TRIAD HUNTER, LLC

APPLICATION FOR G70-A GENERAL PERMIT MODIFICATION

Weese Station
Tyler County, West Virginia

SE TECHNOLOGIES

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

APPLICATION FOR GENERAL PERMIT MODIFICATION
Triad Hunter, LLC

R. Weese Production Facility

Tyler County, West Virginia

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SECTION I

Application Form

	WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57th Street, SE Charleston, WV 25304 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:

- ☐ **G10-D –** Coal Preparation and Handling
- ☐ **G20-B –** Hot Mix Asphalt
- ☐ **G30-D –** Natural Gas Compressor Stations
- ☐ **G33-A –** Spark Ignition Internal Combustion Engines
- ☐ **G35-A –** Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)
- ☐ **G40-C –** Nonmetallic Minerals Processing
- ☐ **G50-B –** Concrete Batch
- ☐ **G60-C** - Class II Emergency Generator
- ☐ **G65-C –** Class I Emergency Generator
- ☒ **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): **Triad Hunter, LLC**	**2.** Federal Employer ID No. **(FEIN):** **27-1355830**
3. Applicant's mailing address: **125 Putnam Street** **Marietta, OH 45750**	4. Applicant's physical address: **Access road off of CR 58 in Tyler County approximately 0.1 miles south of intersection with State Route 18 just west of Alma, No physical address.**

5. If Applicant is a subsidiary corporation, please provide the name of parent corporation.

Magnum Hunter Resources

WV BUSINESS REGISTRATION. Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

- **IF YES,** provide a copy of the Certificate of **Incorporation/ Organization / Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A**.

- **IF NO,** provide a copy of the **Certificate of Authority / Authority of 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 Well Pad and Production Facility**	8a. Standard Industrial Classification (SIC) code: **1311** AND 8b. North American Industry Classification System (NAICS) code: **211111**
9. DAQ Plant ID No. (for existing facilities only): **095-00022**	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): **G70-A087**

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site: **Weese Station**	12A. Address of primary operating site: Mailing: **None** Physical:

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☒ YES ☐ NO

→ IF **YES**, please explain: **Applicant has a lease agreement with the land owner for installation of the well pad and associated gas and liquids management equipment**

→ 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**.

15A. Nearest city or town: **Alma**	16A. County: **Tyler**	17A. UTM Coordinates: Northing (KM): **4363.9242** Easting (KM): **515.0582** Zone: **17**
18A. Briefly describe the proposed new operation or change (s) to the facility: **Natural gas production, liquids separation, truck loading of liquids and dehydration**		19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: **39.424717** Longitude: **-80.82505**

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

11B. Name of 1st alternate operating site:	12B. Address of 1st alternate operating site: Mailing: Physical:

13B. 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.

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 2nd alternate operating site:	12C. Address of 2nd alternate operating site: Mailing: ______ Physical: ______

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: ______
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: ______

20. Provide the date of anticipated installation or change:	21. Date of anticipated Start-up if registration is granted:
12 / 01 / 15 **(dehydration Unit)** If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: ____ / ____ / 2011 **(all other equipment)**	**12/15/2015**

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________ Days per week ________ Weeks per year ________ Percentage of operation ________

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) ____________________
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 M. J. Horan — Responsible Official — Date 10/13/15
(please use blue ink)

Name & Title **Michael Horan, Vice President - Operations**
(please print or type)

Signature ____________________ Authorized Representative (if applicable) — Date
(please use blue ink)

Applicant's Name ____________________

Phone & Fax **740/374-2940** (Phone) ____________________ (Fax)

Email **mhoran@triadhunter.com**

ATTACHMENT A

Business Registration

State of West Virginia

Certificate

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

Triad Hunter, LLC

has filed the appropriate registration documents in my office according to the provisions of the West Virginia Code and hereby declare the organization listed above as duly registered with the Secretary of State's Office.

Given under my hand and
the Great Seal of West Virginia
on this day of
January 29, 2010

Secretary of State

ATTACHMENT B

Process Description

Triad Hunter, LLC
Weese Station Modification
and
Addition of R. Weese Production Facility
Process Description

Triad Hunter, LLC currently owns and operates certain equipment associated with natural gas production at its R. Weese Production Facility which is in close proximity to its Weese Station (aka E. Weese). The R. Weese Production Facility currently consists of four wells, each equipped with a Gas Processing Unit (GPU) and six tanks for receipt and accumulation of Produced Water and Condensate. Vapors from the tanks are controlled by a single enclosed combustor. There is currently no air emissions permit for this facility.

Triad Hunter is seeking inclusion of the emission sources at the R. Weese Production Facility under the existing General Permit G70-A registration for its Weese Station. In addition, Triad Hunter is seeking approval for installation of a 3.0 MMSCFD dehydration unit at the R. Weese facility. Upon installation, the R. Weese Production Facility will receive and dehydrate gas produced from the four Marcellus wells on that well pad prior to transportation via gathering line to the nearby Weese Station where it will be compressed and injection into a gathering line owned and operated by others.

Secondly, Triad is seeking to replace one of the permitted CAT 3516 compressor driver engines (and associated compressor) at the Weese Station with a smaller Cummins GTA 855 (225 Hp) engine and associated compressor.

Lastly, Triad is seeking to reduce the permitted amount of condensate throughput for the Weese station, to better reflect current and anticipated future condensate management. As part of this reduction, the amount of flash gas being generated (and managed) is reduced. Correspondingly, the amount of condensate being load onto trucks is being reduced and the VRU is no longer cost effective and is being eliminated. All gas managed by that unit will be routed to the combustors.

No other equipment additions are planned. There is currently no compression at the R. Weese Well Pad and none is planned in the foreseeable future.

The following discussion describes equipment and material flow through the R. Weese Production Facility:

Gas produced by each well is passed through a dedicated Gas Processing Units (GPUs) where Produced Fluids (water and condensate) is separated from the raw gas stream and then further separated into Produced Water and Condensate. The gas will be dehydrated through the new TEG dehydration unit and injected into pipelines for transportation to the nearby E. Weese Production facility where it will be combined with gas from that pad, compressed and discharged into gather lines for transportation to facilities owned by others for further processing. A small portion of the dehydrated gas will be used as fuel to power the existing equipment. The total amount of gas that will be processed through this facility will vary over time, but is not expected to exceed 3 MMSCFD for the foreseeable future. This application seeks to permit the emissions from the new dehydration equipment.

Under the existing and future configuration, raw condensate and produced water is mixed and routed to a series of four 400 BBL and two 210 BBL accumulation tanks. The accumulated condensate (approximately 10 BBL per day) will be transported, via tank truck, to a condensate processing facility owned and operated by others.

Vapors emitted by the storage tanks (flash, working and breathing losses) and the associated condensate truck loading operations will be captured by a piping system that will route the vapors to the enclosed combustor. For permitting purposes, a capture and control efficiency 98% of the tank vapors is claimed, with approximately 1 percent loss in the various fittings on the tanks and associated piping to the combustor and approximately 1 percent loss in the combustor efficiency.

It is estimated that a maximum of 154,800 gallons of condensate and 908,000 gallons of produced water will be generated and loaded per year.

As noted above, the inlet gas will be dehydrated prior to discharge into a gathering pipeline to route it to the nearby Everett Weese facility. The dehydration process will generate two gaseous streams: Flash Gas and Still Vent vapors. The still vent will vapors will be released directly to atmosphere. The flash gas will be routed to the enclosed combustor.

In Summary, emission sources at the R. Weese facility that Triad Hunter is seeking to add to its Weese Station G70-A registration will include the following:

- One 0.3 MMBTU/Hr TEG Re-boiler **(NEW SOURCE)**
- One Enclosed Combustors managing low pressure vapors from storage tanks, truck loading and dehy flash gas (EXISTING SOURCE)
- Four Gas Processing Units (EXISTING SOURCES)
- Six Water and Condensate Mixture Tanks (EXISTING SOURCE)
- Fugitive Emissions – Facility Roadways (EXISTING SOURCE)
- Fugitive Emissions – Component Leaks **(NEW AND EXISTING SOURCE)**

Weese Station

In addition to the incorporation of equipment at the nearby R. Weese Production Facility, there will be two changes at the Weese Station. One of two compressor engines at Weese Station will also be replaced with a smaller unit. Secondly, the vapor recovery compression unit at Weese Station will be removed. Lastly, as the volume of condensate being managed at this facility has decreased significantly since issuance of the current permit, Triad Hunter is seeking approval for allowing non-certified trucks for condensate loading/transportation to customers. This requested change and associated emission calculations are presented herein.

Emission Units Table

WEESE STATION SOURCES

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device [4]
S1	1E	CAT 3516B Engine	2012	1380 HP.	EXISTING	1C (SCR)
S3A	3E	TEG Dehydration Reboiler (controlling still vent and flash tank)	2012	500 MBTU/Hr.	EXISTING	
S5	5E	CAT 3516B Engine	2015	1380 HP.	**REM**	2C(SCR)
S5A	5E-A	Cummins GTA855 Engine	Upon Receipt of Permit	225	**NEW**	4C(NSCR)
S6-1 to S6-3	6E-1 to 6E-3	Enclosed Vapor Combustors (COMM 200)	2014	7.7 MMBTU/Hr Each	EXISTING	N/A
HTR-1	7E	GPU Heater Pride of the Hills	2012	1.0 MMBTU/Hr	EXISTING	None
HTR-2	8E	GPU Heater Pride of the Hills	2012	1.0 MMBTU/Hr	EXISTING	None
HTR-3	9E	GPU Heater Pride of the Hills	2012	1.0 MMBTU/Hr	EXISTING	None
HTR-4	10E	GPU Heater Pride of the Hills	2014	1.0 MMBTU/Hr	EXISTING	None
HTR-5	11E	GPU Heater Pride of the Hills	2014	1.0 MMBTU/Hr	EXISTING	None
S6	12E	Flash Compressor Engine GasJack GJ230	2014	46 Hp	**REM**	3C
T01-T03	---	Produced Water Tanks	2012	3@ 400 BBL/each	EXISTING	VCU-1 to VCU-3
T04-T06	---	Condensate Tanks	2012	3@ 400 BBL/each	EXISTING	VCU-1 to VCU-3
---	---	Truck Loading (Condensate +Water)		9.8 Million Gallons/Yr	EXISTING	VCU-1 to VCU-3
---	---	Haul Roads	2014	3 Trucks Per Day	EXISTING	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Emission Units Table

R.WEESE SOURCES

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device [4]
1S (GPU-1)	1E	Marcellus GPU Heater	2011	0.75 MMBTU/Hr.	EXISTING	None
1S (GPU-2)	1E	Marcellus GPU Heater	2011	0.75 MMBTU/Hr.	EXISTING	None
1S (GPU-3)	1E	Marcellus GPU Heater	2011	0.75 MMBTU/Hr.	EXISTING	None
1S (GPU-4)	1E	Marcellus GPU Heater	2011	0.50 MMBTU/Hr.	EXISTING	None
2S	2E	Dehydration Unit Re-Boiler	2015	300 MBTU/Hr	**NEW**	None
3S	3E	Dehy Still Vent (Un-captured/Un-controlled)	2015	3 MMSCFD	**NEW**	None
4S	4E	Dehy Flash Tank	2015	3 MMSCFD	**NEW**	VCU-1
VCU-1	4E	Enclosed Combustor	2014	2.39 MMBTU/Hr	EXISTING	N/A
TL-1	4E	Truck Loading (Condensate)	2011	154,800 Gallons/Yr.	EXISTING	VCU-1
T01-T04	4E	Produced Water with Condensate Tanks	2011	4@400 BBL each	EXISTING	VCU-1
T05 - T06	4E	Produced Water with Condensate Tank	2010	210 BBL	EXISTING	VCU-1
TL-2	5E	Truck Loading (Water)	2011	908,000 Gallons/Yr.	EXISTING	None
---	---	Fugitive VOC Emissions – Fittings and Connections	2014	N/A	EXISTING +NEW	None
---	---	Haul Roads	2014	2 Trucks per day max.	EXISTING	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT C

Description of Fugitive Emissions

Triad Hunter, LLC Corporation
Weese Station
Attachment C – Fugitive Emissions Data

Equipment Fugitive Emissions

As noted in the Project Description, Triad Hunter is seeking approval to replace a single compressor driver engine and associated compressor at the existing Everett Weese Station. This exchange will not materially change the number of various valves, flanges, threaded fittings, etc. at the station. The previous potential emission rate of 3.2 tpy of VOCs and 209 tpy CO_2e remains appropriate.

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

Truck Loading Estimates

Estimates of potential VOC emissions from truck loading of condensate and produced water are presented in the calculations in Attachment I and summarized on the table at the end of this Attachment. Calculations were completed using methodology presented in AP-42.

Pigging Emission Estimates

There will be no pig launching or receiving at this facility.

Facility Blowdown Emission Estimates

The gas compressors associated with the existing CAT 3516 and the new Cummins GTA855 at Weese Station (there are no compressors at R. Weese Production Facility) will require routine blowdowns to allow for routine maintenance. The volume of natural gas released per blowdown event from the remaining compressor associated with the CAT 3515B driver has been revised to better reflect associated piping that will also be vented during a blowdown event. It is estimated at approximately 6,523 cubic feet of gas at STP (see attached sheet from vendor). The compressor associated with the planned Cummins driver engine will be 379 cubic feet of gas at STP. There will be a maximum of 90 blow downs per compressor per year. Thus, there is a potential for 621,180 cubic feet (6,902 x 90) or cubic feet of gas emitted from blow downs from the gas compressors.

The density of this gas at STP is 0.056lb/cf (see the Inlet Gas spreadsheet in the calculations). Thus, the amount of gas emitted from residue compressor blowdowns is 34,786 lb/year (621,180 x 0.056). As the percentage of VOCs in the gas (by weight) is 16.3 percent (see Inlet Gas spreadsheet in the calculations), the VOC (non-methane/non-ethane) emissions from compressor blowdowns is estimated at approximately 5,670 lbs per year or 2.84 tpy.

As the methane concentration in the gas is 63.2 % (by weight), methane emissions from the compressors will be 21,984 pounds (34,786 x 0.632) per year. Using a GHG factor of 25, methane emissions from blow downs in CO_{2e} will be 274.8 tons CO_{2e} (21,984 x 25[GHG factor] /2000).

Storage Tank and Haul Road Fugitive Emissions

Water and condensate received by this facility will be accumulated in tanks prior to off-site shipment In addition to flash, working and breathing losses from these tanks (presented in Attachment I), there will be emissions associated with the loading of the condensate tanks and fugitive dust emissions from the tank trucks entering and exiting the site.

Emissions from these sources are summarized in the attached form and the calculations are presented in Attachment I.

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants [-] Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads	PM	10.86	2.41	10.86	2.41	EE
Storage Pile Emissions						
Loading/Unloading Operations **(Uncaptured Emissions Only)**	VOCs	185.8	5.16	55.7	1.58	EE
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	Inlet Natural Gas(VOCs)	0.74	3.2	0.74	3.2	EE
General Clean-up VOC Emissions						
Other: **Blowdowns**	Inlet Natural Gas(VOCs)	N/A	2.84	N/A	2.84	EE

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.
[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

Triad Hunter, LLC Corporation
R. Weese Production Facility
Attachment C – Fugitive Emissions Data

Equipment Fugitive Emissions

As noted in the process description, Triad Hunter plans to install various additional equipment at its R. Weese Production Facility. This equipment, along with existing equipment will contain a variety of piping containing natural gas and separated liquids under pressure. During the normal course of operation minor leaks from valves, pressure release devices and various fittings associated with this piping may occur. The number of valves, flanges, etc. has been estimated to reflect the equipment that will be present after completion of expansion under this permit. A potential emission rate of 1.46 tpy of VOCs and 31.8 tpy CO_2e has been estimated.

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

Truck Loading Estimates

Estimates of potential VOC emissions from truck loading of condensate and produced water are presented in the calculations (Attachment I) and summarized on the table in the fugitive emissions form. Calculations were completed using methodology presented in AP-42.

Pigging Emission Estimates

There will be no pig launching or receiving at this facility.

Facility Blowdown Emission Estimates

As there are no engines present or planned for this facility, there are no blowdown emissions.

Storage Tank and Haul Road Fugitive Emissions

Water and condensate received by this facility will be accumulated in tanks prior to off-site shipment In addition to flash, working and breathing losses from these tanks (presented in Attachment I), there will be emissions associated with the loading of the condensate tanks and fugitive dust emissions from the tank trucks entering and exiting the site. There will be a projected maximum of one condensate and two water truck trips per day.

Emissions from these sources are summarized in the attached form and the calculations are presented in Attachment I.

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads	PM	10.86	0.45	10.86	0.45	EE
Storage Pile Emissions						
Loading/Unloading Operations **(Uncaptured Emissions)**	VOCs	1.33	0.06	1.33	0.06	EE
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	Inlet Natural Gas(VOCs)	0.33	1.46	0.33	1.46	EE
General Clean-up VOC Emissions						
Other:	Inlet Natural Gas(VOCs)					EE

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.
[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

3516B, 2-Stage (Note: assumed ideal gas behavior and used OD for volume calc)

ENTER the following Values:	Suspection Pressure, psig	180	Suction Temperature, F	55
	Discharge Pressure, psig	900	Discharge Temperature, F	120

Cylinders	Bore, in	Stroke, in	Rod Diameter, in	Pocket Clearance, in^3	Total Cylinder Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles	section volumes FT3 @ STP
1st Stage Cylinder	9.13	4.50	2.00	0.00	280	514	500	0.02	6
1st Stage Cylinder	9.13	4.50	2.00	0.00	280	514	890	0.03	10
2nd Stage Cylinder	6.00	4.50	2.00	0.00	113	739	890	0.01	3
2nd Stage Cylinder	6.00	4.50	2.00	0.00	113	739	900	0.01	3
Scrubbers/Suction & Discharge Drums	OD, in	Height/Length, in	Total Volume, in^3			Temperature, R	Pressure, psig	Calculated Moles	
1st Stage Scrubber	30.00	68.00	48066			514	180	0.98	378
1st Stage Suction Drum	20.00	120.00	37699			514	180	0.77	296
1st Stage Discharge Drum	20.00	120.00	37699			739	890	2.49	958
2nd Stage Scrubber	30.00	68.00	48066			589	890	3.98	1532
2nd Stage Suction Drum	16.00	114.50	23022			589	890	1.91	734
2nd Stage Discharge Drum	16.00	114.50	23022			739	1440	2.44	940
Cooler Section	No. of Tubes	OD, in	Length, in	Total Tube Volume, in^3		Temperature, R	Pressure, psig	Calculated Moles	
1st Stage Cooler Section	137	0.63	288	12299		739	890	0.81	312
2nd Stage Cooler Section	170	0.63	288	15262		739	1440	1.62	623
Piping	OD, in	Length, in	Total Piping Volume, in^3			Temperature, R	Pressure, psig	Calculated Moles	
1st Stage Piping	8.00	114	5730			739	500	0.22	83
2nd Stage Piping	6.00	492	13911			739	1100	1.13	435
piping after Cooler	6.00	60	1696			739	1440	0.18	69
Bypass	4.00	348	4373			589	900	0.37	141
Total Estimated Moles of Gas Discharged to Atmosphere per Blowdown =								16.96	
Total Estimated Volume of Blowdown Gas, ft^3 @ STP (68F, 14.7 psia) =								6523	6523

piping and cylinders and scrubber stage 1 cooler section stage 1

74179.15728	59.5672634 lbs/mcf	24.4608 VOC	95.04184509
100			
29.88721779	1245.300741		

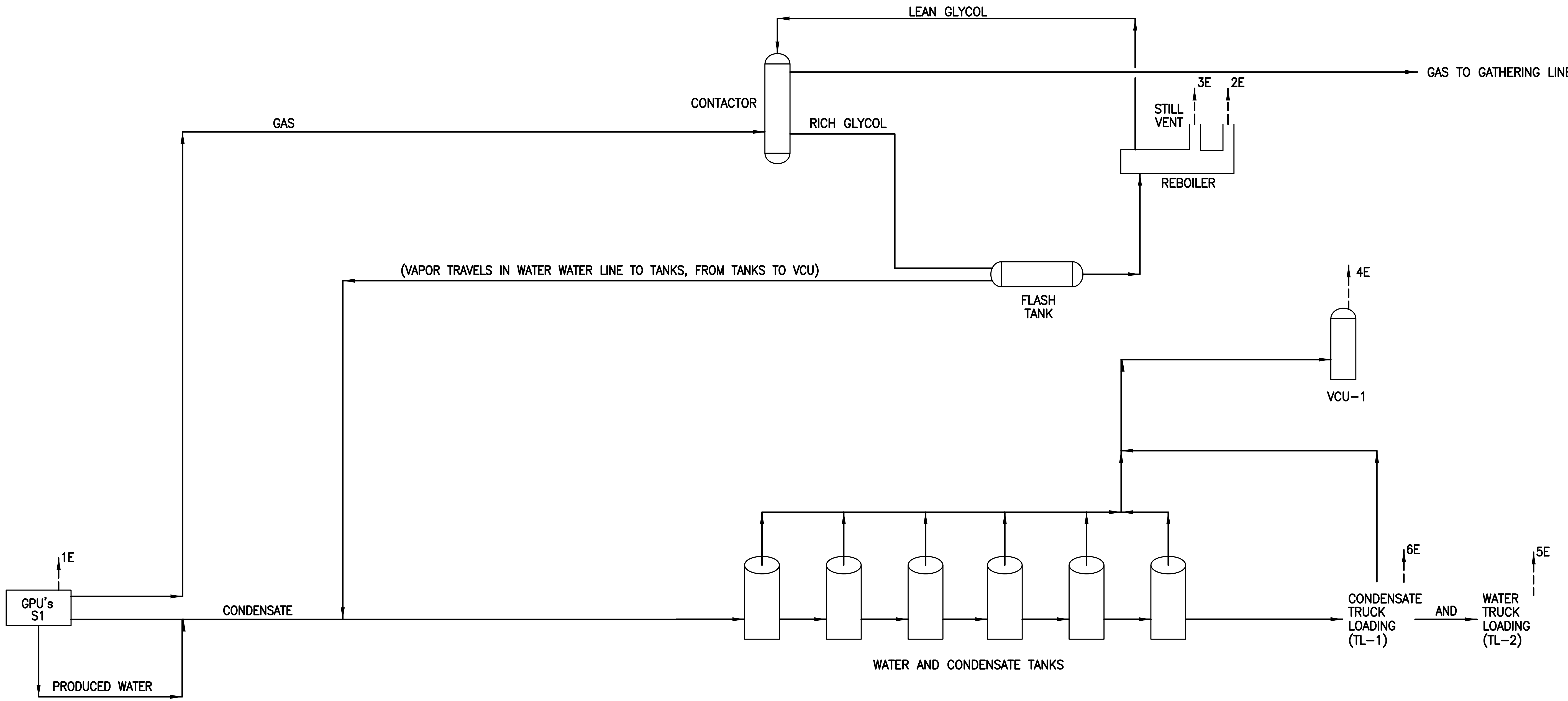
Ryan- I ran several cases on the 225HP blowdown volumes; conservatively I would estimate closer to 380 SCF. We'll follow with unit identification and pricing ASAP.

