5062
n-Pentane	1.5133	36.320	6.6283
n-Hexane	1.0560	25.344	4.6253
Other Hexanes	1.2363	29.670	5.4148
Heptanes	3.1626	75.903	13.8523
Benzene	0.5715	13.717	2.5033
Toluene	4.9502	118.805	21.6818
Ethylbenzene	0.6567	15.760	2.8762
Xylenes	4.6053	110.526	20.1710
C8+ Heavies	15.6571	375.770	68.5781
Total Emissions	81.9927	1967.826	359.1282
Total Hydrocarbon Emissions	81.9927	1967.826	359.1282
Total VOC Emissions	46.9050	1125.721	205.4440
Total HAP Emissions	11.8397	284.152	51.8577
Total BTEX Emissions	10.7837	258.808	47.2324

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 60.00 deg. F
Excess Oxygen: 5.00 %
Combustion Efficiency: 98.00 %
Supplemental Fuel Requirement: 3.75e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%

Heptanes	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
Ethylbenzene	2.00%	98.00%
Xylenes	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

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

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 3.69 lbs. H2O/MMSCF

Temperature: 85.0 deg. F
Pressure: 500.0 psig
Dry Gas Flow Rate: 20.0000 MMSCF/day
Glycol Losses with Dry Gas: 0.0777 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 63.64 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 4.19 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.78%	94.22%
Carbon Dioxide	99.84%	0.16%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.93%	0.07%
Isobutane	99.89%	0.11%
n-Butane	99.86%	0.14%
Isopentane	99.84%	0.16%
n-Pentane	99.80%	0.20%
n-Hexane	99.65%	0.35%
Other Hexanes	99.73%	0.27%
Heptanes	99.29%	0.71%
Benzene	86.76%	13.24%
Toluene	80.51%	19.49%
Ethylbenzene	71.92%	28.08%
Xylenes	62.82%	37.18%
C8+ Heavies	97.22%	2.78%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	37.06%	62.94%
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	0.33%	99.67%
n-Pentane	0.36%	99.64%
n-Hexane	0.41%	99.59%
Other Hexanes	0.78%	99.22%
Heptanes	0.45%	99.55%
Benzene	4.97%	95.03%
Toluene	7.87%	92.13%
Ethylbenzene	10.38%	89.62%
Xylenes	12.89%	87.11%
C8+ Heavies	11.73%	88.27%

STREAM REPORTS:

WET GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 8.35e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.34e-001	5.31e+001
Carbon Dioxide	1.69e-001	1.64e+002
Nitrogen	3.72e-001	2.29e+002
Methane	7.63e+001	2.69e+004
Ethane	1.48e+001	9.80e+003
Propane	4.99e+000	4.84e+003

Isobutane	6.32e-001	8.08e+002
n-Butane	1.27e+000	1.63e+003
Isopentane	3.40e-001	5.39e+002
n-Pentane	3.42e-001	5.43e+002
n-Hexane	1.29e-001	2.45e+002
Other Hexanes	1.90e-001	3.61e+002
Heptanes	1.82e-001	4.02e+002
Benzene	2.50e-003	4.29e+000
Toluene	1.25e-002	2.53e+001
Ethylbenzene	9.99e-004	2.33e+000
Xylenes	5.29e-003	1.24e+001
C8+ Heavies	1.46e-001	5.48e+002
Total Components	100.00	4.71e+004

DRY GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 8.33e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.77e-003	3.07e+000
Carbon Dioxide	1.69e-001	1.63e+002
Nitrogen	3.73e-001	2.29e+002
Methane	7.64e+001	2.69e+004
Ethane	1.48e+001	9.79e+003
Propane	4.99e+000	4.83e+003
Isobutane	6.33e-001	8.08e+002
n-Butane	1.27e+000	1.63e+003
Isopentane	3.40e-001	5.39e+002
n-Pentane	3.42e-001	5.42e+002
n-Hexane	1.29e-001	2.44e+002
Other Hexanes	1.90e-001	3.60e+002
Heptanes	1.81e-001	3.99e+002
Benzene	2.17e-003	3.72e+000
Toluene	1.01e-002	2.04e+001
Ethylbenzene	7.19e-004	1.68e+000
Xylenes	3.33e-003	7.77e+000
C8+ Heavies	1.42e-001	5.33e+002
Total Components	100.00	4.70e+004

LEAN GLYCOL STREAM

Temperature: 85.00 deg. F
Flow Rate: 3.49e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.83e+001	1.93e+003
Water	1.50e+000	2.95e+001
Carbon Dioxide	1.35e-012	2.65e-011
Nitrogen	1.36e-013	2.67e-012
Methane	5.07e-018	9.98e-017
Ethane	8.94e-008	1.76e-006
Propane	7.11e-009	1.40e-007
Isobutane	1.30e-009	2.56e-008
n-Butane	2.93e-009	5.75e-008
Isopentane	2.15e-004	4.22e-003
n-Pentane	2.79e-004	5.49e-003
n-Hexane	2.21e-004	4.35e-003
Other Hexanes	4.92e-004	9.67e-003
Heptanes	7.29e-004	1.43e-002
Benzene	1.52e-003	2.99e-002
Toluene	2.15e-002	4.23e-001
Ethylbenzene	3.87e-003	7.61e-002
Xylenes	3.47e-002	6.81e-001
C8+ Heavies	1.06e-001	2.08e+000
Total Components	100.00	1.97e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 3.77e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.21e+001	1.93e+003
Water	3.79e+000	7.96e+001
Carbon Dioxide	1.86e-002	3.91e-001
Nitrogen	9.73e-003	2.04e-001
Methane	1.13e+000	2.38e+001
Ethane	5.39e-001	1.13e+001
Propane	3.42e-001	7.18e+000
Isobutane	7.05e-002	1.48e+000
n-Butane	1.71e-001	3.58e+000
Isopentane	6.01e-002	1.26e+000

n-Pentane	7.24e-002	1.52e+000
n-Hexane	5.05e-002	1.06e+000
Other Hexanes	5.94e-002	1.25e+000
Heptanes	1.51e-001	3.18e+000
Benzene	2.87e-002	6.01e-001
Toluene	2.56e-001	5.37e+000
Ethylbenzene	3.49e-002	7.33e-001
Xylenes	2.52e-001	5.29e+000
C8+ Heavies	8.45e-001	1.77e+001
Total Components	100.00	2.10e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.98e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.34e+001	5.01e+001
Carbon Dioxide	1.71e-001	3.91e-001
Nitrogen	1.40e-001	2.04e-001
Methane	2.85e+001	2.38e+001
Ethane	7.22e+000	1.13e+001
Propane	3.13e+000	7.18e+000
Isobutane	4.89e-001	1.48e+000
n-Butane	1.18e+000	3.58e+000
Isopentane	3.35e-001	1.26e+000
n-Pentane	4.03e-001	1.51e+000
n-Hexane	2.35e-001	1.06e+000
Other Hexanes	2.76e-001	1.24e+000
Heptanes	6.06e-001	3.16e+000
Benzene	1.41e-001	5.72e-001
Toluene	1.03e+000	4.95e+000
Ethylbenzene	1.19e-001	6.57e-001
Xylenes	8.33e-001	4.61e+000
C8+ Heavies	1.77e+000	1.57e+001
Total Components	100.00	1.33e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia

Flow Rate: 1.83e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.16e+001	4.76e-001
Ethane	1.56e+001	2.26e-001
Propane	6.76e+000	1.44e-001
Isobutane	1.06e+000	2.96e-002
n-Butane	2.56e+000	7.16e-002
Isopentane	7.24e-001	2.51e-002
n-Pentane	8.71e-001	3.03e-002
n-Hexane	5.09e-001	2.11e-002
Other Hexanes	5.96e-001	2.47e-002
Heptanes	1.31e+000	6.33e-002
Benzene	3.04e-001	1.14e-002
Toluene	2.23e+000	9.90e-002
Ethylbenzene	2.57e-001	1.31e-002
Xylenes	1.80e+000	9.21e-002
C8+ Heavies	3.82e+000	3.13e-001
Total Components	100.00	1.64e+000

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Dope40
File Name: C:\Program Files (x86)\GRI-GLYCalc4\Dope40.ddf
Date: July 17, 2017

DESCRIPTION:

Description: Dopey Pad 40 mmscfd
Still vent fuel for reboiler
Excess to enclosed combustors
No flash tank

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 85.00 deg. F
Pressure: 500.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1691
Nitrogen	0.3727
Methane	76.3707
Ethane	14.8261
Propane	4.9931
Isobutane	0.6331
n-Butane	1.2761
Isopentane	0.3403
n-Pentane	0.3427
n-Hexane	0.1293
Other Hexanes	0.1905
Heptanes	0.1826
Benzene	0.0025
Toluene	0.0125
Ethylbenzene	0.0010
Xylenes	0.0053
C8+ Heavies	0.1465

DRY GAS:

Flow Rate: 40.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 7.5 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Combustion Device
Destruction Efficiency: 98.0 %
Excess Oxygen: 5.0 %
Ambient Air Temperature: 60.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Dope40
File Name: C:\Program Files (x86)\GRI-GLYCalc4\Dope40.ddf
Date: July 17, 2017

DESCRIPTION:

Description: Dopey Pad 40 mmscfd
Still vent fuel for reboiler
Excess to enclosed combustors
No flash tank

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.0182	24.437	4.4597
Ethane	0.4845	11.627	2.1219
Propane	0.3076	7.382	1.3472
Isobutane	0.0634	1.522	0.2778
n-Butane	0.1535	3.684	0.6723
Isopentane	0.0539	1.294	0.2362
n-Pentane	0.0649	1.558	0.2844
n-Hexane	0.0453	1.088	0.1986
Other Hexanes	0.0531	1.274	0.2325
Heptanes	0.1360	3.264	0.5956
Benzene	0.0244	0.585	0.1068
Toluene	0.2104	5.050	0.9216
Ethylbenzene	0.0278	0.666	0.1216
Xylenes	0.1933	4.639	0.8466
C8+ Heavies	0.6741	16.178	2.9526
Total Emissions	3.5103	84.248	15.3752
Total Hydrocarbon Emissions	3.5103	84.248	15.3752
Total VOC Emissions	2.0077	48.184	8.7937
Total HAP Emissions	0.5012	12.028	2.1951
Total BTEX Emissions	0.4558	10.940	1.9965

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	50.9095	1221.829	222.9837
Ethane	24.2228	581.346	106.0957
Propane	15.3787	369.088	67.3586
Isobutane	3.1715	76.116	13.8913
n-Butane	7.6747	184.192	33.6150
Isopentane	2.6961	64.706	11.8088
n-Pentane	3.2464	77.914	14.2193
n-Hexane	2.2675	54.420	9.9316
Other Hexanes	2.6540	63.696	11.6245
Heptanes	6.7995	163.188	29.7818
Benzene	1.2188	29.250	5.3382
Toluene	10.5201	252.482	46.0779
Ethylbenzene	1.3879	33.310	6.0791
Xylenes	9.6641	231.939	42.3288
C8+ Heavies	33.7050	808.920	147.6279
Total Emissions	175.5164	4212.395	768.7621

Total Hydrocarbon Emissions	175.5164	4212.395	768.7621
Total VOC Emissions	100.3842	2409.220	439.6826
Total HAP Emissions	25.0583	601.400	109.7555
Total BTEX Emissions	22.7909	546.981	99.8240

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 60.00 deg. F
Excess Oxygen: 5.00 %
Combustion Efficiency: 98.00 %
Supplemental Fuel Requirement: 7.99e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%

Heptanes	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
Ethylbenzene	2.00%	98.00%
Xylenes	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

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

Calculated Absorber Stages: 1.25
Calculated Dry Gas Dew Point: 3.55 lbs. H2O/MMSCF

