



Energy Corporation of America

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October 9, 2015

West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, S.E.
Charleston, WV 25304

RE: Modification for General Permit Registration G35-A Natural Gas Compressor Stations,
Operating Permit G30-A086A.

Energy Corporation of America (ECA) operates a natural gas compressor station at the Yawkey-Freeman facility located in Boone County, West Virginia. ECA is submitting a West Virginia G30-A permit modification to update the facility operations to replacing one (1) existing compressor engine and adding two (2) storage tanks.

Please feel free to call me if you have any questions during the permit application review process.

Brian Schmidt
Energy Corporation of America
Environmental Compliance Manager
500 Corporate Landing
Charleston, WV 25311
(304) 925-6100



WEST VIRGINIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 DIVISION OF AIR QUALITY
 601 57th Street, SE
 Charleston, WV 25304
 Phone: (304) 926-0475 • www.dep.wv.gov/daq

APPLICATION FOR GENERAL PERMIT REGISTRATION
 CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE
 A STATIONARY SOURCE OF AIR POLLUTANTS

- CONSTRUCTION MODIFICATION RELOCATION CLASS I ADMINISTRATIVE UPDATE
 CLASS II ADMINISTRATIVE UPDATE

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

- | | |
|--|--|
| <input type="checkbox"/> G10-D – Coal Preparation and Handling | <input type="checkbox"/> G40-C – Nonmetallic Minerals Processing |
| <input type="checkbox"/> G20-B – Hot Mix Asphalt | <input type="checkbox"/> G50-B – Concrete Batch |
| <input type="checkbox"/> G30-D – Natural Gas Compressor Stations | <input type="checkbox"/> G60-C – Class II Emergency Generator |
| <input type="checkbox"/> G33-A – Spark Ignition Internal Combustion Engines | <input type="checkbox"/> G65-C – Class I Emergency Generator |
| <input checked="" type="checkbox"/> G35-A – Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit) | <input type="checkbox"/> G70-A – Class II Oil and Natural Gas Production Facility |

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office): Energy Corporation of America		2. Federal Employer ID No. (FEIN): 55-0538443-001	
3. Applicant's mailing address: 500 Corporate Landing Charleston, WV 25311		4. Applicant's physical address: 500 Corporate Landing Charleston, WV 25311	
5. If applicant is a subsidiary corporation, please provide the name of parent corporation: Energy Corporation of America			
6. WV BUSINESS REGISTRATION. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
<ul style="list-style-type: none"> - IF YES, provide a copy of the Certificate of Incorporation / Organization / Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A. - IF NO, provide a copy of the Certificate of Authority / Authority of LLC / Registration (one page) including any name change amendments or other Business Certificate as Attachment A. 			

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): Natural Gas Compression and Dehydration Facilities.	8a. Standard Industrial Classification Classification (SIC) code: 1311	AND	8b. North American Industry System (NAICS) code: 211111
9. DAQ Plant ID No. (for existing facilities only): 005-00084	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): G30-A086A		

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site: Yawkey Freeman Compression Station	12A. Address of primary operating site: Mailing: P O Drawer G Marmet, WV 25315 Physical:	
13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - IF YES, please explain: Owner - IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.		
14A. - For Modifications or Administrative Updates at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a MAP as Attachment F. From US Route 119 South turn left onto dog fork road. Go 0.6 miles and turn left on Tower road. Access road to station is ~0.5 miles on left.		
15A. Nearest city or town: Madison	16A. County: Boone	17A. UTM Coordinates: Northing (KM): 4204.910 Easting (KM): 419.752 Zone: 17
18A. Briefly describe the proposed new operation or change (s) to the facility: Replace existing NG compressor engine and removal of the Thermal Oxidizer.		19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: 37.9882955 Longitude: -81.9132015

B: 1ST ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits)

11B. Name of 1 st alternate operating site: _____ _____	12B. Address of 1 st alternate operating site: Mailing: _____ Physical: _____ _____
13B. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input type="checkbox"/> YES <input type="checkbox"/> NO - IF YES, please explain: _____ _____ - IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.	
14B. - For Modifications or Administrative Updates at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a MAP as Attachment F. _____ _____ _____	

15B. Nearest city or town:	16B. County:	17B. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
18B. Briefly describe the proposed new operation or change (s) to the facility:		19B. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____

C: 2ND ALTERNATE OPERATING SITE INFORMATION (only available for G20, G40, & G50 General Permits):

11C. Name of 2 nd alternate operating site:	12C. Address of 2 nd alternate operating site: Mailing: _____ Physical: _____
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13C. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? YES NO

– IF YES, please explain: _____

– IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14C. – For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

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

15C. Nearest city or town:	16C. County:	17C. UTM Coordinates: Northing (KM): _____ Easting (KM): _____ Zone: _____
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18C. Briefly describe the proposed new operation or change (s) to the facility:	19C. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: _____ Longitude: _____
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20. Provide the date of anticipated installation or change: <u>11/25/2015</u> <input type="checkbox"/> If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: : _____/_____/_____	21. Date of anticipated Start-up if registration is granted: <u>12/15/2015</u>
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22. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application if other than 8760 hours/year. (Note: anything other than 24/7/52 may result in a restriction to the facility's operation).

Hours per day 24 Days per week 7 Weeks per year 52 Percentage of operation 100%

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ATTACHMENT B: PROCESS DESCRIPTION
- ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ATTACHMENT D: PROCESS FLOW DIAGRAM
- ATTACHMENT E: PLOT PLAN
- ATTACHMENT F: AREA MAP
- ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ATTACHMENT I: EMISSIONS CALCULATIONS
- ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ATTACHMENT K: ELECTRONIC SUBMITTAL
- ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ATTACHMENT M: SITING CRITERIA WAIVER
- ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please **DO NOT** fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This 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 a 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, Emission Inventory, Certified Emission Statement, 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 Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

I certify that I am the Owner and Proprietor

I hereby certify that (please print or type) *Donald C. Supcoe* 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 Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this 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

Signature _____

(please use blue ink)

Responsible Official

BS

10/8/15

Date

Name & Title Donald C. Supcoe, Executive Vice President

(please print or type)

Signature _____

(please use blue ink)

Authorized Representative (if applicable)

Date

Applicant's Name Brian Schmidt

Phone & Fax (304) 925-6100

Phone

(304) 925-3285

Fax

Email bschmidt@eca.com

Attachment A
Current Business Certificate

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

ISSUED TO:
**ENERGY CORPORATION OF AMERICA
501 56TH ST SE
CHARLESTON, WV 25304-2349**

BUSINESS REGISTRATION ACCOUNT NUMBER: **1052-1408**

This certificate is issued on: **08/13/2010**

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code*

*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.

Attachment B

Detailed Process Description

Natural Gas (Methane Ethane, Propane, etc.) is produced from ECA wells and are piped to the Yawkey-Freeman compressor station. This gas is compressed by the use of a compressor powered by a natural gas combustion engine (CE-1) and an electric motor. The engine drives a compressor that moves the gas to a dehydrator (RBV-1, RSV-1) which reduces the water entrained in the wet gas stream below 7.0 lbs/MMSCFD. The water and trace amounts of oil/condensate is removed and stored in one of two (2) 210 barrel (8,820 gallons) steel holding tanks. The dehydrator brings lean glycol into contact with the "wet" gas in the contactor to remove the moisture content. The "dry" natural gas exits the glycol contactor and is piped to the transmission line.

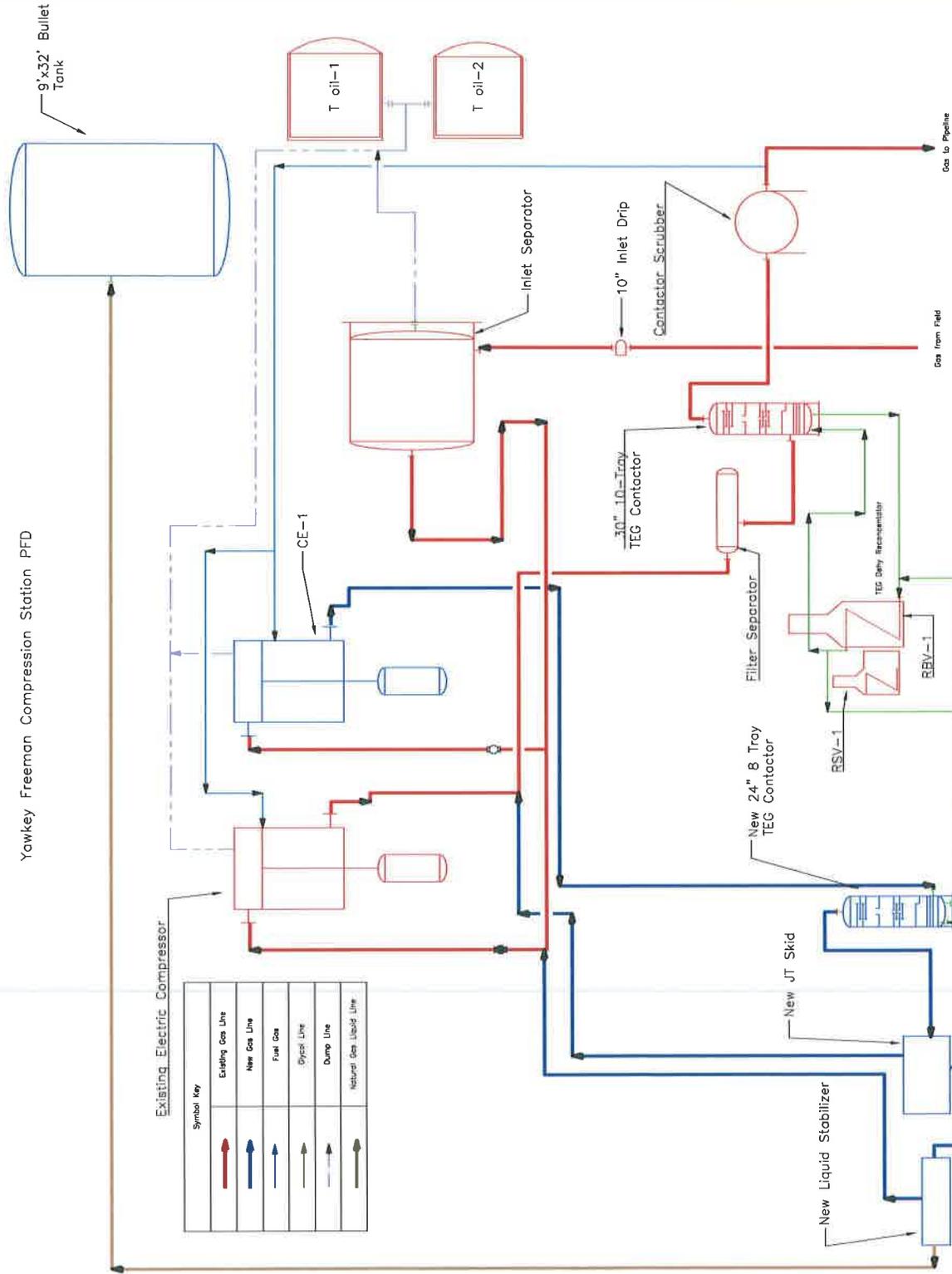
The proposed site equipment modification (See Attachment D – Process Flow Diagram) will entail one (1) engine/compressor, two (2) 210 barrel tanks and one (1) 100 barrel tank for unloading trucks to remove.