Temperature, R	Pressure, psig	Calculated Moles
539	255	0.004
739	510	0.003
739	900	0.002
Temperature, R	**Pressure, psig**	**Calculated Moles**
539	135	0.082
589	255	0.123
589	510	0.118
Temperature, R	**Pressure, psig**	**Calculated Moles**
739	255	0.024
739	510	0.047
739	900	0.081
Temperature, R	**Pressure, psig**	**Calculated Moles**
739	255	0.107
739	510	0.208
739	900	0.040
589	900	0.146
	Total Estimated Moles of Gas Discharged to Atmosphere per Blowdown =	0.98
	Total Estimated Volume of Blowdown Gas, ft^3 @ STP (68F, 14.7 psia) =	379

Matt Smith
USA Compression *Applications Sr.Engineer*
Cell: 724.531.7150 (call>text>voicemail

ATTACHMENT D

Process Flow Diagram



LEGEND:

AIR EMISSIONS

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DATE	9/18/15
CHECKED BY	RAD
SET JOB NO.	213096-04
SET DWG FILE	R. WEESE PROD FAC FDb01.dwg
DRAWING SCALE	N.T.S.

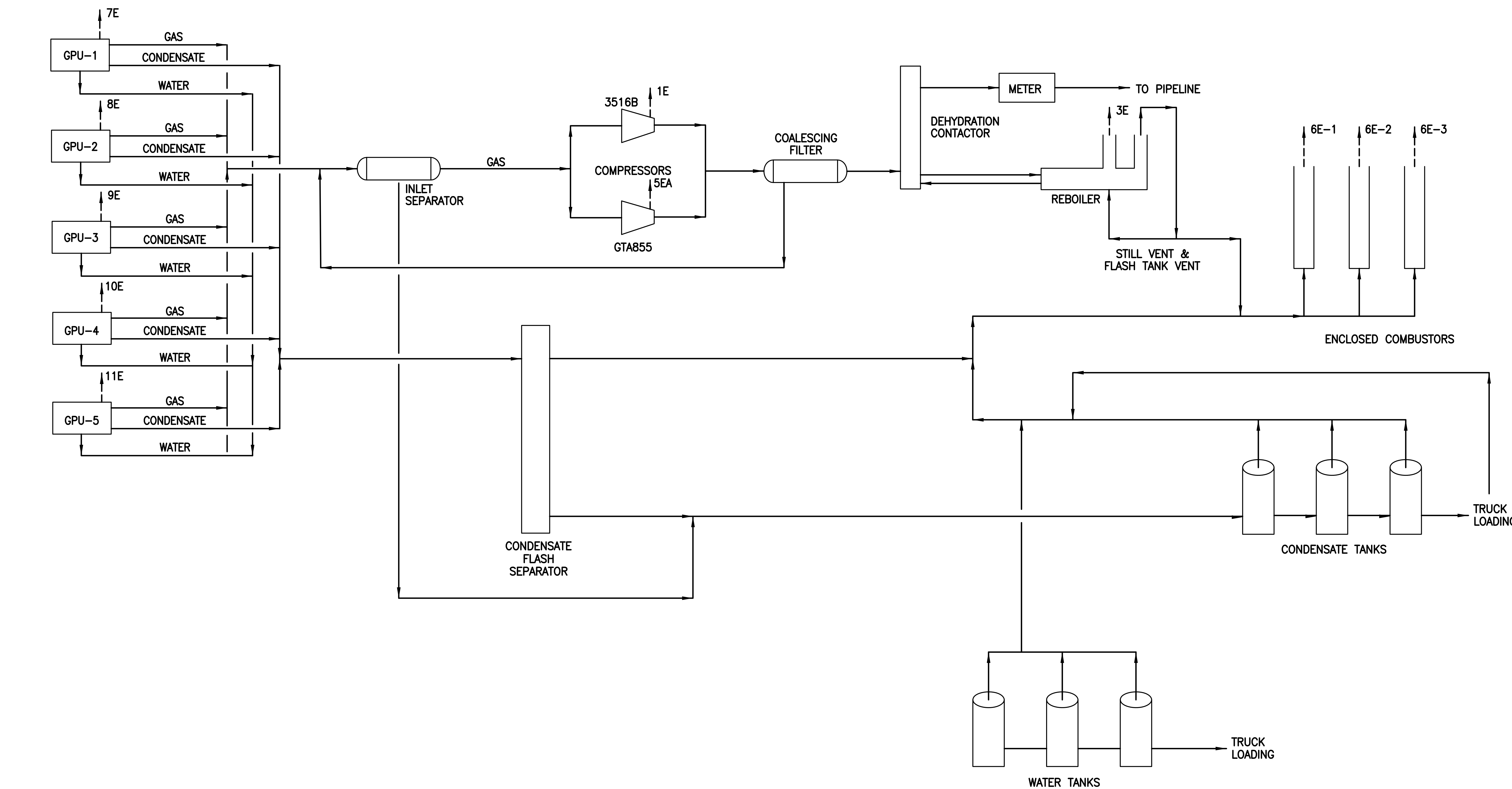
SE TECHNOLOGIES
98 Vanadium Road Bridgeville, PA 15017 (412) 221-1100

TRIAD HUNTER, LLC

R. WEESE PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
PROCESS FLOW DIAGRAM

DRAWING NAME: FIGURE 3
REV. 0

Plot: env045 11/06/2015 11:38 G:\TRIAD HUNTER\213096\R. WEESE PROD FAC FDb01.dwg



LEGEND:

AIR EMISSIONS

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DATE	7/14/14
CHECKED BY	RAD
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DRAWING SCALE	N.T.S.

TECHNOLOGIES
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TRIAD HUNTER

EVERETT WEESE PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
PROCESS FLOW DIAGRAM

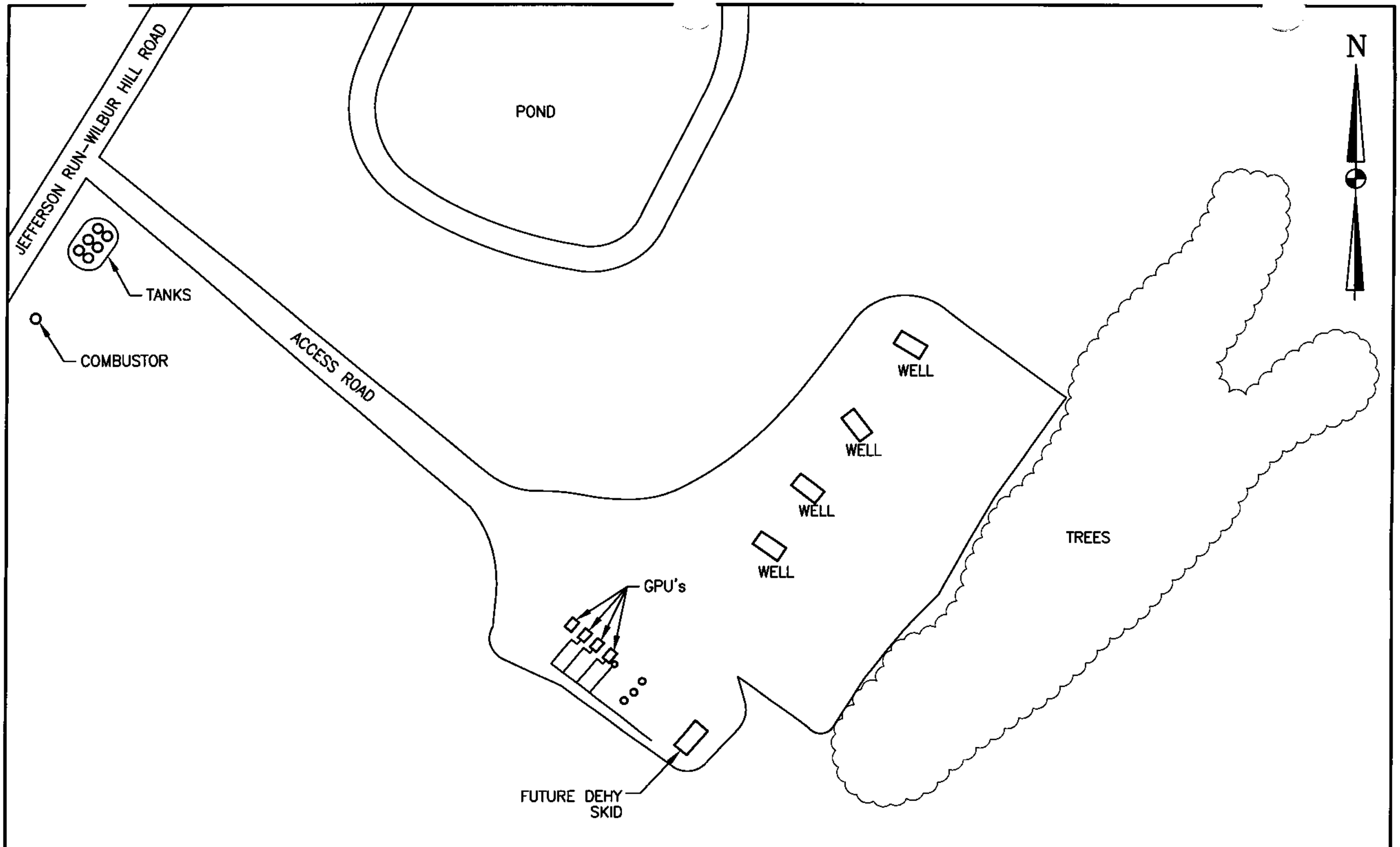
DRAWING NAME: FIGURE 2

REV. 1

Plot: env045 11/06/2015 11:40 G:\TRIAD HUNTER\214074\EVERETT WEESE PROD FACILITY FDb01.dwg

ATTACHMENT E

Plot Plan



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DRAWING SCALE	N.T.S.

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TRIAD HUNTER

R. WEESE PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
SITE LAYOUT

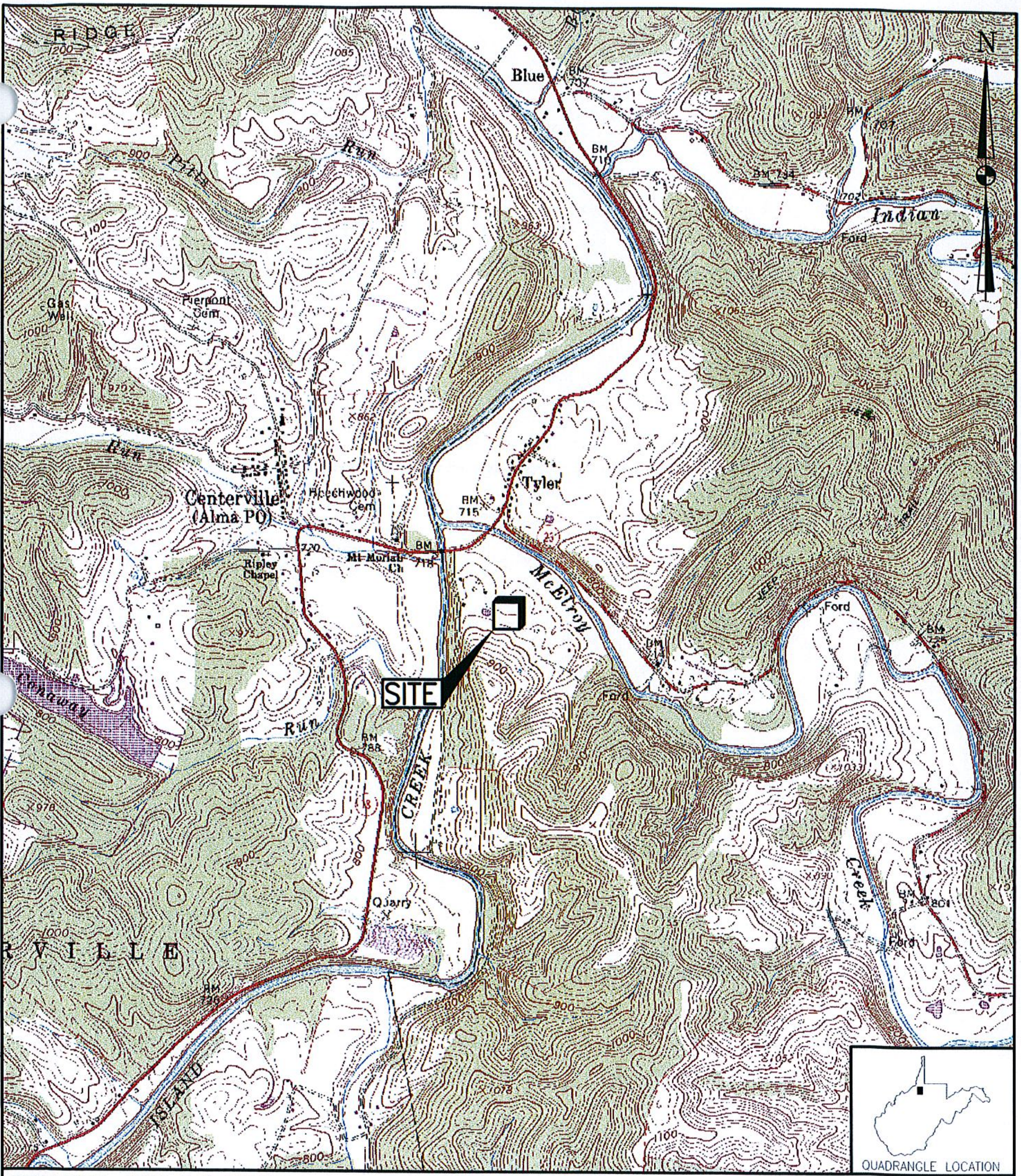
DRAWING NAME: FIGURE 2

REV. 0

Plot: env045 09/25/2015 13:56 G:\TRIAD HUNTER\213096\R WEESE PROD FACa01.dwg

ATTACHMENT F

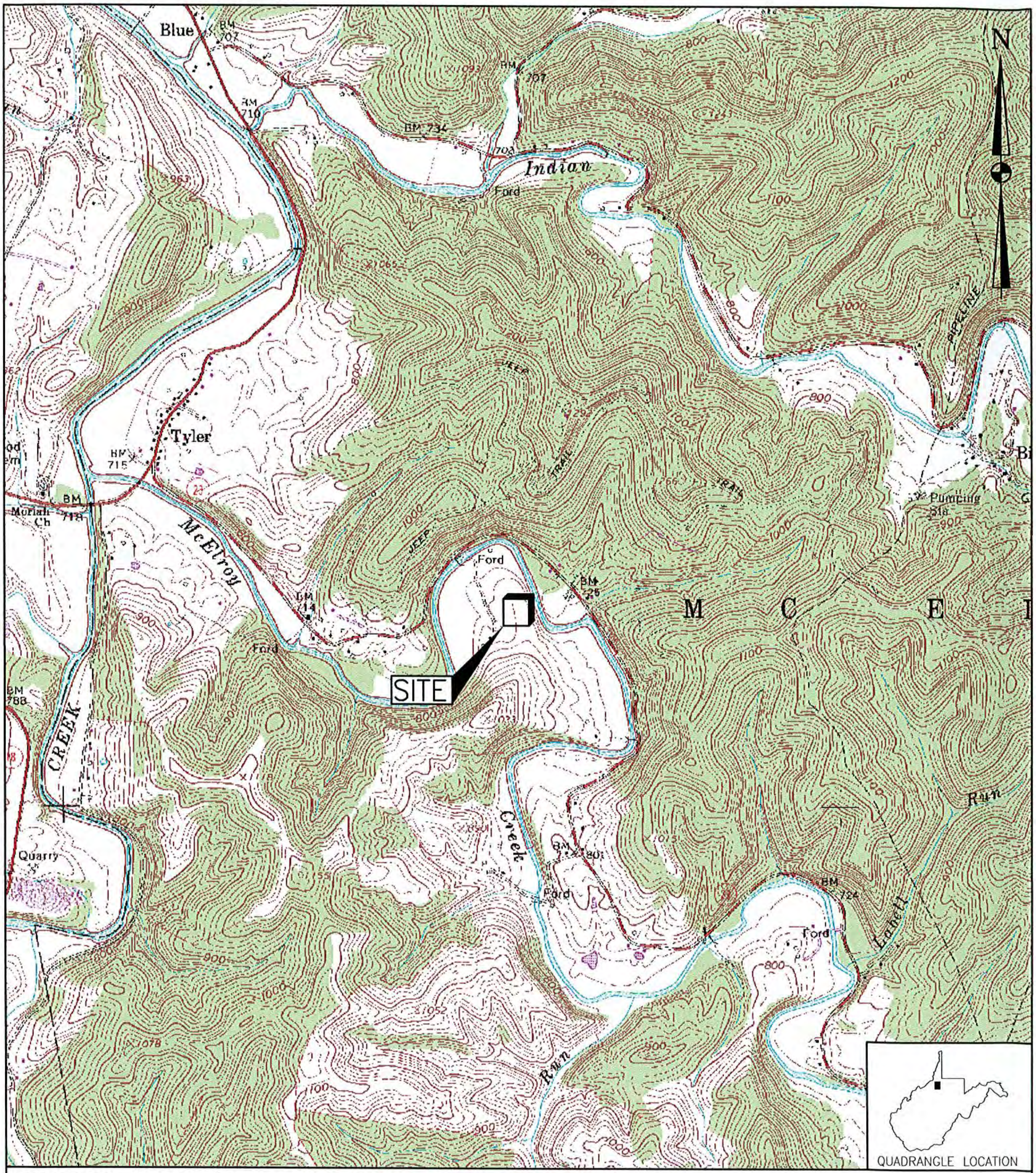
Area Map



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

DRAWN BY: DJF	SE TECHNOLOGIES	TRIAD HUNTER	
DATE: 9/21/15		R. WEESE PRODUCTION FACILITY TYLER COUNTY, WEST VIRGINIA SITE LOCATION MAP	
CHECKED BY: RAD			
SET JOB NO.: 213096-04			
SET DWG FILE: R. WEESE PROD FACm01.dwg		DRAWING NO.: FIGURE 1	REV.: 0
DRAWING SCALE: 1"=2000'	98 Vanadium Road Bridgeville, PA 15017 (412) 221-1100		

Plot: env045 09/21/2015 12:18 G:\TRIAD HUNTER\213096\R WEESE PROD FACm01.dwg



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

DRAWN BY	DJF
DATE	7/14/14
CHECKED BY	RAD
SET JOB NO.	214079
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DRAWING SCALE	1"=2000'

SE TECHNOLOGIES

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

TRIAD HUNTER

EVERETT WEESE PRODUCTION FACILITY
TYLER COUNTY, WEST VIRGINIA
SITE LOCATION MAP

DRAWING NO. FIGURE 1

REV. 0

Plot: env045 07/14/2014 14:04 G:\TRIAD HUNTER\214074\EVERETT WEESEm01.dwg

ATTACHMENT G

Equipment Data Sheets and Registration Section Applicability Form

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

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

Section 5	Natural Gas Well Affected Facility	☒
Section 6	Storage Vessels*	☒
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	☒
Section 8	Pneumatic Controllers Affected Facility(NSPS, Subpart OOOO)	☐
Section 9	*Reserved*	☐
Section 10	Natural gas-fired Compressor Engine(s) (RICE)**	☒
Section 11	Tank Truck Loading Facility ***	☒
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	☐
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	☒
Section 14	Control Devices not subject to NSPS, Subpart OOOO	☒
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	☐
Section 16	Glycol Dehydration Units	☒
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	☒
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	☐
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	☐

* *Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.*

** *Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.*

*** *Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.*

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET
R. Weese Production Facility

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

Please provide the API number(s) for each NG well at this facility:	
API #47-095-02004	
API #47-095-02005	
API #47-095-02019	
API #47-095-02027	

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

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

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

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET
R. Weese Production Facility

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
2S	2E	Exterran	2015	NEW	None	0.300	1243
GPU-1	1E	Natco	2011	Existing	None	0.75	1243
GPU-2	1E	Natco	2011	Existing	None	0.75	1243
GPU-3	8E	Natco	2011	Existing	None	0.75	1243
GPU-4	9E	Natco	2011	Existing	None	0.50	1243

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

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

3 New, modification, removal

4 Complete appropriate air pollution control device sheet for any control device.

5 Enter design heat input capacity in mmBtu/hr.

6 Enter the fuel heating value in Btu/standard cubic foot.

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		S1		S5		S6	
Engine Manufacturer and Model		Caterpillar 3516B		Caterpillar 3516B		GasJack GJ230	
Manufacturer's Rated bhp/rpm		1380/1400		1380/1400		46/2000F	
Source Status[2]		ES		**RS**		**RS**	
Date Installed/Modified/Removed[3]		Approx. Nov. 1, 2012		1/11/2015		2014	
Engine Manufactured/Reconstruction Date[4]		After Jan 01,2010		After Jan 01,2010		After Jan 01, 2010	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No		No		No	
Engine, Fuel and Combustion Data	Engine Type[6]	LB4S		LB4S		RB4S	
	APCD Type[7]	A/F +SCR		A/F +SCR		NSCR	
	Fuel Type[8]	RG		RG		RG	
	H_2S (gr/100 scf)	<1		<1		,1	
	Operating bhp/rpm	1380/1400		1380/1400		46/2000	
	BSFC (Btu/bhp-hr)	8321		8321		10,777	
	Fuel throughput (ft^3/hr)	10,198		10,198		444	
	Fuel throughput ($MMft^3$/yr)	89.33		89.33		3.89	
	Operation (hrs/yr)	8760		8760		8760	
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	1.52	6.66	1.52	6.66	0.20	0.89
MD	CO	4.41	19.32	4.41	19.32	0.41	1.78
MD	VOC	1.22	5.33	1.22	5.33	0.10	0.44
AP	SO_2	0.006	0.03	0.006	0.03	<0.01	<0.01
AP	PM_{10}	0.103	0.45	0.103	0.45	0.01	0.04
MD	Formaldehyde	0.75	3.28	0.75	3.28	0.02	0.11
AP	Total HAPs	0.89	3.91	0.89	3.91	0.03	0.13
AP	CO_2e	1,749	7,762	1,749	7,762	64	280

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		S5A					
Engine Manufacturer and Model		Cummins GTA 855					
Manufacturer's Rated bhp/rpm		225/1800					
Source Status[2]		**NS**					
Date Installed/Modified/Removed[3]		Upon Receipt of Permit					
Engine Manufactured/Reconstruction Date[4]		12/01/2007					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No					
Engine, Fuel and Combustion Data	Engine Type[6]	RB4S					
	APCD Type[7]	NSCR					
	Fuel Type[8]	RG					
	H_2S (gr/100 scf)	<1					
	Operating bhp/rpm	225/1800					
	BSFC (Btu/bhp-hr)	9420					
	Fuel throughput (ft^3/hr)	1726					
	Fuel throughput ($MMft^3$/yr)	15.12					
	Operation (hrs/yr)	8760					
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	1.50	6.56				
MD	CO	0.72	3.15				
MD	VOC	0.15	0.65				
AP	SO_2	<0.01	<0.01				
AP	PM_{10}	0.41	0.18				
MD	Formaldehyde	0.05	0.22				
AP	Total HAPs	0.07	0.32				
AP	CO_2e	261	1145				

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

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

4. Enter the date that the engine was manufactured, modified or reconstructed.

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

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

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

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

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

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

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas

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

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

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

GLYCOL DEHYDRATION EMISSION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		Exterran	
		Max Dry Gas Flow Rate (mmscf/day)		3 MMSCFD	
		Design Heat Input (mmBtu/hr)		300 MBTU/Hr (re-boiler)	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		NEW	
		Date Installed/Modified/Removed[3]		Upon receipt of Permit	
		Regenerator Still Vent APCD[4]		NA	
		Control Device ID[4]		TO (VCU-1)	
		Fuel HV (Btu/scf)		1243 (HHV)	
		H_2S Content (gr/100 scf)		<0.001%	
		Operation (hrs/yr)		8760	
Emission Unit ID/ Emission Point ID[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
2S/2E	Re-boiler Vent	AP-42	NO_X	0.020	0.088
		AP-42	CO	0.017	0.074
		AP-42	VOC	<0.01	<0.01
		AP-42	SO_2	<0.01	<0.01
		AP-42	PM_{10}	<0.01	0.01
3S/3E	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	1.228	5.380
		GRI-GLYCalc™	Benzene	0.039	0.170
		GRI-GLYCalc™	Ethylbenzene	<0.01	<0.01
		GRI-GLYCalc™	Toluene	0.187	0.820
		GRI-GLYCalc™	Xylenes	0.195	0.855
		GRI-GLYCalc™	n-Hexane	0.024	0.106

1. Enter the appropriate Emission Unit ID Numbers and Emission Point ID Numbers for the glycol dehydration unit reboiler vent and glycol regenerator still vent. The glycol dehydration unit reboiler vent and glycol regenerator still vent should be designated RBV-1 and RSV-1, respectively. If the compressor station incorporates multiple glycol dehydration units, a *Glycol Dehydration Emission 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 and the control device ID number:

NA	None	CD	Condenser
FL	Flare	CC	Condenser/Combustion Combination
TO	Thermal Oxidizer		

5. Enter the Potential Emissions Data Reference designation using the following codes:

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

6. Enter the Reboiler Vent and Glycol Regenerator Still Vent Potential to Emit (PTE) for the listed regulated pollutants in lbs per hour and tons per year. The Glycol Regenerator Still Vent potential emissions may be determined using the most recent version of the thermodynamic software model GRI-GLYCalc™ (Radian International LLC & Gas Research Institute). Attach all referenced Potential Emissions Data (or calculations) and the GRI-GLYCalc *Aggregate Calculations Report* to this *Glycol Dehydration Emission Unit Data Sheet(s)*. This PTE data shall be incorporated in the *Emissions Summary Sheet*.