Temperature: 85.0 deg. F
Pressure: 500.0 psig
Dry Gas Flow Rate: 40.0000 MMSCF/day
Glycol Losses with Dry Gas: 0.1554 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 63.64 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 4.48 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.58%	94.42%
Carbon Dioxide	99.83%	0.17%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.92%	0.08%
Isobutane	99.89%	0.11%
n-Butane	99.85%	0.15%
Isopentane	99.83%	0.17%
n-Pentane	99.78%	0.22%
n-Hexane	99.62%	0.38%
Other Hexanes	99.71%	0.29%
Heptanes	99.24%	0.76%
Benzene	85.88%	14.12%
Toluene	79.30%	20.70%
Ethylbenzene	70.33%	29.67%
Xylenes	60.99%	39.01%
C8+ Heavies	97.01%	2.99%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	38.63%	61.37%
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	0.33%	99.67%
n-Pentane	0.36%	99.64%
n-Hexane	0.41%	99.59%
Other Hexanes	0.78%	99.22%
Heptanes	0.45%	99.55%
Benzene	4.97%	95.03%
Toluene	7.87%	92.13%
Ethylbenzene	10.38%	89.62%
Xylenes	12.89%	87.11%
C8+ Heavies	11.73%	88.27%

STREAM REPORTS:

WET GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.34e-001	1.06e+002
Carbon Dioxide	1.69e-001	3.27e+002
Nitrogen	3.72e-001	4.59e+002
Methane	7.63e+001	5.38e+004
Ethane	1.48e+001	1.96e+004
Propane	4.99e+000	9.68e+003

Isobutane	6.32e-001	1.62e+003
n-Butane	1.27e+000	3.26e+003
Isopentane	3.40e-001	1.08e+003
n-Pentane	3.42e-001	1.09e+003
n-Hexane	1.29e-001	4.90e+002
Other Hexanes	1.90e-001	7.21e+002
Heptanes	1.82e-001	8.04e+002
Benzene	2.50e-003	8.58e+000
Toluene	1.25e-002	5.06e+001
Ethylbenzene	9.99e-004	4.67e+000
Xylenes	5.29e-003	2.47e+001
C8+ Heavies	1.46e-001	1.10e+003
Total Components	100.00	9.42e+004

DRY GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.49e-003	5.92e+000
Carbon Dioxide	1.69e-001	3.26e+002
Nitrogen	3.73e-001	4.59e+002
Methane	7.64e+001	5.38e+004
Ethane	1.48e+001	1.96e+004
Propane	4.99e+000	9.67e+003
Isobutane	6.33e-001	1.62e+003
n-Butane	1.27e+000	3.25e+003
Isopentane	3.40e-001	1.08e+003
n-Pentane	3.42e-001	1.08e+003
n-Hexane	1.29e-001	4.88e+002
Other Hexanes	1.90e-001	7.19e+002
Heptanes	1.81e-001	7.98e+002
Benzene	2.15e-003	7.37e+000
Toluene	9.92e-003	4.01e+001
Ethylbenzene	7.04e-004	3.28e+000
Xylenes	3.23e-003	1.51e+001
C8+ Heavies	1.42e-001	1.06e+003
Total Components	100.00	9.40e+004

LEAN GLYCOL STREAM

Temperature: 85.00 deg. F
Flow Rate: 7.49e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.83e+001	4.14e+003
Water	1.50e+000	6.32e+001
Carbon Dioxide	1.35e-012	5.68e-011
Nitrogen	1.36e-013	5.74e-012
Methane	5.09e-018	2.14e-016
Ethane	8.98e-008	3.78e-006
Propane	7.12e-009	3.00e-007
Isobutane	1.31e-009	5.50e-008
n-Butane	2.93e-009	1.23e-007
Isopentane	2.15e-004	9.06e-003
n-Pentane	2.80e-004	1.18e-002
n-Hexane	2.22e-004	9.36e-003
Other Hexanes	4.93e-004	2.08e-002
Heptanes	7.31e-004	3.08e-002
Benzene	1.51e-003	6.38e-002
Toluene	2.13e-002	8.99e-001
Ethylbenzene	3.81e-003	1.61e-001
Xylenes	3.39e-002	1.43e+000
C8+ Heavies	1.06e-001	4.48e+000
Total Components	100.00	4.21e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 85.00 deg. F
Pressure: 514.70 psia
Flow Rate: 8.07e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.23e+001	4.14e+003
Water	3.64e+000	1.64e+002
Carbon Dioxide	1.87e-002	8.39e-001
Nitrogen	9.74e-003	4.37e-001
Methane	1.13e+000	5.09e+001
Ethane	5.40e-001	2.42e+001
Propane	3.43e-001	1.54e+001
Isobutane	7.06e-002	3.17e+000
n-Butane	1.71e-001	7.67e+000
Isopentane	6.03e-002	2.71e+000

n-Pentane	7.26e-002	3.26e+000
n-Hexane	5.07e-002	2.28e+000
Other Hexanes	5.96e-002	2.67e+000
Heptanes	1.52e-001	6.83e+000
Benzene	2.86e-002	1.28e+000
Toluene	2.54e-001	1.14e+001
Ethylbenzene	3.45e-002	1.55e+000
Xylenes	2.47e-001	1.11e+001
C8+ Heavies	8.51e-001	3.82e+001
Total Components	100.00	4.49e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 4.08e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.18e+001	1.00e+002
Carbon Dioxide	1.77e-001	8.39e-001
Nitrogen	1.45e-001	4.37e-001
Methane	2.95e+001	5.09e+001
Ethane	7.48e+000	2.42e+001
Propane	3.24e+000	1.54e+001
Isobutane	5.07e-001	3.17e+000
n-Butane	1.23e+000	7.67e+000
Isopentane	3.47e-001	2.70e+000
n-Pentane	4.18e-001	3.25e+000
n-Hexane	2.44e-001	2.27e+000
Other Hexanes	2.86e-001	2.65e+000
Heptanes	6.30e-001	6.80e+000
Benzene	1.45e-001	1.22e+000
Toluene	1.06e+000	1.05e+001
Ethylbenzene	1.21e-001	1.39e+000
Xylenes	8.46e-001	9.66e+000
C8+ Heavies	1.84e+000	3.37e+001
Total Components	100.00	2.77e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia

Flow Rate: 3.91e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.16e+001	1.02e+000
Ethane	1.56e+001	4.84e-001
Propane	6.77e+000	3.08e-001
Isobutane	1.06e+000	6.34e-002
n-Butane	2.56e+000	1.53e-001
Isopentane	7.25e-001	5.39e-002
n-Pentane	8.73e-001	6.49e-002
n-Hexane	5.11e-001	4.53e-002
Other Hexanes	5.98e-001	5.31e-002
Heptanes	1.32e+000	1.36e-001
Benzene	3.03e-001	2.44e-002
Toluene	2.22e+000	2.10e-001
Ethylbenzene	2.54e-001	2.78e-002
Xylenes	1.77e+000	1.93e-001
C8+ Heavies	3.84e+000	6.74e-001
Total Components	100.00	3.51e+000

ATTACHMENT Q
PNEUMATIC CONTROLLERS DATA SHEET

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

ATTACHMENT R
PNEUMATIC PUMP DATA SHEET

ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

Are there any natural gas-driven diaphragm pumps located at a well site that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

ATTACHMENT S

AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

ATTACHMENT S – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary.

Emissions calculations must be performed using the most conservative control device efficiency.

The following five (5) rows are only to be completed if registering an alternative air pollution control device.

Emission Unit ID: **T01-T06, T08-T11**	Make/Model: **Condensate and Produced Water Tanks**
Primary Control Device ID: **VRU-1**	Make/Model: **Arrow/WRC2**
Control Efficiency (%): **98**	APCD/ERD Data Sheet Completed: ☒ Yes ☐ No
Secondary Control Device ID: **EC-1/2/3**	Make/Model: **Hy-Bon CH 10.0**
Control Efficiency (%): **98**	APCD/ERD Data Sheet Completed: ☒ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **EC-1**	Installation Date: **2016** ☐ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity scfh scfd	Maximum Design Heat Input (from mfg. spec sheet) **10.0 mmBtu/hr**	Design Heat Content BTU/scf

Control Device Information

Type of Vapor Combustion Control?
☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer

Manufacturer: **Hy-Bon** Model: **CH 10.0**	Hours of operation per year? **8,760**

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# RSV-1, RSV-2, T01-T06, T08-T11)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
T01-T03, T08-T09	Condensate Tanks	RSV-1	Dehydrator Still Vent
T04-T06, T10-T11	Produced Water Tanks	RSV-2	Dehydrator Still Vent

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	feet	feet	☐ Yes ☐ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
31.4 (scfm)	**2,313** BTU/ft^3	(ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	**798** scfh	**985,100** BTU/hr	☒ Yes ☐ No

If automatic re-ignition is used, please describe the method. **The unit will try to re-ignite up to 25 times. After that, it will go into manual mode which means someone will need to manually start. Gas flow is shut off if it fails to ignite.**

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* **Combustor burner, pilot, and air inlet arrestor must be checked for foreign debris (dust, sand, etc.) and cleaned at least quarterly.**

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **EC-2**	Installation Date: 2016 ☐ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity scfh scfd	Maximum Design Heat Input (from mfg. spec sheet) **10.0 mmBtu/hr**	Maximum Rated Total Flow Capacity scfh scfd

Control Device Information

Type of Vapor Combustion Control?
☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer

Manufacturer: **Hy-Bon** Model: **CH 10.0**	Hours of operation per year? **8,760**

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# RSV-1, RSV-2, T01-T06, T08-T11)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
T01-T03, T08-T09	Condensate Tanks	RSV-1	Dehydrator Still Vent
T04-T06, T10-T11	Produced Water Tanks	RSV-2	Dehydrator Still Vent

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Assist Type (Flares only)	Flare Height
☐ Steam ☐ Air ☐ Pressure ☒ Non	feet	☐ Steam ☐ Air ☐ Pressure ☒ Non	feet

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
31.4 (scfm)	**2,313** BTU/ft^3	(ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	**798** scfh	**985,100** BTU/hr	☒ Yes ☐ No

If automatic re-ignition is used, please describe the method. **The unit will try to re-ignite up to 25 times. After that, it will go into manual mode which means someone will need to manually start. Gas flow is shut off if it fails to ignite.**

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* **Combustor burner, pilot, and air inlet arrestor must be checked for foreign debris (dust, sand, etc.) and cleaned at least quarterly.**

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: **EC-3**	Installation Date: TBD ☒ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity scfh scfd	Maximum Design Heat Input (from mfg. spec sheet) **10.0 mmBtu/hr**	Maximum Rated Total Flow Capacity scfh scfd

Control Device Information

Type of Vapor Combustion Control?
☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer

Manufacturer: **Hy-Bon** Model: **CH 10.0**	Hours of operation per year? **8,760**

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID# RSV-1, RSV-2, T01-T06, T08-T11)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
T01-T03, T08-T09	Condensate Tanks	RSV-1	Dehydrator Still Vent
T04-T06, T10-T11	Produced Water Tanks	RSV-2	Dehydrator Still Vent

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Assist Type (Flares only)	Flare Height
☐ Steam ☐ Air ☐ Pressure ☒ Non	feet	☐ Steam ☐ Air ☐ Pressure ☒ Non	feet

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
31.4 (scfm)	**2,313** BTU/ft^3	(ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
1	**798** scfh	**985,100** BTU/hr	☒ Yes ☐ No

If automatic re-ignition is used, please describe the method. **The unit will try to re-ignite up to 25 times. After that, it will go into manual mode which means someone will need to manually start. Gas flow is shut off if it fails to ignite.**

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* **Combustor burner, pilot, and air inlet arrestor must be checked for foreign debris (dust, sand, etc.) and cleaned at least quarterly.**

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

VAPOR RECOVERY UNIT
*See Attachment N

General Information

Emission Unit ID#:	Installation Date: ☐ New ☐ Modified ☐ Relocated

Device Information

Manufacturer:
Model:

List the emission units whose emissions are controlled by this vapor recovery unit (Emission Point ID#)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description

If this vapor recovery unit controls emissions from more than six (6) emission units, please attach additional pages.