Attachment C
Fugitive Emissions

Not Applicable

Attachment D
Process Flow Diagram

Yawkey Freeman Compression Station PFD



Existing Electric Compressor

Symbol Key	
	Existing Gas Line
	New Gas Line
	Fuel Gas
	Spigot Line
	Dump Line
	Natural Gas Liquid Line

General Notes

WDEP ADP	1/28/15
Revision/Issue	DATA
NO:	
Drawn Name	Yawkey Freeman Comp PFD
Project Name and Location	dog fork
Boone Co., WV	
License Number	001
Author	W/Stratton

Attachment E

Plot Plan

Yowkey Freeman Compressor Site Layout



Attachment F

Area Map

Attachment G

Equipment Data Sheets and Registration Section Applicability Forms

**General Permit G35-A Registration
 Section Applicability Form**

General Permit G35-A was developed to allow qualified registrants to seek registration for a variety of sources. These sources include internal combustion engines, boilers, reboilers, line heaters, tanks, emergency generators, dehydration units not subject to MACT standards, dehydration units not subject to MACT standards and being controlled by a flare control device, dehydration units not subject to MACT standards and being controlled by recycling the dehydration unit back to flame zone of reboiler, dehydration units not subject to MACT standards being controlled by a thermal oxidizer, and permit exemptions including the less than 1 ton/year benzene exemption, the 40CFR63 Subpart HH - Annual Average Flow of Gas Exemption (3 mmscf/day), and the 40CFR63 Subpart HHH - Annual Average Flow of Gas Exemption (10 mmscf/day). All registered facilities will be subject to Sections 1.0, 1.1, 2.0, 3.0, and 4.0.

General Permit G35-A allows the registrant to choose which sections of the permit that they wish to seek registration under. Therefore, please mark which sections that you are applying for registration under. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

Section 5	Reciprocating Internal Combustion Engines (R.I.C.E.)*	<input checked="" type="checkbox"/>
Section 6	Boilers, Reboilers, and Line Heaters	<input checked="" type="checkbox"/>
Section 7	Tanks	<input checked="" type="checkbox"/>
Section 8	Emergency Generators	<input type="checkbox"/>
Section 9	Dehydration Units Not Subject to MACT Standards	<input type="checkbox"/>
Section 10	Dehydration Units Not Subject to MACT Standards and being controlled by a flare control device	<input type="checkbox"/>
Section 11	Dehydration Units Not Subject to MACT Standards being controlled by recycling the dehydration unit back to the flame zone of the reboiler	<input type="checkbox"/>
Section 12	Dehydration Units Not Subject to MACT Standards and being controlled by a thermal oxidizer	<input checked="" type="checkbox"/>
Section 13	Permit Exemption (Less than 1 ton/year of benzene exemption)	<input checked="" type="checkbox"/>
Section 14	Permit Exemption (40CFR63 Subpart HH – Annual average flow of gas exemption (3 mmscf/day))	<input type="checkbox"/>
Section 15	Permit Exemption (40CFR63 Subpart HHH – Annual average flow of gas exemption (10 mmscf/day))	<input type="checkbox"/>
Section 16	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40CFR60 Subpart JJJ)	<input checked="" type="checkbox"/>

*** Affected facilities that are subject to Section 5 may also be subject to Section 16. Therefore, if the applicant is seeking registration under both sections, please select both.**

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number ¹		CE-1					
Engine Manufacturer and Model		Caterpillar 3516 ULB					
Manufacturer's Rated bhp/rpm		1,380					
Source Status ²		MS					
Date Installed/Modified/Removed ³		11/30/2015					
Engine Manufactured/Reconstruction Date ⁴		3/19/2014					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) ⁵		YES					
Engine, Fuel and Combustion Data	Engine Type ⁶	LB4S					
	APCD Type ⁷	A/F, SCR					
	Fuel Type ⁸	PQ					
	H ₂ S (gr/100 scf)	Negligible					
	Operating bhp/rpm	1,380 bhp /1,400 rpm					
	BSFC (Btu/bhp-hr)	7,187					
	Fuel throughput (ft ³ /hr)	7,839.74					
	Fuel throughput (MMft ³ /yr)	68.67					
	Operation (hrs/yr)	8,760					
Reference ⁹	Potential Emissions ¹⁰	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO _x	3.042	13.326				
MD	CO	0.596	2.610				
MD	VOC	0.636	2.786				
AP-42 Chapter 3.2	SO ₂	0.006	0.026				
AP-42 Chapter 3.2	PM ₁₀	0.098	0.429				
MD	Formaldehyde	0.243	1.064				
MD	GHG CO ₂	1,366.03	5,983.2				

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

2. Enter the Source Status using the following codes:

- | | |
|--|----------------------|
| NS Construction of New Source (installation) | ES Existing Source |
| MS Modification of Existing Source | RS Removal of Source |

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		NATCO 24" OD X 11'0" LG	
		Max Dry Gas Flow Rate (mmscf/day)		5.0	
		Design Heat Input (mmBtu/hr)		0.175	
		Design Type (DEG or TEG)		TEG	
		Source Status ²		ES	
		Date Installed/Modified/Removed ³		11/21/2005	
		Regenerator Still Vent APCD ⁴		TO	
		Fuel HV (Btu/scf)		1,265.1	
		H ₂ S Content (gr/100 scf)		Unknown	
		Operation (hrs/yr)		8,760	
Source ID # ¹	Vent	Reference ⁵	Potential Emissions ⁶	lbs/hr	tons/yr
RBV-1	Reboiler Vent	AP-42 Sec. 1.4	NO _x	0.0138	0.0604
		AP-42 Sec. 1.4	CO	0.01159	0.05077
		AP-42 Sec. 1.4	VOC	0.000759	0.00332
		AP-42 Sec. 1.4	SO ₂	0.00008	0.00036
		AP-42 Sec. 1.4	PM ₁₀	0.00105	0.00459
RSV-1	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	0.4132	1.8097
		GRI-GLYCalc™	Benzene	0.0059	0.0258
		GRI-GLYCalc™	Ethylbenzene	0.0097	0.0424
		GRI-GLYCalc™	Toluene	0.0161	0.0705
		GRI-GLYCalc™	Xylenes	0.0648	0.2839
		GRI-GLYCalc™	n-Hexane	0.0043	0.0186

1. Enter the appropriate Source Identification Numbers for the glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent. The glycol dehydration unit Reboiler Vent and glycol Regenerator Still Vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a *Glycol Dehydration Unit Data Sheet* shall be completed for each, using Source Identification #s RBV-2 and RSV-2, RBV-3 and RSV-3, etc.

2. Enter the Source Status using the following codes:

NS Construction of New Source	ES Existing Source
MS Modification of Existing Source	RS Removal of Source

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

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

West Virginia Department of Environmental Protection

DIVISION OF AIR QUALITY : (304) 926-0475
WEB PAGE: <http://www.wvdep.org>

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

Complete this form for any oil and natural gas production or natural gas transmission and storage facility that uses an affected unit under HH/HHH, whether subject or not.

Section A: Facility Description			
Affected facility actual annual average natural gas throughput (scf/day):	5.0 MMscf/day		
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	120 bbl/day		
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	Yes	<input checked="" type="radio"/> No	
The affected facility is:	<input type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> a NG processing plant <input checked="" type="checkbox"/> prior to the point of custody transfer and there is no NG processing plant		
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	Yes	<input checked="" type="radio"/> No	
The affected facility exclusively processes, stores, or transfers black oil.	Yes	<input checked="" type="radio"/> No	
Initial producing gas-to-oil ratio (GOR): _____ scf/bbl	API gravity: _____	degrees	
Section B: Dehydration Unit (if applicable) ¹			
Description:			
Date of Installation: 11/21/2005	Annual Operating Hours: 8,760	Burner rating (MMbtu/hr): 0.175	
Exhaust Stack Height (ft): 10.0	Stack Diameter (ft): 0.5	Stack Temp. (°F): 385	
Glycol Type:	<input checked="" type="checkbox"/> TEG <input type="checkbox"/> EG <input type="checkbox"/> Other:		
Glycol Pump Type:	<input type="checkbox"/> Electric <input checked="" type="checkbox"/> Gas If gas, what is the volume ratio? 0.80 ACFM/gpm		
Condenser installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Exit Temp. _____ °F Condenser Pressure _____ psig		
Incinerator/flare installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Destruction Eff.		
Other controls installed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Describe: Thermal Oxidizer		
Wet Gas ² : (Upstream of Contact Tower)	Gas Temp.: 65 °F Gas Pressure 240 psig Saturated Gas? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, water content _____ lb/MMSCF		
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate(MMSCFD) Actual 5.0 Design 10.0 Water Content 7 lb/MMSCF		
Lean Glycol:	Circulation rate (gpm) Actual ³ 2.7 Maximum ⁴ 3.0 Pump make/model: KimRay		
Glycol Flash Tank (if applicable):	Temp.: 80 °F Pressure 30 psig Vented? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If no, describe vapor control: Thermal Oxidizer		
Stripping Gas (if applicable):	Source of gas: NA Rate _____ scfm		

Please attach the following required dehydration unit information:

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream including mole percents of C₁-C₈, benzene, ethylbenzene, toluene, xylene and n-Hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

	<input type="checkbox"/>	Subject to Subpart HH	
Affected facility	<input type="checkbox"/>	Subject to Subpart HHH	
status:	<input checked="" type="checkbox"/>	Not Subject	<input checked="" type="checkbox"/> < 10/25 TPY
(choose only one)	because:	<input type="checkbox"/>	Affected facility exclusively handles black oil
		<input type="checkbox"/>	The facility wide actual annual average NG throughput is < 650 thousand scf/day and facility wide actual annual average hydrocarbon liquid is < 250 bpd
		<input type="checkbox"/>	No affected source is present

Thermal Oxidizer (TO) Control Device Sheet

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS SECTION BEFORE COMPLETING.

General Information

1) Control Device ID#: THOX-1	2) Installation Date: 11/5/2005 <input type="checkbox"/> New
3) Maximum Rated Capacity: 1.3 MMBtu/hr	4) Type of TO: <input type="checkbox"/> Regenerative <input checked="" type="checkbox"/> Recuperative
5) If a regenerative TO, type of regeneration: <input type="checkbox"/> Online <input type="checkbox"/> Offline <input type="checkbox"/> N/A <input type="checkbox"/> Other	

6) Emission Unit Information

List the emission units whose emissions are controlled by this thermal oxidizer:

Emission Unit ID#	Emission Source Description	Installation Date
RSV-1	TEG Dehydrator Still Vent	11/5/2005 <input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW
		<input type="checkbox"/> NEW

If this emission point receives emissions from more than eight (8) units, please attach additional pages.

7) Stack Information N/A

Height	Top Inside Diameter	Stack Discharge	Exit Velocity of Gas	Exit Temperature of Gas
7 ft	1.3 ft	<input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Horizontal <input type="checkbox"/> Vert. w/rain cap	~20 Ft/s	537.7 °C

8) Fuel Information

Type/Grade of Fuel Combusted	Maximum Fuel Capacity (include units)	Heat Content (include units)	Fuel Contents	Requested Operating Limitation (include units)
NG	0.175 MMBtu/hr	1265.1 BTU/cf	% Sulfur: nil	NA
			% Ash: nil	
			% Sulfur:	
			% Ash:	

If the thermal oxidizer combusts more than two types of fuel, attach additional information.