Include a copy of the GRI-GLYCalc™ analysis. This includes a printout of the aggregate calculations report, which shall include emissions reports, equipment reports, and stream reports.

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **R. Weese Tank Farm**	2. Tank Name **T01-T04**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 4E**	4. Emission Point ID number **4E**
5. Date Installed or Modified *(for existing tanks)* **December 2010**	6. Type of change: ☐ New construction ☐ New stored material ☒ Other
7A. Description of Tank Modification *(if applicable)* **No modification. Existing Tank**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 908,000 gallons of produced water per year for Tanks T01 through T06 combined.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. **400 BBL**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.)**20**
10A. Maximum Liquid Height (ft.)**19**	10B. Average Liquid Height (ft.) **12**
11A. Maximum Vapor Space Height (ft.) **19.5**	11B. Average Vapor Space Height (ft.) **8**
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume. **320 BBL**	
13A. Maximum annual throughput (gal/yr) **200,660/tank**	13B. Maximum daily throughput (gal/day) **1500**
14. Number of tank turnovers per year **12(max)**	15. Maximum tank fill rate (gal/min) **6**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof __X_ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐	Refer to enclosed TANKS Summary Sheets
☒	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Rupture Disc (psig)
☐ Carbon Adsorption[1]
☐ Inert Gas Blanket of _____________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Conservation Vent (psig
Vacuum Setting Pressure Setting
☐ Other[1] (describe)
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
VOCs							0.07	0.31	Promax Model
(Un-controlled)									Stream 145 attached
Individual constituents									In Calculations
In provided Promax									
Output for Stream 415									
Tanks T01-T06 Combined									Tanks Emissions
Emissions									Controlled 98%

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

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

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:
☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color: **Blue**	20B. Roof Color: **Blue**	20C. Year Last Painted: **2011**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig): **Less than 0.3 psig**

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

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

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): **70**	34A. Minimum (°F): **Promax Model based on steady state**		34B. Maximum (°F)**: Promax Model based on steady state**
35. Avg. operating pressure range of tank (psig): **0-0.3 psig**	35A. Minimum (psig): **0 psig**		35B. Maximum (psig): **0.3 psig**
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			

39A. Material name and composition:	**Produced Water**		
39B. CAS number:	N/A		
39C. Liquid density (lb/gal):	**8.33**		
39D. Liquid molecular weight (lb/lb-mole):	**19.78**		
39E. Vapor molecular weight (lb/lb-mole):	**19.78**		
39F. Maximum true vapor pressure (psia):	**5.066**		
39G. Maxim Reid vapor pressure (psia):	**1.033**		
39H. Months Storage per year. From: To:	**Continuous**		

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **R. Weese Tank Farm**	2. Tank Name **T05 and T06**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 4E**	4. Emission Point ID number **4E**
5. Date Installed or Modified *(for existing tanks)* **December 2010**	6. Type of change: ☐ New construction ☐ New stored material ☒ Other
7A. Description of Tank Modification *(if applicable)* **No modification. Existing Tank**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 908,000 gallons of produced water per year for Tanks T01 through T06 combined.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **210 BBL**	
9A. Tank Internal Diameter (ft.) **10**	9B. Tank Internal Height (ft.)**15**
10A. Maximum Liquid Height (ft.)**9**	10B. Average Liquid Height (ft.) **8**
11A. Maximum Vapor Space Height (ft.) **8**	11B. Average Vapor Space Height (ft.) **7**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. **190 BBL**	
13A. Maximum annual throughput (gal/yr) **105,360/tank**	13B. Maximum daily throughput (gal/day) **500**
14. Number of tank turnovers per year **12(max)**	15. Maximum tank fill rate (gal/min) **6**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof __X_ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐	Refer to enclosed TANKS Summary Sheets
☒	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Carbon Adsorption[1] ☐ Inert Gas Blanket of _____________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1] ☐ Conservation Vent (psig
☐ Other[1] (describe) Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
VOCs							0.07	0.31	Promax Model
(Un-controlled)									Stream 145 attached
Individual constituents									In Calculations
In provided Promax									
Output for Stream 415									
Tanks T01-T63 Combined									Tanks Emissions
Emissions									Controlled 98%

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:
☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color: **Blue**	20B. Roof Color: **Blue**	20C. Year Last Painted: **2011**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig): **Less than 0.3 psig**

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

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

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): **70**	34A. Minimum (°F): **Promax Model based on steady state**		34B. Maximum (°F)**: Promax Model based on steady state**
35. Avg. operating pressure range of tank (psig): **0-0.3 psig**	35A. Minimum (psig): **0 psig**		35B. Maximum (psig): **0.3 psig**
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			

39A. Material name and composition:	**Produced Water**		
39B. CAS number:	N/A		
39C. Liquid density (lb/gal):	**8.33**		
39D. Liquid molecular weight (lb/lb-mole):	**19.78**		
39E. Vapor molecular weight (lb/lb-mole):	**19.78**		
39F. Maximum true vapor pressure (psia):	**5.066**		
39G. Maxim Reid vapor pressure (psia):	**1.033**		
39H. Months Storage per year. From: To:	**Continuous**		

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **R. Weese Tank Farm**	2. Tank Name **T01-T04**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 4E**	4. Emission Point ID number **4E**
5. Date Installed or Modified *(for existing tanks)* **December 2010**	6. Type of change: ☐ New construction ☐ New stored material ☒ Other
7A. Description of Tank Modification *(if applicable)* **No modification. Existing Tank**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 154,800 gallons of condensate per year for Tanks T01 through T06 combined.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. **400 BBL**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.)**20**
10A. Maximum Liquid Height (ft.)**19**	10B. Average Liquid Height (ft.) **12**
11A. Maximum Vapor Space Height (ft.) **19.5**	11B. Average Vapor Space Height (ft.) **8**
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. **320 BBL**	
13A. Maximum annual throughput (gal/yr) **62,000/tank**	13B. Maximum daily throughput (gal/day) **300**
14. Number of tank turnovers per year **5(max)**	15. Maximum tank fill rate (gal/min) **6**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof __X_ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐	Refer to enclosed TANKS Summary Sheets
☒	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Carbon Adsorption[1] ☐ Inert Gas Blanket of _____________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1] ☐ Conservation Vent (psig
☐ Other[1] (describe) Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
VOCs							12.43	54.4	Promax Model
(Un-controlled)									Stream 144 attached
Individual constituents									In Calculations
In provided Promax									
Output for Stream 144									
Tanks T01-T06 Combined									Tanks Emissions
Emissions									Controlled 98%

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:
☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color: **Blue**	20B. Roof Color: **Blue**	20C. Year Last Painted: **2011**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig): **Less than 0.3 psig**

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

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

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No			
25F. Describe deck fittings:			
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply			
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): **70**	34A. Minimum (°F): **Promax Model based on steady state**		34B. Maximum (°F)**: Promax Model based on steady state**
35. Avg. operating pressure range of tank (psig): **0-0.3 psig**	35A. Minimum (psig): **0 psig**		35B. Maximum (psig): **0.3 psig**
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			

39A. Material name and composition:	**Condensate**		
39B. CAS number:	N/A		
39C. Liquid density (lb/gal):	**5.76**		
39D. Liquid molecular weight (lb/lb-mole):	**98.49**		
39E. Vapor molecular weight (lb/lb-mole):	**36.66**		
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):	**11.14**		
39H. Months Storage per year. From: To:	**Continuous**		

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **R. Weese Tank Farm**	2. Tank Name **T05 and T06**
3. Emission Unit ID number **N/A Vapors to combustors, emission point 4E**	4. Emission Point ID number **4E**
5. Date Installed or Modified *(for existing tanks)* **December 2010**	6. Type of change: ☐ New construction ☐ New stored material ☒ Other
7A. Description of Tank Modification *(if applicable)* **No modification. Existing Tank**	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 154,800 gallons of condensate per year for Tanks T01 through T06 combined.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. **210 BBL**	
9A. Tank Internal Diameter (ft.) **12**	9B. Tank Internal Height (ft.)**15**
10A. Maximum Liquid Height (ft.)**19**	10B. Average Liquid Height (ft.) **8**
11A. Maximum Vapor Space Height (ft.) **19.5**	11B. Average Vapor Space Height (ft.) **7**
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume. **190 BBL**	
13A. Maximum annual throughput (gal/yr) **31,000/tank**	13B. Maximum daily throughput (gal/day) **300**
14. Number of tank turnovers per year **5(max)**	15. Maximum tank fill rate (gal/min) **6**
16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof __X_ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐	Refer to enclosed TANKS Summary Sheets
☒	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Rupture Disc (psig)
☐ Carbon Adsorption[1]
☐ Inert Gas Blanket of ______________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Conservation Vent (psig
☐ Other[1] (describe)
Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOCs							12.43	54.4	Promax Model
(Un-controlled)									Stream 144 attached
Individual constituents									In Calculations
In provided Promax									
Output for Stream 144									
Tanks T01-T06 Combined									Tanks Emissions
Emissions									Controlled 98%

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

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

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:
☒ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color: **Blue** | 20B. Roof Color: **Blue** | 20C. Year Last Painted: **2011**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

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

23. Operating Pressure Range (psig): **Less than 0.3 psig**

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

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

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No				
25F. Describe deck fittings:				
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply				
26A. Deck Type: ☐ Bolted ☐ Welded		26B. For bolted decks, provide deck construction:		
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)				
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:	
SITE INFORMATION:				
27. Provide the city and state on which the data in this section are based:				
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):		
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):		
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):		
LIQUID INFORMATION:				
34. Avg. daily temperature range of bulk liquid (°F): **70**	34A. Minimum (°F): **Promax Model based on steady state**		34B. Maximum (°F**): Promax Model based on steady state**	
35. Avg. operating pressure range of tank (psig): **0-0.3 psig**	35A. Minimum (psig): **0 psig**		35B. Maximum (psig): **0.3 psig**	
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):		
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):		
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):		
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.				
39A. Material name and composition:	**Condensate**			
39B. CAS number:	N/A			
39C. Liquid density (lb/gal):	**5.76**			
39D. Liquid molecular weight (lb/lb-mole):	**98.49**			
39E. Vapor molecular weight (lb/lb-mole):	**36.66**			
39F. Maximum true vapor pressure (psia):				
39G. Maxim Reid vapor pressure (psia):	**11.14**			
39H. Months Storage per year. From: To:	**Continuous**			

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Roger Weese
File Name: C:\Rogers_Files\Misc\Triad Hunter\Weese\R. Weese 2015\Roger Weese.ddf
Date: September 17, 2015

DESCRIPTION:

Description: 3 MMCFD Dehy
Flash Gas to Combustor

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 65.00 deg. F
Pressure: 420.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1710
Nitrogen	0.4460
Methane	79.1390
Ethane	13.5620
Propane	4.1280
Isobutane	0.5650
n-Butane	1.0180
Isopentane	0.2850
n-Pentane	0.2520
Cyclopentane	0.1390
n-Hexane	0.0870
Cyclohexane	0.0110
Heptanes	0.1090
Benzene	0.0020
Toluene	0.0050
Xylenes	0.0020
C8+ Heavies	0.0800

DRY GAS:

Flow Rate: 3.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

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

PUMP:

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

FLASH TANK:

```
      Flash Control: Vented to atmosphere
Temperature:       90.0 deg. F
   Pressure:       40.0 psig
```

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Roger Weese
File Name: C:\Rogers_Files\Misc\Triad Hunter\Weese\R. Weese 2015\Roger Weese.ddf
Date: September 17, 2015

DESCRIPTION:

Description: 3 MMCFD Dehy
Flash Gas to Combustor

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0160	0.384	0.0701
Ethane	0.0256	0.615	0.1123
Propane	0.0373	0.894	0.1632
Isobutane	0.0135	0.323	0.0590
n-Butane	0.0389	0.933	0.1703
Isopentane	0.0174	0.418	0.0764
n-Pentane	0.0229	0.550	0.1004
Cyclopentane	0.0837	2.008	0.3664
n-Hexane	0.0243	0.583	0.1064
Cyclohexane	0.0187	0.448	0.0818
Heptanes	0.0994	2.385	0.4353
Benzene	0.0389	0.934	0.1705
Toluene	0.1872	4.494	0.8201
Xylenes	0.1951	4.681	0.8544
C8+ Heavies	0.4510	10.823	1.9753
Total Emissions	1.2698	30.476	5.5618
Total Hydrocarbon Emissions	1.2698	30.476	5.5618
Total VOC Emissions	1.2282	29.477	5.3795
Total HAP Emissions	0.4455	10.692	1.9513
Total BTEX Emissions	0.4212	10.109	1.8450

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.1748	28.194	5.1454
Ethane	0.4840	11.617	2.1201
Propane	0.2758	6.619	1.2079
Isobutane	0.0605	1.453	0.2652
n-Butane	0.1273	3.055	0.5575
Isopentane	0.0465	1.116	0.2037
n-Pentane	0.0473	1.135	0.2071
Cyclopentane	0.0462	1.110	0.2025

n-Hexane	0.0252	0.605	0.1103
Cyclohexane	0.0051	0.123	0.0224
Heptanes	0.0459	1.103	0.2012
Benzene	0.0011	0.028	0.0050
Toluene	0.0032	0.078	0.0142
Xylenes	0.0011	0.028	0.0050
C8+ Heavies	0.0224	0.537	0.0981
Total Emissions	2.3666	56.798	10.3657
Total Hydrocarbon Emissions	2.3666	56.798	10.3657
Total VOC Emissions	0.7078	16.987	3.1002
Total HAP Emissions	0.0307	0.737	0.1346
Total BTEX Emissions	0.0055	0.133	0.0242

EQUIPMENT REPORTS:

ABSORBER

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

Calculated Absorber Stages:	1.25
Calculated Dry Gas Dew Point:	2.83 lbs. H2O/MMSCF
Temperature:	65.0 deg. F
Pressure:	420.0 psig
Dry Gas Flow Rate:	3.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.0031 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	38.32 lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio:	3.00 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.38%	92.62%
Carbon Dioxide	99.94%	0.06%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.97%	0.03%
Isobutane	99.96%	0.04%
n-Butane	99.94%	0.06%
Isopentane	99.93%	0.07%
n-Pentane	99.91%	0.09%
Cyclopentane	99.62%	0.38%
n-Hexane	99.82%	0.18%
Cyclohexane	99.25%	0.75%
Heptanes	99.62%	0.38%
Benzene	92.24%	7.76%

Toluene	87.47%	12.53%
Xylenes	71.97%	28.03%
C8+ Heavies	98.97%	1.03%

FLASH TANK

Flash Control: Vented to atmosphere
Flash Temperature: 90.0 deg. F
Flash Pressure: 40.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.95%	0.05%
Carbon Dioxide	17.81%	82.19%
Nitrogen	1.25%	98.75%
Methane	1.34%	98.66%
Ethane	5.03%	94.97%
Propane	11.90%	88.10%
Isobutane	18.21%	81.79%
n-Butane	23.40%	76.60%
Isopentane	27.53%	72.47%
n-Pentane	32.92%	67.08%
Cyclopentane	64.57%	35.43%
n-Hexane	49.30%	50.70%
Cyclohexane	79.19%	20.81%
Heptanes	68.53%	31.47%
Benzene	97.28%	2.72%
Toluene	98.44%	1.56%
Xylenes	99.49%	0.51%
C8+ Heavies	95.83%	4.17%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	27.12%	72.88%
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	1.34%	98.66%
n-Pentane	1.20%	98.80%
Cyclopentane	0.73%	99.27%
n-Hexane	0.89%	99.11%
Cyclohexane	3.91%	96.09%
Heptanes	0.68%	99.32%

Benzene	5.13%	94.87%
Toluene	8.02%	91.98%
Xylenes	12.98%	87.02%
C8+ Heavies	12.30%	87.70%

STREAM REPORTS:

WET GAS STREAM

Temperature: 65.00 deg. F
Pressure: 434.70 psia
Flow Rate: 1.25e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.07e-002	4.79e+000
Carbon Dioxide	1.71e-001	2.48e+001
Nitrogen	4.46e-001	4.12e+001
Methane	7.91e+001	4.18e+003
Ethane	1.36e+001	1.34e+003
Propane	4.12e+000	6.00e+002
Isobutane	5.65e-001	1.08e+002
n-Butane	1.02e+000	1.95e+002
Isopentane	2.85e-001	6.77e+001
n-Pentane	2.52e-001	5.99e+001
Cyclopentane	1.39e-001	3.21e+001
n-Hexane	8.69e-002	2.47e+001
Cyclohexane	1.10e-002	3.05e+000
Heptanes	1.09e-001	3.60e+001
Benzene	2.00e-003	5.15e-001
Toluene	5.00e-003	1.52e+000
Xylenes	2.00e-003	7.00e-001
C8+ Heavies	7.99e-002	4.49e+001
Total Components	100.00	6.77e+003

DRY GAS STREAM

Temperature: 65.00 deg. F
Pressure: 434.70 psia
Flow Rate: 1.25e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.96e-003	3.54e-001
Carbon Dioxide	1.71e-001	2.48e+001
Nitrogen	4.46e-001	4.12e+001
Methane	7.91e+001	4.18e+003
Ethane	1.36e+001	1.34e+003

Propane	4.13e+000	6.00e+002
Isobutane	5.65e-001	1.08e+002
n-Butane	1.02e+000	1.95e+002
Isopentane	2.85e-001	6.77e+001
n-Pentane	2.52e-001	5.98e+001
Cyclopentane	1.38e-001	3.20e+001
n-Hexane	8.69e-002	2.47e+001
Cyclohexane	1.09e-002	3.03e+000
Heptanes	1.09e-001	3.59e+001
Benzene	1.84e-003	4.75e-001
Toluene	4.37e-003	1.33e+000
Xylenes	1.44e-003	5.03e-001
C8+ Heavies	7.92e-002	4.44e+001
Total Components	100.00	6.76e+003

LEAN GLYCOL STREAM

Temperature: 65.00 deg. F
Flow Rate: 1.96e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.84e+001	1.08e+002
Water	1.50e+000	1.65e+000
Carbon Dioxide	1.38e-012	1.52e-012
Nitrogen	1.32e-013	1.45e-013
Methane	4.31e-018	4.75e-018
Ethane	7.40e-008	8.14e-008
Propane	6.01e-009	6.62e-009
Isobutane	1.28e-009	1.41e-009
n-Butane	2.64e-009	2.91e-009
Isopentane	2.14e-004	2.36e-004
n-Pentane	2.52e-004	2.77e-004
Cyclopentane	5.56e-004	6.12e-004
n-Hexane	1.98e-004	2.17e-004
Cyclohexane	6.91e-004	7.61e-004
Heptanes	6.22e-004	6.85e-004
Benzene	1.91e-003	2.10e-003
Toluene	1.48e-002	1.63e-002
Xylenes	2.64e-002	2.91e-002
C8+ Heavies	5.74e-002	6.32e-002
Total Components	100.00	1.10e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 65.00 deg. F
Pressure: 434.70 psia
Flow Rate: 2.12e-001 gpm
NOTE: Stream has more than one phase.