Additional information attached? ☐ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, and performance testing.

The registrant may claim a capture and control efficiency of 95 % (which accounts for 5% downtime) for the vapor recovery unit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup flare that meet the requirements of Section 8.1.2 of this general permit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup VRU.

Vapor Combustor Unit (VCU)

HY-BON/EDI is pleased to provide the CH2.5 and CH10.0 enclosed combustors as an effective solution for eliminating VOC emissions. HY-BON/EDI's insulated combustors are automated and have been successfully tested per EPA 40, CFR 60 guidelines – making it the perfect blend of performance and safety. The combustor comes as a complete, skid mounted package containing the liquid knock-out vessel, liquid transfer pump, flame arrestor, bird screen and burner control system. Installation is simple and field performance adjustments can be made as production changes – making it the most flexible solution in the industry.

- EPA 40 CFR 60, Quad O Compliant
  List of EPA Approved Combustion Control Devices
- Completely Enclosed Combustion
- 99.99% Destruction Efficiency
- User Friendly Automated System
- Operational and Quad O reporting data can be saved to a USB Key
- RS-232 or RS-485 Communication supports satellite, cellular, or radio
- Modbus Slave Protocol allows it to communicate with SCADA systems and other devices/software

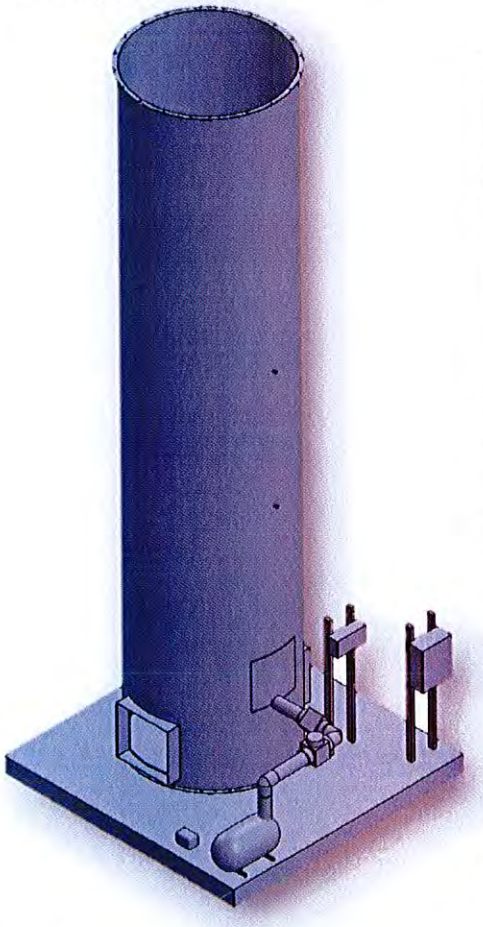
GENERAL PROPERTIES	CH2.5	CH10.0
BURNER SIZE (MMBTU/hr)	2.5	10.0
OUTER DIAMETER (inches)	34	54
HEIGHT (feet)	16	20
INLET PRESSURE (oz/in²)	≥ 0.5	
DESTRUCTION EFFICIENCY	≥ 99.99%	
SMOKELESS CAPACITY	100%	
TURN DOWN	SCALABLE	

HY-BON/EDI
Vent Gas Management

2404 Commerce Dr.
Midland, TX 79703
432-697-2292
hy-bon.com

100 Ayers Blvd.
Belpre, OH 45714
740-401-4000
ediplungerlift.com

With the fairly recent publication of the NSPS OOOO emission standard, all storage tank facilities constructed on or after August 23, 2011 will be allowed to emit 6 Tons or less of VOC's per year. This regulation not only forces companies to monitor and control their emissions, but it also forces the *means* of emission monitoring and controlling to be more reliable and exact. In response to such a stringent protocol, HY-BON Engineering Company is pleased to offer the **CH10.0** enclosed Vapor Combustor Unit (VCU). Built upon a foundation of 60+ years' experience with tank vapors, the VCU is the solution for reducing residual tank vapor emissions when a Vapor Recovery Unit (VRU) is not sufficient or a viable option.



GENERAL PROPERTIES	
TYPE	Enclosed Tank Battery Flare
AMBIENT TEMPERATURE	-20 °F to +100 °F
PILOT FUEL REQUIREMENTS	Propane or Site Gas @5psi of natural gas = 13.3 SCFM @5psi of propane = 12.5 SCFM
BURNER SIZE	10.0 million BTU/hr
INLET PRESSURE REQUIRMENTS	Minimum 0.5 oz/in^2 (~1.0 inches w.c.)
TURN DOWN RATIO	5:1
DESTRUCTION EFFICIENCY	99.99% DRE
MECHANICAL PROPERTIES	
DESIGN WIND SPEED	100 MPH
AMBIENT TEMPERATURE	-20 °F to +120 °F
ELECTRICAL AREA CLASSIFICATION	General Area Classification (Non-Hazardous)
ELEVATION	up to 3,000ft ASL
PROCESS PROPERTIES	
SMOKELESS CAPACITY	100%
OPERATING TEMPERATURE	800 °F to 2000 °F (1500 °F Nominal)
UTILITIES	
PILOT GAS	Process Gas
ELECTRICITY	1 Phase, 60 Hz, 120V/10A
SOLAR PANEL OPTION AVAILABLE	YES

- EPA 40 CFR 60, Quad O Compliant
- Completely Enclosed Combustion
- 99.99% Destruction Efficiency
- Fully Automated System
- Output Operational Data via Thumb Drive
- Capable of SCADA Integration

Revision #3: 09/04/2015

HY-BON/EDI
Vent Gas Management

2404 Commerce Dr.
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hy-bon.com

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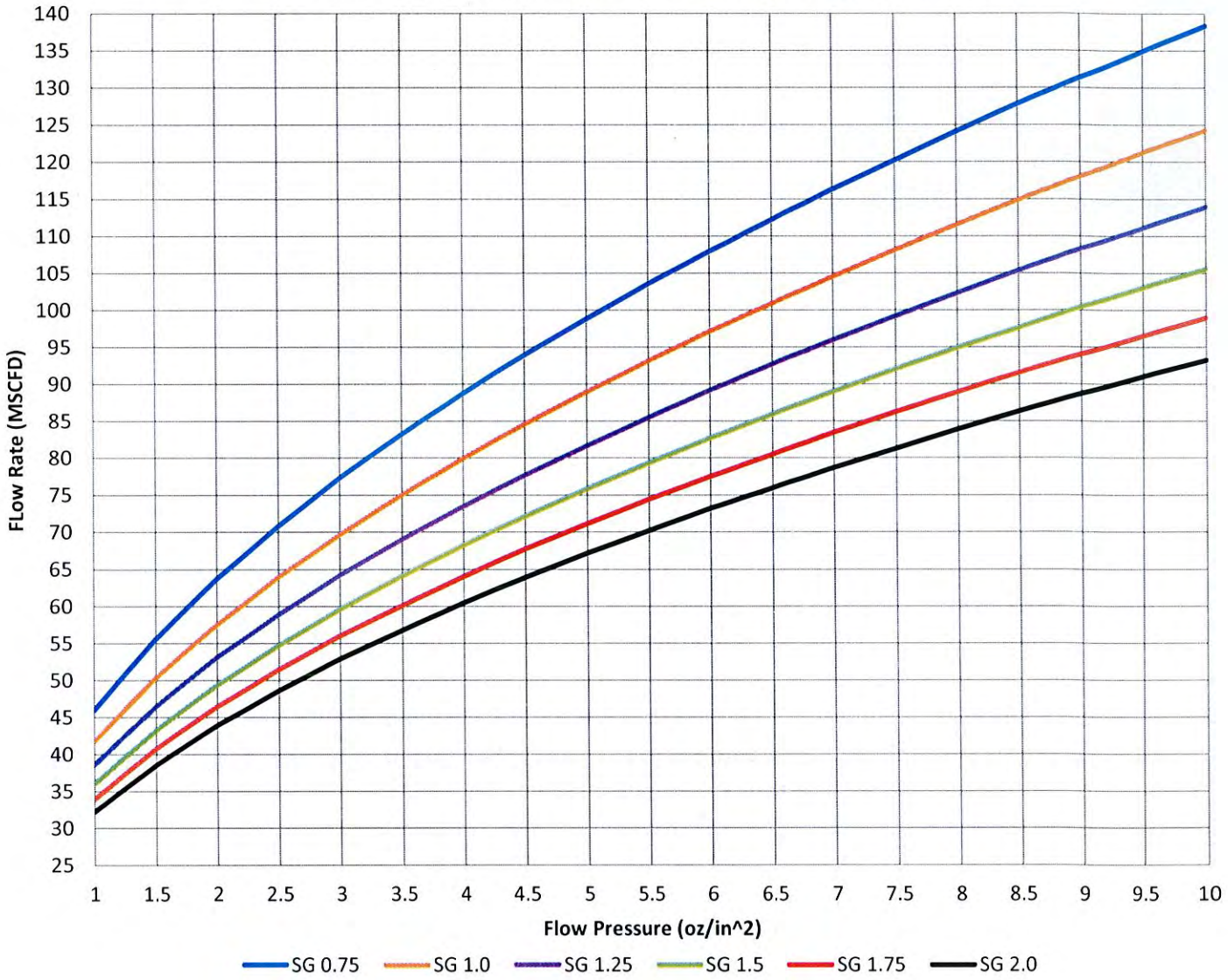
ediplungerlift.com

CH10.0: Flow Rate vs Flow Pressure with Corresponding Specific Gravity



ATTACHMENT T
EMISSIONS CALCULATIONS

Jay-Bee Oil & Gas, Inc.

EMISSIONS SUMMARY

Dopey Well Pad Production Facility
Tyler County, WV

Emission Point ID	Emission Unit ID	Description	NOx lb/hr	CO lb/hr	VOC[4] lb/hr	SO2 lb/hr	PM lb/hr	CH4[4] lb/hr	CO2e lb/hr	Benzene lb/hr	Ethylbenzene lb/hr	Xylenes lb/hr	n-Hexane lb/hr	Toluene lb/hr	Formaldehyde lb/hr	Total HAPs lb/hr
1E	HTR-1	GPU #1	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
2E	HTR-2	GPU #2	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
3E	HTR-3	GPU #3	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
4E	HTR-4	GPU #4	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
14E	HTR-6	GPU #5	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
15E	HTR-7	GPU #6	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
16E	HTR-8	GPU #7	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
17E	HTR-9	GPU #8	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
18E	HTR-10	GPU #9	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
19E	HTR-11	GPU #10	0.150	0.126	0.008	0.001	0.011	0.003	181.1				0.003		0.000	0.003
10E	HTR-5	Line Heater	0.050	0.042	0.003	0.000	0.004	0.001	60.38				0.001		0.000	0.001
5E	TL-1	Truck Loading - Condensate[2]			1.98								0.107			0.107
6E	TL-2	Truck Loading - Produced Water[2]			0.102								0.011			0.011
7E	VRU-1	VRU Compressor	0.185	0.370	0.041	0.000	0.013	0.126	89.7	0.001	0.000	0.000		0.000	0.015	0.022
8E	TEG-1	Thermoelectric Generator	0.001	0.001	0.000	0.000	0.000	0.000	1.57				0.000		0.000	0.000
9E	EC-1	Condensate/Water Tanks + Dehy Combustor[1]	0.838	4.11	3.18	0.001	0.053	0.315	1398.8				0.090	0.103	0.001	0.308
12E	EC-2	Condensate/Water Tanks + Dehy Combustor[1]	0.838	4.11	3.18	0.001	0.053	0.315	1398.8				0.090	0.103	0.001	0.308
21E	EC-3	Condensate/Water Tanks + Dehy Combustor[1]	0.838	4.11	3.18	0.001	0.053	0.315	1398.8				0.090	0.103	0.001	0.308
11E	RBV-1	500 MBTU/hr Reboiler	0.050	0.042	0.003	0.000	0.004	0.001	60.4	0.000			0.001	0.000	0.000	0.001
20E	RBV-2	300 MBTU/hr Reboiler	0.030	0.025	0.002	0.000	0.002	0.001	36.0	0.000			0.001	0.000	0.000	0.001
22E	CE-1	2370 HP Compressor Engine	2.612	1.006	2.445	0.011	0.179	583.879	2889.2	0.008	0.001	0.003	0.020	0.007	0.246	0.572
7E/9E,12E,21E	T01-06 + T08-11	Condensate Tanks + Water Tanks[3, 4]			6.6			0.93	23.3	0.003	0.000	0.006	0.197	0.008		0.215
---	CE-1	Blowdowns and Startups - Fugitives						NA	NA							NA
---	---	Truck Traffic Fugitive Dust					7.57									
---	---	Fugitive Emissions			2.55			2.15	53.7							0.024
Total (Exluding Fugitive Emissions)			6.94	15.07	14.20	0.023	0.475	584.99	9145.1	0.009	0.001	0.003	0.436	0.317	0.263	1.67
Total			6.94	15.07	16.75	0.023	8.04	587.14	9198.8	0.009	0.001	0.003	0.436	0.317	0.263	1.69