Thermal Oxidizer (TO) Control Device Sheet (continued)

9) Control and Emissions Information								
Pollutants Controlled	% Control Efficiency	Potential Emissions from Emission Point (This table does not replace the emission calculations for this unit)						
		Combustion Emissions			Process Emissions		Total Emissions	
		Lb/hr	Ton/yr	Included with Process Emissions	lb/hr	ton/yr	lb/hr	ton/yr
PM	0%	0.00781	0.03419	<input type="checkbox"/> YES	0.0000	0.0000	0.00781	0.0342
PM ₁₀	0%	0.00781	0.03419	<input type="checkbox"/> YES	0.0000	0.0000	0.00781	0.0342
NO _x	0%	0.08840	0.38719	<input type="checkbox"/> YES	0.0000	0.0000	0.08840	0.3872
SO ₂	0%	0.00062	0.00270	<input type="checkbox"/> YES	0.0000	0.0000	0.00062	0.0027
CO	0%	0.40300	1.76514	<input type="checkbox"/> YES	0.0000	0.0000	0.40300	1.7651
VOC	95%	0.18200	0.79716	<input type="checkbox"/> YES	0.4132	1.8097	0.5952	2.6069
Individual HAPs								
Benzene	95%			<input checked="" type="checkbox"/> YES	0.00619	0.02711	0.00619	0.0271
Toluene	95%			<input checked="" type="checkbox"/> YES	0.01691	0.07407	0.01691	0.0741
Ethyl Benzene	95%			<input checked="" type="checkbox"/> YES	0.01018	0.04459	0.01018	0.0446
Xylene	95%			<input checked="" type="checkbox"/> YES	0.06804	0.29802	0.06804	0.2980
n-Hexane	95%			<input checked="" type="checkbox"/> YES	0.00451	0.01975	0.00451	0.0198
Total HAPs				<input checked="" type="checkbox"/> YES	0.10583	0.46354	0.10583	0.4635
If additional pollutants are being controlled, attach additional information.								
10) Emission Calculations Attached? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Please attach a copy of all emission calculations.								
11) Additional Information Attached? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO Please attach a copy of TO manufacturer's data sheet.								

**If any of the requested information is not available, please contact the TO manufacturer.
Thermal Oxidizers meeting the requirements of G35-A Section 12 and
registered under General Permit G35-A are considered federally
enforceable.**

COMPRESSOR STATION EMISSION SUMMARY SHEET FOR CRITERIA POLLUTANTS												
Compressor Station											Registration Number (Agency Use)	
Source ID No.	NO_x	CO	VOC	SO₂	PM₁₀	NO_x	CO	VOC	SO₂	PM₁₀	Potential Emissions (tons/yr)	
CE-1	3.042	0.596	0.636	0.006	0.098	13.326	2.610	2.786	0.026	0.429		
RVB-1	0.0138	0.01159	0.000759	0.0000828	0.00105	0.06044	0.05077	1.813	0.00036	0.00459		
RSV-1	NA	NA	0.4132	NA	NA	NA	NA	1.8097	NA	NA		
THOX-1	0.0884	0.403	0.182	0.000616	0.00781	0.38719	1.76514	0.79716	0.0027	0.03419		
TO1	NA	NA	0.16792	NA	NA	NA	NA	0.7355	NA	NA		
TO2	NA	NA	0.16792	NA	NA	NA	NA	0.7355	NA	NA		
TO3	NA	NA	0.15548	NA	NA	NA	NA	0.6810	NA	NA		
Total	3.1442	1.01059	1.723279	0.006699	0.10686	13.77363	4.42591	9.35786	0.02906	0.46778		

COMPRESSOR STATION EMISSION SUMMARY SHEET FOR HAZARDOUS/TOXIC POLLUTANTS

Compressor Station		Registration Number (Agency Use) <u>G35-A</u>																		
Source ID No.	Potential Emissions (lbs/hr)										Potential Emissions (tons/yr)									
	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formaldehyde	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formaldehyde	Benzene	Ethyl-benzene	Toluene	Xylenes	n-Hexane	Formaldehyde		
CE-1	NA	NA	NA	NA	NA	0.243	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.064		
RVB-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
RSV-1	0.0059	0.0097	0.0161	0.0648	0.0043	NA	0.0258	0.0424	0.0705	0.2839	0.0186	NA	0.0258	0.0424	0.0705	0.2839	0.0186	NA		
THOX-1	0.00619	0.01018	0.01691	0.06804	0.00451	NA	0.02711	0.04459	0.07407	0.29802	0.01975	NA	0.02711	0.04459	0.07407	0.29802	0.01975	NA		
TO1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
TO2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
TO3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Total	0.01209	0.01988	0.03301	0.13284	0.00881	0.243	0.05291	0.08699	.14457	0.58192	0.03835	1.064	0.05291	0.08699	.14457	0.58192	0.03835	1.064		

General Permit Levels

Attachment H

Air Pollution Control Device Sheets

Not Applicable

Attachment I

Emission Calculations

CE-1 Compressor Engine

Caterpillar Model G3516B (4SLB)(1,380 BHP @ 1,400 RPM) – SN# JEF02674 Built 3/19/2014

Equipped with DCL DC63 Oxidation Catalyst. Emission Values Below are at the 100% Load Rating Maximum Allowable & PTE.

NOx =	1.00 Grams/BHP-Hr (1.00 x 0.0% = 1.00 Grams/BHP-Hr) (Manufacture)
CO =	0.196 Grams/BHP-Hr (2.80 x 93.0% (SCR) = 0.196 Grams/BHP-Hr) (Manufacture)
VOC/NMNEHC =	0.209 Grams/BHP-Hr (0.38 x 45.0% (SCR) = 0.209 Grams/BHP-Hr) (Manufacture)
Formaldehyde =	0.08 Grams/BHP-Hr (0.40 x 80.0% (SCR) = 0.08 Grams/BHP-Hr) (Manufacture)
SOx =	0.000588 lbs/MMbtu (AP-42 Chapter 3, Table 2-2)
PM _{Filterable} =	0.0000771 lbs/MMbtu (AP-42 Chapter 3, Table 2-2)
CO ₂ =	449.0 Grams/BHP-Hr (Manufacture)

NOx = 1.00 Grams/bhp-hr x 1,380 bhp/453.5924 grams/lb = 3.042 lbs/hr
3.042 lbs/hr x 1 ton/2,000 lbs x 8,760 hours/1 year = **13.326 Tons/year**

CO = 0.196 Grams/bhp-hr x 1,380 bhp/453.5924 grams/lb = 0.596 lbs/hr
0.596 lbs/hr x 1 ton/2,000 lbs x 8,760 hours/1 year = **2.610 Tons/year**

VOC's/NMNEHC = 0.209 Grams/bhp-hr x 1,380 bhp/453.5924 grams/lb = 0.636 lbs/hr
0.636 lbs/hr x 1 ton/2,000 lbs x 8,760 hours/1 year = **2.786 Tons/year**

Formaldehyde = 0.08 Grams/bhp-hr x 1,380 bhp/453.5924 grams/lb = 0.243 lbs/hr
0.243 lbs/hr x 1 ton/2,000 lbs x 8,760 hours/1 year = **1.064 Tons/year**

SOx = 0.000588 lbs/MMbtu x 1,380 bhp x 7,187 Btu/bhp-hr ÷ 1,000,000 = 0.006 lbs/hr
0.006 lbs/hr x 1 ton/2,000 lbs x 8,760 hours/1 year = **0.026 Tons/year**

PM_{condensable} = 0.00991 lbs/MMbtu x 1,380 bhp x 7,187 MMBtu/bhp-hr ÷ 1,000,000 = 0.098 lbs/hr
0.098 lbs/hr x 8,760 hours/1 year x 1 ton/2,000 lbs = **0.429 Tons/year**

CO₂ = 449.0 Grams/bhp-hr X 1,380 bhp/453.5924 grams/lb = 1,366.028 lbs/hr
1,366.028 lbs/hr x 8,760 hours/ 1 year x 1 ton/2,000 lbs = **5,983.203 Tons/year**

RBV-1 Re-Boiler Stack and Fire Tube

NATCO Re-Boiler, Built 1986

Tri-Ethylene Glycol Equipment

GRI-GLYCalc version 4.0 emission software from OEM =

0.175 MMBtu/hr ÷ 1,265.1 btu/scf = 138.329 scf/hr = 0.000138 MMscf/hr (Using the highest rating)

Volume through Dryer = 5.0 MMSCF/Day (Saturated @1,265.1 btu/scf)

Combustion Emissions

NO_x = 100 lbs/10⁶ scf × 0.000138 MMscf/hr = 0.0138 lbs/hr = **0.06044 Tons/yr**

CO = 84 lbs/10⁶ scf × 0.000138 MMscf/hr = 0.01159 lbs/hr = **0.05077 Tons/yr**

VOC = 5.5 lbs/10⁶ scf × 0.000138 MMscf/hr = 0.000759 lbs/hr = **0.00332 Tons/yr**

SO₂ = 0.6 lbs/10⁶ scf × 0.000138 MMscf/hr = 0.0000828 lbs/hr = **0.00036 Tons/yr**

PM = 7.6 lbs/10⁶ scf × 0.000138 MMscf/hr = 0.00105 lbs/hr = **0.00459 Tons/yr**

CO₂ = 120,000 lbs/10⁶ scf × 0.000138 MMscf/hr = 16.56 lbs/hr = **72.5328 Tons/yr**

*NO_x and CO Emission Factors from AP-42 table 1.4-1

*VOC, SO₂, PM, and CO₂ Emission Factors from AP-42 table 1.4-2

RSV-1 TEG Dehydrator Still Vent

VOC = (See GRI-GLYCalc) Uncontrolled Regenerator Emissions = 8.2635 lbs/hr = 36.1941 Tons/yr

VOC with still vapors and flash emissions @ 95% destruction = 0.4132 lbs/hr = **1.8097 Tons/yr**

Total HAP = (See GRI-GLYCalc) Uncontrolled Regenerator Emissions = 2.0153 lbs/hr = 8.8269 Tons/yr

Total HAP @ 95% destruction = 0.1008 lbs/hr = **0.4413 Tons/yr**

Total BTEX = (See GRI-GLYCalc) Uncontrolled Regenerator Emissions = 1.9302 lbs/hr = 8.4543 Tons/yr

Total BTEX @ 95% destruction = 0.0965 lbs/hr = **0.4227 Tons/yr**

THOX – 1 Thermal Oxidizer

QB Johnson Manufacturing Company, Built 2006

One (1) 1.30 MMBTU/hr Thermal Oxidizer Combustion Emissions =

1.3 MMBtu/hr ÷ 1,265.1 btu/scf = 1,027.587 scf/hr = 0.001027 MMscf/hr

Combustion Emissions

NO_x = 0.068 lb/10⁶ BTU x 1.3 MMBtu/hr = 0.0884 lbs/hr = **0.38719 TPY**

CO = 0.31 lb/10⁶ BTU x 1.3 MMBtu/hr = 0.403 lbs/hr = **1.76514 TPY**

VOC/THC = 0.14 lb/10⁶ BTU x 1.3 MMBtu/hr = 0.182 lbs/hr = **0.79716 TPY**

SO₂ = 0.6 lbs/10⁶ scf × 0.001027MMscf/hr = 0.000616 lbs/hr = **0.0027 Tons/yr**

PM = 7.6 lbs/10⁶ scf × 0.001027MMscf/hr = 0.00781 lbs/hr = **0.03419 Tons/yr**

CO₂ = 120,000 lbs/10⁶ scf × 0.001027MMscf/hr = 123.24 lbs/hr = **539.7912 Tons/yr**

*NO_x, CO and VOC/THC Emission Factors from AP-42 Chapter 13.5 Emissions for Flares

*SO₂, PM and CO₂ Emission Factors from AP-42 table 1.4-2

Tank TO1 Working/Breathing/Loading Loss

See Attached Calculations for Loading Loss (Ll) **VOC's = 0.339 TPY** when trucks empty tanks.

Calculations utilized EPA TANKS 4.0.9d Software, & Gas/Oil Ratio Correlation Method to calculate Working & Breathing Emission Rates.

Attached is Tanks 4.0.9d Emission Report – Detailed Format Working & Breathing/Standing Loss.

Working Tank TO1 VOC's = 0.0152 lbs/hr = **0.0658 TPY**

Breathing Tank TO1 VOC's = 0.0755 lbs/hr = **0.3307 TPY**

No Flash HAP's or Working or Breathing HAP's because there are no HAP's in Gas Analysis

Total VOC's Tanks: Working/Breathing/Flashing/Loading = **0.0658 + 0.3307 + 0.339 = 0.7355 TPY**

Tank TO2 Working/Breathing/Loading Loss

See Attached Calculations for Loading Loss (Ll) **VOC's = 0.339 TPY** when trucks empty tanks.