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

TEG	9.16e+001	1.08e+002
Water	5.16e+000	6.09e+000
Carbon Dioxide	1.81e-002	2.14e-002
Nitrogen	9.96e-003	1.18e-002
Methane	1.01e+000	1.19e+000
Ethane	4.31e-001	5.10e-001
Propane	2.65e-001	3.13e-001
Isobutane	6.26e-002	7.40e-002
n-Butane	1.41e-001	1.66e-001
Isopentane	5.43e-002	6.42e-002
n-Pentane	5.96e-002	7.05e-002
Cyclopentane	1.10e-001	1.30e-001
n-Hexane	4.21e-002	4.97e-002
Cyclohexane	2.08e-002	2.46e-002
Heptanes	1.24e-001	1.46e-001
Benzene	3.57e-002	4.22e-002
Toluene	1.75e-001	2.07e-001
Xylenes	1.91e-001	2.25e-001
C8+ Heavies	4.54e-001	5.37e-001
Total Components	100.00	1.18e+002

FLASH TANK OFF GAS STREAM

Temperature: 90.00 deg. F
Pressure: 54.70 psia
Flow Rate: 3.90e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.58e-001	2.93e-003
Carbon Dioxide	3.89e-001	1.76e-002
Nitrogen	4.04e-001	1.16e-002
Methane	7.13e+001	1.17e+000
Ethane	1.57e+001	4.84e-001
Propane	6.09e+000	2.76e-001
Isobutane	1.01e+000	6.05e-002
n-Butane	2.13e+000	1.27e-001
Isopentane	6.27e-001	4.65e-002
n-Pentane	6.38e-001	4.73e-002
Cyclopentane	6.42e-001	4.62e-002
n-Hexane	2.84e-001	2.52e-002
Cyclohexane	5.91e-002	5.11e-003
Heptanes	4.46e-001	4.59e-002
Benzene	1.43e-002	1.15e-003
Toluene	3.42e-002	3.23e-003
Xylenes	1.05e-002	1.15e-003
C8+ Heavies	1.28e-001	2.24e-002
Total Components	100.00	2.40e+000

VOC Mass Flow
= 0.714 lb/hr

FLASH TANK GLYCOL STREAM

Temperature: 90.00 deg. F
Flow Rate: 2.07e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.35e+001	1.08e+002
Water	5.26e+000	6.09e+000
Carbon Dioxide	3.29e-003	3.81e-003
Nitrogen	1.27e-004	1.47e-004
Methane	1.38e-002	1.60e-002
Ethane	2.21e-002	2.56e-002
Propane	3.22e-002	3.73e-002
Isobutane	1.16e-002	1.35e-002
n-Butane	3.36e-002	3.89e-002
Isopentane	1.53e-002	1.77e-002
n-Pentane	2.00e-002	2.32e-002
Cyclopentane	7.28e-002	8.43e-002
n-Hexane	2.12e-002	2.45e-002
Cyclohexane	1.68e-002	1.94e-002
Heptanes	8.64e-002	1.00e-001
Benzene	3.54e-002	4.10e-002
Toluene	1.76e-001	2.04e-001
Xylenes	1.94e-001	2.24e-001
C8+ Heavies	4.44e-001	5.14e-001
Total Components	100.00	1.16e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 9.88e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.46e+001	4.44e+000
Carbon Dioxide	3.32e-002	3.81e-003
Nitrogen	2.02e-003	1.47e-004
Methane	3.83e-001	1.60e-002
Ethane	3.27e-001	2.56e-002
Propane	3.24e-001	3.73e-002
Isobutane	8.90e-002	1.35e-002
n-Butane	2.57e-001	3.89e-002
Isopentane	9.28e-002	1.74e-002
n-Pentane	1.22e-001	2.29e-002
Cyclopentane	4.58e-001	8.37e-002
n-Hexane	1.08e-001	2.43e-002
Cyclohexane	8.52e-002	1.87e-002
Heptanes	3.81e-001	9.94e-002
Benzene	1.91e-001	3.89e-002
Toluene	7.80e-001	1.87e-001
Xylenes	7.05e-001	1.95e-001
C8+ Heavies	1.02e+000	4.51e-001

Total Components	100.00	5.71e+000

ATTACHMENT H

Air Pollution Control Device Sheets

MIRATECH

Proposal Number: MH-15-4553

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cumminns
Model Number:	GTA855
Power Output:	225 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	945 acfm (cfm)
Exhaust Temperature:	1250 F

System Details

Housing Model Number:	VXC-1610-05-HSG
Element Model Number:	VX-RE-10XC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	3.0 inches of WC (Clean)
Sound Attenuation:	28-32 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	VXC-1610-XC1
Material:	Carbon Steel
Inlet Pipe Size & Connection:	5 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	5 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	65 inches
Weight Without Catalyst:	191 lbs
Weight Including Catalyst:	205 lbs
Instrumentation Ports:	1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/bhp-hr)	Reduction (%)	Warranted Converter Ouputs (g/bhp-hr)	Requested Emissions Targets
NO_x*	12.1	75	3.02	75 Reduction %
CO	2.9	50	1.45	50 Reduction %
NMNEHC**	0.3	50	0.15	50 Reduction %
CH_2O	0.1			
PM_{10}	0.1			
O2	0.4%			
H2O	18.5%			

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

*MW referenced as NO_2 **MW referenced as CH_4. Assumed as 100% unsaturated HCs. Average at steady state per EPA 40CFR60 Method 25A for HC or mutually agreed test method.

USA COMPRESSION

Emissions Report

10/23/2015

USA Compression Unit 5103 GTA855/H302

Engine Serial Number :	25327442	Engine Manufactured Date :	12/01/2007
Max HP :	225	Max RPM :	1800
Number of Engine Cylinders :	6	Total Displacement (in3) :	855
Combustion Type & Setting :	4 Stroke Rich Burn	Fuel Delivery Method:	Carburetor
Compression Ratio :	8.5:1	Combustion Air Treatment :	Turbocharged and Aftercooled
Engine Modified/Reconstructed? :			
Compressor Frame Serial # :	HSR-003539	Unit Packaged Date :	01/16/2009
Compressor Frame Max RPM :	0	# of Compressor Throws :	2

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Wetzel WV

NSPS JJJJ	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr		
Ozone Non-Attainment / General Permit	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr	CH2O	g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : 9,420 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	12.10		6.002	26.289
Carbon Monoxide (CO) :	2.90		1.438	6.298
Volatile Organic Compounds (NMNEHC excluding CH2O) :		0.03	0.063	0.276
Formaldehyde (CH2O) :		0.02	0.043	0.188
Particulate Matter (PM) Filterable+Condensable :		0.0194	0.041	0.180
Sulfur Dioxide (SO2) :		0.0006	0.001	0.005

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	524.00		259.92	1,032.61
Methane (CH4) :		0.23	0.49	1.94

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	VXC-1610-05-HSG
Catalyst Element Type:	3-Way
Number of Catalyst Elements currently in Housing:	0
Air/Fuel Ratio Control :	Yes
Other Engine Emissions Control Equipment :	

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	0	6.002	26.289
Carbon Monoxide (CO) :	0	1.438	6.298
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0	0.063	0.276
Formaldehyde (CH2O) :	0	0.043	0.188
Particulate Matter (PM) Filterable+Condensable :	0	0.041	0.180
Sulfur Dioxide (SO2) :	0	0.001	0.005

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0	259.92	1,032.61
Methane (CH4) :	0	0.49	1.94

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

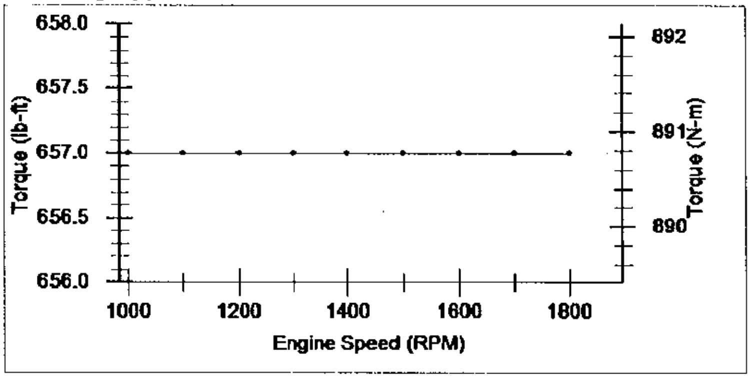
2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

Engine Performance Data Cummins Inc Columbus, Indiana 47202-3005 http://www.cummins.com	Industrial **GTA855** **FR10688**	**225 BHP (168 kW) @ 1800 RPM** **657 lb-ft (891 N-m) @ 1800 RPM**		
		Configuration **D253007CX02**	CPL Code **10183**	Revision **26-May-2011**

Compression Ratio:	**8.5:1**	Displacement:	**855 in3 (14.0 L)**
Fuel System:	**Field Gas, Dry Processed Nat Gas**	Aspiration:	**Turbocharged and Aftercooled**
Emission Certification:	**Non-certified, Catalyst**		

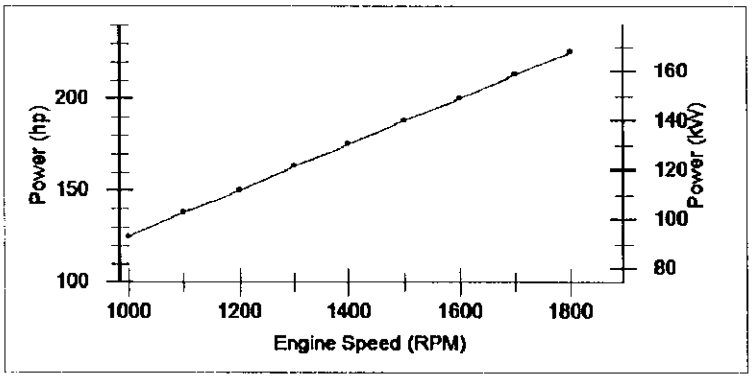
All data is based on the engine operating with fuel system, water pump, and 8 in H2O (1.99 kPa) inlet air restriction with 5 in (127 mm) inner diameter, and with 1.1 in Hg (4 kPa) exhaust restriction with 4 in (102 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR



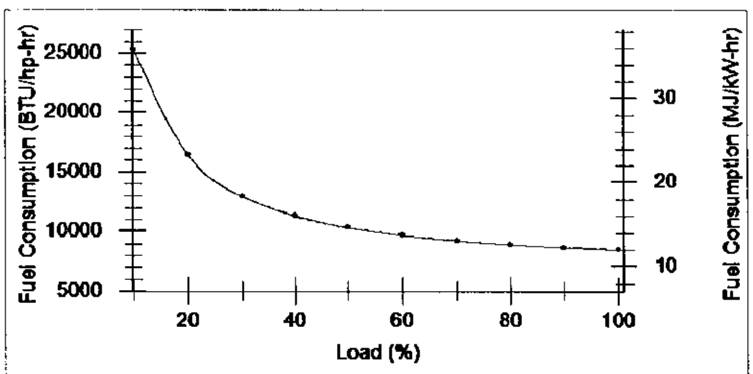
Torque Output

RPM	lb-ft	N-m
1,000	657	891
1,100	657	891
1,200	657	891
1,300	657	891
1,400	657	891
1,500	657	891
1,600	657	891
1,700	657	891
1,800	657	891



Power Output

RPM	hp	kW
1,000	125	93
1,100	138	103
1,200	150	112
1,300	163	122
1,400	175	130
1,500	188	140
1,600	200	149
1,700	213	159
1,800	225	168



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
225	168	100	8,479	12
203	151	90	8,675	12.27
180	134	80	8,921	12.62
158	118	70	9,236	13.07
135	101	60	9,678	13.69
113	84	50	10,323	14.6
90	67	40	11,309	16
68	51	30	12,953	18.33
45	34	20	16,457	23.28
23	17	10	25,282	35.77

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 930 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering with operating questions.

STATUS FOR CURVES AND DATA: Beta-(Measured data)
Tolerance: Within +/- 5%

CHIEF ENGINEER:
Alfred S Weber

Bold entries revised after 1-Mar-2010

Intake Air System

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

Low Temperature Aftercooling System

Coolant temperature from the Aftercooler outlet @ Maximum engine coolant out temperature at Limiting Ambient Temperature		
Maximum coolant temperature into the Aftercooler @ 25C (77F) ambient		
Maximum coolant temperature into Aftercooler @ Limiting Ambient conditions	130 deg F	54 deg C
Maximum coolant temperature for engine protection controls	212 deg F	100 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	204 deg F	96 deg C

Exhaust System

Maximum exhaust back pressure:	2 in-Hg	7 kPa
Recommended exhaust piping size (inner diameter):	4 in	102 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	15 psi	103 kPa
@ maximum rated speed	60 psi	414 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	15 psi	103 kPa

Fuel System

Minimum fuel inlet pressure:	**0** psi	**2** kPa
Maximum fuel inlet pressure:	1 psi	5 kPa

Performance Data

Engine low idle speed:	900 RPM	
Maximum low idle speed:	1,980 RPM	
Minimum low idle speed:	850 RPM	
Engine high idle speed	1,800 RPM	
Governor break speed:		
Maximum torque available at closed throttle low idle speed:	0 lb-ft	0 N-m

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	225 hp	168 kW	169 hp	126 kW	113 hp	84 kW
Torque	657 lb-ft	891 N-m	493 lb-ft	668 N-m	330 lb-ft	447 N-m
Intake Manifold Pressure	9 in-Hg	30 kPa	2 in-Hg	7 kPa	-3 in-Hg	-11 kPa
Turbo Comp. Outlet Pressure	22 in-Hg	73 kPa	15 in-Hg	49 kPa	8 in-Hg	28 kPa
Turbo Comp. Outlet Temperature	235 deg F	113 deg C	196 deg F	91 deg C	159 deg F	71 deg C
Inlet Air Flow	411 ft3/min	194 L/s	329 ft3/min	155 L/s	236 ft3/min	111 L/s
Exhaust Gas Flow	945 ft3/min	446 L/s	757 ft3/min	357 L/s	553 ft3/min	261 L/s
Exhaust Gas Temperature	1,304 deg F	707 deg C	1,254 deg F	679 deg C	1,195 deg F	646 deg C
Heat Rejection to Coolant	11,445 BTU/min	201 kW	9,835 BTU/min	173 kW	8,237 BTU/min	145 kW
Heat Reject to Aftercooler Coolant	807 BTU/min	14 kW	584 BTU/min	10 kW	401 BTU/min	7 kW
Heat Rejection to Ambient	1,904 BTU/min	33 kW	1,707 BTU/min	30 kW	1,742 BTU/min	31 kW
Heat Rejection to Exhaust	8,137 BTU/min	143 kW	6,320 BTU/min	111 kW	4,287 BTU/min	75 kW
Fuel Consumption	8,478 BTU/hp-hr	12 MJ/kW-hr	9,077 BTU/hp-hr	13 MJ/kW-hr	10,323 BTU/hp-hr	15 MJ/kW-hr
Air Fuel Ratio (dry)	16.6 vol/vol		16.5 vol/vol		15.6 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	1.43 g/hp-hr		1.35 g/hp-hr		1.49 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	12.1 g/hp-hr	16.23 g/kW-hr	10.8 g/hp-hr	14.48 g/kW-hr	8.4 g/hp-hr	11.26 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	2.9 g/hp-hr	3.89 g/kW-hr	4.4 g/hp-hr	5.9 g/kW-hr	4.5 g/hp-hr	6.03 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO_2	524 g/hp-hr	703 g/kW-hr	555 g/hp-hr	744 g/kW-hr	588 g/hp-hr	789 g/kW-hr
O_2	0.41 %		0.42 %		0.42 %	

Bold entries revised after 1-Mar-2010

Cranking System (Cold Starting Capability)

Unaided Cold Start:

Minimum cranking speed	150 RPM	
Breakaway torque at minimum unaided cold start temperature:	375 lb-ft	508 N-m
Cold starting aids available	**Block Heater, Oil Pan Heater**	
Maximum parasitic load at 10 deg F @		

Noise Emissions

Top	94.2 dBa
Right Side	91 dBa
Left Side	93.4 dBa
Front	92.9 dBa
Exhaust noise emissions	106.9 dBa

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

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

Ambient Temp deg F (deg C)

Altitude ft (m)		120 (49)	110 (43)	100 (38)	90 (32)	80 (27)	70 (21)
	0 (0)	896 (15.8)	839 (14.8)	775 (13.6)	718 (12.6)	654 (11.5)	597 (10.5)
	1000 (305)	944 (16.6)	880 (15.5)	823 (14.5)	759 (13.3)	702 (12.3)	638 (11.2)
	2000 (610)	993 (17.5)	928 (16.3)	863 (15.2)	807 (14.2)	742 (13.0)	686 (12.1)
	3000 (914)	1,041 (18.3)	976 (17.2)	912 (16.0)	855 (15.0)	791 (13.9)	726 (12.8)
	4000 (1219)	1,081 (19.0)	1,025 (18.0)	960 (16.9)	896 (15.8)	831 (14.6)	767 (13.5)
	5000 (1524)	1,138 (20.0)	1,073 (18.9)	1,009 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
	6000 (1829)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
	7000 (2134)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
	8000 (2438)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
	9000 (2743)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
	10000 (3048)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)

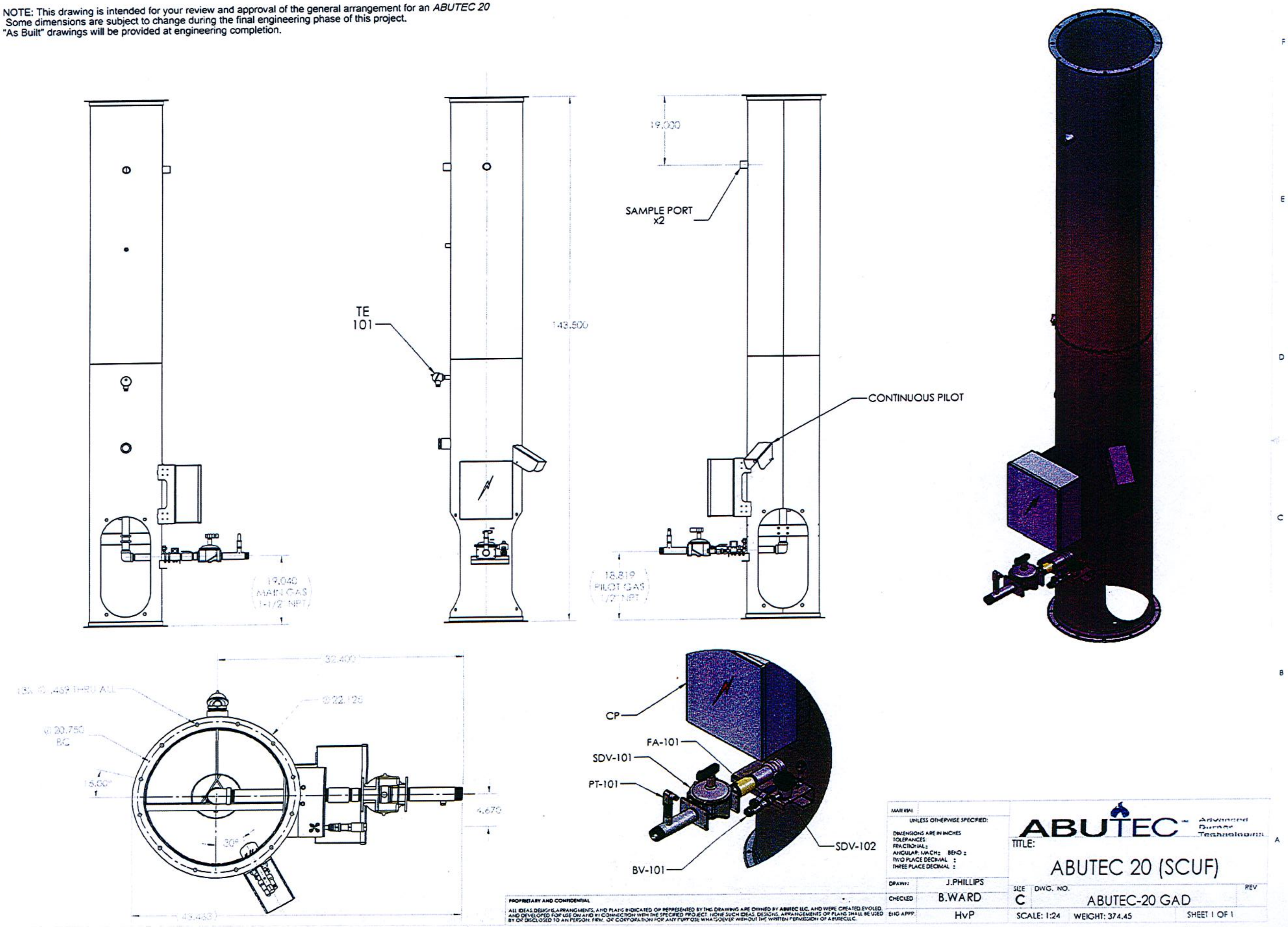
Change Log

Date	Author	Change Description
7/3/2007	Cary A McFarden	Add noise data

End of Report

General Arrangement Drawing

NOTE: This drawing is intended for your review and approval of the general arrangement for an *ABUTEC 20*
Some dimensions are subject to change during the final engineering phase of this project.
"As Built" drawings will be provided at engineering completion.



MATERIAL	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	
DRAWN	J.PHILLIPS
CHECKED	B.WARD
ENG APPR.	HvP

ABUTEC™ Advanced Burner Technologies

TITLE: ABUTEC 20 (SCUF)

SIZE	DWG. NO.	REV
C	ABUTEC-20 GAD	

SCALE: 1:24 WEIGHT: 374.45 SHEET 1 OF 1

MANUFACTURER'S CERTIFICATION PERFORMANCE TEST
ENCLOSED GAS VAPOR COMBUSTOR CERTIFICATION TEST
ENCLOSED GAS VAPOR COMBUSTORS

(SMALL COMBUSTION UTILITY FLARE (SCUF) MTF 0.7 AND MTF 2.7)

AT

ABUTEC – ADVANCED BURNER TECHNOLOGIES
CHATTANOOGA, TENNESSEE

PREPARED FOR:

ABUTEC™ Advanced Burner Technologies

2959 CHEROKEE STREET, SUITE 101
KENNESAW, GEORGIA 30144

PREPARED BY:

ADVANCED INDUSTRIAL RESOURCES, INC.
3407 NOVIS POINTE
ACWORTH, GEORGIA 30101

OCTOBER 18-23, 2012

ADVANCED INDUSTRIAL RESOURCES, INC.

CERTIFICATION SHEET

Having conducted the Technical Review of this report, I hereby certify the data, information, results, and calculations in this report to be accurate and true according to the methods and procedures used.

Derek Stephens
Technical Director
Advanced Industrial Resources

December 13, 2012
Date

Having written and prepared this report, I hereby certify that the data, information and results in this report to be correct and all inclusive of the necessary information required for a complete third-party review of the testing event.

Steven Haigh
Report Preparation Director
Advanced Industrial Resources

December 13, 2012
Date

Having supervised all aspects of the field testing, I hereby certify the equipment preparation, field sample collection procedures, and all equipment calibrations were conducted in accordance to the applicable methodologies.

Bill Nelson
Field Project Supervisor
Advanced Industrial Resources

October 26, 2012
Date

Table of Contents

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

ABUTEC, an acronym for Advanced Burner Technologies, is an international manufacturer of Environmentally Friendly Combustion Solutions. ABUTEC specializes in offering high efficiency, low emission, burners and flares to various industry segments and applications. ABUTEC manufactures Infrared Burners, Enclosed Flares, Vapor Combustors, Incinerators, Thermal Oxidizers, and CHP "Gas-to-Energy" systems all aimed at reducing plant emissions and increasing efficiency.

ABUTEC is seeking Manufacturers' Certification in accordance to 40 CFR Part 60 Subpart OOOO 60.5413(d) for two (2) models of Enclosed Gas Vapor Combustors including the *Small Combustion Utility Flare (SCUF) MTF 0.7* and *MTF 2.7*. These units are manufactured at ABUTEC's manufacturing facility in Chattanooga, Tennessee.

The following test report describes the sampling and measurement procedures that were used to certify the subject combustors in accordance to Subpart OOOO 60.5413(d). Upon inquiry into the certification process to Mr. Steffan Johnson of the EPA's Measurement Policy Group, it was made aware to AIR and ABUTEC that the Federal Register Volume 77, Number 159 issued on August 16, 2012 contained incorrect information regarding the performance test procedures used to 'manufacturer certify' enclosed combustors. As directed in email correspondence from Mr. Johnson received on September 13, 2012, the test program is to be conducted in accordance to guidelines presented in 40 CFR Part 63 Subpart HH 63.1282(g). It was also indicated by Mr. Johnson at that time that it was anticipated that 60 Subpart OOOO 60.5413(d) test requirements would be corrected and updated in a later revision to the Subpart and an additional Federal Register will be issued as applicable.