Emission Point ID	Emission Unit ID	Description	NOx tpy	CO tpy	VOC tpy	SO2 tpy	PM tpy	CH4 tpy	CO2e tpy	Benzene tpy	Ethylbenzene tpy	Xylenes tpy	n-Hexane tpy	Toluene tpy	Formaldehyde tpy	Total HAPs tpy
1E	HTR-1	GPU #1	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
2E	HTR-2	GPU #2	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
3E	HTR-3	GPU #3	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
4E	HTR-4	GPU #4	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
14E	HTR-6	GPU #5	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
15E	HTR-7	GPU #6	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
16E	HTR-8	GPU #7	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
17E	HTR-9	GPU #8	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
18E	HTR-10	GPU #9	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
19E	HTR-11	GPU #10	0.657	0.552	0.036	0.004	0.050	0.015	793.4				0.012		0.000	0.012
10E	HTR-5	Line Heater	0.219	0.184	0.012	0.001	0.017	0.005	264.5				0.004		0.000	0.004
5E	TL-1	Truck Loading - Condensate[2]			2.90								0.157			0.157
6E	TL-2	Truck Loading - Produced Water[2]			0.222								0.025			0.025
7E	VRU-1	VRU Compressor	0.811	1.622	0.178	0.002	0.057	0.553	393.0	0.005	0.000	0.001		0.002	0.065	0.096
8E	TEG-1	Thermoelectric Generator	0.006	0.005	0.000	0.000	0.000	0.000	6.88				0.000		0.000	0.000
9E	EC-1	Condensate/Water Tanks + Dehy Combustor[1]	3.67	17.99	13.93	0.003	0.232	1.38	6126.7				0.385	0.451	0.002	1.35
12E	EC-2	Condensate/Water Tanks + Dehy Combustor[1]	3.67	17.99	13.93	0.003	0.232	1.38	6126.7				0.385	0.451	0.002	1.35
21E	EC-3	Condensate/Water Tanks + Dehy Combustor[1]	3.67	17.99	13.93	0.003	0.232	1.38	6126.7				0.385	0.451	0.002	1.35
11E	RBV-1	500 MBTU/hr Reboiler	0.219	0.184	0.012	0.001	0.017	0.005	264.5				0.004		0.000	0.00
20E	RBV-2	300 MBTU/hr Reboiler	0.131	0.110	0.007	0.001	0.010	0.003	158.7				0.002		0.000	0.00
22E	CE-1	2370 HP Compressor Engine	11.443	4.405	10.710	0.047	0.784	2557.390	12654.7	0.035	0.003	0.014	0.087	0.032	1.076	2.50
7E/9E,12E,21E	T01-06 + T08-11	Condensate Tanks + Water Tanks[3, 4]			28.8			4.08	102.0	0.015	0.002	0.028	0.86	0.034		0.94
---	CE-1	Blowdowns and Startups - Fugitives						7.85	196.3							0.006
---	---	Truck Traffic Fugitive Dust					6.93									
---	---	Fugitive Emissions			11.2			9.41	235.4							0.103
Total (Exluding Fugitive Emissions)			30.41	66.00	53.07	0.099	2.08	2562.25	40056.3	0.04	0.00	0.015	1.37	1.387	1.153	6.785
Total			30.41	66.00	67.35	0.099	9.01	2579.51	40488.01	0.04	0.00	0.02	1.55	1.387	1.153	7.075

[1] Condensate and water tank emissions are currently controlled by a VRU + Enclosed Combustor at 98%. This line represents the un-controlled 2%.

[2] Truck loading is un-controlled.

[3] This line represents the 2% Un-captured/Controlled associated with the VRU.

[4] VRU-1 and EC-1 would not run concurrent so hourly VOC and CH4 emissions for these sources are only accounted for once.

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Proposed Emission Rates

Source CE-1

Engine Data:

Engine Manufacturer	CAT	
Engine Model	3608	
Type (Rich-burn or Low Emission)	Low Emissions	
Aspiration (Natural or Turbocharged)	Natural	
Turbocharge Cooler Temperature	130	deg. F
Manufacturer Rating	2,370	hp
Speed at Above Rating	1,000	rpm
Configeration (In-line or Vee)	V-8	
Number of Cylinders	8	
Engine Bore	11.810	inches
Engine Stroke	11.810	inches
Fuel Heat Content	1,258	BTU/scf
Engine Displacement	10,350	cu. in.
Fuel Consumption (HHV)	7,560	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokelean lb/mmbtu
Oxides of Nitrogen, NOx	0.500	2.61	11.44	1,185	62.70	
Carbon Monoxide CO	0.193	1.01	4.41	456	24.14	
VOC (NMNEHC)	0.468	2.45	10.71	1,109	58.69	
CO2e		2889	12654.68			
CO2	441	2304	10092.43	1,045,170	55300.98	
Total Annual Hours of Operation	**8,760**					
SO2		0.0108	0.0471			0.0006
PM (Condensable+ Filterable)		0.179	0.7840			0.00999
CH_4 as CO_{2e}	4.47	583.88	2557.4			0.0022
N_2O as CO_{2e}		1.1109	4.8656			0.0002
acrolein		0.0921	0.4034			0.00514
acetaldehyde		0.1498	0.6561			0.00836
formaldehyde	0.0470	0.2456	1.0756			0.0528
biphenyl		0.0002	0.0009			0.000212
benzene		0.0079	0.0345			0.00044
toluene		0.0073	0.0320			0.000408
ethylbenzene		0.0007	0.0031			3.97E-05
xylene		0.0033	0.0144			0.000184
methanol		0.0448	0.1962			0.0025
n-hexane		0.0199	0.0871			0.00111
total HAPs		0.5715	2.5034			0.071194

Exhaust Parameters:

Exhaust Gas Temperature	992	deg. F
Exhaust Gas Flow Rate	9216	acfm
Total Exhaust Gas Volume Flow, wet	9,216	acfm
Total Exhaust Gas Volume Flow, wet	153.6	acf per sec
Exhaust Stack Height	260	inches
	21.67	feet
Exhaust Stack Inside Diameter	20	inches
	1.667	feet
Exhaust Stack Velocity	70.4	ft/sec
	4,224.3	ft/min

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

Blowdowns		**Startup Emissions**	
Est. No. per Year	24	Est. No. per Year	24
Blowdown Volume, cu. Ft.	12439.24	Startup Volume, cu. Ft.	2204
Total Blowdown Volume, cu. Ft.	298541.7	Total Startup Volume, cu. Ft.	52896
Gas Density (STP), lb/cu.ft.	0.058	Gas Density (STP), lb/cu.ft.	0.058
Blowdown mass, lb/y	17311.4	Blowdown mass, lb/y	3067.3
Blowdown mass, tons/y	8.66	Blowdown mass, tons/y	1.53
Blowdown Emissions			
CH4, tpy	6.672	CH4, tpy	1.182
CO2e, tpy	166.8	CO2e, tpy	29.6
Total HAPs, tpy	0.005	Total HAPs, tpy	0.001

COMPRESSOR BLOWDOWN VOLUME with 3608 Driver

Given:

Q_a =	**161.50**	Cubic feet	yields	**4.5731632**	Cubic Meters	Volume of compressor, scrubbers and piping
P_i=	**68.03**	Atm	yields	**6893.14**	kPa	Pressure of Pipeline
T_i =	**25.00**	Deg C	yields	**298.15**	Deg K	Temperature in Pipeline
P_f=	**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=	**0.84311**					See Compressiblity spreadsheet
z_f=	**1.00111**					See Compressiblity spreadsheet

Q_t= 352.239 Cubic Meters or 12439.24 Cubic Feet

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

$$Q_t = Q_a \times (T_s/P_s) \times (Pi/(z_i * T_i)) - (P_f/(z_f * T_f))$$

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)

INITIAL COMPRESSABILITY FACTOR

Given:

Pressure **68.03 Atm.** **6893.1 kPa** **1000.04 PSIG**

Temperature **25 Deg. C**

Compressibility Factor **0.8431113**

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

$$aP + cT + dP^2 + eT$$

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

FINAL COMPRESSABILITY FACTOR

Given:

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

Temperature **25 Deg. C**

Compressibility Factor **1.0011085**

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

$$aP + cT + dP^2 + eT$$

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

Jay-Bee Oil &Gas ,LLC
ENGINE EMISSIONS

Dopey Well Pad Production Facility
Tyler County, WV

Controlled Emission Rates

Source VRU-1

Engine Data:

Engine Manufacturer	Cummins	
Engine Model	G5.9	
Type (Rich-burn or Low Emission)	Rich Burn	
Aspiration (Natural or Turbocharged)	Natural	
Manufacturer Rating	84	hp
Speed at Above Rating	1,800	rpm
Configuration (In-line or V)	In-line	
Number of Cylinders	6	
Engine Bore	4.020	inches
Engine Stroke	4.720	inches
Engine Displacement	359	cu. in.
Engine BMEP	103	psi
Fuel Consumption (HHV)	7,914	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tpy	g/hr	lb/day	AP-42 4strokerich lb/MMBtu	Comment
Oxides of Nitrogen, NOx	1.000	0.19	0.81	84	4.44		
Carbon Monoxide CO	2.000	0.37	1.62	168	8.89		453.59 grams = 1 pound
VOC (NMNEHC)	0.220	0.04	0.18	18	0.98		2,000 pounds = 1 ton
CO2	449	83	364	37,716	1,996		
CO2e		89.7	393				
Total Annual Hours of Operation	**8,760**						
SO2		0.0004	0.0017			0.0006	
PM2.5		0.0063	0.0277			0.0095	
PM (Condensable)		0.0066	0.0289			0.00991	
CH_4		0.1262	0.5529			0.0022	Factor From 40 CFR 98, Table C-2
N_2O		0.0115	0.0503			0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0017	0.0077			0.00263	
acetaldehyde		0.0019	0.0081			0.00279	
formaldehyde	0.080	0.0148	0.0649				Per Mfg.
benzene		0.0011	0.0046			0.00158	
toluene		0.0004	0.0016			0.000558	
ethylbenzene		2E-05	0.0001			0.0000248	
xylenes		0.0001	0.0006			0.000195	
methanol		0.002	0.0089			0.00306	
Total HAPs		0.022	0.0964				

Exhaust Parameters:

Exhaust Gas Temperature	1,078	deg. F
Exhaust Gas Mass Flow Rate		lb/hr
Exhaust Gas Mass Flow Rate	430	acfm
Exhaust Stack Height	96	inches
	8.00	feet
Exhaust Stack Inside Diameter	4	inches
	0.333	feet
Exhaust Stack Velocity	82.1	ft/sec
	4,927.4	ft/min