Calculations utilized EPA TANKS 4.0.9d Software, & Gas/Oil Ratio Correlation Method to calculate Working & Breathing Emission Rates.

Attached is Tanks 4.0.9d Emission Report – Detailed Format Working & Breathing/Standing Loss.

Working Tank TO1 VOC's = 0.0152 lbs/hr = **0.0658 TPY**

Breathing Tank TO1 VOC's = 0.0755 lbs/hr = **0.3307 TPY**

No Flash HAP's or Working or Breathing HAP's because there are no HAP's in Gas Analysis

Total VOC's Tanks: Working/Breathing/Flashing/Loading = **0.0658 + 0.3307 + 0.339 = 0.7355 TPY**

Tank TO3 Working/Breathing/Loading Loss

See Attached Calculations for Loading Loss (Ll) **VOC's = 0.339 TPY** when trucks empty tanks.

Calculations utilized EPA TANKS 4.0.9d Software, & Gas/Oil Ratio Correlation Method to calculate Working & Breathing Emission Rates.

Attached is Tanks 4.0.9d Emission Report – Detailed Format Working & Breathing/Standing Loss.

Working Tank TO1 VOC's = 0.0158 lbs/hr = **0.0694 TPY**

Breathing Tank TO1 VOC's = 0.0622 lbs/hr = **0.2726 TPY**

No Flash HAP's or Working or Breathing HAP's because there are no HAP's in Gas Analysis

Total VOC's Tanks: Working/Breathing/Flashing/Loading = **0.0694 + 0.2726 + 0.339 = 0.681 TPY**

Truck Loading Loss (Ll)

Where:

Ll = Loading loss, pounds per 1,000 gallons

S = Saturation factor (Table 5.2-1)

P = True vapor pressure of liquid loaded (psia)

M = Molecular weight of vapors

T = temperature of bulk liquid loaded, °R (°F + 460)

EFF = VRU reduction efficiency

Bbl = 42 gallons

Total throughput for both Tanks: (2,183 bbl/yr x 42 gallons/bbl = 91,688 gallons/yr)

91,688 ÷ 1,000 = 91.688 M gallons

91.688 gallons x 7.39 lbs/1,000 gal = 677.574 lbs of VOC annually

677.574 lbs/yr ÷ 2,000 lbs/ton = **0.339 TPY VOC Station Total**

Total VOC's Tanks: Working/Breathing/Loading

Tank ID	Capacity (Gallons)	Control Device	Years in Service	Content	VOC's (TPY)	HAP's (TPY)
Tank TO1	8,840	NA	8	Brine & Residual Oil	0.7355	<0.000
Tank TO2	8,840	NA	5	Brine & Residual Oil	0.7355	<0.000
Tank TO3	4,200	NA	5	Brine & Residual Oil	0.6810	<0.000

Estimated Emissions from Tank Operation

VOC Total = 2.152 TPY

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Yawkey - Freeman

File Name: C:\Program Files\GRI-GLYCalc4\Yawkey Freeman 2015.ddf

Date: October 05, 2015

DESCRIPTION:

Description: 5 MM/D; Stripping Gas; Glycol Driven Pumps

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0046	0.111	0.0202
Ethane	0.0076	0.182	0.0332
Propane	0.0138	0.330	0.0603
Isobutane	0.0034	0.083	0.0151
n-Butane	0.0133	0.319	0.0582
Isopentane	0.0044	0.105	0.0192
n-Pentane	0.0063	0.151	0.0275
n-Hexane	0.0043	0.102	0.0186
Cyclohexane	0.0049	0.117	0.0213
Other Hexanes	0.0042	0.101	0.0185
Heptanes	0.0149	0.357	0.0652
Benzene	0.0059	0.141	0.0258
Toluene	0.0161	0.387	0.0705
Ethylbenzene	0.0097	0.233	0.0424
Xylenes	0.0648	1.556	0.2839
C8+ Heavies	0.2473	5.934	1.0830
Total Emissions	0.4254	10.209	1.8631
Total Hydrocarbon Emissions	0.4254	10.209	1.8631
Total VOC Emissions	0.4132	9.916	1.8097
Total HAP Emissions	0.1008	2.418	0.4413
Total BTEX Emissions	0.0965	2.316	0.4227

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0923	2.215	0.4042
Ethane	0.1515	3.635	0.6634
Propane	0.2752	6.605	1.2054
Isobutane	0.0689	1.653	0.3017
n-Butane	0.2657	6.377	1.1638
Isopentane	0.0876	2.103	0.3839
n-Pentane	0.1257	3.016	0.5504
n-Hexane	0.0851	2.042	0.3727
Cyclohexane	0.0974	2.338	0.4267
Other Hexanes	0.0846	2.029	0.3703
Heptanes	0.2978	7.146	1.3042
Benzene	0.1178	2.828	0.5161
Toluene	0.3221	7.731	1.4110
Ethylbenzene	0.1938	4.651	0.8489

Xylenes	1.2964	31.114	21.6607
C8+ Heavies	4.9454	118.689	37.2616
Total Emissions	8.5072	204.173	37.2616
Total Hydrocarbon Emissions	8.5072	204.173	37.2616
Total VOC Emissions	8.2635	198.324	36.1941
Total HAP Emissions	2.0153	48.367	8.8269
Total BTEX Emissions	1.9302	46.325	8.4543

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.2612	6.269	1.1440
Ethane	0.1055	2.531	0.4619
Propane	0.0727	1.745	0.3185
Isobutane	0.0107	0.257	0.0469
n-Butane	0.0297	0.712	0.1300
Isopentane	0.0078	0.187	0.0342
n-Pentane	0.0085	0.204	0.0372
n-Hexane	0.0028	0.067	0.0123
Cyclohexane	0.0008	0.020	0.0037
Other Hexanes	0.0039	0.093	0.0169
Heptanes	0.0042	0.101	0.0185
Benzene	0.0001	0.003	0.0005
Toluene	0.0002	0.004	0.0007
Ethylbenzene	<0.0001	0.001	0.0002
Xylenes	0.0002	0.005	0.0009
C8+ Heavies	0.0089	0.214	0.0390
Total Emissions	0.5172	12.413	2.2654
Total Hydrocarbon Emissions	0.5172	12.413	2.2654
Total VOC Emissions	0.1506	3.613	0.6595
Total HAP Emissions	0.0033	0.080	0.0146
Total BTEX Emissions	0.0005	0.013	0.0023

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	5.2238	125.371	22.8803
Ethane	2.1091	50.617	9.2377
Propane	1.4545	34.908	6.3708
Isobutane	0.2140	5.137	0.9375
n-Butane	0.5937	14.248	2.6003
Isopentane	0.1560	3.743	0.6832
n-Pentane	0.1699	4.078	0.7443
n-Hexane	0.0560	1.344	0.2453
Cyclohexane	0.0169	0.405	0.0739
Other Hexanes	0.0773	1.856	0.3387
Heptanes	0.0844	2.025	0.3696
Benzene	0.0021	0.050	0.0091
Toluene	0.0032	0.078	0.0142
Ethylbenzene	0.0010	0.024	0.0043
Xylenes	0.0042	0.102	0.0185
C8+ Heavies	0.1780	4.271	0.7795
Total Emissions	10.3441	248.258	45.3070

Total Hydrocarbon Emissions	10.3441	248.258	Page: 3 45.3070
Total VOC Emissions	3.0112	72.269	13.1891
Total HAP Emissions	0.0665	1.597	0.2915
Total BTEX Emissions	0.0105	0.253	0.0462

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature: 100.00 deg. F
 Excess Oxygen: 1.00 %
 Combustion Efficiency: 95.00 %
 Supplemental Fuel Requirement: 4.32e-002 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	5.00%	95.00%
Isobutane	5.00%	95.00%
n-Butane	5.00%	95.00%
Isopentane	5.00%	95.00%
n-Pentane	5.00%	95.00%
n-Hexane	5.00%	95.00%
Cyclohexane	5.00%	95.00%
Other Hexanes	5.00%	95.00%
Heptanes	5.00%	95.00%
Benzene	5.00%	95.00%
Toluene	5.00%	95.00%
Ethylbenzene	5.00%	95.00%
Xylenes	5.00%	95.00%
C8+ Heavies	5.00%	95.00%

ABSORBER

Calculated Absorber Stages: 1.80
 Specified Dry Gas Dew Point: 7.00 lbs. H2O/MMSCF
 Temperature: 100.0 deg. F
 Pressure: 300.0 psig
 Dry Gas Flow Rate: 5.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0295 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 155.41 lbs. H2O/MMSCF
 Specified Lean Glycol Recirc. Ratio: 2.70 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.49%	95.51%
Carbon Dioxide	99.86%	0.14%
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	99.60%	0.40%
Cyclohexane	98.31%	1.69%
Other Hexanes	99.70%	0.30%
Heptanes	99.17%	0.83%
Benzene	86.06%	13.94%
Toluene	78.63%	21.37%
Ethylbenzene	66.66%	33.34%
Xylenes	55.41%	44.59%
C8+ Heavies	93.84%	6.16%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 95.00 %
Flash Temperature: 80.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.97%	0.03%
Carbon Dioxide	23.42%	76.58%
Nitrogen	1.60%	98.40%
Methane	1.74%	98.26%
Ethane	6.70%	93.30%
Propane	15.91%	84.09%
Isobutane	24.35%	75.65%
n-Butane	30.92%	69.08%
Isopentane	36.20%	63.80%
n-Pentane	42.73%	57.27%
n-Hexane	60.48%	39.52%
Cyclohexane	85.70%	14.30%
Other Hexanes	52.62%	47.38%
Heptanes	78.02%	21.98%
Benzene	98.35%	1.65%
Toluene	99.08%	0.92%
Ethylbenzene	99.55%	0.45%
Xylenes	99.72%	0.28%
C8+ Heavies	96.94%	3.06%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	27.43%	72.57%
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	0.99%	99.01%
n-Pentane	0.90%	99.10%
n-Hexane	0.71%	99.29%
Cyclohexane	3.59%	96.41%

Other Hexanes	1.55%	98.45%
Heptanes	0.59%	99.41%
Benzene	5.06%	94.94%
Toluene	7.95%	92.05%
Ethylbenzene	10.44%	89.56%
Xylenes	12.94%	87.06%
C8+ Heavies	12.28%	87.72%

STREAM REPORTS:

WET GAS STREAM

Temperature: 100.00 deg. F
 Pressure: 314.70 psia
 Flow Rate: 2.09e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.27e-001	3.25e+001
Carbon Dioxide	1.39e-001	3.37e+001
Nitrogen	2.44e+000	3.77e+002
Methane	7.66e+001	6.77e+003
Ethane	1.30e+001	2.15e+003
Propane	4.96e+000	1.21e+003
Isobutane	4.83e-001	1.55e+002
n-Butane	1.21e+000	3.87e+002
Isopentane	2.53e-001	1.01e+002
n-Pentane	2.55e-001	1.01e+002
n-Hexane	6.28e-002	2.98e+001
Cyclohexane	1.40e-002	6.49e+000
Other Hexanes	9.17e-002	4.35e+001
Heptanes	7.67e-002	4.23e+001
Benzene	1.99e-003	8.56e-001
Toluene	2.99e-003	1.52e+000
Ethylbenzene	9.97e-004	5.83e-001
Xylenes	4.98e-003	2.91e+000
C8+ Heavies	8.77e-002	8.23e+001
Total Components	100.00	1.15e+004