However, through additional communication with Mr. Johnson on December 3, 2012, it was determined that there were no current plans for any updated revisions to 60 Subpart OOOO in the near term and that testing needed to be conducted and results assessed in accordance to the currently issued regulation. As stated, this information was not learned until ***after*** the testing was completed. Therefore, the test program was conducted in accordance to 63 Subpart HH 63.1282(g) as described above and the associated site-specific test protocol. The major difference between the two regulatory guidance documents is in the quantity of inlet fuel gas samples to be collected. 63 Subpart HH calls for one (1) inlet fuel sample to be collected per test condition over a period of at least three (3) hours while 60 Subpart OOOO calls for three (3) inlet fuel samples to be collected per test condition over a period of at least one (1) hour per test run. Additionally, 63 Subpart HH does not require the fuel samples to be analyzed for sulfur compounds while 60 Subpart OOOO does require the sulfur compounds to be analyzed. It is noted that although the sulfur compounds were not initially required to be quantified, in fact they were for this test program.

In accordance to 63.1282(g) and 60.5413(d), testing on each unit included determining the inlet volumetric flow rate to the combustors as well as collecting inlet fuel samples for content determination. Additionally, testing on the combustor exhausts included determining the volumetric flow rates, molecular weight, exhaust gas contents, carbon monoxide, visual emissions, and volatile organic compounds measured as propane. Testing on each unit was conducted under four (4) separate operating conditions, as described in this test report.

Testing was conducted on October 18-23, 2012. All testing and sample analysis, as applicable, was conducted by Advanced Industrial Resources, Inc. (*AIR*) in accordance with approved USEPA sampling methods (40 CFR 60 Appendix A Method 1, 2, 2A, 3, 3B, 3C, 4, 10, 22, 25A, 205) and ASTM analytical methods (ASTM D1945, ASTM D3588).

1.2 KEY PERSONNEL

The key personnel who coordinated and this Test Report and their telephone numbers are:

Brad Ward, ABUTEC	770-846-2554
Derek Stephens, Advanced Industrial Resources	800-224-5007
Scott Wilson, Advanced Industrial Resources	404-843-2100

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS & CONTROL EQUIPMENT DESCRIPTION

ABUTEC manufactures several models of Enclosed Gas Vapor Combustors (Combustors). The company seeks 'manufacturers' certification' on two (2) specific models currently in production in accordance to 40 CFR Part 60 Subpart OOOO 60.5413(d). These models include the *Small Combustion Utility Flare (SCUF) MTF 0.7* and *MTF 2.7*.

Testing consisted of four (4) operating conditions per source with three (3), sixty (60) minute tests being conducted under each condition:

<u>**Condition 1:**</u> 90–100 percent of maximum design rate (fixed rate).

<u>**Condition 2:**</u> 70–100–70 percent (ramp up, ramp down).

<u>**Condition 3:**</u> 30–70–30 percent (ramp up, ramp down).

<u>**Condition 4:**</u> 0–30–0 percent (ramp up, ramp down).

Minimum and maximum design rates are determined by the manufacturer. Through discussion with the manufacturer's representative, Mr. Brad Ward of ABUTEC, it was determined that the minimum design rate (i.e. 0%) for the MTF 2.7 unit was 20 standard cubic feet per minute (SCFM) and the maximum design rate (100%) was 100 SCFM. The minimum design rate for the MTF 0.7 unit was 5 SCFM and maximum was 25 SCFM.

2.2 SAMPLING LOCATION

The (SCUF) MTF 0.7 exhaust stack has a circular cross section with an internal diameter of approximately 18.5 inches. The sampling location is located 3.6 equivalent diameters downstream from the nearest upstream flow disturbance and 4.9 equivalent diameters upstream from the stack exhaust. Two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the flow direction. Sixteen (16) sampling points were used for USEPA Methods 2, 3, and 4 sampling, in accordance with USEPA Method 1 requirements. Three (3) traverse points located at 16.7%, 50%, and 83.3% were used for EPA Methods 10 and 25A sampling.

The (SCUF) MTF 2.7 exhaust stack has a circular cross section with an internal diameter of approximately 33.0 inches. The sampling location is located 3.0 equivalent diameters downstream from the nearest upstream flow disturbance and 2.2 equivalent diameters upstream from the stack exhaust. Two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the flow direction. Sixteen, (16), sampling points were used for USEPA Methods 2, 3, and 4 sampling, in accordance with USEPA Method 1 requirements. Three (3) traverse points located at 16.7%, 50%, and 83.3% were used for EPA Methods 10 and 25A sampling.

The inlet gas flow metering system conducted via Method 2A was located at least 8 duct diameters downstream from the fuel contents sampling location during each test set.

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES

ABUTEC is seeking Manufacturers' Certification in accordance to 40 CFR Part 60 Subpart OOOO 60.5413(d) for two (2) models of Enclosed Gas Vapor Combustors including the *Small Combustion Utility Flare (SCUF) MTF 0.7* and *MTF 2.7*.

3.2 FIELD TEST CHANGES AND PROBLEMS

No significant problems were encountered during testing that required deviation from the planned test protocol. Items of note include the following:

1) Initially the inlet volumetric flow rate measurements were attempted to be conducted using a ROOTS Series B3 3M173 Meter via EPA Method 2A. However, because the facility was utilizing the inlet volumetric flow rate measurements to determine the various operating conditions and thus generate the required system fluctuations, this system was found to not be efficient in determining this information. Therefore, prior to beginning the testing, ABUTEC removed the Vane meter from the selected sample location and installed a thermal mass flow measuring system (Model Proline t-mass, 65F, 65I) which provided real-time, instantaneous flow rate measurements. This unit also measured the inlet fuel delivery line pressure and temperature.
2) The moisture content of the inlet gas fuel samples was not able to be conducted by the analytical laboratory. This information was also not able to be measured in the field due to the limited access and gas stream characteristics of the inlet fuel delivery sample line and locations.

3.3 PRESENTATION OF TEST RESULTS

Emission test results are presented in Appendix A. Reduced and tabulated data from the field-testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D. Laboratory reports and custody records are presented in Appendix E

Equipment calibration information and gas calibration certification sheets are presented in Appendix F. . Process operation data information is presented in Appendix G.

Performance criteria of the control devices (Enclosed Combustors) were assessed as follows:

1) No visible emissions were observed throughout the test periods. Method 22 data sheets are presented and required digital photographs of the exhaust stacks are presented in Appendix D.

2) THC as propane corrected to 3.0 percent CO_2 did not exceed 10.0 ppmvw. Results are presented in Appendix A.

3) CO emissions corrected to 3.0 percent CO_2 did not exceed 10.0 ppmvd. Results are presented in Appendix A.

(4) It was determined that the maximum inlet gas flow rate measured for each unit did not result in emissions of VE, THC, or CO which exceeded the applicable criteria listed above. Results are presented in Appendix A.

(6) The control device HAP destruction efficiency (DRE) requirement (>95.0%) listed in 63 Subpart HH was determined, through communication with the previously referenced EPA contact, to not be applicable to these units and thus was not specifically assessed during this test event and therefore the unit exhaust samples were not requested to be analyzed for HAP contents. Additionally, as indicated by the EPA contact, it is expected that a unit which successfully demonstrates the ability to combust propylene and meet the emissions criteria listed in the rule, will be able to combust >95% of any HAPs or other organic compounds it encounters in field usage with the assumption that no liquid is fed to the burners.

(7) The control device VOC destruction efficiency (DRE) requirement listed in 60 Subpart OOOO is also greater than 95.0%. The inlet 'VOC' mass rates were determined via the inlet fuel sample contents' analysis and fuel flow rate. The exhaust VOC emissions were determined via Method 25A and measured as total hydrocarbons. As expected, the inlet fuel samples contained greater than 99.99% of hydrocarbons (C2-C6+). The resulting DRE was determined to be greater than 99.99% for both units tested.

Additionally, this test report includes the following information:

(i) Full schematic of the control device and dimensions of the device components.

SEE Appendix G.

(ii) Design net heating value (minimum and maximum) of the devices ranged from 220-3500 BTU/FT^3.

(iii) Test fuel gas flow range (in both mass and volume). Include the minimum and maximum allowable inlet gas flowrate. See Appendix A.

(iv) Air/stream injection/assist ranges are not applicable to these units.

(v) The test parameter ranges listed in paragraphs (A) through (O), as applicable for the tested model.

(A) Fuel gas delivery pressure and temperature. – see Appendix D
(B) Fuel gas moisture range. – See note in Section 3.2
(C) Purge gas usage range. – PURGE GAS NOT USED
(D) Condensate (liquid fuel) separation range. – NO LIQUIDS IN THE GAS
(E) Combustion zone temperature range was found to be 1400-2100 deg F.
(F) Excess combustion air range. – see Appendix A
(G) Flame arrestor(s). – see Appendix G - Components List
(H) Burner manifold pressure ranged from 2 to 4 oz/ in^2.
(I) Pilot flame sensor. – Type K thermocouple; see Components List in Appendix G.
(J) Pilot flame design fuel and fuel usage - Optional 50kW Coander Anti-Flashback Pilot Burner; Pilot not used during testing.
(K) Tip velocity range.– for 0.7 unit = 23.75ft/sec; for 2.7 unit = 36.7 ft/sec; both at full flow / max capacity
(L) Momentum flux ratio. –see Appendix G
(M) Exit temperature range. – see Appendix B, D
(N) Exit flowrate. – see Appendix A
(O) Wind velocity and direction. – see Appendix D

TABLE 3-1: Results Summary

Source	Condition #	Pollutant / Parameter	Average Measured	Allowable	Units	% of Allowable
Flare 2.7 Outlet	1 - 90-100%	CO	2.71	10	ppm_D @ 3% CO_2	27%
		THC (as propane)	0.2	10	ppm_w @ 3% CO_2	2%
	2 - 70-100%	CO	2.75	10	ppm_D @ 3% CO_2	27%
		THC (as propane)	0.2	10	ppm_w @ 3% CO_2	2%
	2 - 70-100%	CO	1.08	10	ppm_D @ 3% CO_2	11%
		THC (as propane)	0.2	10	ppm_w @ 3% CO_2	2%
	4 - 0-30%	CO	0.67	10	ppm_D @ 3% CO_2	7%
		THC (as propane)	0.1	10	ppm_w @ 3% CO_2	1%
Flare 0.7 Outlet	1 - 90-100%	CO	4.14	10	ppm_D @ 3% CO_2	41%
		THC (as propane)	0.3	10	ppm_w @ 3% CO_2	3%
	2 - 70-100%	CO	2.96	10	ppm_D @ 3% CO_2	30%
		THC (as propane)	0.3	10	ppm_w @ 3% CO_2	3%
	3 - 30-70%	CO	2.60	10	ppm_D @ 3% CO_2	26%
		THC (as propane)	0.6	10	ppm_w @ 3% CO_2	6%
	4 - 0-30%	CO	0.89	10	ppm_D @ 3% CO_2	9%
		THC (as propane)	0.4	10	ppm_w @ 3% CO_2	4%

TABLE 3-2: THC Destruction & Removal Efficiency Summary

Source	Condition	Measured (Inlet)	Average Measured (Outlet)	Units	Destruction & Removal Efficiency (%)
Flare 0.7	1	76.7	0.00157	kg/hr	99.998%
	2	67.4	0.00207		99.997%
	3	48.9	0.00213		99.996%
	4	41.0	0.000548		99.999%
Flare 2.7	1	279.0	0.00591	kg/hr	99.998%
	2	257.57	0.00520		99.998%
	3	175.00	0.00587		99.997%
	4	93.98	0.00161		99.998%

Notes:

Inlet THC measured as C2-C6 on a dry mole percent basis; Outlet THC measured via Method 25A on a carbon converted to 'as propane' basis.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Testing was conducted according to the methodology in the *Title 40 Code of Federal Regulation*, Part 60, Appendix A and in accordance to the Site-Specific Test Protocol. The following methods were employed for emission sampling and analyses:

Combustor Inlet:

- **EPA 40 CFR 60 Appendix A Method 2A** was used to quantify the volumetric flow rate of the fuel gas being fed to the combustor. A thermal mass flow measuring system (Model Proline t-mass, 65F, 65I) was used for these measurements.

- **ASTM D1945, ASTM D3588, and ASTM D5504-8** were used to quantify Hydrocarbons (C1-C5 + benzene); H_2, CO, CO_2, N_2, & O_2 and Higher Heating Value (Btu), and carbonyl sulfide, carbon disulfide plus mercaptans, respectively. These samples were collected in 6 Liter Silonite-coated stainless steel evacuated canisters fitted with a flow controller sufficient to fill the canister over a 3 hour period. A single canister sample was conducted over a three (3) hour period, per source operating condition.

Combustor Outlet:

- **EPA 40 CFR 60 Appendix A Method 1** was used to determine the flow rate measurement traverse points via Method 2.

- **EPA 40 CFR 60 Appendix A Method 2** was used to determine the velocity and volumetric flow rate of combustor exhaust gases.

- **EPA 40 CFR 60 Appendix A Method 3B** was be used to determine the excess air using the results of Method 3C.

- **EPA 40 CFR 60 Appendix A Method 3C** was used to determine the molecular weight of the exhaust gas by quantifying the contents of carbon dioxide, methane, nitrogen, and oxygen. These samples were collected in 6 Liter stainless steel evacuated canisters fitted with a flow controller sufficient to fill the canister over a 3 hour period. A single canister sample was conducted over a three (3) hour period, per source operating condition. .

- **EPA 40 CFR 60 Appendix A Method 4** was used to determine the moisture contents of the exhaust gas streams.

- **EPA 40 CFR 60 Appendix A Method 10** was used to quantify the carbon monoxide concentrations being emitted from the respective combustor exhaust stacks. Sampling was conducted with a calibrated, non-dispersive infrared instrumental analyzer calibrated on a range of 0-10 ppmvd and results reported on a 3% carbon dioxide correction basis.

- **EPA 40 CFR 60 Appendix A Method 22** was used to verify the absence of visible emissions from the exhaust stacks. Observations were conducted continuously throughout each test condition. A digital color photograph of the exhaust point, taken from the position of the observer and annotated with date and time, was taken once per test run and the four photos are included in this test report.

- **EPA 40 CFR 60 Appendix A Method 25A** was used to quantify the total hydrocarbon (THC) concentrations exiting the combustor exhaust gas streams. Sampling and analysis was conducted via flame ionization detector analyzer (FID) calibrated using EPA Protocol 1 methane calibration gases on a range of 0-30 parts per million on a wet basis and THC concentrations have been reported on a 'wet' basis (ppmvw), as propane, corrected to 3% carbon dioxide.

- **EPA 40 CFR 60 Appendix A Method 205** was used to verify the dilution panel used to dilute the EPA Protocol 1 calibration gases, as applicable. A carbon dioxide (CO2) EPA Protocol 1 calibration gas was used to verify the dilution panel.

5.0 QUALITY ASSURANCE ACTIVITIES

The quality assurance/quality control (QA/QC) measures associated with the sampling and analysis procedures given in the noted EPA reference methodologies, in Subparts A of 40 *CFR* 60 and 40 *CFR* 63, and in the *EPA QA/QC Handbook*, Volume III (EPA 600/R-94/038c) were employed, as applicable. Such measures included, but were not limited to, the procedures detailed below.

5.1 GAS ANALYZER CALIBRATION

5.1.1 CALIBRATION GAS CONCENTRATION VERIFICATION

Calibration gases that were analyzed following the Environmental Protection Agency Traceability Protocol No. 1 were used. Certifications from the gas manufacturers that Protocol No. 1 was followed are presented in Appendix E.

5.1.2 MEASUREMENT SYSTEM PREPARATION

AIR assembled each measurement system by following the manufacturer's written instructions for preparing and preconditioning each gas analyzer and, as applicable, the other system components. *AIR* made all necessary adjustments to calibrate the analyzers and the data recorders.

5.1.3 ANALYZER CALIBRATION ERROR

AIR conducted the analyzer calibration error check by introducing calibration gases to the measurement system upstream of each gas analyzer. After the measurement system had been prepared for use and immediately prior to starting the tests, *AIR* introduced the zero, high-range, and mid-range gases to the analyzer. During this check, *AIR* made no adjustments to the system except those necessary to achieve the correct calibration gas flow rate at the analyzer. .

5.1.4 SAMPLING SYSTEM BIAS CHECK

AIR performed the sampling system bias check by introducing calibration gases at the calibration valve installed at the outlet of the sampling probe. Immediately prior to starting each test run, a zero gas and the mid-range gas (which most closely approximated the effluent concentrations) were used for this check. *AIR* introduced the zero calibration gas and record the gas concentration displayed by the analyzér. *AIR* then introduced mid-range calibration gas and recorded the gas concentration displayed by the analyzer. During the sampling system bias check, *AIR* operated the system at the normal sampling rate and made no adjustments to the measurement system other than those necessary to achieve proper calibration gas flow rates at the analyzer.

5.1.5 ZERO AND CALIBRATION DRIFT CHECKS

At the end of each test run and whenever adjustments were necessary for the measurement system, *AIR* repeated the sampling system bias check procedure described in Section 6.1.4.

5.1.6 ANALYZER ERROR, BIAS AND DRIFT CHECK SPECIFICATIONS

Analyzer calibration error was less than +/-2 percent of the span for the zero, mid-range, and high-range calibration gases. Sampling system bias were less than +/-5 percent of the span for the zero and mid-range calibration gases. Zero drift were less than +/-3 percent of the span over the period between zero drift checks. Calibration drift were less than +/-3 percent of the span over the period between calibration drift checks.

5.2 NO_2-NO CONVERSION EFFICIENCY

This conversion efficiency check was not applicable to this test program.

5.3 INSTRUMENT INTERFENCE RESPONSE

AIR obtained instrument vendor data that demonstrates the interference performance specification is not exceeded as defined in EPA Method 7E Section 8.2.7. Documentation is provided in Appendix D.

5.4 INSTRUMENT RESPONSE TIME

To determine the system response time, prior to testing, *AIR* introduced the upscale calibration gas into the measurement system at the calibration valve assembly, which is located prior to all sample conditioning components. AIR recorded the upscale response time, which is equivalent to the time that was required for the system response output to stabilize at a value that is 95 percent or 0.5 ppm (whichever is less restrictive) of the certified upscale calibration gas value. AIR then quickly switched to the zero calibration gas and recorded the time from the concentration change to the measurement system response equivalent to 95 percent or 0.5 ppm (whichever is less restrictive) of the zero gas. This procedure was repeated three times. A stable value is equivalent to a change of less than 1 percent of span value for 30 seconds or less than 5 percent of the measured average concentration for 2 minutes. The greater of the average upscale or downscale response times was taken as the "response time" for each analyzer.

5.5 DATA REDUCTION CHECKS

AIR ran an independent check (using a validated computer program) of the calculations with predetermined data before the field test, and the *AIR* Team Leader conducted spot checks on-site to assure that data was being recorded accurately. After the test, *AIR* checked the data input to assure that the raw data had been transferred to the computer accurately.

6.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) process is generally a seven-step iterative planning approach to ensure development of sampling designs for data collection activities that support decision making. The seven steps are as follows: (1) defining the problem; (2) stating decisions and alternative actions; (3) identifying inputs into the decision; (4) defining the study boundaries; (5) defining statistical parameters, specifying action levels, and developing action logic; (6) specifying acceptable error limits; and (7) selecting resource-effective sampling and analysis plan to meet the performance criteria. The first five steps are primarily focused on identifying qualitative criteria such as the type of data needed and defining how the data will be used. The sixth step defines quantitative criteria and the seventh step is used to develop a data collection design. In regards to emissions sampling, these steps have already been identified for typical monitoring parameters.

Monitoring methods presented in 40 *CFR* 60 Appendix A indicate the following regarding DQOs: Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods. At a minimum, each method provides the following types of information: summary of method; equipment and supplies; reagents and standards; sample collection, preservation, storage, and transportation; quality control; calibration and standardization; analytical procedures, data analysis and calculations; and alternative procedures. These test methods have been designed and tested according to DQOs for emissions testing and analysis. These test methods have been specified and were followed to testing to ensure that DQOs were met for this project.

ATTACHMENT I

Emissions Calculations

Triad Hunter, LLC
EMISSIONS SUMMARY

Everett Weese Production Facility
Tyler County

Source	Description	NOx lb/hr	CO lb/hr	CO_{2e} lb/hr	VOC lb/hr	SO2 lb/hr	H2S lb/hr	PM lb/hr	n-Hexane lb/hr	benzene lb/hr	formaldehyde lb/hr	Total HAPs lb/hr
S1	Compressor Engine #1	1.52	4.41	1749.25	1.22	0.006	0.00	0.103	0.0011	0.0004	0.7484	0.8929
S5	Compressor Engine #2 **(REMOVED**	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.0000	0.0000	0.0000	0.0000
S5A	**NEW** Compressor Engine	1.50	0.72	261.50	0.15	0.001	0.00	0.041		0.0033	0.0496	0.0730
HTR-1 to HTR-3	Three Existing GPU Heaters	0.30	0.25	362.36	0.02	0.002	0.00	0.023	0.0054	0.0000	0.0002	0.0056
HTR-4 and HTR-5	Two New GPU Heaters	0.20	0.17	241.58	0.01	0.001	0.00	0.015	0.0036	0.0000	0.0002	0.0038
S3A	Dehy Reboiler	0.05	0.04	60.39	0.00	0.002	0.00	0.004	0.0000			0.0000
S4A	Dehy Still Vent + Flash Tank Vent (Controlled)			57.95	3.66					0.0046		0.0506
S6	Flash Compressor **(REM)**	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.0000	0.0000	0.0000	0.0000
VCU-1 to VCU-3	VCUs and Pilots (including Water and Condensate tank vapors)[2]	0.41	2.20	699.77	1.88	0.000	0.00	0.001	0.0002	0.0000	0.0000	0.0002
---	Blowdowns[1]			N/A	N/A							
---	Truck Loading[3]				55.70							
---	Fugitive Dust - Roadways							N/A				
---	Fugitive VOCs			47.60	0.74							
Total		3.98	7.79	3480.39	63.38	0.01	0.00	0.19	0.01	0.01	0.80	1.03

Source	Description	NOx tpy	CO tpy	CO_{2e} tpy	VOC tpy	SO2 tpy	H2S tpy	PM tpy	n-Hexane tpy	benzene tpy	formaldehyde tpy	Total HAPs tpy
S1	Compressor Engine #1	6.66	19.32	7662	5.33	0.027	0.00	0.45	0.005	0.002	3.278	3.911
S5	Compressor Engine #2 **(REMOVED**	0.00	0.00	0	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000
S5A	**NEW** Compressor Engine	6.56	3.15	1145	0.65	0.004	0.00	0.18		0.015	0.217	0.320
HTR-1 to HTR-3	Three Existing GPU Heaters	1.31	1.10	1587	0.07	0.008	0.00	0.10	0.024	0.000		0.025
HTR-4 and HTR-5	Two New GPU Heaters	0.88	0.74	1052	0.05	0.005	0.00	0.07	0.016	0.000	0.001	0.016
S3A	Dehy Reboiler	0.22	0.18	265	0.01	0.001	0.00	0.02	0.000			0.000
S4A	Dehy Still Vent + Flash Tank Vent(Controlled)			254	4.39					0.020		0.222
S6	Flash Compressor **(REM)**	0.00	0.00	0	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000
VCU- to VCU-3	VCUs and Pilots (including Water and Condensate tank vapors)[2]	0.62	3.26	1051	5.58	0.000		0.03	0.007	0.000		0.007
---	Blowdowns[1]			275	2.84							
---	Truck Loading[3]				1.58							
---	Fugitive Dust- Roadways							2.41				
---	Fugitive VOCs			208	3.24							
Total		16.25	27.75	13,499	23.75	0.05	0.00	3.26	0.05	0.037	3.496	4.501
	Currently Permitted Emissions	**18.79**	**54.15**	**22,697**	**21.19**	**0.07**	**0.00**	**3.63**	**0.07**	**0.027**	**6.666**	**8.239**
	Changes At Weese Station	**-2.54**	**-26.39**	**-9,198**	**2.56**	**-0.02**	**0.00**	**-0.37**	**-0.02**	**0.01**	**-3.17**	**-3.74**
	Additions from R. Weese Well Pad (see following R. Weese Calculations)	**1.53**	**2.19**	**1,983**	**7.24**	**0.01**	**0.00**	**0.64**	**0.11**	**0.170**	**0.001**	**1.974**
	Total Changes	**-1.01**	**-24.20**	**-7,214**	**9.80**	**-0.02**	**0.00**	**0.27**	**0.09**	**0.18**	**-3.17**	**-1.76**

= Changes at Weese Station

[1] See Appendix C for Blowdown Calculations

[2] Condensate tanks and water tank emissions are controlled by a combustor.
Combined capture and control effiency of system for controlleding water and condensate tanks is 98%
All emissions from this capture and control system are presented in this line. It is a mixture of un-captured/un-controlled VOCs and combustion products.