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source HTR1-4 & 6-11

*Emissions shown below are for each Gas Processing Unit

Burner Duty Rating	1500.0	Mbtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	29,208.1	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.1501	lb/hr	0.657	tpy
CO	0.1261	lb/hr	0.552	tpy
CO2	180.1	lb/hr	788.7	tpy
CH4	0.003	lb/hr	0.015	tpy
CO2e	181	lb/hr	793	tpy
VOC	0.0083	lb/hr	0.036	tpy
SO2	0.0009	lb/hr	0.004	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0114	lb/hr	0.050	tpy
CHOH	0.0001	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0027	lb/hr	0.012	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0028	lb/hr	0.012	tpy

AP-42 Factors Used

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential =298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source HTR-5
Line Heater

Burner Duty Rating	500.0	Mbtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	9,736.0	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0500	lb/hr	0.219	tpy
CO	0.0420	lb/hr	0.184	tpy
CO2	60.0	lb/hr	262.9	tpy
CH4	0.001	lb/hr	0.01	tpy
CO2e	60.4	lb/hr	264	tpy
VOC	0.0028	lb/hr	0.012	tpy
SO2	0.0003	lb/hr	0.001	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0038	lb/hr	0.017	tpy
CHOH	0.0000	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0009	lb/hr	0.004	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0009	lb/hr	0.004	tpy

AP-42 Factors Used

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential =298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source TEG-1

Burner Duty Rating	13.0	MBtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	253.1	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0013	lb/hr	0.006	tpy
CO	0.0011	lb/hr	0.005	tpy
CO2	1.6	lb/hr	6.8	tpy
CH4	0.000	lb/hr	0.000	tpy
CO2e	1.6	lb/hr	7	tpy
VOC	0.0001	lb/hr	0.000	tpy
SO2	0.0000	lb/hr	0.000	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0001	lb/hr	0.000	tpy
CHOH	0.0000	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0000	lb/hr	0.000	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0000	lb/hr	0.000	tpy

AP-42 Factors Used

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential =298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Source RBV-1

Burner Duty Rating	500.0	MBtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	9,736	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0500	lb/hr	0.219	tpy
CO	0.0420	lb/hr	0.184	tpy
CO2	60.0	lb/hr	262.9	tpy
CH4	0.001	lb/hr	0.01	tpy
CO2e	60.4	lb/hr	264.5	tpy
VOC	0.0028	lb/hr	0.012	tpy
SO2	0.0003	lb/hr	0.001	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0038	lb/hr	0.017	tpy
CHOH	0.0000	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0009	lb/hr	0.004	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0009	lb/hr	0.004	tpy

AP-42 Factors Used

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential = 298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Source RBV-2

Burner Duty Rating	300.0	MBtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	5,842	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0300	lb/hr	0.131	tpy
CO	0.0252	lb/hr	0.110	tpy
CO2	36.0	lb/hr	157.7	tpy
CH4	0.001	lb/hr	0.00	tpy
CO2e	36.2	lb/hr	158.7	tpy
VOC	0.0017	lb/hr	0.007	tpy
SO2	0.0002	lb/hr	0.001	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0023	lb/hr	0.010	tpy
CHOH	0.0000	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0005	lb/hr	0.002	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0006	lb/hr	0.002	tpy

AP-42 Factors Used

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential = 298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-1, 2, & 3
Enclosed Combustor Pilot

Per Unit Basis

Burner Duty Rating	985.1	MBtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1257.7	Btu/scf
Total Gas Consumption	19181.9	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0985	lb/hr	0.432	tpy
CO	0.0828	lb/hr	0.363	tpy
CO2	118.3	lb/hr	518.0	tpy
CH4	0.002	lb/hr	0.01	tpy
CO2e	119	lb/hr	521	tpy
VOC	0.0054	lb/hr	0.024	tpy
SO2	0.0006	lb/hr	0.003	tpy
H2S	0.0000	lb/hr	0.000	tpy
PM10	0.0075	lb/hr	0.033	tpy
CHOH	0.0001	lb/hr	0.000	tpy
Benzene	0.0000	lb/hr	0.000	tpy
N-Hexane	0.0018	lb/hr	0.008	tpy
Toluene	0.0000	lb/hr	0.000	tpy
Total HAPs	0.0019	lb/hr	0.008	tpy

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	**100**	**lb/MMCF**	
CO	**84**	**lb/MMCF**	
CO_2	**120,000**	**lb/MMCF**	Global Warming Potential = 1
VOC	**5.5**	**lb/MMCF**	
PM	**7.6**	**lb/MMCF**	
SO_2	**0.6**	**lb/MMCF**	
CH_4	**2.3**	**lb/MMCF**	Global Warming Potential = 25
N_2O	**2.2**	**lb/MMCF**	Global Warming Potential =298
HCOH	**0.075**	**lb/MMCF**	
Benzene	**0.0021**	**lb/MMCF**	
n-Hexane	**1.8**	**lb/MMCF**	
Toluene	**0.0034**	**lb/MMCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-1
Enclosed Vapor Combustor - Control of Tank Emissions

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	2313.1	Btu/scf		
Flare Burner MDHI	10	MMBTU/hr		
Max Flow to T-E	0.034	MMSCFD	12.495	MMSCF/yr
Max BTUs to Flare	3.299	MMBTU/hr	28,903	MMBTU/yr

NOx	0.68	lb/hr	2.98	tpy
CO	3.70	lb/hr	16.21	tpy
CO2	1,168.90	lb/hr	5,119.78	tpy
CO2e	1,177.33	lb/hr	5,156.69	tpy
VOC	2.19	lb/hr	9.61	tpy
CH4	0.3108	lb/hr	1.36	tpy
N2O	0.0022	lb/hr	0.0096	tpy
PM	0.0329	lb/hr	0.1439	tpy
CHOH	0.0003	lb/hr	0.0014	tpy
Benzene	0.0011	lb/hr	0.0049	tpy
n-Hexane	0.0658	lb/hr	0.2882	tpy
Toluene	0.0002	lb/hr	0.0007	tpy
Total HAP	0.0674	lb/hr	0.2952	tpy

Notes: VOC, Total HAP, N-Hexane and CH4 emissions are taken from the Condensate and Produced Water Tank Emissions

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068**	**lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37**	**lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89**	**lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022**	**lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022**	**lb/MMBTU**	Global Warming Potential =298
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, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-2
Enclosed Vapor Combustor - Control of Tank Emissions

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	2313.1	Btu/scf		
Flare Burner MDHI	10	MMBTU/hr		
Max Flow to T-E	0.034	MMSCFD	12.495	MMSCF/yr
Max BTUs to Flare	3.299	MMBTU/hr	28,903	MMBTU/yr

NOx	0.68	lb/hr	2.98	tpy
CO	3.70	lb/hr	16.21	tpy
CO2	1,168.90	lb/hr	5,119.78	tpy
CO2e	1,177.33	lb/hr	5,156.69	tpy
VOC	2.19	lb/hr	9.61	tpy
CH4	0.3108	lb/hr	1.36	tpy
N2O	0.0022	lb/hr	0.0096	tpy
PM	0.0329	lb/hr	0.1439	tpy
CHOH	0.0003	lb/hr	0.0014	tpy
Benzene	0.0011	lb/hr	0.0049	tpy
n-Hexane	0.0658	lb/hr	0.2882	tpy
Toluene	0.0002	lb/hr	0.0007	tpy
Total HAP	0.0674	lb/hr	0.2952	tpy

Notes: VOC, Total HAP, N-Hexane and CH4 emissions are taken from the Condensate and Produced Water Tank Emissions

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068**	**lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37**	**lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89**	**lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022**	**lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022**	**lb/MMBTU**	Global Warming Potential =298
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, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-3
Enclosed Vapor Combustor - Control of Tank Emissions

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	2313.1	Btu/scf		
Flare Burner MDHI	10	MMBTU/hr		
Max Flow to T-E	0.034	MMSCFD	12.495	MMSCF/yr
Max BTUs to Flare	3.299	MMBTU/hr	28,903	MMBTU/yr

NOx	0.68	lb/hr	2.98	tpy
CO	3.70	lb/hr	16.21	tpy
CO2	1,168.90	lb/hr	5,119.78	tpy
CO2e	1,177.33	lb/hr	5,156.69	tpy
VOC	2.19	lb/hr	9.61	tpy
CH4	0.3108	lb/hr	1.36	tpy
N2O	0.0022	lb/hr	0.0096	tpy
PM	0.0329	lb/hr	0.1439	tpy
CHOH	0.0003	lb/hr	0.0014	tpy
Benzene	0.0011	lb/hr	0.0049	tpy
n-Hexane	0.0658	lb/hr	0.2882	tpy
Toluene	0.0002	lb/hr	0.0007	tpy
Total HAP	0.0674	lb/hr	0.2952	tpy

Notes: VOC, Total HAP, N-Hexane and CH4 emissions are taken from the Condensate and Produced Water Tank Emissions

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068**	**lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37**	**lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89**	**lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022**	**lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022**	**lb/MMBTU**	Global Warming Potential =298
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, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-1
Enclosed Vapor Combustor

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	527.7	Btu/scf		
Max Flow to T-E	0.03984	MMSCFD	348.998	MMSCF/yr
Max BTUs to Flare	0.88	MMBtu/hr	7,674	MMBtu/yr

NOx	0.06	lb/hr	0.26	tpy
CO	0.32	lb/hr	1.42	tpy
CO2	102.40	lb/hr	448.50	tpy
CO2e	102.50	lb/hr	448.97	tpy
VOC	0.98	lb/hr	4.30	tpy
CH4	0.00	lb/hr	0.0084	tpy
N2O	0.000	lb/hr	0.0008	tpy
PM	0.013	lb/hr	0.055	tpy
Benzene	0.012	lb/hr	0.053	tpy
CHOH	0.000	lb/hr	0.001	tpy
n-Hexane	0.022	lb/hr	0.096	tpy
Toluene	0.103	lb/hr	0.451	tpy
Total HAPs	0.239	lb/hr	1.047	tpy

Note: VOCs and HAPs are set at 2% of the still vent emissions in the Glycalc Report.

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068 lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37 lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89 lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022 lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022 lb/MMBTU**	Global Warming Potential =298
AP-42 Table 1.4-2	**PM**	**7.6 lb/MMSCF**	
AP-42 Table 1.4-3	**CHOH**	**0.075 lb/MMSCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-2
Enclosed Vapor Combustor

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	527.7	Btu/scf		
Max Flow to T-E	0.03984	MMSCFD	348.998	MMSCF/yr
Max BTUs to Flare	0.88	MMBtu/hr	7,674	MMBtu/yr

NOx	0.06	lb/hr	0.26	tpy
CO	0.32	lb/hr	1.42	tpy
CO2	102.40	lb/hr	448.50	tpy
CO2e	102.50	lb/hr	448.97	tpy
VOC	0.98	lb/hr	4.30	tpy
CH4	0.00	lb/hr	0.0084	tpy
N2O	0.000	lb/hr	0.0008	tpy
PM	0.013	lb/hr	0.055	tpy
Benzene	0.012	lb/hr	0.053	tpy
CHOH	0.000	lb/hr	0.001	tpy
n-Hexane	0.022	lb/hr	0.096	tpy
Toluene	0.103	lb/hr	0.451	tpy
Total HAPs	0.239	lb/hr	1.047	tpy

Note: VOCs and HAPs are set at 2% of the still vent emissions in the Glycalc Report.