DRY GAS STREAM

Temperature: 100.00 deg. F
 Pressure: 314.70 psia
 Flow Rate: 2.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	1.46e+000
Carbon Dioxide	1.39e-001	3.37e+001
Nitrogen	2.45e+000	3.77e+002
Methane	7.68e+001	6.77e+003
Ethane	1.30e+001	2.15e+003
Propane	4.97e+000	1.20e+003
Isobutane	4.84e-001	1.54e+002
n-Butane	1.21e+000	3.87e+002
Isopentane	2.53e-001	1.00e+002

n-Pentane	2.55e-001	1.01e+002
n-Hexane	6.28e-002	2.97e+001
Cyclohexane	1.38e-002	6.38e+000
Other Hexanes	9.17e-002	4.34e+001
Heptanes	7.63e-002	4.20e+001
Benzene	1.72e-003	7.37e-001
Toluene	2.36e-003	1.19e+000
Ethylbenzene	6.67e-004	3.89e-001
Xylenes	2.77e-003	1.61e+000
C8+ Heavies	8.26e-002	7.72e+001

Total Components	100.00	1.15e+004

LEAN GLYCOL STREAM

 Temperature: 100.00 deg. F
 Flow Rate: 1.39e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.84e+001	7.70e+002
Water	1.50e+000	1.17e+001
Carbon Dioxide	6.19e-013	4.84e-012
Nitrogen	4.91e-013	3.84e-012
Methane	2.95e-018	2.31e-017
Ethane	4.75e-008	3.72e-007
Propane	4.71e-009	3.69e-008
Isobutane	6.79e-010	5.31e-009
n-Butane	1.88e-009	1.47e-008
Isopentane	1.12e-004	8.78e-004
n-Pentane	1.45e-004	1.14e-003
n-Hexane	7.75e-005	6.06e-004
Cyclohexane	4.64e-004	3.63e-003
Other Hexanes	1.71e-004	1.33e-003
Heptanes	2.27e-004	1.77e-003
Benzene	8.03e-004	6.28e-003
Toluene	3.56e-003	2.78e-002
Ethylbenzene	2.89e-003	2.26e-002
Xylenes	2.46e-002	1.93e-001
C8+ Heavies	8.85e-002	6.92e-001

Total Components	100.00	7.82e+002

RICH GLYCOL AND PUMP GAS STREAM

 Temperature: 100.00 deg. F
 Pressure: 314.70 psia
 Flow Rate: 1.49e+000 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.24e+001	7.70e+002
Water	5.14e+000	4.28e+001
Carbon Dioxide	8.59e-003	7.15e-002
Nitrogen	3.55e-002	2.96e-001
Methane	6.39e-001	5.32e+000
Ethane	2.72e-001	2.26e+000
Propane	2.08e-001	1.73e+000
Isobutane	3.40e-002	2.83e-001

n-Butane	1.03e-001	8.59e-001
Isopentane	2.94e-002	2.44e-001
n-Pentane	3.56e-002	2.97e-001
n-Hexane	1.70e-002	1.42e-001
Cyclohexane	1.42e-002	1.18e-001
Other Hexanes	1.96e-002	1.63e-001
Heptanes	4.61e-002	3.84e-001
Benzene	1.52e-002	1.26e-001
Toluene	4.24e-002	3.53e-001
Ethylbenzene	2.61e-002	2.17e-001
Xylenes	1.79e-001	1.49e+000
C8+ Heavies	6.99e-001	5.82e+000

Total Components	100.00	8.33e+002

FLASH TANK OFF GAS STREAM

Temperature: 80.00 deg. F
 Pressure: 44.70 psia
 Flow Rate: 1.76e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	1.36e-001	1.14e-002
Carbon Dioxide	2.68e-001	5.47e-002
Nitrogen	2.24e+000	2.91e-001
Methane	7.03e+001	5.22e+000
Ethane	1.51e+001	2.11e+000
Propane	7.12e+000	1.45e+000
Isobutane	7.95e-001	2.14e-001
n-Butane	2.21e+000	5.94e-001
Isopentane	4.67e-001	1.56e-001
n-Pentane	5.08e-001	1.70e-001
n-Hexane	1.40e-001	5.60e-002
Cyclohexane	4.33e-002	1.69e-002
Other Hexanes	1.94e-001	7.73e-002
Heptanes	1.82e-001	8.44e-002
Benzene	5.77e-003	2.09e-003
Toluene	7.58e-003	3.24e-003
Ethylbenzene	2.01e-003	9.87e-004
Xylenes	8.60e-003	4.23e-003
C8+ Heavies	2.26e-001	1.78e-001

Total Components	100.00	1.07e+001

FLASH TANK GLYCOL STREAM

Temperature: 80.00 deg. F
 Flow Rate: 1.47e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.36e+001	7.70e+002
Water	5.21e+000	4.28e+001
Carbon Dioxide	2.04e-003	1.67e-002
Nitrogen	5.77e-004	4.74e-003
Methane	1.12e-002	9.23e-002
Ethane	1.84e-002	1.51e-001
Propane	3.35e-002	2.75e-001
Isobutane	8.38e-003	6.89e-002

n-Butane	3.23e-002	2.66e-001
Isopentane	1.08e-002	8.85e-002
n-Pentane	1.54e-002	1.27e-001
n-Hexane	1.04e-002	8.57e-002
Cyclohexane	1.23e-002	1.01e-001
Other Hexanes	1.05e-002	8.59e-002
Heptanes	3.64e-002	3.00e-001
Benzene	1.51e-002	1.24e-001
Toluene	4.26e-002	3.50e-001
Ethylbenzene	2.63e-002	2.16e-001
Xylenes	1.81e-001	1.49e+000
C8+ Heavies	6.86e-001	5.64e+000

Total Components	100.00	8.22e+002

FLASH GAS EMISSIONS

Flow Rate: 6.61e+002 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)

Water	6.13e+001	1.92e+001
Carbon Dioxide	3.68e+001	2.82e+001
Nitrogen	5.97e-001	2.91e-001
Methane	9.35e-001	2.61e-001
Ethane	2.01e-001	1.05e-001
Propane	9.47e-002	7.27e-002
Isobutane	1.06e-002	1.07e-002
n-Butane	2.93e-002	2.97e-002
Isopentane	6.21e-003	7.80e-003
n-Pentane	6.76e-003	8.50e-003
n-Hexane	1.87e-003	2.80e-003
Cyclohexane	5.76e-004	8.43e-004
Other Hexanes	2.58e-003	3.87e-003
Heptanes	2.42e-003	4.22e-003
Benzene	7.67e-005	1.04e-004
Toluene	1.01e-004	1.62e-004
Ethylbenzene	2.67e-005	4.93e-005
Xylenes	1.14e-004	2.12e-004
C8+ Heavies	3.00e-003	8.90e-003

Total Components	100.00	4.82e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 6.85e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	9.55e+001	3.10e+001
Carbon Dioxide	2.11e-002	1.67e-002
Nitrogen	9.38e-003	4.74e-003
Methane	3.19e-001	9.23e-002
Ethane	2.79e-001	1.51e-001
Propane	3.46e-001	2.75e-001
Isobutane	6.57e-002	6.89e-002

n-Butane	2.53e-001	2.66e-001
Isopentane	6.73e-002	8.76e-002
n-Pentane	9.65e-002	1.26e-001
n-Hexane	5.47e-002	8.51e-002
Cyclohexane	6.42e-002	9.74e-002
Other Hexanes	5.44e-002	8.46e-002
Heptanes	1.65e-001	2.98e-001
Benzene	8.36e-002	1.18e-001
Toluene	1.94e-001	3.22e-001
Ethylbenzene	1.01e-001	1.94e-001
Xylenes	6.77e-001	1.30e+000
C8+ Heavies	1.61e+000	4.95e+000

Total Components	100.00	3.96e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
 Pressure: 14.70 psia
 Flow Rate: 1.52e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	7.20e+000	4.61e-003
Ethane	6.30e+000	7.57e-003
Propane	7.81e+000	1.38e-002
Isobutane	1.48e+000	3.44e-003
n-Butane	5.72e+000	1.33e-002
Isopentane	1.52e+000	4.38e-003
n-Pentane	2.18e+000	6.28e-003
n-Hexane	1.24e+000	4.25e-003
Cyclohexane	1.45e+000	4.87e-003
Other Hexanes	1.23e+000	4.23e-003
Heptanes	3.72e+000	1.49e-002
Benzene	1.89e+000	5.89e-003
Toluene	4.37e+000	1.61e-002
Ethylbenzene	2.28e+000	9.69e-003
Xylenes	1.53e+001	6.48e-002
C8+ Heavies	3.63e+001	2.47e-001

Total Components	100.00	4.25e-001



**Southern
Hydrocarbon
Corporation**

SERVICES & PRODUCTS

Apt. B, 934 Little Coal River
Alum Creek, West Virginia 25003
Tel: (304) 756-3171 • Fax: (304) 756-1364

Chandler Engineering Co.
Model 292/2920 BTU Analyzer

Test time: Aug.04 14 08:55
Test #:2280

Calibration #: 30
Location No. :3

	Standard/Dry Analysis				Saturated/Wet Analysis		
	Mole%	BTU*	R.Den.*	GPM**	Mole%	BTU*	R.Den.*
Methane	75.129	760.58	0.4161	--	73.821	747.34	0.4089
Ethane	15.127	268.31	0.1570	4.0428	14.863	263.64	0.1543
Propane	5.696	143.66	0.0867	1.5683	5.597	141.16	0.0852
i-Butane	0.559	18.21	0.0112	0.1828	0.549	17.90	0.0110
n-Butane	1.379	45.11	0.0277	0.4349	1.355	44.32	0.0272
i-Pentane	0.295	11.82	0.0073	0.1078	0.290	11.61	0.0072
n-Pentane	0.306	12.28	0.0076	0.1107	0.300	12.07	0.0075
(C6+)	0.426	21.62	0.0135	0.1834	0.418	21.25	0.0133
Moisture	0.000	0.00	0.0000	--	1.740	0.88	0.0108
Nitrogen	0.619	0.00	0.0060	--	0.609	0.00	0.0059
(CO2)	0.465	0.00	0.0071	--	0.457	0.00	0.0069

Ideal 100.00 1281.6 0.7403 6.6307

* : Uncorrected for compressibility at 60.0F & 14.730PSIA.

** : Liquid Volume reported at 60.0F.

	Standard/Dry Analysis	Saturated/Wet Analysis
Molar Mass	= 21.442	21.382
Relative Density	= 0.7429	0.7409
Compressibility Factor	= 0.9962	0.9961
Gross Heating Value	= 22630. Btu/lb	22313. Btu/lb
Gross Heating Value	= 1286.5 Btu/CF	1265.1 Btu/CF
Absolute Gas Density	= 56.8512 lbm/1000CF	56.6978 lbm/1000CF
Wobbe Index	= 1467.82	
Unnormalized Total :	100.629	
Last Calibrated with Calgas of	1056.4 Btu/CF	Aug.04 14 08:38
C6+ Last Update: GPA	2261-90.	
C6+ BTU/CF:	5065.8, C6+ lbm/Gal	5.64250, and C6+ Mol.Wt. 92.00.