[3] Un-Captured Truck Loading Emissions Only. Captured and Controlled emissions represented by the VCUs emisisons

Triad Hunter, LLC
ENGINE EMISSIONS

Everett Weese Production Facility
Tyler County

Proposed Emission Rates

Source S1

Engine Data:

Engine Manufacturer	CAT	
Engine Model	3516B	
Type (Rich-burn or Low Emission)	Low Emissions	
Aspiration (Natural or Turbocharged)	Natural	
Turbocharge Cooler Temperature	130	deg. F
Manufacturer Rating	1,380	hp
Speed at Above Rating	1,400	rpm
Configeration (In-line or Vee)	V-16	
Number of Cylinders	16	
Engine Bore	6.700	inches
Engine Stroke	7.500	inches
Fuel Heat Content	1,117	BTU/scf
Engine Displacement	4,231	cu. in.
Fuel Consumption	7,500	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokelean lb/mmbtu	
Oxides of Nitrogen, NOx	0.50	1.52	6.66	690	36.51		Comment
Carbon Monoxide CO	1.45	4.41	19.32	2,001	105.87		453.59 grams = 1 pound
VOC (NMNEHC)	0.40	1.22	5.33	552	29.21		2,000 pounds = 1 ton
CO2e		1749	7661.70				
CO2	483	1469	6436.28	666,540	35267.29		
Total Annual Hours of Operation	**8,760**						
SO2		0.0062	0.0272			0.0006	
PM2.5		0.0008	0.0035			7.71E-05	
PM (Condensable)		0.1026	0.4493			0.00991	
CH_4 as CO_{2e}	3.67	279.13	1222.6			0.0022	**Mfg. Spec Used**
N_2O as CO_{2e}		0.6417	2.8106			0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0532	0.2330			0.00514	
acetaldehyde		0.0865	0.3790			0.00836	
formaldehyde	0.2460	0.7484	3.2780			0.0528	**Mfg. Spec Used**
biphenyl		0.0002	0.0009			0.000212	
benzene		0.0004	0.0019			0.00044	
toluene		0.0004	0.0017			0.000408	
ethylbenzene		4E-05	0.0002			3.97E-05	
xylene		0.0002	0.0008			0.000184	
methanol		0.0024	0.0107			0.0025	
n-hexane		0.0011	0.0047			0.00111	
total HAPs		0.8929	3.9109			0.071194	

Exhaust Parameters:

Exhaust Gas Temperature	1,005	deg. F
Exhaust Gas Flow Rate	9216	acfm
Total Exhaust Gas Volume Flow, wet	9,216	acfm
Total Exhaust Gas Volume Flow, wet	153.6	acf per sec
Exhaust Stack Height	260	inches
	21.67	feet
Exhaust Stack Inside Diameter	20	inches
	1.667	feet

Triad Hunter, LLC
ENGINE EMISSIONS

Everett Weese Production Facility
Tyler County

Proposed Emission Rates

Source S5A

Engine Data:

Engine Manufacturer	Cummins	
Engine Model	GTA855	
Type (Rich-burn or Low Emission)	Rich Burn	
Aspiration (Natural or Turbocharged)	Natural	
Manufacturer Rating	225	hp
Speed at Above Rating	1,800	rpm
Configeration (In-line or Vee)	In-Line	
Number of Cylinders	6	
Engine Bore	5.500	inches
Engine Stroke	6.000	inches
Fuel Heat Content	1,117	BTU/scf
Engine Displacement	855	cu. in.
Fuel Consumption	9,420	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4stroke rich lb/mmbtu	
Oxides of Nitrogen, NOx	3.02	1.50	6.56	680	35.95		Comment
Carbon Monoxide CO	1.45	0.72	3.15	326	17.26		453.59 grams = 1 pound
VOC (NMNEHC)	0.30	0.15	0.65	68	3.57		2,000 pounds = 1 ton
CO2e		261	1145.36				
CO2	524	260	1138.47	117,900	6238.21		

Total Annual Hours of Operation	**8,760**				
SO2		0.001	0.0044		**Mfg. Spec Used**
PM2.5 + Condensable		0.041	0.1796		**Mfg. Spec Used**
CH_4 as CO2e		1.4455	6.3	0.0022	Factor From 40 CFR 98, Table C-2
N_2O as CO_{2e}		0.1263	0.5533	0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0056	0.0244	0.00263	
acetaldehyde		0.0059	0.0259	0.00279	
formaldehyde	0.1000	0.0496	0.2173		**Mfg. Spec Used**
biphenyl		0.0004	0.0020	0.000212	
benzene		0.0033	0.0147	0.00158	
toluene		0.0012	0.0052	0.000558	
ethylbenzene		5E-05	0.0002	2.48E-05	
xylene		0.0004	0.0018	0.000195	
methanol		0.0065	0.0284	0.00306	
total HAPs		0.073	0.3198	0.01105	

Exhaust Parameters:

Exhaust Gas Temperature	1,005	deg. F
Exhaust Gas Flow Rate	9216	acfm
Total Exhaust Gas Volume Flow, wet	9,216	acfm
Total Exhaust Gas Volume Flow, wet	153.6	acf per sec
Exhaust Stack Height	260	inches
	21.67	feet
Exhaust Stack Inside Diameter	20	inches
	1.667	feet

Triad Hunter, LLC
ENGINE EMISSIONS

Everett Weese Production Facility
Tyler County

Proposed Emission Rates

Source S6 (REM)

Engine Data:

Engine Manufacturer	GasJack	
Engine Model	GJ230	
Type (Rich-burn or Low Emission)	Low Emissions	
Aspiration (Natural or Turbocharged)	Natural	
Turbocharge Cooler Temperature		deg. F
Manufacturer Rating	46	hp
Speed at Above Rating	1,400	rpm
Configeration (In-line or Vee)	In-line	
Number of Cylinders	4	
Engine Bore	4.360	inches
Engine Stroke	3.850	inches
Fuel Heat Content	1,117	BTU/scf
Engine Displacement	230	cu. in.
Fuel Consumption	10,777	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokerich lb/mmbtu	Comment
Oxides of Nitrogen, NOx	2.00	0.20	0.89	92	4.87		
Carbon Monoxide CO	4.00	0.41	1.78	184	9.74		453.59 grams = 1 pound
VOC (NMNEHC)	1.00	0.10	0.44	46	2.43		2,000 pounds = 1 ton
CO2e		64	279.74				
Total Annual Hours of Operation	**8,760**						
SO2		0.0003	0.0013			0.0006	
PM2.5		0.0047	0.0206			0.0095	
PM (Condensable)		0.0049	0.0215			0.00991	
CO2		54.532	238.8			110	
CH_4 as CO2e	3.67	9.3045	40.8			1.25	
N_2O as CO_{2e}		0.0307	0.1346			0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0013	0.0057			0.00263	
acetaldehyde		0.0014	0.0061			0.00279	
formaldehyde	0.2460	0.0249	0.1093			0.0205	
benzene		0.0008	0.0034			0.00158	
toluene		0.0003	0.0011			0.000508	
ethylbenzene		1E-05	0.0001			2.48E-05	
xylene		1E-04	0.0004			0.000195	
methanol		0.0015	0.0066			0.00306	
total HAPs		0.0303	0.1327			0.031288	

Exhaust Parameters:

Exhaust Gas Temperature	1,005	deg. F
Exhaust Gas Flow Rate	9216	acfm
Total Exhaust Gas Volume Flow, wet	9,216	acfm
Total Exhaust Gas Volume Flow, wet	153.6	acf per sec
Exhaust Stack Height	260	inches
	21.67	feet
Exhaust Stack Inside Diameter	20	inches
	1.667	feet

Everett Weese Production Facility
Tyler County, WV

'otential Emission Rate

Sources HTR-1 to HTR-3

Burner Duty Rating	3000.0	Mbtu/hr	Three Units at 1.0 Mbtu/Hr Each
Burner Efficiency	98.0	%	
Gas Heat Content (HHV)	1232.8	Btu/scf	
Total Gas Consumption	59596.5	scfd	
H2S Concentration	0.000	Mole %	
Hours of Operation	8760		

NOx	0.3001	lbs/hr	1.315	TPY
CO	0.2521	lbs/hr	1.104	TPY
CO2	360.1	lbs/hr	1577.4	TPY
CO2e	362	lbs/hr	1,587	TPY
VOC	0.0165	lbs/hr	0.072	TPY
SO2	0.0018	lbs/hr	0.008	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0228	lbs/hr	0.100	TPY
CHOH	0.0002	lbs/hr	0.001	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hezane	0.0054	lbs/hr	0.024	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0056	lbs/hr	0.025	TPY

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	**100**	**Lbs/MMCF**	
CO	**84**	**Lbs/MMCF**	
CO_2	**120,000**	**Lbs/MMCF**	**Global Warming Potential = 1**
VOC	**5.5**	**Lbs/MMCF**	
PM	**7.6**	**Lbs/MMCF**	
SO_2	**0.6**	**Lbs/MMCF**	
CH_4	**2.3**	**Lbs/MMCF**	**Global Warming Potential = 25**
N_2O	**2.2**	**Lbs/MMCF**	**Global Warming Potential =310**
HCOH	**0.075**	**Lbs/MMCF**	
Benzene	**0.0021**	**Lbs/MMCF**	
n-Hexane	**1.8**	**Lbs/MMCF**	
Toluene	**0.0034**	**Lbs/MMCF**	

Everett Weese Production Facility
Tyler County, WV

'otential Emission Rate

Sources HTR-4 to HTR-5

Burner Duty Rating	2000.0	Mbtu/hr	Two Units at 1.0 Mbtu/Hr Each
Burner Efficiency	98.0	%	
Gas Heat Content (HHV)	1232.8	Btu/scf	
Total Gas Consumption	39731.0	scfd	
H2S Concentration	0.000	Mole %	
Hours of Operation	8760		

NOx	0.2001	lbs/hr	0.876	TPY
CO	0.1681	lbs/hr	0.736	TPY
CO2	240.1	lbs/hr	1051.6	TPY
CO2e	242	lbs/hr	1,058	TPY
VOC	0.0110	lbs/hr	0.048	TPY
SO2	0.0012	lbs/hr	0.005	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0152	lbs/hr	0.067	TPY
CHOH	0.0002	lbs/hr	0.001	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hezane	0.0036	lbs/hr	0.016	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0038	lbs/hr	0.016	TPY

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	**100**	**Lbs/MMCF**	
CO	**84**	**Lbs/MMCF**	
CO_2	**120,000**	**Lbs/MMCF**	**Global Warming Potential = 1**
VOC	**5.5**	**Lbs/MMCF**	
PM	**7.6**	**Lbs/MMCF**	
SO_2	**0.6**	**Lbs/MMCF**	
CH_4	**2.3**	**Lbs/MMCF**	**Global Warming Potential = 25**
N_2O	**2.2**	**Lbs/MMCF**	**Global Warming Potential =310**
HCOH	**0.075**	**Lbs/MMCF**	
Benzene	**0.0021**	**Lbs/MMCF**	
n-Hexane	**1.8**	**Lbs/MMCF**	
Toluene	**0.0034**	**Lbs/MMCF**	

DEHYDRATOR EMISSIONS

Everett Weese Production Facility
Tyler County

Dehydration Emissions
Sources S3A and S4A

Reboiler Burner (S3A)

Burner Duty Rating	500.0	Mbtu/hr	
Burner Efficiency	98.0	%	
Gas Heat Content (HHV)	1232.8	Btu/scf	
Total Gas Consumption	9932.7	scfd	3.63 MMscf/yr
H2S Concentration	0.000	Mole %	

NOx	0.0500	lbs/hr	0.219	TPY
CO	0.0420	lbs/hr	0.184	TPY
VOC	0.0028	lbs/hr	0.012	TPY
SO2	0.0002	lbs/hr	0.001	TPY
PM	0.0038	lbs/hr	0.017	TPY
CO_2	60.0	lb/hr	262.9	TPY
CO_{2e}	60.4	lb/hr	264.5	TPY
n-Hexane	0.0000	lb/hr	0.000	TPY

Controlled Still Vent + Flash Tank Emissions (S4A)

From Gri GlyCalc 4.0

Dry Gas Rate	40,000	MCFD
Glycol Circulation Rate	3.5	Gal/min
Treating Temperature	90	Deg F
Treating Pressure	900	psi

Total HC	4.1847	lbs/hr	18.329	TPY
Total VOC	1.0018	lbs/hr	4.388	TPY
Total HAP	0.0506	lbs/hr	0.222	TPY
CO_{2e}	57.9450	lbs/hr	253.799	TPY
benzene	0.0046	lbs/hr	0.020	TPY
toluene	0.0108	lbs/hr	0.047	TPY
ethyl benzene	0.0000	lbs/hr	0.000	TPY
xylene	0.0094	lbs/hr	0.041	TPY
n-hexane	0.0259	lbs/hr	0.113	TPY

Total Dehy Emissions

NOx	0.0500	lbs/hr	0.219	TPY
CO	0.0420	lbs/hr	0.184	TPY
VOC	1.0046	lbs/hr	4.400	TPY
SO2	0.0002	lbs/hr	0.000	TPY
PM	0.0038	lbs/hr	0.017	TPY
CO_2	0.0	lb/hr	0.000	TPY
CO_{2e}	0.0	lb/hr	0.000	TPY
n-Hexane	0.0000	lb/hr	0.000	TPY

Everett Weese Production Facility
Tyler County

Potential Emission Rates

Source EC-1

Combustor Pilot

Burner Duty Rating	57.00	Mbtu/hr	**Three Units at 0.019 MMBTU/Hr each**
Burner Efficiency	98.0	%	
Gas Heat Content (HHV)	1126.0	Btu/scf	
Total Gas Consumption	1,215	scfd	
H2S Concentration	0.000	Mole %	
Duty Hrs/Yr	8760		

NOx	0.0051	lbs/hr	0.022	TPY
CO	0.0043	lbs/hr	0.019	TPY
CO2e	6.080	lbs/hr	26.63	TPY
VOC	0.0003	lbs/hr	0.001	TPY
SO2	0.0000	lbs/hr	0.000	TPY
PM	0.0004	lb/hr	0.002	TPY

AP-42 Factors Used

NOx	**100**	**Lbs/MMCF**
CO	**84**	**Lbs/MMCF**
CO2	**120,000**	**Lbs/MMCF**
VOC	**5.5**	**Lbs/MMCF**
PM	**7.6**	**Lbs/MMCF**
SO2	**0.6**	**Lbs/MMCF**
CH4	**2.3**	**Lbs/MMCF**

Everett Weese Production Facility
Tyler County

Potential Emission Rates

Sources VCU-1 through VCU-3

Enclosed Combustors

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	2631.0	Btu/scf[1]		
Max Flow to Combustor	2,253	scf/hr[2]	7.584	MMCF/Yr[3]
Max BTUs to Flare	5.93	MMBTU/Hr[2]	17,509	MMBTU/Yr

NOx	0.40	lbs/hr	0.60	tpy
CO	2.19	lbs/hr	3.24	tpy
CO2	692.88	lbs/hr	1,023.31	tpy
CO2e	693.69	lb/hr	1,024.51	tpy
VOC	1.88	lb/hr	5.58	tpy
PM	0.00	lb/hr	0.03	tpy
Benzene	0.0000	lb/hr	0.00	tpy
Toluene	0.0000	lb/hr	0.00	tpy
Hexane	0.0002	lb/hr	0.01	tpy
Formaldehy	0.0000	lb/hr	0.00	tpy
CH4	0.01	lbs/hr	0.0193	tpy
N2O	0.0013	lbs/hr	0.0019	tpy

[1]BTU content of gas is that estimatedby Promax for a combination of vapors from tank and truck loading emissions (2779.4 BTU/cf)

[2] Maximum daily gas flow to combustor.

[3]Annual flow assumes continuous operation
Thus, annual flow is hourly times 8760.

Factors Used

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

VOC emissions equals non-combusted NMNEHC

Everett Weese Production Facility
Tyler County, WV

Fugitive VOC Emissions

Volatile Organic Compounds, NMNEHC from gas analysis:	16.32	weight percent
Methane from gas analysis:	63.20	weight percent
Carbon Dioxide from gas analysis:	0.39	weight percent
Gas Density	0.0565	lb/scf

Emission Source:	Number	Oil & Gas Production*		VOC %	VOC, lb/h	VOC TPY	CO2 lb/H	CO2 TPY	CH4 lb/hr	CH4 TPY	CO2e
Valves:											
Gas/Vapor:	205	0.02700	scf/hr	16.3	0.051	0.224	0.001	0.005	0.198	0.8655	21.643
Light Liquid:	136	0.05000	scf/hr	100.0	0.384	1.683					0.000
Heavy Liquid (Oil):	-	0.00050	scf/hr	100.0	0.000	0.000					
,ow Bleed Pneumati	27	1.39000	scf/hr	16.3	0.346	1.516	1.340	5.869	1.340	5.8686	152.583
Relief Valves:	35	0.04000	scf/hr	16.3	0.013	0.057	0.000	0.001	0.050	0.2189	5.474
pen-ended Lines, ga	-	0.06100	sfc/hr	16.3	0.000	0.000					0.000
en-ended Lines, liqu	-	0.05000	lb/hr	100.0	0.000	0.000					0.000
Pump Seals:											0.000
Gas:	-	0.00529	lb/hr	16.3	0.000	0.000	0.000	0.000	0.000	0.0000	0.000
Light Liquid:	-	0.02866	lb/hr	100.0	0.000	0.000					
Heavy Liquid (Oil):	-	0.00133	lb/hr	100.0	0.000	0.000					
ompressor Seals, Ga	3	0.01940	lb/hr	16.3	0.009	0.042	0.000	0.001	0.002	0.0091	0.229
Connectors:											0.000
Gas:	355	0.00300	scf/hr	16.3	0.010	0.043	0.000	0.001	0.038	0.1665	4.164
Light Liquid:	30	0.00700	scf/hr	100.0	0.210	0.920					0.000
Heavy Liquid (Oil):	-	0.00030	scf/hr	100.0	0.000	0.000					
Flanges:											0.000
Gas:	410	0.00086	lb/hr	16.3	0.058	0.252	0.001	0.006	0.223	0.9760	24.406
Light Liquid:	34	0.00300	scf/hr	100.0	0.006	0.025					0.000
Heavy Liquid:		0.0009	scf/hr	100.0	0.000	0.000					

Fugitive Calculations:

	lb/hr	t/y
VOC	**0.741**	**3.244**
CH4	**1.850**	**8.105**
CO2	**0.003**	**0.015**
CO2e	**47.602**	**208.50**

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

Triad Hunter, LLC
GAS ANALYSIS INFORMATION

Everett Weese Production Facility
Tyler County

Inlet Gas Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N2	0.393	0.110	0.004	0.542			-		0.0039	
Carbon Dioxide, CO2	0.181	0.080	0.003	0.392			-		0.0018	
Hydrogen Sulfide, H2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	79.964	12.829	0.443	63.195	727.2	807.6	7.621		0.7980	
Ethane, C2H6	13.198	3.969	0.137	19.550	213.6	233.6	2.201		0.1309	3.511
Propane	3.901	1.720	0.059	8.474	90.3	98.2	0.929	8.474	0.0383	1.069
Iso-Butane	0.514	0.299	0.010	1.472	15.4	16.7	0.159	1.472	0.0050	0.167
Normal Butane	0.937	0.545	0.019	2.683	28.2	30.6	0.290	2.683	0.0091	0.294
Iso Pentane	0.251	0.181	0.006	0.892	9.3	10.0	0.096	0.892	0.0025	0.091
Normal Pentane	0.228	0.165	0.006	0.810	8.5	9.1	0.087	0.810	0.0023	0.082
Hexane	0.215	0.185	0.006	0.913	9.5	10.2	0.097	0.913	0.0021	0.088
Heptane	0.218	0.218	0.008	1.076	11.1	12.0	0.114	1.076	0.0022	0.100
	100.000	20.300	0.701		1,113.1	1,228.0	11.595	16.320	0.9961	5.403

Gas Density (STP) = 0.056

Ideal Gross (HHV)	1,228.0
Ideal Gross (sat'd)	1,207.4
GPM	-
Real Gross (HHV)	1,232.8
Real Net (LHV)	1,117.4

Traid Hunter, LLC

Everett Weese Production Facility
Tyler County

Fuel Gas Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N2	0.393	0.110	0.004	0.542			-		0.0039	
Carbon Dioxide, CO2	0.181	0.080	0.003	0.392			-		0.0018	
Hydrogen Sulfide, H2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	79.964	12.829	0.443	63.195	727.2	807.6	7.621		0.7980	
Ethane, C2H6	13.198	3.969	0.137	19.550	213.6	233.6	2.201		0.1309	3.511
Propane	3.901	1.720	0.059	8.474	90.3	98.2	0.929	8.474	0.0383	1.069
Iso-Butane	0.514	0.299	0.010	1.472	15.4	16.7	0.159	1.472	0.0050	0.167
Normal Butane	0.937	0.545	0.019	2.683	28.2	30.6	0.290	2.683	0.0091	0.294
Iso Pentane	0.251	0.181	0.006	0.892	9.3	10.0	0.096	0.892	0.0025	0.091
Normal Pentane	0.228	0.165	0.006	0.810	8.5	9.1	0.087	0.810	0.0023	0.082
Hexane	0.215	0.185	0.006	0.913	9.5	10.2	0.097	0.913	0.0021	0.088
Heptane	0.218	0.218	0.008	1.076	11.1	12.0	0.114	1.076	0.0022	0.100
	100.000	20.300	0.701		1,113.1	1,228.0	11.595	16.320	0.9961	5.403