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068 lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37 lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89 lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022 lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022 lb/MMBTU**	Global Warming Potential =298
AP-42 Table 1.4-2	**PM**	**7.6 lb/MMSCF**	
AP-42 Table 1.4-3	**CHOH**	**0.075 lb/MMSCF**	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Potential Emission Rates

Source EC-3
Enclosed Vapor Combustor

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	527.7	Btu/scf		
Max Flow to T-E	0.03984	MMSCFD	348.998	MMSCF/yr
Max BTUs to Flare	0.88	MMBtu/hr	7,674	MMBtu/yr

NOx	0.06	lb/hr	0.26	tpy
CO	0.32	lb/hr	1.42	tpy
CO2	102.40	lb/hr	448.50	tpy
CO2e	102.50	lb/hr	448.97	tpy
VOC	0.98	lb/hr	4.30	tpy
CH4	0.00	lb/hr	0.0084	tpy
N2O	0.000	lb/hr	0.0008	tpy
PM	0.013	lb/hr	0.055	tpy
Benzene	0.012	lb/hr	0.053	tpy
CHOH	0.000	lb/hr	0.001	tpy
n-Hexane	0.022	lb/hr	0.096	tpy
Toluene	0.103	lb/hr	0.451	tpy
Total HAPs	0.239	lb/hr	1.047	tpy

Note: VOCs and HAPs are set at 2% of the still vent emissions in the Glycalc Report.

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068**	**lb/MMBTU**	
AP-42 Table 13.5-1	**CO**	**0.37**	**lb/MMBTU**	
40 CFR 98 Table C-1	**CO2**	**116.89**	**lb/MMBTU**	Global Warming Potential = 1
40 CFR 98 Table C-2	**CH4**	**0.0022**	**lb/MMBTU**	Global Warming Potential = 25
40 CFR 98 Table C-2	**N2O**	**0.00022**	**lb/MMBTU**	Global Warming Potential =298
AP-42 Table 1.4-2	**PM**	**7.6**	**lb/MMSCF**	
AP-42 Table 1.4-3	**CHOH**	**0.075**	**lb/MMSCF**	

Jay-Bee Oil & Gas - Dopey

Flash Emission Calculations - Condensate

Using Gas-Oil Ratio Method

Un-Controlled

Site specific data

Gas-Oil-ratio	=	500	scf/bbl	Using GOR from comparable well pads.
Throughput	=	73,000	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	2012.2936	E_{TOT}
VOC	**1412.0063**	Sum of C3+
Nitrogen	5.03E-01	
Carbon Dioxide	3.16E+00	
Methane	2.00E+02	
Ethane	3.97E+02	
Propane	5.22E+02	
Isobutane	1.41E+02	
n-Butane	3.25E+02	
2,2 Dimethylpropane	3.96E+00	
Isopentane	1.11E+02	
n-Pentane	1.17E+02	
2,2 Dimethylbutane	4.21E+00	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	6.10E+00	
2 Methylpentane	3.24E+01	
3 Methylpentane	1.93E+01	
n-Hexane	4.23E+01	HAP
Methylcyclopentane	3.08E+00	
Benzene	7.24E-01	HAP
Cyclohexane	4.37E+00	
2-Methylhexane	9.38E+00	
3-Methylhexane	9.22E+00	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	8.77E+00	
n-Heptane	1.36E+01	
Methylcyclohexane	8.43E+00	
Toluene	1.65E+00	HAP
Other C8's	1.38E+01	
n-Octane	4.59E+00	
Ethylbenzene	1.01E-01	HAP
M & P Xylenes	1.19E+00	HAP
O-Xylene	1.61E-01	HAP
Other C9's	5.71E+00	
n-Nonane	1.37E+00	
Other C10's	2.15E+00	
n-Decane	2.82E-01	
Undecanes (11)	3.02E-01	

Jay-Bee Oil & Gas - Dopey

Flash Emission Calculations - Produced Water

Using Gas-Water Ratio Method

Un-Controlled

Site specific data

Gas-Water-ratio	=	4.06	scf/bbl	Using GOR from comparable well pads.
Throughput	=	220,000	bbl/yr	
Stock tank gas molecular weight	=	30.68	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	38.1897	E_{TOT}
VOC	**19.5321**	Sum of C3+
Nitrogen	6.35E-01	
Carbon Dioxide	5.75E-01	
Methane	1.13E+01	
Ethane	6.15E+00	
Propane	4.39E+00	
Isobutane	1.10E+00	
n-Butane	3.09E+00	
2,2 Dimethylpropane	4.85E-02	
Isopentane	1.55E+00	
n-Pentane	2.16E+00	
2,2 Dimethylbutane	8.06E-02	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	1.55E-01	
2 Methylpentane	8.66E-01	
3 Methylpentane	5.58E-01	
n-Hexane	1.51E+00	HAP
Methylcyclopentane	1.41E-01	
Benzene	2.75E-02	HAP
Cyclohexane	1.94E-01	
2-Methylhexane	4.21E-01	
3-Methylhexane	4.37E-01	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	4.03E-01	
n-Heptane	7.34E-01	
Methylcyclohexane	3.89E-01	
Toluene	6.03E-02	HAP
Other C8's	6.67E-01	
n-Octane	2.09E-01	
Ethylbenzene	4.20E-03	HAP
M & P Xylenes	3.44E-02	HAP
O-Xylene	3.82E-03	HAP
Other C9's	2.02E-01	
n-Nonane	3.78E-02	
Other C10's	4.43E-02	
n-Decane	7.64E-03	
Undecanes (11)	7.26E-03	

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

TL-1
Truck Loading - Condensate

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

$$L_L = 12.46 * (SPM/T)$$

Where,

Loading Loss	L_L=	2.658	lb/1000 gallons
Saturation Factor	S=	0.551	
True Vapor Pressure	P=	3.02	psia
Molecular Weight of Vapors	M=	66.64	lb/lb-mol
Temperature	T=	520	deg R

Maximum Daily Loading	200	BBL/day
	8,400	gpd
Hours of Loading	8	hr

Total VOC	15.9	lb/day	1.98	lb/hr
Total HAP	0.9	lb/day	0.11	lb/hr

Maximum Annual Loading	73,000	BBL/yr
	3,066,000	gpy

Total VOC	5791.0	lb/yr	2.90	tpy
Total HAP	313.0	lb/yr	0.16	tpy

Emissions

Total VOC	71.059	%
Total HAP	3.841	%

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

TL-2
Truck Loading - Produced Water

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

$$L_L = 12.46 * (SPM/T)$$

Where,

Loading Loss	L_L=	0.132	lb/1000 gallons
Saturation Factor	S=	0.6	
True Vapor Pressure	P=	0.3	psia
Molecular Weight of Vapors	M=	30.68	lb/lb-mol
Temperature	T=	520	deg R

Maximum Daily Loading	603	BBL/day
	25,326	gpd
Hours of Loading	12	hr

Total VOC	1.2	lb/day	0.10	lb/hr
Total HAP	0.1	lb/day	0.011	lb/hr

Maximum Annual Loading	220,000	BBL/yr
	9,240,000	gpy

Total VOC	444.8	lb/yr	0.22	tpy
Total HAP	49.0	lb/yr	0.02	tpy

Emissions

Total VOC	36.376	%
Total HAP	4.009	%

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Truck Loading
Fugitive Dust

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Truck Capacity (BBL/Truck)	Maximum Trips per Year	Control	Control Efficiency (%)
1	Produced Water Transportation Trucks	18	27	10	0.44	1	80	2750	None	---
2	Condensate Transportation Trucks	18	27	10	0.44	1	80	912.5	None	---
			54000	lbs						

		PM	PM-10
k =	Particle size multiplier	0.8	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	27
p =	Number of days per year with precipitation >0.01 in.	157	157

E (lb/ vehicle mile traveled) = $k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365)$

Item 1 - Produced Water		**PM**	**PM-10**	
E	lb/vmt	7.378804125	1.220015589	
E	[lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr	**3.247**	**0.537**	lb/hr
E	[lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = t	**4.464**	**0.738**	tpy

Item 2 - Condensate		**PM**	**PM-10**	
E	lb/vmt	7.378804125	1.220015589	
E	[lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr	**3.247**	**0.537**	lb/hr
E	[lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = t	**1.481**	**0.245**	tpy

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Fugitive VOC Emissions

Volatile Organic Compounds, NMNEHC from gas analysis:	18.40	weight percent
Methane from gas analysis:	59.35	weight percent
Carbon Dioxide from gas analysis:	0.32	weight percent
HAPs from gas analysis:		
Hexane	0.62	weight percent
Gas Density:	0.0580	lb/scf

Emission Source:	Count	Oil & Gas Production*	VOC %	VOC (lb/hr)	VOC (tpy)	CO2 (lb/hr)	CO2 (tpy)	CH4 (lb/hr)	CH4 (tpy)	CO2e (tpy)	Hexane (tpy)
Pump Seals:											
Gas:	1	0.00529 lb/hr	18.4	0.001	0.004	0.000	0.000	0.003	0.0138	0.344	0.000
Valves:											
Gas/Vapor:	202	0.02700 scf/hr	18.4	0.058	0.255	0.001	0.004	0.188	0.8221	20.556	0.009
Light Liquid:	94	0.05000 scf/hr	100.0	0.272	1.190						
Low Bleed Pneumatic	-	1.39000 scf/hr	18.4	0.000	0.000	0.000	0.000	0.000	0.0000	0.000	0.000
Relief Valves:	5	0.04000 scf/hr	18.4	0.002	0.009	0.000	0.000	0.007	0.0301	0.754	0.000
Open-ended Lines, gas:	11	0.06100 scf/hr	18.4	0.007	0.031	0.000	0.001	0.023	0.1011	2.529	0.001
Sampling Connectors:											
Gas:	90	0.03300 lb/hr	18.4	0.546	2.394	0.009	0.041	1.763	7.7202	193.047	0.081
Light Liquid:	45	0.03300 lb/hr	100.0	1.485	6.504						
Connectors:											
Gas:	693	0.00300 scf/hr	18.4	0.022	0.097	0.000	0.002	0.072	0.3134	7.836	0.003
Light Liquid:	211	0.00700 scf/hr	100.0	0.086	0.376						
Compressor Seals, Gas:	1	0.01940 lb/hr	18.4	0.004	0.016	0.000	0.000	0.012	0.0504	1.261	0.001
Flanges:											
Gas:	159	0.00086 lb/hr	18.4	0.025	0.110	0.000	0.002	0.081	0.3544	8.863	0.004
Light Liquid:	53	0.00300 scf/hr	100.0	0.009	0.040						

Blowdowns:

	Pressure (psig)	Internal Volume (scf)	Projected Blowdown Events (per year)	Gas Released Per Year (scf)	Gas Released Per Year (lbs)	Composition of Gas (% by volume)	Released (lb/hr)	Released (tpy)	CO2e (tpy)
VOC	300	65	48	3120	374.4	0.70	0.0300	0.1314	
CH4	300	65	48	3120	132.0	0.10	0.0015	0.0066	0.1638
HAPs	300	65	48	3120	348.8	0.02	0.0009	0.0040	

Fugitive Calculations:

	lb/hr	tpy
VOC	**2.547**	**11.158**
CH4	**2.149**	**9.412**
CO2	**0.012**	**0.051**
CO2e	**53.734**	**235.354**
HAPs	**0.024**	**0.103**

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

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility

Tyler County, WV

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	0.394	0.110	0.004	0.530			-		0.0039	
Carbon Dioxide, CO2	0.151	0.066	0.002	0.319			-		0.0015	
Hydrogen Sulfide, H2S	-	-	-	-			-		-	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	77.080	12.366	0.427	59.347	701.0	778.5	7.346		0.7693	
Ethane, C2H6	14.832	4.460	0.154	21.405	240.1	262.5	2.474		0.1471	3.945
Propane	4.967	2.190	0.076	10.512	115.0	125.0	1.183	10.512	0.0488	1.361
Iso-Butane	0.616	0.358	0.012	1.718	18.5	20.0	0.191	1.718	0.0060	0.200
Normal Butane	1.210	0.703	0.024	3.375	36.4	39.5	0.375	3.375	0.0117	0.379
Iso Pentane	0.266	0.192	0.007	0.921	9.8	10.6	0.101	0.921	0.0027	0.097
Normal Pentane	0.262	0.189	0.007	0.907	9.7	10.5	0.100	0.907	0.0026	0.094
Hexane	0.151	0.130	0.004	0.625	6.6	7.2	0.068	0.625	0.0015	0.062
Heptane	0.071	0.071	0.002	0.341	3.6	3.9	0.037	0.341	0.0007	0.033
	100.000	20.837	0.719		1,140.8	1,257.7	11.875	18.400	0.9958	6.172