DISCLAIMER

All analysis are based solely on samples and materials supplied to Southern Hydrocarbon Corporation by the client. Southern Hydrocarbon Corporation, its officers and employees assume no responsibility for and make no warranty as to the productivity, proper operations, or profitability of any gas well or well or other operations or facilities in connection with which these analysis are relied upon. Southern Hydrocarbon Corporation makes no warranty as to the accuracy of these analysis. These analysis reflect the best judgement by Southern Hydrocarbon Corporation

Client: Energy Corporation of America

Well/Site: Lick Creek LBC

Measuring Station: _____

District: _____ **Pressure:** 242#

Date: 07/30/2014 **Time:** _____

Remarks: _____

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

Identification

User Identification:	Yaykey-Freeman Tank TO1
City:	Charleston
State:	West Virginia
Company:	Energy Corporation of America
Type of Tank:	Vertical Fixed Roof Tank
Description:	210 bbl Lube Oils & Condensate Tank

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	8.50
Liquid Height (ft) :	9.00
Avg. Liquid Height (ft):	9.00
Volume (gallons):	3,820.35
Turnovers:	12.00
Net Throughput(gal/yr):	45,844.23
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition:	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	15.00
Radius (ft) (Dome Roof)	8.50

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

Yaykey-Freeman Tank TO1 - Vertical Fixed Roof Tank
Charleston, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Crude oil (RVP 5)	All	66.21	54.54	77.67	59.32	3.2482	2.5822	4.0406	50.0000			207.00	Option 4: RVP=5

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

Yaykey-Freeman Tank TO1 - Vertical Fixed Roof Tank
Charleston, West Virginia

Annual Emission Calculations

Standing Losses (lb):	861.0852
Vapor Space Volume (cu ft):	2,533.2036
Vapor Density (lb/cu ft):	0.0288
Vapor Space Expansion Factor:	0.2158
Vented Vapor Saturation Factor:	0.1152
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,533.2036
Tank Diameter (ft):	8.5000
Vapor Space Outage (ft):	44.6419
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	9.0000
Roof Outage (ft):	38.6419
Roof Outage (Dome Roof)	
Roof Outage (ft):	38.6419
Dome Radius (ft):	8.5000
Shell Radius (ft):	4.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0288
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.9933
Tank Paint Solar Absorptance (Shell):	0.8000
Tank Paint Solar Absorptance (Roof):	0.8000
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2158
Daily Vapor Temperature Range (deg. R):	46.8683
Daily Vapor Pressure Range (psia):	1.4584
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.5822
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.0406
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Min. Liquid Surface Temp. (deg. R):	514.2094
Daily Max. Liquid Surface Temp. (deg. R):	537.5438
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1152
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Space Outage (ft):	44.6419
Working Losses (lb):	132.8738
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Annual Net Throughput (gal/yr.):	45,844.2302
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	3,820.3525
Maximum Liquid Height (ft):	9.0000
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	793.9590

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

Emissions Report for: Annual

Yaykey-Freeman Tank TO1 - Vertical Fixed Roof Tank
Charleston, West Virginia

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Crude oil (RVP 5)	132.87	661.09	793.96

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

Identification

User Identification:	Yahey-Freeman TO2 Tank
City:	Charleston
State:	West Virginia
Company:	Energy Corporation of America
Type of Tank:	Vertical Fixed Roof Tank
Description:	210 bbl Lube Oil & Condensate Tank

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	8.50
Liquid Height (ft) :	9.00
Avg. Liquid Height (ft):	9.00
Volume (gallons):	3,820.35
Turnovers:	12.00
Nel Throughput(gal/yr):	45,844.23
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition:	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	15.00
Radius (ft) (Dome Roof)	8.50

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

Yahey-Freeman TO2 Tank - Vertical Fixed Roof Tank
Charleston, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. WeighL	Liquid Mass FractL	Vapor Mass FractL	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Crude oil (RVP 5)	All	66.21	54.54	77.67	59.32	3.2462	2.5822	4.0406	50.0000			207.00	Option 4: RVP=5

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

Yahey-Freeman TO2 Tank - Vertical Fixed Roof Tank
Charleston, West Virginia

Annual Emission Calculations

Standing Losses (lb):	861.0852
Vapor Space Volume (cu ft):	2,533.2036
Vapor Density (lb/cu ft):	0.0288
Vapor Space Expansion Factor:	0.2158
Vented Vapor Saturation Factor:	0.1152
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,533.2036
Tank Diameter (ft):	8.5000
Vapor Space Outage (ft):	44.6419
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	9.0000
Roof Outage (ft):	38.6419
Roof Outage (Dome Roof)	
Roof Outage (ft):	38.6419
Dome Radius (ft):	8.5000
Shell Radius (ft):	4.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0288
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.9833
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2158
Daily Vapor Temperature Range (deg. R):	46.6683
Daily Vapor Pressure Range (psia):	1.4584
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.5822
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.0406
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Min. Liquid Surface Temp. (deg. R):	514.2094
Daily Max. Liquid Surface Temp. (deg. R):	537.5436
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1152
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Space Outage (ft):	44.6419
Working Losses (lb):	
Working Losses (lb):	132.8738
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Annual Net Throughput (gal/yr.):	45,844.2302
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	3,820.3525
Maximum Liquid Height (ft):	9.0000
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	
Total Losses (lb):	793.9590

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

Emissions Report for: Annual

Yahey-Freeman TO2 Tank - Vertical Fixed Roof Tank
Charleston, West Virginia

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Crude oil (RVP 5)	132.87	661.09	793.96

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

Identification

User Identification:	Yahey-Freeman Tank T03
City:	Charleston
State:	West Virginia
Company:	Energy Corporation of America
Type of Tank:	Vertical Fixed Roof Tank
Description:	100 bbl Lube Oil & Condensate Tank

Tank Dimensions

Shell Height (ft):	10.20
Diameter (ft):	8.50
Liquid Height (ft) :	9.40
Avg. Liquid Height (ft):	9.40
Volume (gallons):	3,990.15
Turnovers:	12.00
Net Throughput(gal/yr):	47,881.75
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition:	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	10.20
Radius (ft) (Dome Roof)	8.50

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

Yahey-Freeman Tank TO3 - Vertical Fixed Roof Tank
Charleston, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Crude oil (RVP 5)	All	66.21	54.54	77.87	59.32	3.2462	2.5922	4.0406	50.0000			207.00	Option 4: RVP=5

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

Yahey-Freeman Tank TO3 - Vertical Fixed Roof Tank
Charleston, West Virginia

Annual Emission Calculations

Standing Losses (lb):	545.2110
Vapor Space Volume (cu ft):	890.4428
Vapor Density (lb/cu ft):	0.0288
Vapor Space Expansion Factor:	0.2158
Vented Vapor Saturation Factor:	0.2703
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	890.4428
Tank Diameter (ft):	8.5000
Vapor Space Outage (ft):	15.8620
Tank Shell Height (ft):	10.2000
Average Liquid Height (ft):	9.4000
Roof Outage (ft):	14.8620
Roof Outage (Dome Roof)	
Roof Outage (ft):	14.8620
Dome Radius (ft):	8.5000
Shell Radius (ft):	4.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0288
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	519.9633
Tank Paint Solar Absorptance (Shell):	0.8600
Tank Paint Solar Absorptance (Roof):	0.8600
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2158
Daily Vapor Temperature Range (deg. R):	46.6683
Daily Vapor Pressure Range (psia):	1.4584
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.5822
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.0406
Daily Avg. Liquid Surface Temp. (deg. R):	525.8785
Daily Min. Liquid Surface Temp. (deg. R):	514.2094
Daily Max. Liquid Surface Temp. (deg. R):	537.5436
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.2703
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.2482
Vapor Space Outage (ft):	15.8620
Working Losses (lb):	
Vapor Molecular Weight (lb/lb-mole):	138.7763
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	50.0000
Annual Net Throughput (gal/yr):	3.2482
Annual Turnovers:	47,981.7515
Turnover Factor:	12.0000
Maximum Liquid Volume (gal):	1.0000
Maximum Liquid Height (ft):	3,990.1480
Tank Diameter (ft):	9.4000
Working Loss Product Factor:	8.5000
	0.7500
Total Losses (lb):	683.9802

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

Emissions Report for: Annual

Yakey-Freeman Tank TO3 - Vertical Fixed Roof Tank
Charleston, West Virginia

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Crude oil (RVP 5)	138.78	545.21	683.99

Attachment J
Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is hereby given that Energy Corporation of America has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G35-A General Permit Registration to modify a natural gas compressor station located on Tower road near Madison, in Boone County, West Virginia.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:
NO_x = 13.77 TPY, CO = 4.43 TPY, VOC = 9.36 TPY, SO_x = 0.03 TPY, PM/PM₁₀ = 0.47 TPY, CH₂O = 1.06 TPY.

Startup of operation is planned to begin on or about the 1st day of December, 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, until November 14, 2015.

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 8th day of October, 2015.

By: Energy Corporation of America
Donald C. Supcoe
Executive Vice President
500 Corporate Landing
Charleston, WV 25311

Attachment K
Electronic Submittal

(Attached)

THE ATTACHED CHECK
CONSTITUTES PAYMENT
FOR THE FOLLOWING:

ENERGY CORPORATION OF AMERICA

CHECK NO.
384776

INVOICE #	INV DATE	INVOICE DESCRIPTION	INVOICE AMT	AMOUNT PAID
09292015	09-29-15	WVAIR PERMIT FEE	500.00	500.00

TOTALS 01		500.00	500.00
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THIS MULTI-TONE AREA OF THE DOCUMENT CHANGES COLOR GRADUALLY AND EVENLY FROM DARK TO LIGHT WITH DARKER AREAS BOTH TOP AND BOTTOM.



ENERGY CORPORATION OF AMERICA

500 Corporate Landing
Charleston, WV 25311

WELLS FARGO BANK, N.A.
SAN FRANCISCO, CA

384776

DATE

10/09/15

11-24
1210 (8)

VOID AFTER SIX MONTHS FROM DATE OF ISSUE

PAY ONLY **500.00** FIVE HUNDRED DOLLARS AND ZERO CENTS

AMOUNT
*****\$500.00

PAY FIVE HUNDRED DOLLARS AND ZERO CENTS *****

ENERGY CORPORATION OF AMERICA

TO THE ORDER OF

WV DEP-DIVISION OF AIR QUALITY
601 57TH STREET, SE
CHARLESTON, WV 25304

[Signature]

J. Michael Forbes

⑈0000384776⑈ ⑆121000248⑆4196669691⑈

THE ORIGINAL DOCUMENT HAS A REFLECTIVE WATERMARK ON THE BACK. HOLD AT AN ANGLE TO VIEW WHEN CHECKING THE ENDORSEMENT

Attachment L

General Permit Registration Application Fee

Attachment M
Sitting Criteria Waiver

Not Applicable

Attachment N
Material Safety Data Sheets (MSDS)

Not Applicable

Other Supporting Documents

PRODUCT IDENTIFICATION CONTROL SHEET



Unit Number: 6991

Unit Work Order Number: 112113

Configuration: (2) 17.25 - 11.5 - 6.38 X 4.50

Unit Height: 12' 6" Unit Width: 13' 10" Unit Length: 38' 0"

Unit Weight: 129680 lbs

Unit Part Number: 991-01646

Type: CA-1380-3 LP

Product Description Manufacturer	J-W Part Number Model Number	Serial Number Quantity
-------------------------------------	---------------------------------	---------------------------

ENGINE

ENGINE CAT	800-00244 G3516 ULB ARR# 330-8202	JEF02674 1
MANUFACTURE DATE: 3/19/2014		

ENGINE ACCESSORIES

ACTUATOR ELEC GOVERNOR CAT	310-05390 328-2641	N/A 1
ENGINE PYROMETER CAT	310-04192 357-4880	18283 1
STARTER CAT	310-05737 3339888	14021021 1
TURBOCHARGER CAT	310-05388 3287582	HTS44615 1
TURBOCHARGER CAT	310-05388 3287582	HTS44633 1
ALTERNATOR CAT	310-05389 2988838	N/A 1
CATALYTIC CONVERTER W/SILENCER DCL	318-00916 C2E2-01-4Q63-32	278977 1
CATALYTIC CONVERTER SPEC DCL	335-23931 N/A	REV 00 1