Gas Density (STP) = 0.056

Ideal Gross (HHV)	1,228.0
Ideal Gross (sat'd)	1,207.4
GPM	-
Real Gross (HHV)	1,232.8
Real Net (LHV)	1,117.4

Triad Hunter, LLC

Everett Weese Production Facility
Tyler County

Flash Gas Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N2	0.099	0.028	0.001	0.094			-		0.0010	
Carbon Dioxide, CO2	0.228	0.100	0.003	0.340			-		0.0023	
Hydrogen Sulfide, H2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	42.455	6.811	0.235	23.029	386.1	428.8	4.046		0.4237	
Ethane, C2H6	31.856	9.579	0.331	32.388	515.7	563.7	5.314		0.3160	8.474
Propane	15.906	7.014	0.242	23.716	368.2	400.2	3.789	23.716	0.1563	4.359
Iso-Butane	1.784	1.037	0.036	3.506	53.5	58.0	0.552	3.506	0.0173	0.580
Normal Butane	4.568	2.655	0.092	8.976	137.5	149.0	1.415	8.976	0.0442	1.432
Iso Pentane	0.853	0.615	0.021	2.081	31.5	34.1	0.325	2.081	0.0085	0.311
Normal Pentane	1.103	0.796	0.027	2.691	40.9	44.2	0.420	2.691	0.0110	0.397
Hexane	0.435	0.375	0.013	1.267	19.1	20.7	0.197	1.267	0.0043	0.178
Heptane	0.565	0.566	0.020	1.913	28.8	31.1	0.296	1.913	0.0056	0.259
	99.851	29.576	1.021		1,581.4	1,729.8	16.354	44.149	0.9902	15.991

Gas Density (STP) = **0.082**

Ideal Gross (HHV)	1,729.8
Ideal Gross (sat'd)	1,700.4
GPM	-
Real Gross (HHV)	1,747.0
Real Net (LHV)	1,597.1

GAS DATA INFORMATION

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

Hydrogen Sulfide (H2S) conversion chart:

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

Ideal Gas at 14.696 psia and 60°F

		MW lb/mol	Specific Gravity	Lb per Cu Ft	Cu Ft per Lb	LHV, dry Btu/scf	HHV, dry Btu/scf	LHV Btu/lb	HHV Btu/lb	cu ft of air / 1 cu ft of gas	Z factor
Nitrogen	N2	28.013	0.9672	0.0738	13.552	0	0	0	0	0	0.9997
Carbon Dioxide	CO2	44.010	1.5196	0.1159	8.626	0	0	0	0	0	0.9964
Hydrogen Sulfide	H2S	34.076	1.1766	0.0898	11.141	587	637	6,545	7,100	7.15	0.9846
Helium	He	4.003	0.1382	0.0105	94.848						1.0006
Oxygen	O2	31.999	1.1048	0.0843	11.864	0	0	0	0	0	0.9992
Methane	CH4	16.043	0.5539	0.0423	23.664	909.4	1,010.0	21,520	23,879	9.53	0.9980
Ethane	C2H6	30.070	1.0382	0.0792	12.625	1,618.7	1,769.6	20,432	22,320	16.68	0.9919
Propane	C3H8	44.097	1.5226	0.1162	8.609	2,314.9	2,516.1	19,944	21,661	23.82	0.9825
Iso-Butane	C4H10	58.124	2.0069	0.1531	6.532	3,000.4	3,251.9	19,629	21,257	30.97	0.9711
Normal Butane	C4H10	58.124	2.0069	0.1531	6.532	3,010.8	3,262.3	19,680	21,308	30.97	0.9667
Iso Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,699.0	4,000.9	19,478	21,052	38.11	1.0000
Normal Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,706.9	4,008.9	19,517	21,091	38.11	1.0000
Hexane	C6H14	86.178	2.9755	0.2270	4.405	4,403.8	4,755.9	19,403	20,940	45.26	0.9879
Heptane	C7H16	100.205	3.4598	0.2639	3.789	5,100.0	5,502.5	22,000	23,000	52.41	0.9947

Real Gas at 14.696 psia and 60°F

		MW lb/mol	Specific Gravity	Lb per Cu Ft	Cu Ft per Lb	LHV, dry Btu/scf	HHV, dry Btu/scf	LHV Btu/lb	HHV Btu/lb	cu ft of air / 1 cu ft of gas	Gal/Mole	
Nitrogen	N2	28.013	0.9672	0.0738	13.552	0	0	0	0	0	4.1513	
Carbon Dioxide	CO2	44.010	1.5196	0.1159	8.626	0	0	0	0	0	6.4532	
Hydrogen Sulfide	H2S	34.076	1.1766	0.0898	11.141	621	672	6,545	7,100	7.15	5.1005	
Helium	He	4.003	0.1382	0.0105	94.848						3.8376	
Oxygen	O2	31.999	1.1048	0.0843	11.864	0	0	0	0	0	3.3605	
Methane	CH4	16.043	0.5539	0.0423	23.664	911	1,012	21,520	23,879	9.53	6.4172	
Ethane	C2H6	30.070	1.0382	0.0792	12.625	1,631	1,783	20,432	22,320	16.68	10.126	
Propane	C3H8	44.097	1.5226	0.1162	8.609	2,353	3,354	19,944	21,661	23.82	10.433	
Iso-Butane	C4H10	58.124	2.0069	0.1531	6.532	3,101	3,369	19,629	21,257	30.97	12.386	
Normal Butane	C4H10	58.124	2.0069	0.1531	6.532	3,094	3,370	19,680	21,308	30.97	11.937	
Iso Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,709	4,001	19,478	21,052	38.11	13.86	
Normal Pentane	C5H12	72.151	2.4912	0.1901	5.262	3,698	4,009	19,517	21,091	38.11	13.713	
Hexane	C6H14	86.178	2.9755	0.2270	4.405	4,404	4,756	19,403	20,940	45.26	15.566	16.3227
Heptane	C7H16	100.205	3.4598	0.2639	3.789	5,101	5,503	22,000	23,000	52.41	17.468	17.468

Condensate Truck Loading Lost Emissions Per AP-42
Weese Station

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

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

Where:

L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded
S= saturation factor (0.6)
P=true vapor pressure of liquid loaded 18.1 psia (by ProMax)
M= Molecular weight of vapor in lb/lb-mole (estimated at 82.92 by ProMax)
T= temperature of bulk liquid loaded in deg R or 460+deg F (70 Deg F)

Thus, $L_L = 12.46[0.6 \times 18.1 \times 82.92]/[460+70]$
$L_L = 21.17$ lb/1000 gallons loaded

<u>Based on the ProMax model, these emissions are 99.5% VOCs.</u>.

Given a maximum loading of 210 BBL (8,820 gallons) a day, uncontrolled VOC emissions are estimated at 185.8 lb of VOC per day [8.82 x 21.17 x .995]. The overall control system is estimated to reduce these emissions greater than 68.6%. This will be accomplished through a combination of a vapor control system and use of un-certified tanker trucks. Un-certified tankers have a capture efficiency of 70% per AP-42, Chapter 5.2.2.1.1. Thus, uncaptured VOC emissions are estimated at 55.7 lb/day [185.8 x 0.3]. With all daily loading taking place within 1 hour, the uncaptured hourly VOC emission rate is the same as the daily rate, 55.7 lb/hr.

Maximum annual throughput is 490,000 gallons per year. Thus, un-captured VOC emissions are conservatively estimated at 3096 pounds per year [490 x 21.17 x 30% x 0.995] or 1.58 tons per year.

The captured VOC emissions are routed to the combustor [185.8 lb/day x 70% = 130.1 lb/day VOC or a 1 hour loading day]. Annually, captured VOC emissions are estimated at (490 x 21.17 x 70% x .995) or 7,225 pounds per year or 3.01 tons per year. With a minimum capture and control efficiency of 98%, hourly and annual VOC emissions from the combustor are 2.60 lb/hr and 0.07 tpy.

It is important to note that all captured truck loading vapors will be routed to an enclosed combustor. This device will have a warranted destruction efficiency >99%. However, per the limitations of the G70-A permit, a maximum capture/control efficiency of 98% is claimed.

Condensate Truck Loading Emissions to Combustor

Given: Vapor Heat Content: 2830 btu/scf (HHV – per ProMax Stream 407)
Vapor Density: 0.134 lb/scf (per ProMax Stream 407)
Max to Combustor: 93.4 lb/hr [total gas flow, not just VOCs]
(185.8/ lb/day / 0.995 = 186.7 lb/day or 93.4 lb/hr)
Max to Combustor (per Yr) 7,261 lb/yr [3.63 tons per year]

<u>Max Hourly BTUs to Combustor</u>
(186.8 lb/hr)/(0.134 lb/scf) = 1394 scf/hr
1394 scf/hr x 2830 btu/scf = 3.945 MMBTU/hr

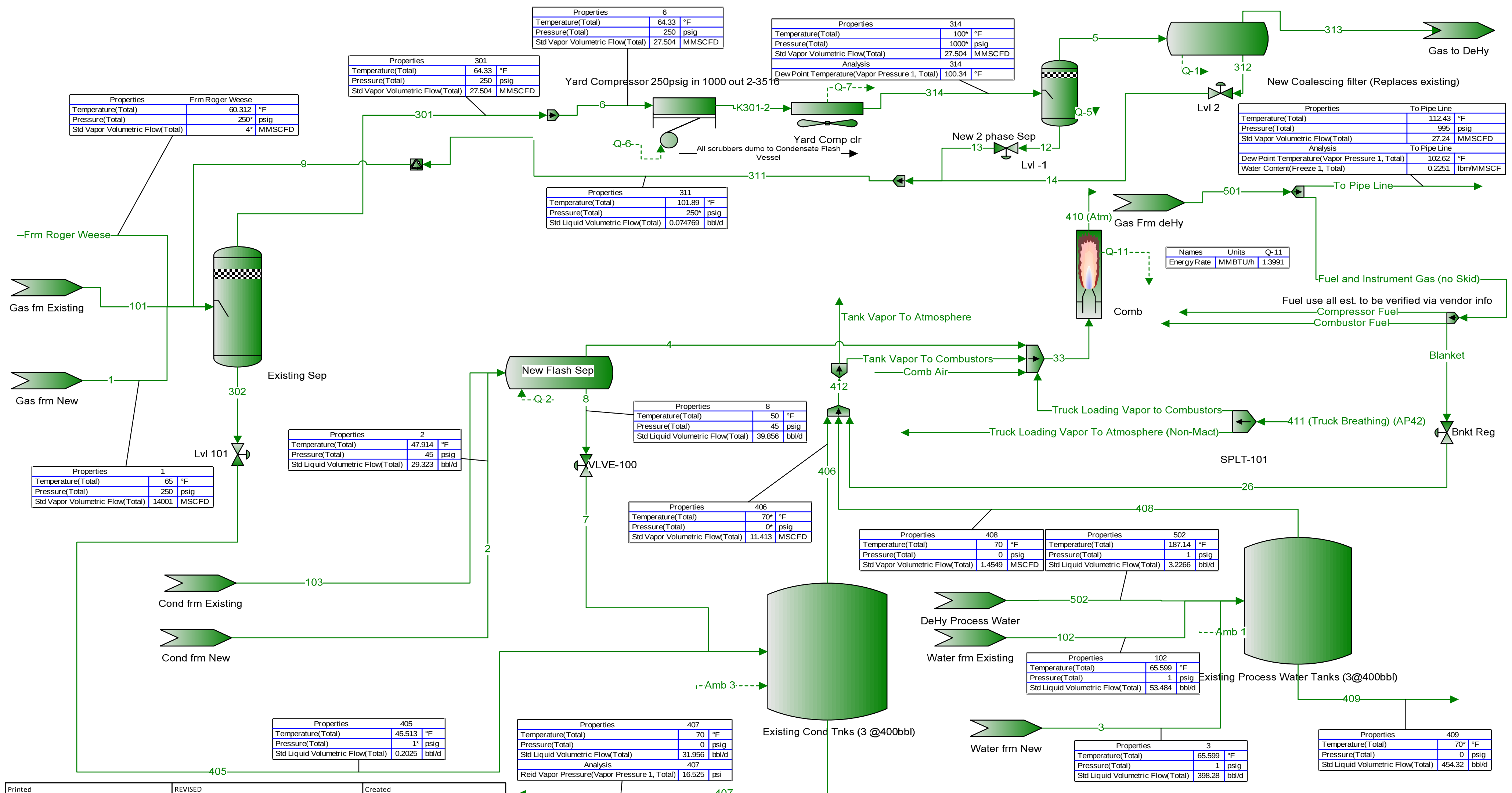
<u>Max Annual BTUs to VRU or Combustor</u>
(7,261 lb/yr) / (0.134 lb/scf) = 54,189 scf/yr
54,189 scf/yr x 2830 btu/scf = 153 MMBTU/yr

Triad Hunter
Weese Station
Loading to Combustor

There are three gas streams that are routed to the combustor: flash gas from the flash separator, tank vapors and condensate loading vapors. These three streams and associated contribution to the overall loading to the combustor is summarized in the following table.

Source	SCFD	SCF/Hr	BTU /scf	MMSCF/Yr	MMBTU/Hr	Tons /yr	% VOC	MMBTU /Yr	Reference
Flash Separator	7,736	322	1734	2.824	0.56	110.4	44.1	4896	ProMax Stream 4
Water and Condensate Tanks	12,892	537	2648	4.706	1.422	293.1	82.7	12,460	ProMax Stream 412
Condensate Truck Loading	1,394	1394	2830	0.054	3.945	3.61	99.5	153	Truck Loading Worksheet
Total to Combustor	22,022	2253	2631	7.584	5.927	407.1	68.5	17,509	

Given an overall combustion efficiency of 98%, potential annual VOC emissions are 5.58 tpy [407.1 x 0.685 x 0.02]. In a similar manner, hourly potential VOC emissions (during truck loading) have been estimated at 1.88 lb/hr. These have been used in the combustor emission calculation worksheet for Weese Station.



Properties	Frm Roger Weese	
Temperature(Total)	60.312	°F
Pressure(Total)	250*	psig
Std Vapor Volumetric Flow(Total)	4*	MMSCFD

Properties	301	
Temperature(Total)	64.33	°F
Pressure(Total)	250	psig
Std Vapor Volumetric Flow(Total)	27.504	MMSCFD

Properties	6	
Temperature(Total)	64.33	°F
Pressure(Total)	250	psig
Std Vapor Volumetric Flow(Total)	27.504	MMSCFD

Properties	311	
Temperature(Total)	101.89	°F
Pressure(Total)	250*	psig
Std Liquid Volumetric Flow(Total)	0.074769	bbl/d

Properties	314	
Temperature(Total)	100*	°F
Pressure(Total)	1000*	psig
Std Vapor Volumetric Flow(Total)	27.504	MMSCFD
Analysis	314	
Dew Point Temperature(Vapor Pressure 1, Total)	100.34	°F

Properties	To Pipe Line	
Temperature(Total)	112.43	°F
Pressure(Total)	995	psig
Std Vapor Volumetric Flow(Total)	27.24	MMSCFD
Analysis	To Pipe Line	
Dew Point Temperature(Vapor Pressure 1, Total)	102.62	°F
Water Content(Freeze 1, Total)	0.2251	lbm/MMSCF

Names	Units	Q-11
Energy Rate	MMBTU/h	1.3991

Properties	8	
Temperature(Total)	50	°F
Pressure(Total)	45	psig
Std Liquid Volumetric Flow(Total)	39.856	bbl/d

Properties	2	
Temperature(Total)	47.914	°F
Pressure(Total)	45	psig
Std Liquid Volumetric Flow(Total)	29.323	bbl/d

Properties	1	
Temperature(Total)	65	°F
Pressure(Total)	250	psig
Std Vapor Volumetric Flow(Total)	14001	MSCFD

Properties	406	
Temperature(Total)	70*	°F
Pressure(Total)	0*	psig
Std Vapor Volumetric Flow(Total)	11.413	MSCFD

Properties	408	
Temperature(Total)	70	°F
Pressure(Total)	0	psig
Std Vapor Volumetric Flow(Total)	1.4549	MSCFD

Properties	502	
Temperature(Total)	187.14	°F
Pressure(Total)	1	psig
Std Liquid Volumetric Flow(Total)	3.2266	bbl/d

Properties	102	
Temperature(Total)	65.599	°F
Pressure(Total)	1	psig
Std Liquid Volumetric Flow(Total)	53.484	bbl/d

Properties	405	
Temperature(Total)	45.513	°F
Pressure(Total)	1*	psig
Std Liquid Volumetric Flow(Total)	0.2025	bbl/d

Properties	407	
Temperature(Total)	70	°F
Pressure(Total)	0	psig
Std Liquid Volumetric Flow(Total)	31.956	bbl/d
Analysis	407	
Reid Vapor Pressure(Vapor Pressure 1, Total)	16.525	psi

Properties	3	
Temperature(Total)	65.599	°F
Pressure(Total)	1	psig
Std Liquid Volumetric Flow(Total)	398.28	bbl/d

Properties	409	
Temperature(Total)	70*	°F
Pressure(Total)	0	psig
Std Liquid Volumetric Flow(Total)	454.32	bbl/d

Printed 7/23/2014	REVISED 10/30/2015	Created RGWSolutions		
DRAWN ROB		SIZE 11*17	FSCM NO	DWG NO Ed Weese w Flash Gas 20151030.pmx	REV Preliminary
ISSUED Preliminary		SCALE None	EdWese Productuin Eq	SHEET 2 OF 3

Process Streams		Comb AIR	Comb Stack	1	2	3	4	5	12
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	--	REAC-100	MIX-101	RCYL-1	VSSL-101	VLVE-106	VSSL-101	VLVE-108
	To Block:	MIX-105	--	VLVE-108	MIX-101	MIX-100	Water Tanks	RCYL-1	Condensate Tanks
Mass Fraction		%	%	%	%	%	%	%	%
Methane		0*	0.0100644	2.29748	0.0119944	3.99878	0.0434767	0.0119944	2.29748
Ethane		0*	0.0133793	3.56554	0.218507	11.2061	0.0132379	0.218507	3.56554
Propane		0*	0.0146433	4.71583	1.36911	20.6941	0.00516717	1.36911	4.71583
Isobutane		0*	0.00426351	1.86745	2.23964	12.5195	0.000297174	2.23964	1.86745
n-Butane		0*	0.00880612	4.58524	4.57623	17.4005	0.00119085	4.57623	4.58524
Isopentane		0*	0.00364528	3.54283	6.56881	10.0084	0.000236794	6.56881	3.54283
n-Pentane		0*	0.00333662	4.13717	12.9911	14.5636	0.000219218	12.9911	4.13717
Isohexane		0*	0.00217504	6.04875	0	0	6.56540E-05	0	6.04875
Heptane		0*	0.00158643	18.6341	63.0879	6.27206	3.42053E-05	63.0879	18.6341
Octane		0*	0.000715980	27.6903	0	0	1.39661E-05	0	27.6903
Nonane		0*	0.000124870	15.5510	0	0	3.92658E-06	0	15.5510
Decane		0*	0	0	0	0	0	0	0
n-Hexane		0*	0.00133370	5.10261	7.97301	2.31775	3.16591E-05	7.97301	5.10261
Benzene		0*	2.96497E-05	0.108833	0.0827123	0.0259667	0.000331791	0.0827123	0.108833
Toluene		0*	6.94464E-05	0.923639	0	0	0.000686229	0	0.923639
Ethylbenzene		0*	4.91171E-06	0.210437	0.0310333	0.000843795	4.42173E-05	0.0310333	0.210437
o-Xylene		0*	1.67747E-05	0.961570	0.465887	0.00946456	0.000224662	0.465887	0.961570
2,2,4-Trimethylpentane		0*	0	0	0	0	0	0	0
Carbon Dioxide		0*	9.32550	0.0329067	0.000481239	0.0565176	0.00453956	0.000481239	0.0329067
Water		0*	5.39461	0.0163010	0.383511	0.926353	99.9300	0.383511	0.0163010
TEG		0*	0	0	0	0	0	0	0
Nitrogen		76.7082*	74.2356	0.00792451	8.68120E-08	8.97052E-05	0.000229310	8.68120E-08	0.00792451
Oxygen		23.2918*	10.9800	0	0	0	0	0	0
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Methane		0*	0.0618137	2.75759	6.61757E-05	0.00101349	0.376309	6.22330E-05	2.75759
Ethane		0*	0.0821728	4.27961	0.00120555	0.00284019	0.114579	0.00113373	4.27961
Propane		0*	0.0899360	5.66026	0.00755369	0.00524491	0.0447240	0.00710364	5.66026
Isobutane		0*	0.0261857	2.24144	0.0123566	0.00317307	0.00257217	0.0116204	2.24144
n-Butane		0*	0.0540855	5.50351	0.0252481	0.00441015	0.0103073	0.0237438	5.50351
Isopentane		0*	0.0223886	4.25234	0.0362417	0.00253662	0.00204955	0.0340824	4.25234
n-Pentane		0*	0.0204929	4.96571	0.0716752	0.00369115	0.00189742	0.0674048	4.96571
Isohexane		0*	0.0133587	7.26012	0	0	0.000568263	0	7.26012
Heptane		0*	0.00974355	22.3659	0.348071	0.00158965	0.000296061	0.327333	22.3659
Octane		0*	0.00439741	33.2358	0	0	0.000120883	0	33.2358
Nonane		0*	0.000766928	18.6654	0	0	3.39862E-05	0	18.6654
Decane		0*	0	0	0	0	0	0	0
n-Hexane		0*	0.00819132	6.12449	0.0439890	0.000587433	0.000274023	0.0413681	6.12449
Benzene		0*	0.000182103	0.130628	0.000456343	6.58126E-06	0.00287179	0.000429154	0.130628
Toluene		0*	0.000426526	1.10861	0	0	0.00593960	0	1.10861
Ethylbenzene		0*	3.01668E-05	0.252581	0.000171218	2.13860E-07	0.000382719	0.000161017	0.252581
o-Xylene		0*	0.000103027	1.15414	0.00257041	2.39879E-06	0.00194455	0.00241727	1.15414
2,2,4-Trimethylpentane		0*	0	0	0	0	0	0	0
Carbon Dioxide		0*	57.2754	0.0394969	2.65511E-06	1.43244E-05	0.0392918	2.49692E-06	0.0394969
Water		0*	33.1327	0.0195655	0.00211592	0.000234784	864.935	0.00198985	0.0195655
TEG		0*	0	0	0	0	0	0	0
Nitrogen		455.929*	455.941	0.00951153	4.78962E-10	2.27358E-08	0.00198477	4.50426E-10	0.00951153
Oxygen		138.439*	67.4373	0	0	0	0	0	0