Gas Density (STP) = 0.058

Ideal Gross (HHV)	1,257.7
Ideal Gross (sat'd)	1,236.6
GPM	-
Real Gross (HHV)	1,263.0
Real Net (LHV)	1,145.6

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility

Tyler County, WV

Condensate Tank Flash Vapor 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	0.036	0.009	0.000	0.022			-		0.0003	
Carbon Dioxide, CO2	0.141	0.041	0.001	0.103			-		0.0009	
Hydrogen Sulfide, H2S	-	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	24.485	3.370	0.116	8.458	191.0	212.2	2.002		0.2096	
Ethane, C2H6	25.943	8.112	0.280	20.358	436.7	477.4	4.500		0.2676	7.176
Propane	23.253	11.311	0.391	28.386	593.8	645.4	6.110	28.386	0.2520	7.030
Iso-Butane	4.773	3.064	0.106	7.690	158.2	171.4	1.633	7.690	0.0512	1.715
Normal Butane	10.980	6.916	0.239	17.357	358.3	388.2	3.685	17.357	0.1150	3.731
Iso Pentane	3.135	2.367	0.082	5.941	121.4	131.3	1.250	5.941	0.0328	1.195
Normal Pentane	3.175	2.307	0.080	5.791	118.5	128.2	1.219	5.791	0.0320	1.152
Hexane	2.378	1.531	0.053	3.841	78.2	84.5	0.804	3.841	0.0175	0.726
Heptane	1.701	0.818	0.028	2.052	41.6	44.9	0.428	2.052	0.0081	0.374
	100.000	39.846	1.376		2,097.7	2,283.4	21.630	71.059	0.9872	23.100

Gas Density (STP) = 0.111

Ideal Gross (HHV)	2,283.4
Ideal Gross (sat'd)	2,244.3
GPM	-
Real Gross (HHV)	2,313.1
Real Net (LHV)	2,124.9

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Water Tank Flash Vapor 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	1.821	0.161	0.006	0.652			-		0.0057	
Carbon Dioxide, CO2	1.049	0.705	0.024	2.855			-		0.0160	
Hydrogen Sulfide, H2S	-	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	56.602	11.902	0.411	48.188	674.7	749.3	7.070		0.7404	
Ethane, C2H6	16.424	2.946	0.102	11.929	158.6	173.4	1.634		0.0972	2.606
Propane	8.000	1.933	0.067	7.827	101.5	110.3	1.044	7.827	0.0431	1.202
Iso-Butane	1.516	1.070	0.037	4.332	55.2	59.9	0.570	4.332	0.0179	0.599
Normal Butane	4.274	1.187	0.041	4.808	61.5	66.6	0.633	4.808	0.0197	0.641
Iso Pentane	1.784	0.942	0.033	3.812	48.3	52.2	0.497	3.812	0.0131	0.475
Normal Pentane	2.405	0.670	0.023	2.711	34.4	37.2	0.354	2.711	0.0093	0.334
Hexane	2.953	0.990	0.034	4.009	50.6	54.6	0.520	4.009	0.0114	0.470
Heptane	3.172	2.192	0.076	8.877	111.6	120.4	1.147	8.877	0.0218	1.004
	100.000	24.699	0.853		1,296.4	1,424.0	13.469	36.376	0.9954	7.331

Gas Density (STP) = 0.069

Ideal Gross (HHV)	1,424.0
Ideal Gross (sat'd)	1,399.9
GPM	-
Real Gross (HHV)	1,430.5
Real Net (LHV)	1,302.3

Jay-Bee Oil & Gas, Inc.

Dopey Well Pad Production Facility
Tyler County, WV

Still Vent 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	0.113	0.032	0.001	0.159	0.0	0.0	-		0.0011	
Carbon Dioxide, CO2	0.137	0.060	0.002	0.303	0.0	0.0	0.010		0.0014	
Hydrogen Sulfide, H2S	-	-	-	-	0.0	0.0	-		-	
Water	62.500	11.250	0.388	56.522	0.0	0.0	-		0.6254	
Oxygen, O2	-	-	-	-	0.0	0.0	-		-	
Methane, CH4	23.000	3.690	0.127	18.539	209.2	232.3	3.836		0.2295	
Ethane, C2H6	5.790	1.741	0.060	8.747	93.7	102.5	1.379		0.0574	1.540
Propane	2.510	1.107	0.038	5.561	58.1	63.2	0.777	5.561	0.0247	0.688
Iso-Butane	0.391	0.227	0.008	1.142	11.7	12.7	0.121	1.142	0.0038	0.127
Normal Butane	0.945	0.549	0.019	2.760	28.5	30.8	0.360	2.760	0.0091	0.296
Iso Pentane	0.267	0.193	0.007	0.968	9.9	10.7	0.113	0.968	0.0027	0.097
Normal Pentane	0.320	0.231	0.008	1.160	11.9	12.8	0.133	1.160	0.0032	0.115
Hexane	0.404	0.348	0.012	1.749	17.8	19.2	0.197	1.749	0.0040	0.165
Heptane	0.475	0.476	0.016	2.391	24.2	26.1	1.310	2.391	0.0047	0.218
	96.852	19.904	0.687		464.9	510.3	8.236	15.731	0.9670	3.247

Gas Density (STP) = **0.055**

Ideal Gross (HHV)	510.3
Ideal Gross (sat'd)	502.3
GPM	-
Real Gross (HHV)	527.7
Real Net (LHV)	480.8

Jay-Bee Oil & Gas, Inc.

GAS DATA INFORMATION

Specific Gravity of Air, @ 29.92 in. Hg and 60 -F, 28.9625
One mole of gas occupies, @ 14.696 psia & 32 -F, 359.2 cu ft. per lb-mole
One mole of gas occupies, @ 14.696 psia & 60 -F, 379.64 cu ft. per lb-mole

Hydrogen Sulfide (H2S) conversion chart:

0 grains H2S/100 scf	=	0.00000 mole % H2S
		0.0 ppmv H2S
0 mole % H2S	=	0 grains H2S/100 scf
		0.0 ppmv H2S
0 ppmv H2S	=	0.000 grains H2S/100 scf
		0.00000 mole % H2S

Ideal Gas at 14.696 psia and 60°F

		MW lb/mol	Specific Gravity	Lb per Cu Ft	Cu Ft per Lb	LHV, dry Btu/scf	HHV, dry Btu/scf	LHV Btu/lb	HHV Btu/lb	cu ft of air / 1 cu ft of gas	Z factor
Nitrogen	N2	28.013	0.9672	0.0738	13.552	0	0	0	0	0	0.9997
Carbon Dioxide	CO2	44.010	1.5196	0.1159	8.626	0	0	0	0	0	0.9964
Hydrogen Sulfide	H2S	34.076	1.1766	0.0898	11.141	587	637	6,545	7,100	7.15	0.9846
Water	H20	18.000	0.6215	0.0474	21.091	0	0	0	0	0	1.0006
Oxygen	O2	31.999	1.1048	0.0843	11.864	0	0	0	0	0	0.9992
Methane	CH4	16.043	0.5539	0.0423	23.664	909.4	1,010.0	21,520	23,879	9.53	0.9980
Ethane	C2H6	30.070	1.0382	0.0792	12.625	1,618.7	1,769.6	20,432	22,320	16.68	0.9919
Propane	C3H8	44.097	1.5226	0.1162	8.609	2,314.9	2,516.1	19,944	21,661	23.82	0.9825
Iso-Butane	C4H10	58.124	2.0069	0.1531	6.532	3,000.4	3,251.9	19,629	21,257	30.97	0.9711
Normal Butane	C4H10	58.124	2.0069	0.1531	6.532	3,010.8	3,262.3	19,680	21,308	30.97	0.9667
Iso Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,699.0	4,000.9	19,478	21,052	38.11	1.0000
Normal Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,706.9	4,008.9	19,517	21,091	38.11	1.0000
Hexane	C6H14	86.178	2.9755	0.2270	4.405	4,403.8	4,755.9	19,403	20,940	45.26	0.9879
Heptane	C7H16	100.205	3.4598	0.2639	3.789	5,100.0	5,502.5	22,000	23,000	52.41	0.9947

Real Gas at 14.696 psia and 60°F

		MW lb/mol	Specific Gravity	Lb per Cu Ft	Cu Ft per Lb	LHV, dry Btu/scf	HHV, dry Btu/scf	LHV Btu/lb	HHV Btu/lb	cu ft of air / 1 cu ft of gas	Gal/Mole
Nitrogen	N2	28.013	0.9672	0.0738	13.552	0	0	0	0	0	4.1513
Carbon Dioxide	CO2	44.010	1.5196	0.1159	8.626	0	0	0	0	0	6.4532
Hydrogen Sulfide	H2S	34.076	1.1766	0.0898	11.141	621	672	6,545	7,100	7.15	5.1005
Water	H2O	18.000	0.6215	0.0474	21.091						3.8376
Oxygen	O2	31.999	1.1048	0.0843	11.864	0	0	0	0	0	3.3605
Methane	CH4	16.043	0.5539	0.0423	23.664	911	1,012	21,520	23,879	9.53	6.4172
Ethane	C2H6	30.070	1.0382	0.0792	12.625	1,631	1,783	20,432	22,320	16.68	10.126
Propane	C3H8	44.097	1.5226	0.1162	8.609	2,353	3,354	19,944	21,661	23.82	10.433
Iso-Butane	C4H10	58.124	2.0069	0.1531	6.532	3,101	3,369	19,629	21,257	30.97	12.386
Normal Butane	C4H10	58.124	2.0069	0.1531	6.532	3,094	3,370	19,680	21,308	30.97	11.937
Iso Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,709	4,001	19,478	21,052	38.11	13.86
Normal Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,698	4,009	19,517	21,091	38.11	13.713
Hexane	C6H14	86.178	2.9755	0.2270	4.405	4,404	4,756	19,403	20,940	45.26	15.566
Heptane	C7H16	100.205	3.4598	0.2639	3.789	5,101	5,503	22,000	23,000	52.41	17.468

Gas Analytical Services

Good

Charleston, WV

844-445-4207

Customer	: 8788 - JayBee Oil & Gas	**Date Sampled**	: 02/02/2016
Station ID	: DOC 2H	**Date Analyzed**	: 02/01/2016
Cylinder ID	: 0379	**Effective Date**	: 03/01/2016
Producer	:	**Cyl Pressure**	: 1,115
Lease	: DOC 2H JayBee	**Temp**	: 0
Area	: 357 - Union	**Cylinder Type**	: Spot
State	:	**Sample By**	: Justin Whipkey

COMPONENT	MOL%	GPM@14.73(PSIA)
Carbon-Dioxide	0.1587	0.000
Oxygen	0.0009	0.000
Nitrogen	0.3525	0.000
Methane	74.7431	0.000
Ethane	14.5795	3.917
Propane	4.6929	1.299
Iso-Butane	0.6066	0.199
N-Butane	1.1732	0.372
Neo-Pentane	0.0105	0.004
Iso-Pentane	0.3013	0.111
N-Pentane	0.3415	0.124
N-Hexane	0.5710	0.369
N-Heptane	0.3362	0.156
N-Octane	0.0627	0.032
N-Nonane	0.0067	0.004
N-Decane	0.0009	0.001
Benzene	0.0106	0.003
Toluene	0.0691	0.023
Ethylbenzene	0.0027	0.001
M-Xylene/P-Xylene	0.0038	0.001
O-Xylene	0.0024	0.001
C6's	0.6464	0.261
C7's	0.7941	0.356
C9's	0.0590	0.031
C10's	0.0051	0.003
C11's	0.0001	0.000
C8's	0.4685	0.238
TOTAL	**100.0000**	**7.506**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9952 **C5+ GPM** : 0.63300