G3516B

GAS ENGINE TECHNICAL DATA



ENGINE SPEED (rpm):	1400	FUEL:	Nat Gas
COMPRESSION RATIO:	8:1	FUEL SYSTEM:	CAT WIDE RANGE
AFTERCOOLER - STAGE 2 INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 INLET (°F):	201	FUEL PRESSURE RANGE(psig):	7.0-50.0
JACKET WATER OUTLET (°F):	210	FUEL METHANE NUMBER:	80
ASPIRATION:	TA	FUEL LHV (Btu/scf):	905
COOLING SYSTEM:	JW+OC+1AC, 2AC	ALTITUDE CAPABILITY AT 100°F INLET AIR TEMP. (ft):	6000
IGNITION SYSTEM:	ADEM3	APPLICATION:	Gas Compression
EXHAUST MANIFOLD:	DRY		
COMBUSTION:	Ultra Lean Burn		
NOx EMISSION LEVEL (g/bhp-hr NOx):	1.0		

RATING	NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN) (1)	bhp	1380	1035	690
ENGINE EFFICIENCY	(ISO 3046/1) (2)	%	36.1	33.6	31.4
ENGINE EFFICIENCY	(NOMINAL) (2)	%	35.4	33.0	30.8

ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(3)	Btu/bhp-hr	7050	7570	8095
FUEL CONSUMPTION	(NOMINAL)	(3)	Btu/bhp-hr	7187	7717	8252
AIR FLOW (77°F, 14.7 psia)	(WET)	(4) (5)	scfm	2989	2317	1604
AIR FLOW	(WET)	(4) (5)	lb/hr	13254	10273	7112
COMPRESSOR OUT PRESSURE			in Hg(abs)	99.3	87.8	66.9
COMPRESSOR OUT TEMPERATURE			°F	363	342	265
AFTERCOOLER AIR OUT TEMPERATURE			°F	133	132	131
INLET MAN. PRESSURE		(6)	in Hg(abs)	90.7	73.2	52.1
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(7)	°F	145	145	142
TIMING		(8)	°BTDC	30	28	24
EXHAUST TEMPERATURE - ENGINE OUTLET		(9)	°F	990	952	1018
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(10) (5)	ft ³ /min	8712	6589	4785
EXHAUST GAS MASS FLOW	(WET)	(10) (5)	lb/hr	13754	10677	7399

EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)		(11)(12)	g/bhp-hr	1.00	1.00	1.00
CO		(11)(13)	g/bhp-hr	2.80	3.02	3.27
THC (mol. wt. of 15.84)		(11)(13)	g/bhp-hr	3.78	3.60	3.42
NMHC (mol. wt. of 15.84)		(11)(13)	g/bhp-hr	0.57	0.54	0.51
NMNEHC (VOCs) (mol. wt. of 15.84)		(11)(13)(14)	g/bhp-hr	0.38	0.36	0.34
HCHO (Formaldehyde)		(11)(13)	g/bhp-hr	0.40	0.41	0.40
CO2		(11)(13)	g/bhp-hr	449	485	526
EXHAUST OXYGEN		(11)(15)	% DRY	8.7	8.2	7.6
LAMBDA		(11)(15)		1.67	1.61	1.56

ENERGY BALANCE DATA						
LHV INPUT		(16)	Btu/min	165289	133116	94894
HEAT REJECTION TO JACKET WATER (JW)		(17)(24)	Btu/min	23835	24569	20240
HEAT REJECTION TO ATMOSPHERE		(18)	Btu/min	6110	5092	4074
HEAT REJECTION TO LUBE OIL (OC)		(19)(24)	Btu/min	4475	3978	3363
HEAT REJECTION TO EXHAUST (LHV TO 77°F)		(20)	Btu/min	58081	42911	31718
HEAT REJECTION TO EXHAUST (LHV TO 350°F)		(20)	Btu/min	39645	28952	22411
HEAT REJECTION TO A/C - STAGE 1 (1AC)		(21)(24)	Btu/min	8972	7559	2454
HEAT REJECTION TO A/C - STAGE 2 (2AC)		(22)(25)	Btu/min	4464	4285	2952
PUMP POWER		(23)	Btu/min	833	833	833

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3.

For notes information consult page three.

FUEL USAGE GUIDE

CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	85
SET POINT TIMING	25	25	25	25	26	27	28	30	30	30	30	30
DERATION FACTOR	0.90	0.92	0.93	0.95	0.96	0.97	0.99	1	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °F	ALTITUDE (FEET ABOVE SEA LEVEL)												
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1	1	1	1	1	1	0.97	0.89	0.67	No Rating	No Rating	No Rating	No Rating
120	1	1	1	1	1	1	0.98	0.92	0.86	No Rating	No Rating	No Rating	No Rating
110	1	1	1	1	1	1	0.99	0.94	0.89	0.71	No Rating	No Rating	No Rating
100	1	1	1	1	1	1	1	0.95	0.91	0.86	No Rating	No Rating	No Rating
90	1	1	1	1	1	1	1	0.96	0.91	0.86	0.73	0.57	No Rating
80	1	1	1	1	1	1	1	0.96	0.91	0.86	0.76	0.63	No Rating
70	1	1	1	1	1	1	1	0.97	0.92	0.87	0.76	0.63	No Rating
60	1	1	1	1	1	1	1	0.97	0.92	0.87	0.76	0.63	No Rating
50	1	1	1	1	1	1	1	0.97	0.92	0.87	0.76	0.63	No Rating

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

INLET AIR TEMP °F	ALTITUDE (FEET ABOVE SEA LEVEL)												
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.33	1.38	1.42	1.48	1.53	1.58	1.63	1.65	1.65	No Rating	No Rating	No Rating	No Rating
120	1.26	1.31	1.36	1.41	1.46	1.51	1.56	1.58	1.58	No Rating	No Rating	No Rating	No Rating
110	1.19	1.24	1.29	1.34	1.39	1.44	1.49	1.51	1.51	1.51	No Rating	No Rating	No Rating
100	1.13	1.18	1.22	1.27	1.32	1.37	1.42	1.44	1.44	1.44	No Rating	No Rating	No Rating
90	1.06	1.11	1.16	1.20	1.25	1.30	1.35	1.36	1.36	1.36	1.36	1.36	No Rating
80	1	1.04	1.09	1.13	1.18	1.23	1.28	1.29	1.29	1.29	1.29	1.29	No Rating
70	1	1	1.02	1.07	1.11	1.16	1.21	1.22	1.22	1.22	1.22	1.22	No Rating
60	1	1	1	1	1.04	1.09	1.14	1.15	1.15	1.15	1.15	1.15	No Rating
50	1	1	1	1	1	1.02	1.07	1.08	1.08	1.08	1.08	1.08	No Rating

MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM)

INLET AIR TEMP °F	ALTITUDE (FEET ABOVE SEA LEVEL)												
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1050	1050	1050	1050	1050	1050	1110	1170	1180	No Rating	No Rating	No Rating	No Rating
120	1050	1050	1050	1050	1050	1050	1090	1150	1180	No Rating	No Rating	No Rating	No Rating
110	1050	1050	1050	1050	1050	1050	1070	1140	1170	1180	No Rating	No Rating	No Rating
100	1050	1050	1050	1050	1050	1050	1050	1130	1160	1180	No Rating	No Rating	No Rating
90	1050	1050	1050	1050	1050	1050	1050	1120	1150	1170	1190	1200	No Rating
80	1050	1050	1050	1050	1050	1050	1050	1080	1120	1160	1190	1200	No Rating
70	1050	1050	1050	1050	1050	1050	1050	1070	1110	1150	1180	1200	No Rating
60	1050	1050	1050	1050	1050	1050	1050	1070	1110	1150	1180	1200	No Rating
50	1050	1050	1050	1050	1050	1050	1050	1070	1110	1150	1180	1200	No Rating

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

- 1) Fuel Usage Guide Deration
- 2) $1 - ((1 - \text{Altitude/Temperature Deration}) + (1 - \text{RPC}))$

AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):

To maintain a constant air inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for inlet air temp and altitude conditions. See notes 24 and 25 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM):

This table shows the minimum allowable engine turndown speed where the engine will maintain the Rated Speed's Torque for the given ambient conditions. For some ambient conditions, the engine is not capable of being loaded continuously from idle to the max site torque at the indicated speed.

NOTES:

1. Engine rating is with two engine driven water pumps. Tolerance is $\pm 3\%$ of full load.
2. ISO 3046/1 engine efficiency tolerance is (+)0, (-)5% of full load % efficiency value. Nominal engine efficiency tolerance is $\pm 3.0\%$ of full load % efficiency value.
3. ISO 3046/1 fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal fuel consumption tolerance is $\pm 3.0\%$ of full load data.
4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of $\pm 5\%$.
5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
6. Inlet manifold pressure is a nominal value with a tolerance of $\pm 5\%$.
7. Inlet manifold temperature is a nominal value with a tolerance of $\pm 9^\circ\text{F}$.
8. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
9. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
10. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of $\pm 6\%$.
11. Emissions data is at engine exhaust flange prior to any after treatment.
12. NOx values are "Not to Exceed".
13. CO, CO₂, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.
14. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
15. Exhaust Oxygen tolerance is ± 0.5 ; Lambda tolerance is ± 0.05 . Lambda and Exhaust Oxygen level are the result of adjusting the engine to operate at the specified NOx level.
16. LHV rate tolerance is $\pm 3.0\%$.
17. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is $\pm 10\%$ of full load data.
18. Heat rejection to atmosphere based on treated water. Tolerance is $\pm 50\%$ of full load data.
19. Lube oil heat rate based on treated water. Tolerance is $\pm 20\%$ of full load data.
20. Exhaust heat rate based on treated water. Tolerance is $\pm 10\%$ of full load data.
21. Heat rejection to A/C - Stage 1 based on treated water. Tolerance is $\pm 5\%$ of full load data.
22. Heat rejection to A/C - Stage 2 based on treated water. Tolerance is $\pm 5\%$ of full load data.
23. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
24. Total Jacket Water Circuit heat rejection is calculated as: $(\text{JW} \times 1.1) + (\text{OC} \times 1.2) + (1\text{AC} \times 1.05) + [0.95 \times (1\text{AC} + 2\text{AC}) \times (\text{ACHRF} - 1) \times 1.05]$. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
25. Total Second Stage Aftercooler Circuit heat rejection is calculated as: $(2\text{AC} \times 1.05) + [(1\text{AC} + 2\text{AC}) \times 0.05 \times (\text{ACHRF} - 1) \times 1.05]$. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

FREE FIELD MECHANICAL & EXHAUST NOISE

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	1380	116.2	79.2	77.2	80.1	80.6	89.3	88.1	92.5	95.7	95.8	98.7
75	1035	115.4	78.0	76.9	79.1	79.6	88.1	86.9	92.4	95.4	95.9	99.5
50	690	113.2	74.7	74.2	76.5	77.5	86.0	84.6	90.3	94.7	94.8	98.2

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	1380	101.7	102.2	98.7	100.7	101.8	96.8	96.6	96.6	94.1	105.6	115.2
75	1035	102.6	103.3	100.4	103.0	104.5	101.0	104.8	104.3	106.2	109.2	103.9
50	690	101.2	103.5	99.0	102.1	102.8	100.9	104.0	103.4	103.8	102.4	102.1

EXHAUST: Sound Power (1/3 Octave Frequencies)

Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	1380	130.0	101.4	99.0	106.2	105.5	100.7	97.7	98.5	101.7	108.5	113.2
75	1035	120.5	100.2	99.1	103.8	101.6	97.4	95.2	95.3	98.7	104.5	110.1
50	690	117.8	99.3	96.7	101.7	97.8	95.1	92.6	94.9	98.2	103.3	107.4

EXHAUST: Sound Power (1/3 Octave Frequencies)

Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	1380	113.0	112.0	114.7	119.7	122.4	120.3	121.2	122.5	120.8	118.8	116.9
75	1035	111.0	103.2	105.3	106.1	107.2	109.1	111.0	110.9	111.2	110.5	107.4
50	690	101.5	101.4	102.7	102.4	105.4	107.5	108.7	108.6	108.2	107.8	107.3

SOUND PARAMETER DEFINITION:

Sound Power Level Data - DM8702-01

Sound power is defined as the total sound energy emanating from a source irrespective of direction or distance. Sound power level data is presented under two index headings:

Sound power level -- Mechanical

Sound power level -- Exhaust

Mechanical: Sound power level data is calculated in accordance with ISO 6798. The data is recorded with the exhaust sound source isolated.

Exhaust: Sound power level data is calculated in accordance with ISO 6798 Annex A.

Measurements made in accordance with ISO 6798 for engine and exhaust sound level only. No cooling system noise is included unless specifically indicated. Sound level data is indicative of noise levels recorded on one engine sample in a survey grade 3 environment.

How an engine is packaged, installed and the site acoustical environment will affect the site specific sound levels. For site specific sound level guarantees, sound data collection needs to be done on-site or under similar conditions.



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	Mark Davis	Phone	
	J-W Power	Fax	
Date	October 11, 2012	Email	mdavis@jwenergy.com

RE: EMISSIONS GUARANTEE

Mark,

We hereby guarantee that our QUICK-LID™ Model DC63L2-14HGS catalytic silencer described below:

Catalyst model	DC63
Catalyst coating	Oxidation (Q coating)
Outside Diameter of catalyst substrate	20.41"
No. of catalyst layers	1
No. of catalyst substrates per layer	2
Cell Density	300 cpsi

and sized for the following engine:

Engine model	CAT G3516 B
Power	1380 hp @ 1400 rpm
Fuel	Pipeline Quality Natural Gas

will perform as follows:

SILENCER SYSTEM DATA

Silencer Grade	Hospital
Approx. Attenuation	35-40 dBA

Emissions	After Catalyst (% destruction)
Carbon Monoxide (CO)	93%
Formaldehyde (CH ₂ O)	80%
Volatile Organic Compounds	45%

for a period of 1 year (after invoice date) or 8000 hours, whichever comes first, subject to all terms and conditions contained in the attached warranty document being respected and met.

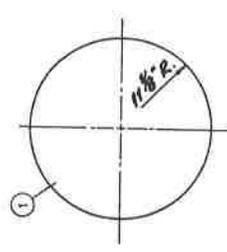
Best regards,
DCL America

Sam Kirk
Regional Account Manager

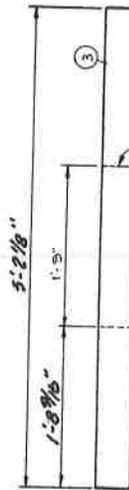
335-23931-00

Confidential Communication

J-W I
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Issue
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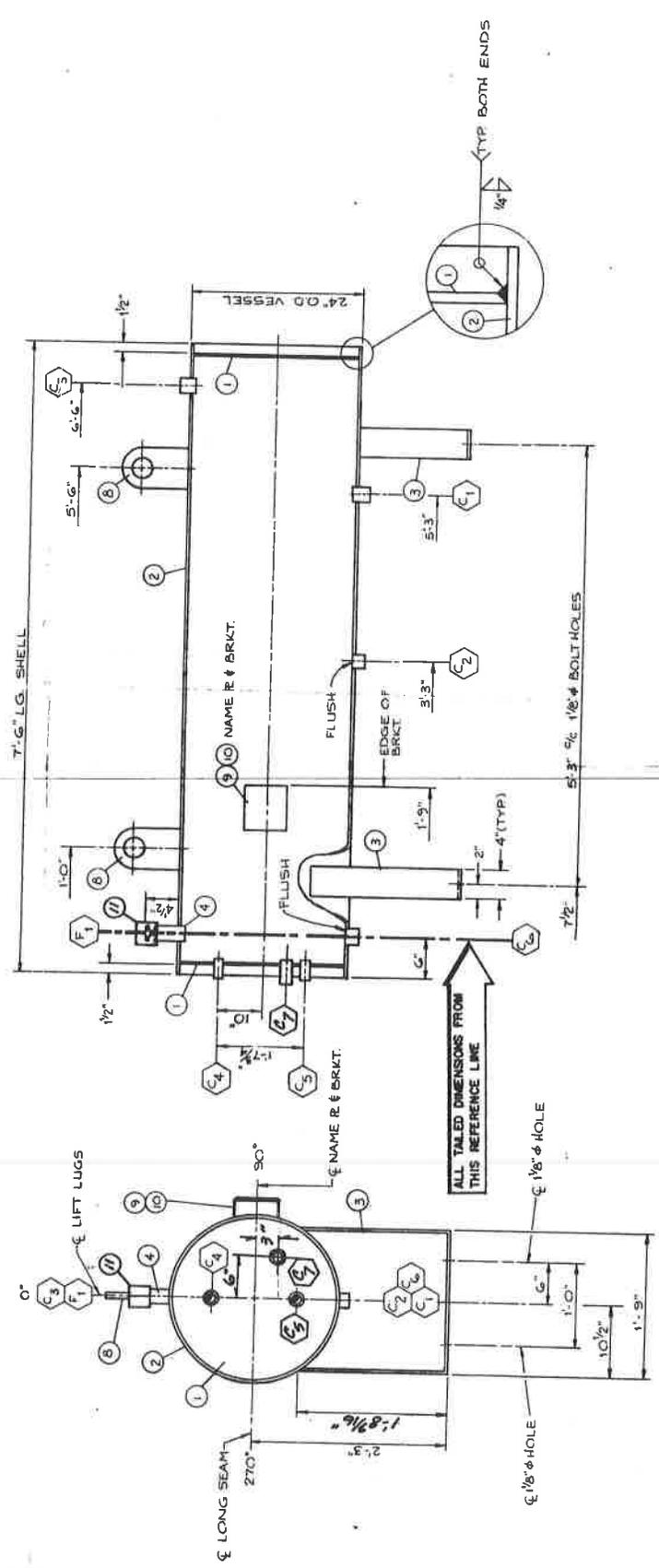
DETAIL ITEM No. 1
(2) REQ'D.



DETAIL ITEM No. 3
(2) REQ'D.

- LEGEND**
- F₁ FILL CONNECTION: INVERTED (SEE TANK), (4) (1)
 - C₁ 1/2" STD. LIT. PIPE (SEE TANK), (5)
 - C₂ INLET CONNECTION: 1/2" 6000* CPLG., (6)
 - C₃ DRAIN CONNECTION: 1" 6000* CPLG., (7)
 - C₄ FLANKET GAS CONNECTION: 1/2" 6000* CPLG., (8)
 - C₅ LEVEL GAUGE CONNECTION: 1/2" 6000* CPLG., (9)
 - C₆ OUTLET CONNECTION: 1/2" 6000* CPLG., (10)
 - C₇ LOW LEVEL CONNECTION: 2"-3000* CPLG., (11)

- GENERAL SPECIFICATIONS**
- MATERIAL:**
- HEADS: FLAT R. SA283-C .250" THK.
 - SHELL: PIPE SA53-B .250" THK.
- DESIGN DATA:**
- DESIGN PRESS: 0 PSI
 - TEMP: 250°F
 - TEST PRESS: 3 PSI
- NOTES:**
- ALL COUPLINGS TO EXTEND 1/2" OUTSIDE
 - PAINT: MECHANICALLY CLEAN AND PRIME (1) COAT
 - 2-E UNLTD STABILIZED PRIMER
 3. APPROX. WEIGHT: 610#



NO.		E.C.O.		DATE		BY		CHK'D.		REVISIONS	
DESCRIPTION											
DNG. NO. A-1925											
REFERENCE DRAWINGS											
DESCRIPTION: RITCON ASSEMBLY											
CUSTOMER: CARTRIAL COMPRESSION											
DRAWN: R. SMITH											
SCALE: 1" = 1'-0"											
TMO: EDC-0400											
PROJECT: GLYCOL SURGE DRUM											
SHEET NO. 053037502408											
DATE: 12-18-78											
BY: J. J. BROWN											
CHECKED: J. J. BROWN											
APPROVED: J. J. BROWN											

EM NATCO
COMBUSTION ENGINEERING, INC.
The quality is the product of
combustion engineering, inc.
1700 North 17th Street
Tulsa, Oklahoma 74101
and is a registered trademark of
combustion engineering, inc.
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SEPA FROM B-35167



Q.B. JOHNSON MANUFACTURING, INC.
MANUFACTURERS OF GAS PROCESSING EQUIPMENT
PO BOX 95129 OKLAHOMA CITY, OKLAHOMA 73143
(405) 677-6676 - FAX (405) 670-3270

QUOTATION
04-11206R5
(5th Revision)

May 19, 2006

Energy Corporation
Attn: Jeff Shue
P.O. Box G
Marmet, WV 25315

Re: Your RFQ

Gentlemen,

Thank you for your inquiry. We appreciate this opportunity to submit our quotation on the following equipment in accordance with the following specifications, prices, deliveries and terms.

- 1 - Q.B. Johnson Mfg., Inc. **54" OD X 16' -0" BTEX vapor incinerator**, complete with:
 - a) 6" ceramic fiber refractory
 - b) 1 - Maxon forced draft burner system complete with ignition and flame failure shutdown complete with Honeywell temperature control actuator
 - c) Stack with waste gas heat exchanger, and exhaust gas cooler
 - d) 1 - 8" x 2'-0" drip leg, complete with:
 - 1) bottom drain with gate valve
 - 2) 2 - 1" 3000# Cplgs - Plugged
 - 3) 1-1/2" insulation
 - e) Fuel regulators
 - f) Pilot regulator
 - g) Sandblasted and painted
 - h) 1 - Control panel purged NEMA 4 (Hoffman closure or equal) complete as follows:
 - 1) Allen Bradley PLC
 - 2) Power on/off
 - 3) Stack HTSD
 - 4) Watlow temperature controller with HTSD
 - 5) Fuel pressure PAH
 - 6) Fuel pressure PAL
 - 7) Air blower LPSD
 - 8) Flame failure shutdown FFSD
 - 9) Scrubber LAH & LAHH
 - 10) Local start/stop control for combustion air blower
 - 11) Step-down transformers for all on skid voltage
 - 12) Relay contacts for remote status
 - 13) PLC Configured for first out indication
 - 14) Properly configured for ESD shutdown



Q.B. JOHNSON MANUFACTURING, INC.
MANUFACTURERS OF GAS PROCESSING EQUIPMENT
PO BOX 95129 OKLAHOMA CITY, OKLAHOMA 73143
(405) 677-6676 - FAX (405) 670-3270

QUOTATION
04-11206R5
(5th Revision)

- 15) Fuel pressure PAH
- 16) Fuel pressure PAL
- 17) Fuel / Air Blower LPSD
- 18) Flame failure shutdown FFSD
- i) Unit test fired before shipment
- j) 1 - 3" 150# Piston Balanced 3 way valve configured for diverting still vapors from vapor incinerator to customer supplied "vent" upon shutdown of incinerator (1 for Each Dehydrator
- k) 1 - Common Inline Flash Arrestor
- l) 7'-0" x 20'-0" skid

Total Price FOB OKC Plant \$96,240.00

The above unit will provide a 95.0% destruction of Hydrocarbons (C1 - E-Benzene) with an inlet feed (Streams 5 Flash & 12 Still Vapors) as shown on our HYSYS Case 04-11206R4 ECA TO.HSC and when operated in strict accordance with QBJ operating instructions. (Streams 5 and 12 calculated by GRI-GLYCalc)

The retention time of the above quoted thermal oxidizer when operated with an inlet feed as shown on our HYSYS Case 04-11206R4ECA TO.HSC and when operated in strict accordance with QBJ operating instructions is in excess of 2.0 seconds.

Drawings: Four (4) Weeks ARO

Shipment: Ten (10) Weeks ARAD

Taxes: If any are applicable, they shall be borne by the purchaser.

Terms: 20% Due Upon Receipt Shell Material
20% Due Upon Completion of Rolling & Welding of TO Shell
20% Due Upon Completion of Welding of Structural
40% Due Upon Completion

Invoices due 1% in Ten Days Net 30