Ideal Gravity: 0.7964 **Real Gravity:** 0.7999 **C5+ Mole %** : 3.2756

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025
Ideal GPM	7.430	7.453	7.471	7.620
Ideal BTU Dry	1,371.30	1,375.61	1,378.79	1,406.40
Ideal BTU Sat	1,347.30	1,351.61	1,354.79	1,382.40
Real GPM	7.465	7.489	7.506	7.657
Real BTU Dry	1,377.82	1,382.17	1,385.38	1,413.26

Real BTU Sat	1,354.31	1,358.66	1,361.87	1,389.77

Comments:

Gas Analysis performed in accordance with GPA 2286

Analytical Calculations performed in accordance with GPA 2172

Sample Count : 230000010

COC :

April 24, 2014

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

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 361-661-7015

April 23, 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
Gas Evolved from Hydrocarbon Liquid Flashed
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	6.457
Isobutane	4.773	1.574
n-Butane	10.980	3.489
2-2 Dimethylpropane	0.108	0.042
Isopentane	3.027	1.116
n-Pentane	3.175	1.160
Hexanes	2.378	0.988
Heptanes Plus	1.701	0.761
Totals	100.000	22.579

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.599	(Air=1)
Molecular Weight	102.69	
Gross Heating Value	5488	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.387	(Air=1)
Compressibility (Z)	0.9850	
Molecular Weight	39.56	
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 PPMV or <0.001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: AL
Cylinder ID: ST# 20

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.036		0.025
Carbon Dioxide	0.141		0.157
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	10.980	3.489	16.132
2,2 Dimethylpropane	0.108	0.042	0.197
Isopentane	3.027	1.116	5.521
n-Pentane	3.175	1.160	5.791
2,2 Dimethylbutane	0.096	0.040	0.209
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.139	0.057	0.303
2 Methylpentane	0.738	0.309	1.608
3 Methylpentane	0.441	0.181	0.961
n-Hexane	0.964	0.400	2.100
Methylcyclopentane	0.072	0.025	0.153
Benzene	0.018	0.005	0.036
Cyclohexane	0.102	0.035	0.217
2-Methylhexane	0.184	0.086	0.466
3-Methylhexane	0.181	0.083	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	0.169	0.068	0.419
Toluene	0.035	0.012	0.082
Other C8's	0.246	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	0.068
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)	0.9850	
Molecular Weight	39.56	
Gross Heating Value		
Dry Basis	2321	BTU/CF
Saturated Basis	2282	BTU/CF

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 2286

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	13.160	5.466
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	98.01	
Gross Heating Value	5251	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.412	(Air=1)
Compressibility (Z)	0.9539	
Molecular Weight	66.64	
Gross Heating Value		
Dry Basis	3921	BTU/CF
Saturated Basis	3853	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

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: AL
Cylinder ID: ST# 21

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

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	9.586	26.312
2,2 Dimethylpropane	0.370	0.142	0.401
Isopentane	15.123	5.574	16.374
n-Pentane	17.412	6.361	18.852
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	0.356	0.124	0.450
Benzene	0.078	0.022	0.091
Cyclohexane	0.432	0.148	0.545
2-Methylhexane	0.606	0.284	0.911
3-Methylhexane	0.569	0.261	0.856
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.649	0.285	0.966
n-Heptane	0.658	0.306	0.989
Methylcyclohexane	0.408	0.165	0.601
Toluene	0.071	0.024	0.098
Other C8's	0.379	0.178	0.627
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	34.799	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.412	(Air=1)
Compressibility (Z)	0.9539	
Molecular Weight	66.64	
Gross Heating Value		
Dry Basis	3921	BTU/CF
Saturated Basis	3853	BTU/CF

September 2, 2015

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

For: SE Technologies, LLC
Building D, Second Floor
98 Vanadium Road
Bridgeville, Pennsylvania 15017-3061

Date Sampled: 08/12/15

Date Analyzed: 08/22/15

Job Number: [redacted]

Sample: [redacted] Well B1 2H

FLASH LIBERATION OF SEPARATOR WATER		
	Separator	**Stock Tank**
Pressure, psig	540	0
Temperature, °F	78	70
Gas Water Ratio (1)	------	4.06
Gas Specific Gravity (2)	------	1.069

(1) - Scf of water saturated vapor per barrel of stock tank water
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
Analyst: T.G.

Piston No. : WF# 235

Base Conditions: 14.65 PSI & 60 °F

Certified: FESCO, Ltd. Alice, Texas

David Dannhaus 361-661-7015

August 27, 2015

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

For: SE Technologies, LLC
Building D, Second Floor
98 Vanadium Road
Bridgeville, Pennsylvania 15017-3061

Sample: [redacted] Well B1 2H
Gas Liberated from Separator Water
From 540 psig & 78 °F to 0 psig & 70 °F

Date Sampled: 08/12/15 Job Number: [redacted]

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	1.821	
Carbon Dioxide	1.049	
Methane	56.602	
Ethane	16.424	4.367
Propane	8.000	2.191
Isobutane	1.516	0.493
n-Butane	4.274	1.340
2-2 Dimethylpropane	0.054	0.020
Isopentane	1.730	0.629
n-Pentane	2.405	0.867
Hexanes	2.953	1.209
Heptanes Plus	3.172	1.397
Totals	100.000	12.514

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.549	(Air=1)
Molecular Weight	101.90	
Gross Heating Value	5380	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	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: 14.650 PSI & 60 Deg F

Sampled By: (16) Gonzalez
Analyst: MR
Processor: OA
Cylinder ID: WF# 10S

Certified: FESCO, Ltd. Alice, Texas
David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	1.821		1.663
Carbon Dioxide	1.049		1.505
Methane	56.602		29.592
Ethane	16.424	4.367	16.095
Propane	8.000	2.191	11.497
Isobutane	1.516	0.493	2.872
n-Butane	4.274	1.340	8.096
2,2 Dimethylpropane	0.054	0.020	0.127
Isopentane	1.730	0.629	4.069
n-Pentane	2.405	0.867	5.655
2,2 Dimethylbutane	0.075	0.031	0.211
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.145	0.059	0.407
2 Methylpentane	0.807	0.333	2.268
3 Methylpentane	0.520	0.211	1.461
n-Hexane	1.405	0.575	3.947
Methylcyclopentane	0.134	0.046	0.368
Benzene	0.028	0.008	0.072
Cyclohexane	0.185	0.063	0.507
2-Methylhexane	0.337	0.156	1.102
3-Methylhexane	0.351	0.159	1.145
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.326	0.141	1.054
n-Heptane	0.588	0.270	1.921
Methylcyclohexane	0.318	0.127	1.018
Toluene	0.053	0.018	0.158
Other C8's	0.486	0.225	1.747
n-Octane	0.147	0.075	0.548
Ethylbenzene	0.003	0.001	0.011
M & P Xylenes	0.026	0.010	0.090
O-Xylene	0.003	0.001	0.010
Other C9's	0.129	0.065	0.530
n-Nonane	0.024	0.013	0.099
Other C10's	0.025	0.015	0.116
n-Decane	0.004	0.003	0.020
Undecanes (11)	0.004	0.002	0.019
Totals	100.000	12.514	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	BTU/CF

ATTACHMENT U
FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CH_4		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
2E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
3E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
4E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
14E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
15E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
16E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
17E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
18E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
19E	0.150	0.657	0.126	0.552	0.008	0.036	0.001	0.004	0.011	0.050	0.011	0.050	0.003	0.015	181.1	793
10E	0.050	0.219	0.042	0.184	0.003	0.012	0.000	0.001	0.004	0.017	0.004	0.017	0.001	0.005	60.4	265
5E					1.98	2.90										
6E					0.102	0.222										
7E	0.185	0.811	0.370	1.622	0.041	0.178	0.000	0.002	0.013	0.057	0.013	0.057	0.126	0.553	89.7	393
8E	0.001	0.006	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.57	6.88
9E	0.838	3.67	4.11	17.99	3.18	13.93	0.001	0.003	0.053	0.232	0.053	0.232	0.315	1.38	1,399	6,127
12E	0.838	3.67	4.11	17.99	3.18	13.93	0.001	0.003	0.053	0.232	0.053	0.232	0.315	1.38	1,399	6,127
21E	0.838	3.67	4.11	17.99	3.18	13.93	0.001	0.003	0.053	0.232	0.053	0.232	0.315	1.38	1,399	6,127
11E	0.050	0.219	0.042	0.184	0.003	0.012	0.000	0.001	0.004	0.017	0.004	0.017	0.001	0.005	60.4	264.5
20E	0.030	0.131	0.025	0.110	0.002	0.007	0.000	0.001	0.002	0.010	0.002	0.010	0.001	0.003	36.0	158.7
22E	2.612	11.44	1.01	4.41	2.45	10.71	0.011	0.047	0.179	0.784	0.179	0.784	583.9	2,557	2,889	12,654
TOTAL	6.94	30.41	15.07	66.00	14.20	53.07	0.023	0.10	0.475	2.08	0.475	2.08	585.0	2,562	9,145	40,056

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1E	0.000	0.000									0.003	0.012	0.003	0.012
2E	0.000	0.000									0.003	0.012	0.003	0.012
3E	0.000	0.000									0.003	0.012	0.003	0.012
4E	0.000	0.000									0.003	0.012	0.003	0.012
14E	0.000	0.000									0.003	0.012	0.003	0.012
15E	0.000	0.000									0.003	0.012	0.003	0.012
16E	0.000	0.000									0.003	0.012	0.003	0.012
17E	0.000	0.000									0.003	0.012	0.003	0.012
18E	0.000	0.000									0.003	0.012	0.003	0.012
19E	0.000	0.000									0.003	0.012	0.003	0.012
10E	0.000	0.000									0.001	0.004	0.001	0.004
5E											0.107	0.157	0.107	0.157
6E											0.011	0.025	0.011	0.025
7E	0.015	0.065	0.001	0.005	0.000	0.002	0.000	0.000	0.000	0.001			0.022	0.096
8E	0.000	0.000									0.000	0.000	0.000	0.000
9E	0.001	0.002			0.103	0.451					0.090	0.385	0.308	1.35
12E	0.001	0.002			0.103	0.451					0.090	0.385	0.308	1.35
21E	0.001	0.002			0.103	0.451					0.090	0.385	0.308	1.35
11E	0.000	0.000	0.000		0.000						0.001	0.004	0.001	0.00
20E	0.000	0.000	0.000		0.000						0.001	0.002	0.001	0.00
22E	0.246	1.076	0.008	0.035	0.007	0.032	0.001	0.003	0.003	0.014	0.020	0.087	0.572	2.50
TOTAL	0.263	1.153	0.009	0.04	0.317	1.39	0.001	0.003	0.003	0.015	0.436	1.37	1.69	6.78

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT V
CLASS I LEGAL ADVERTISEMENT

Affidavit Notice Will Be Submitted Upon Receipt

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Jay-Bee Oil & Gas, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, to modify an existing G70-C General Permit Registration (G70-C210) and convert it to a G70-D General Permit Registration for its Dopey Well Pad Production Facility located off Indian Creek Rd., near Middlebourne, in Tyler County, West Virginia. The latitude and longitude coordinates are: 39.43806, -80.77255.

The applicant estimates an increase in potential emissions of the following regulated air pollutants:

30.41 tons of Nitrogen Oxides per year
53.07 tons of Volatile Organics per year
66.00 tons of Carbon Monoxide per year
4.16 tons of Particulate Matter per year
0.10 tons of Sulfur Dioxide per year
1.15 tons of Formaldehyde per year
0.04 tons of Benzene per year
1.37 tons of n-Hexane per year
0.02 tons of Xylene per year
1.39 tons of Toluene per year
6.79 tons of Total Hazardous Air Pollutants per year
2,562 tons of Methane per year
40,056 tons of Greenhouse Gases per year

Startup of operation is planned to begin on or about the 11th day of September, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the **(Day)** day of **(Month)**, **(Year)**.

By: Mr. Shane Dowell
Office Manager
Jay-Bee Oil & Gas, Inc.