Process Streams		16	17	18	140	140A	143	144	145	150	153
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	9H Marcela's Gas	9H Mar Cond	9H Mar Water	MIX-100	MIX-105	--	Condensate Tanks	Water Tanks	Condensate Tanks	Water Tanks
	To Block:	--	MIX-101	VLVE-106	MIX-105	REAC-100	VSSL-101	MIX-100	MIX-100	--	--
Mass Fraction		%	%	%	%	%	%	%	%	%	%
Methane		61.8019	2.30804	0.0434767	15.5998	0.503221	0.197672*	14.1972	64.1695	0.0278654	0.00186611
Ethane		19.8052	3.58100	0.0132379	20.7379	0.668963	0.730235*	20.7905	19.3644	0.280246	0.000681181
Propane		8.81550	4.73129	0.00516717	22.6970	0.732163	2.26913*	23.1441	7.47390	1.20103	0.000320804
Isobutane		1.59428	1.86573	0.000297174	6.60844	0.213176	2.71841*	6.78049	0.448288	0.930395	6.47901E-06
n-Butane		2.88319	4.58528	0.00119085	13.6495	0.440306	5.17349*	13.9918	1.75299	2.79113	5.41358E-05
Isopentane		1.02088	3.52886	0.000236794	5.65019	0.182264	6.72900*	5.79909	0.352964	3.11250	7.91397E-06
n-Pentane		0.911318	4.09628	0.000219218	5.17176	0.166831	13.0644*	5.30081	0.327364	3.91523	6.93730E-06
Isohexane		0.623957	6.07668	6.56540E-05	3.37132	0.108752	0*	3.47127	0.0997159	6.54035	9.92249E-07
Heptane		0.573875	18.4289	3.42053E-05	2.45897	0.0793216	60.4418*	2.52422	0.0517997	21.7068	6.15283E-07
Octane		0.332545	27.8182	1.39661E-05	1.10977	0.0357990	0*	1.14301	0.0213290	32.7536	1.35065E-07
Nonane		0.0715936	15.6228	3.92658E-06	0.193549	0.00624350	0*	0.199280	0.00595824	18.4790	6.28976E-08
Decane		0	0	0	0	0	0*	0	0	0	0
n-Hexane		0.396006	5.08935	3.16591E-05	2.06723	0.0666850	7.70963*	2.12585	0.0482264	5.67036	3.86194E-07
Benzene		0.00816332	0.108953	0.000331791	0.0459570	0.00148249	0.0800695*	0.0454828	0.0631051	0.120915	0.000291058
Toluene		0.0234799	0.927904	0.000686229	0.107642	0.00347232	0*	0.106431	0.153978	1.07950	0.000586760
Ethylbenzene		0.00210150	0.211265	4.42173E-05	0.00761315	0.000245586	0.0296272*	0.00754978	0.0100896	0.249133	3.76989E-05
o-Xylene		0.00748181	0.963859	0.000224662	0.0260007	0.000838733	0.444630*	0.0256282	0.0395086	1.14008	0.000199171
2,2,4-Trimethylpentane		0	0	0	0	0	0*	0	0	0	0
Carbon Dioxide		0.365457	0.0330565	0.00453956	0.294278	0.00949283	0.00309103*	0.199275	3.55920	0.00117556	0.00223299
Water		0.154598	0.0146052	99.9300	0.145375	0.00468952	0.408793*	0.0986194	1.71166	0.000600479	99.9937
TEG		0	0	0	0	0	0*	0	0	0	0
Nitrogen		0.608478	0.00796110	0.000229310	0.0576714	74.2356	4.26063E-06*	0.0493278	0.346068	2.77020E-05	4.89981E-06
Oxygen		0	0	0	0	22.5404	0*	0	0	0	0
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Methane		4178.81	2.75753	0.376309	3.09068	3.09068	0.00107572*	2.72950	0.360167	0.0280886	0.0161415
Ethane		1339.15	4.27840	0.114579	4.10864	4.10864	0.00397392*	3.99711	0.108687	0.282491	0.00589208
Propane		596.070	5.65270	0.0447240	4.49680	4.49680	0.0123485*	4.44961	0.0419491	1.21065	0.00277489
Isobutane		107.799	2.22908	0.00257217	1.30928	1.30928	0.0147935*	1.30359	0.00251613	0.937848	5.60421E-05
n-Butane		194.950	5.47826	0.0103073	2.70427	2.70427	0.0281540*	2.69002	0.00983906	2.81349	0.000468264
Isopentane		69.0278	4.21610	0.00204955	1.11943	1.11943	0.0366190*	1.11491	0.00198110	3.13743	6.84543E-05
n-Pentane		61.6198	4.89403	0.00189742	1.02464	1.02464	0.0710959*	1.01912	0.00183741	3.94659	6.00062E-05
Isohexane		42.1896	7.26012	0.000568263	0.667935	0.667935	0*	0.667375	0.000559680	6.59274	8.58276E-06
Heptane		38.8032	22.0179	0.000296061	0.487178	0.487178	0.328923*	0.485297	0.000290739	21.8806	5.32207E-06
Octane		22.4854	33.2358	0.000120883	0.219871	0.219871	0*	0.219751	0.000119715	33.0160	1.16829E-06
Nonane		4.84088	18.6654	3.39862E-05	0.0383464	0.0383464	0*	0.0383129	3.34421E-05	18.6271	5.44051E-07
Decane		0	0	0	0	0	0*	0	0	0	0
n-Hexane		26.7764	6.08051	0.000274023	0.409566	0.409566	0.0419556*	0.408708	0.000270682	5.71579	3.34050E-06
Benzene		0.551972	0.130172	0.00287179	0.00910513	0.00910513	0.000435736*	0.00874436	0.000354193	0.121884	0.00251759
Toluene		1.58762	1.10861	0.00593960	0.0213263	0.0213263	0*	0.0204621	0.000864238	1.08815	0.00507536
Ethylbenzene		0.142095	0.252409	0.000382719	0.00150834	0.00150834	0.000161231*	0.00145149	5.66306E-05	0.251129	0.000326088
o-Xylene		0.505891	1.15157	0.00194455	0.00515134	0.00515134	0.00241966*	0.00492719	0.000221752	1.14921	0.00172279
2,2,4-Trimethylpentane		0	0	0	0	0	0*	0	0	0	0
Carbon Dioxide		24.7108	0.0394942	0.0392918	0.0583031	0.0583031	1.68213E-05*	0.0383119	0.0199769	0.00118498	0.0193149
Water		10.4533	0.0174496	864.935	0.0288021	0.0288021	0.00222464*	0.0189602	0.00960713	0.000605289	864.926
TEG		0	0	0	0	0	0*	0	0	0	0
Nitrogen		41.1429	0.00951152	0.00198477	0.0114260	455.941	2.31862E-08*	0.00948360	0.00194239	2.79239E-05	4.23824E-05
Oxygen		0	0	0	0	138.439	0*	0	0	0	0

Process Streams	Comb AIR	Comb Stack	1	2	3	4	5	12
Composition — Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total — From Block:	--	REAC-100	MIX-101	RCYL-1	VSSL-101	VLVE-106	VSSL-101	VLVE-108
To Block:	MIX-105	--	VLVE-108	MIX-101	MIX-100	Water Tanks	RCYL-1	Condensate Tanks
Mole Fraction	%	%	%	%	%	%	%	%
Methane	0*	0.0178925	11.1050	0.0635442	11.9309	0.0488273	0.0635442	11.1050
Ethane	0*	0.0126901	9.19480	0.617611	17.8382	0.00793188	0.617611	9.19480
Propane	0*	0.00947099	8.29275	2.63883	22.4629	0.00211122	2.63883	8.29275
Isobutane	0*	0.00209208	2.49140	3.27496	10.3101	9.21184E-05	3.27496	2.49140
n-Butane	0*	0.00432112	6.11725	6.69168	14.3296	0.000369142	6.69168	6.11725
Isopentane	0*	0.00144097	3.80765	7.73798	6.63973	5.91315E-05	7.73798	3.80765
n-Pentane	0*	0.00131896	4.44642	15.3034	9.66175	5.47424E-05	15.3034	4.44642
Isohexane	0*	0.000719844	5.44275	0	0	1.37264E-05	0	5.44275
Heptane	0*	0.000451543	14.4201	53.5106	2.99606	6.15027E-06	53.5106	14.4201
Octane	0*	0.000178764	18.7970	0	0	2.20282E-06	0	18.7970
Nonane	0*	2.77675E-05	9.40200	0	0	5.51590E-07	0	9.40200
Decane	0*	0	0	0	0	0	0	0
n-Hexane	0*	0.000441396	4.59140	7.86338	1.28736	6.61901E-06	7.86338	4.59140
Benzene	0*	1.08257E-05	0.108039	0.0899959	0.0159117	7.65287E-05	0.0899959	0.108039
Toluene	0*	2.14962E-05	0.777315	0	0	0.000134185	0	0.777315
Ethylbenzene	0*	1.31949E-06	0.153701	0.0248437	0.000380427	7.50391E-06	0.0248437	0.153701
o-Xylene	0*	4.50636E-06	0.702321	0.372966	0.00426712	3.81264E-05	0.372966	0.702321
2,2,4-Trimethylpentane	0*	0	0	0	0	0	0	0
Carbon Dioxide	0*	6.04337	0.0579795	0.000929361	0.0614685	0.00185842	0.000929361	0.0579795
Water	0*	8.54029	0.0701630	1.80928	2.46122	99.9383	1.80928	0.0701630
TEG	0*	0	0	0	0	0	0	0
Nitrogen	79*	75.5788	0.0219352	2.63380E-07	0.000153274	0.000147480	2.63380E-07	0.0219352
Oxygen	21*	9.78642	0	0	0	0	0	0

Process Streams	16	17	18	140	140A	143	144	145	150	153
Composition — Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total — From Block:	9H Marcela's Gas	9H Mar Cond	9H Mar Water	MIX-100	MIX-105	--	Condensate Tanks	Water Tanks	Condensate Tanks	Water Tanks
To Block:	--	MIX-101	VLVE-106	MIX-105	REAC-100	VSSL-101	MIX-100	MIX-100	--	--
Mole Fraction	%	%	%	%	%	%	%	%	%	%
Methane	79.0255	11.1515	0.0488273	34.8146	0.910684	1.01072*	32.4403	79.1382	0.171083	0.00209565
Ethane	13.5112	9.23092	0.00793188	24.6920	0.645896	1.99205*	25.3454	12.7413	0.917979	0.000408126
Propane	4.10098	8.31657	0.00211122	18.4283	0.482050	4.22107*	19.2397	3.35336	2.68269	0.000131068
Isobutane	0.562675	2.48810	9.21184E-05	4.07070	0.106482	3.83646*	4.27634	0.152596	1.57666	2.00825E-06
n-Butane	1.01758	6.11483	0.000369142	8.40788	0.219934	7.30129*	8.82441	0.596712	4.72988	1.67801E-05
Isopentane	0.290256	3.79110	5.91315E-05	2.80379	0.0733418	7.65032*	2.94634	0.0967898	4.24906	1.97614E-06
n-Pentane	0.259106	4.40069	5.47424E-05	2.56639	0.0671317	14.8531*	2.69318	0.0897699	5.34491	1.73226E-06
Isohexane	0.148528	5.46567	1.37264E-05	1.40065	0.0366382	0*	1.47659	0.0228934	7.47532	2.07439E-07
Heptane	0.117484	14.2555	6.15027E-06	0.878596	0.0229824	49.4788*	0.923429	0.0102277	21.3369	1.10624E-07
Octane	0.0597190	18.8762	2.20282E-06	0.347833	0.00909864	0*	0.366799	0.00369424	28.2421	2.13020E-08
Nonane	0.0114508	9.44160	5.51590E-07	0.0540291	0.00141330	0*	0.0569564	0.000919119	14.1911	8.83509E-09
Decane	0	0	0	0	0	0*	0	0	0	0
n-Hexane	0.0942660	4.57762	6.61901E-06	0.858854	0.0224659	7.33852*	0.904278	0.0110721	6.48097	8.07373E-08
Benzene	0.00214381	0.108115	7.65287E-05	0.0210643	0.000551002	0.0840830*	0.0213443	0.0159836	0.152467	6.71297E-05
Toluene	0.00522746	0.780589	0.000134185	0.0418267	0.00109410	0*	0.0423429	0.0330632	1.15397	0.000114729
Ethylbenzene	0.000406055	0.154244	7.50391E-06	0.00256741	6.71585E-05	0.0228912*	0.00260679	0.00188028	0.231133	6.39734E-06
o-Xylene	0.00144565	0.703708	3.81264E-05	0.00876833	0.000229362	0.343539*	0.00884890	0.00736273	1.05771	3.37985E-05
2,2,4-Trimethylpentane	0	0	0	0	0	0*	0	0	0	0
Carbon Dioxide	0.170344	0.0582197	0.00185842	0.239400	0.00626223	0.00576122*	0.165981	1.60005	0.00263094	0.000914097
Water	0.176035	0.0628387	99.9383	0.288910	0.00755731	1.86132*	0.200666	1.87977	0.00328299	99.9962
TEG	0	0	0	0	0	0*	0	0	0	0
Nitrogen	0.445570	0.0220276	0.000147480	0.0737067	76.9354	1.24757E-05*	0.0645475	0.244413	9.73997E-05	3.15112E-06
Oxygen	0	0	0	0	20.4507	0*	0	0	0	0

Process Streams	Units	Comb AIR	Comb Stack	1	2	3	4	5	12
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	--	REAC-100	MIX-101	RCYL-1	VSSL-101	VLVE-106	VSSL-101	VLVE-108
	To Block:	MIX-105	--	VLVE-108	MIX-101	MIX-100	Water Tanks	RCYL-1	Condensate Tanks
Property	Units								
Temperature	°F	70*	600*	49.4038	70	70	91.0653	70	50.4352
Pressure	psig	1*	0	0	0	0	1*	0	1*
Mass Flow	lb/h	594.368*	614.181	120.027	0.551724	0.0253450	865.542	0.518852	120.027
Mass Fraction Vapor	%	100	100	14.2273	0	100	0.0675367	0	13.9208
Enthalpy	MMBtu/h	-0.00108558	-0.328756	-0.119150	-0.000558890	-2.68715E-05	-5.88936	-0.000525591	-0.119150
Mole Fraction Vapor	%	100	100	31.7051	0	100	0.0613600	0	31.2764
Molecular Weight	lb/lbmol	28.8503	28.5203	77.5418	84.9904	47.8647	18.0168	84.9904	77.5418
Molar Flow	lbmol/h	20.6018	21.5349	1.54790	0.00649160	0.000529513	48.0409	0.00610483	1.54790
Specific Gravity		0.996124	0.984727		0.660701	1.65264		0.660701	
Dynamic Viscosity	cP	0.0180500	0.0285029		0.313523	0.00808981		0.313523	
Kinematic Viscosity	cSt	14.1386	48.2935		0.474311	4.00113		0.474311	
Thermal Conductivity	Btu/(h*ft*°F)	0.0147468	0.0254359		0.0702527	0.0103366		0.0702527	
Std Vapor Volumetric Flow	MMSCFD	0.187633	0.196132	0.0140977	5.91231E-05	4.82260E-06	0.437538	5.56005E-05	0.0140977
Std Liquid Volumetric Flow	Mbbl/d	0.0470349	0.0499107	0.0129662	5.70944E-05	3.30680E-06	0.0594029	5.36927E-05	0.0129662
Gross Ideal Gas Heating Value	Btu/ft^3	0	5.35453	4280.83	4669.28	2685.24	50.9979	4669.28	4280.83
CpCv Ratio		1.40096	1.35369	1.14888	1.17639	1.12294	1.41732	1.17639	1.14959
Compressibility		0.999581	1.00032	0.317410	0.00533241	0.980414	0.00138218	0.00533241	0.313295
Mass Volume	ft^3/lb	12.5473	27.1407	1.52171	0.0242675	7.92256	0.0288873	0.0242675	1.40914
Mass Density	lb/ft^3	0.0796987	0.0368450	0.657156	41.2073	0.126222	34.6173	41.2073	0.709652
Net Ideal Gas Heating Value	Btu/ft^3	0	0.970355	3962.80	4323.23	2472.14	0.651540	4323.23	3962.80

Process Streams	Units	16	17	18	140	140A	143	144	145	150	153
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	9H Marcela's Gas	9H Mar Cond	9H Mar Water	MIX-100	MIX-105	--	Condensate Tanks	Water Tanks	Condensate Tanks	Water Tanks
	To Block:	--	MIX-101	VLVE-106	MIX-105	REAC-100	VSSL-101	MIX-100	MIX-100	--	--
Property	Units										
Temperature	°F	70.4140	83.6550	91.0555	61.9881	69.4764	70*	62*	62*	62	62
Pressure	psig	185*	185*	10	0	0	0*	0	0	0	0
Mass Flow	lb/h	6761.61	119.475	865.542	19.8123	614.181	0.544197*	19.2257	0.561275	100.801	864.980
Mass Fraction Vapor	%	99.8950	3.16758	0.0643202	100	100	4.65732	100	100	0	0
Enthalpy	MMBtu/h	-11.3224	-0.118591	-5.88936	-0.0234809	-0.0245665	-0.000552463	-0.0224083	-0.00104574	-0.0956743	-5.91305
Mole Fraction Vapor	%	99.9757	10.6380	0.0586571	100	100	7.98138	100	100	0	0
Molecular Weight	lb/lbmol	20.5133	77.5104	18.0168	35.8024	29.0322	82.0272	36.6567	19.7847	98.4946	18.0157
Molar Flow	lbmol/h	329.620	1.54141	48.0409	0.553378	21.1552	0.00663434	0.524479	0.0283692	1.02342	48.0125
Specific Gravity					1.23616	1.00240		1.26566	0.683110	0.690507	0.999623
Dynamic Viscosity	cP				0.00882526	0.0176857		0.00874846	0.0105961	0.423284	1.10445
Kinematic Viscosity	cSt				5.79363	14.6873		5.60629	12.6916	0.613584	1.10591
Thermal Conductivity	Btu/(h*ft*°F)				0.0123910	0.0146820		0.0121820	0.0169974	0.0722995	0.343232
Std Vapor Volumetric Flow	MMSCFD	3.00206	0.0140385	0.437538	0.00503996	0.192673	6.04231E-05	0.00477676	0.000258376	0.00932091	0.437280
Std Liquid Volumetric Flow	Mbbl/d	1.36375	0.0129091	0.0594029	0.00301139	0.0500463	5.69995E-05	0.00289455	0.000113525	0.0100716	0.0592893
Gross Ideal Gas Heating Value	Btu/ft^3	1236.98	4279.19	50.9979	2058.60	53.8489	4510.93	2107.27	1147.03	5394.73	50.3503
CpCv Ratio		1.31459	1.18797	1.41728	1.16113	1.38485	1.17432	1.15785	1.27237	1.14582	1.39001
Compressibility		0.949850	0.162858	0.00179608	0.988335	0.999483	0.0831574	0.987769	0.996450	0.00600362	0.000758550
Mass Volume	ft^3/lb	1.31904	0.0613485	0.0238574	10.5158	13.3026	0.392116	10.2651	19.1862	0.0232200	0.0160396
Mass Density	lb/ft^3	0.758127	16.3003	41.9157	0.0950946	0.0751730	2.55026	0.0974171	0.0521207	43.0662	62.3455
Net Ideal Gas Heating Value	Btu/ft^3	1121.47	3961.28	0.651540	1888.08	49.3886	4175.49	1933.49	1037.78	5002.77	0.0387300

Process Streams	Comb AIR	Comb Stack	1	2	3	4	5	12	16	17	18	140	140A	143	144	145	150	153
Composition Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Vapor** From Block:	--	REAC-100	MIX-101	RCYL-1	VSSL-101	VLVE-106	VSSL-101	VLVE-108	9H Marcela's Gas	9H Mar Cond	9H Mar Water	MIX-100	MIX-105	--	Condensate Tanks	Water Tanks	Condensate Tanks	Water Tanks
To Block:	MIX-105	--	VLVE-108	MIX-101	MIX-100	Water Tanks	RCYL-1	Condensate Tanks	--	MIX-101	VLVE-106	MIX-105	REAC-100	VSSL-101	MIX-100	MIX-100	--	--
Mass Fraction	%	%	%		%	%		%	%	%	%	%	%	%	%	%		
Methane	0	0.0100644	15.9572		3.99878	62.0024		16.2920	61.8659	46.7039	63.5956	15.5998	0.503221	3.99878	14.1972	64.1695		
Ethane	0	0.0133793	23.0294		11.2061	18.7923		23.3885	19.8240	27.5660	19.2260	20.7379	0.668963	11.2061	20.7905	19.3644		
Propane	0	0.0146433	24.4170		20.6941	7.33461		24.4867	8.82172	13.3586	7.50485	22.6970	0.732163	20.6941	23.1441	7.47390		
Isobutane	0	0.00426351	6.62976		12.5195	0.433286		6.55247	1.59460	2.35632	0.450613	6.60844	0.213176	12.5195	6.78049	0.448288		
n-Butane	0	0.00880612	13.1637		17.4005	1.70327		12.9380	2.88278	4.20593	1.75098	13.6495	0.440306	17.4005	13.9918	1.75299		
Isopentane	0	0.00364528	4.94453		10.0084	0.342791		4.80919	1.01894	1.39018	0.354987	5.65019	0.182264	10.0084	5.79909	0.352964		
n-Pentane	0	0.00333662	4.38324		14.5636	0.317082		4.25668	0.908652	1.22593	0.328198	5.17176	0.166831	14.5636	5.30081	0.327364		
Isohexane	0	0.00217504	2.67366		0	0.0961111		2.59048	0.618705	0.787976	0.100212	3.37132	0.108752	0	3.47127	0.0997159		
Heptane	0	0.00158643	1.78775		6.27206	0.0502641		1.73822	0.553315	0.642985	0.0525332	2.45897	0.0793216	6.27206	2.52422	0.0517997		
Octane	0	0.000715980	0.767220		0	0.0205514		0.749087	0.298385	0.339127	0.0214978	1.10977	0.0357990	0	1.14301	0.0213290		
Nonane	0	0.000124870	0.127060		0	0.00575952		0.124509	0.0533048	0.0663603	0.00601337	0.193549	0.00624350	0	0.199280	0.00595824		
Decane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
n-Hexane	0	0.00133370	1.59857		2.31775	0.0464584		1.54947	0.391274	0.487532	0.0485131	2.06723	0.0666850	2.31775	2.12585	0.0482264		
Benzene	0	2.96497E-05	0.0345082		0.0259667	0.0975434		0.0334482	0.00806385	0.0103830	0.0682741	0.0459570	0.00148249	0.0259667	0.0454828	0.0631051		
Toluene	0	6.94464E-05	0.0754445		0	0.233883		0.0733365	0.0224671	0.0270743	0.166270	0.107642	0.00347232	0	0.106431	0.153978		
Ethylbenzene	0	4.91171E-06	0.00508636		0.000843795	0.0172488		0.00496523	0.00185109	0.00220031	0.0124663	0.00761315	0.000245586	0.000843795	0.00754978	0.0100896		
o-Xylene	0	1.67747E-05	0.0170445		0.00946456	0.0657916		0.0166573	0.00634402	0.00769637	0.0462753	0.0260007	0.000838733	0.00946456	0.0256282	0.0395086		
2,2,4-Trimethylpentane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Carbon Dioxide	0	9.32550	0.222884		0.0565176	3.91082		0.227131	0.365824	0.424751	3.23819	0.294278	0.00949283	0.0565176	0.199275	3.55920		
Water	0	5.39461	0.110342		0.926353	4.19651		0.112439	0.154753	0.184292	2.68261	0.145375	0.00468952	0.926353	0.0986194	1.71166		
TEG	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Nitrogen	76.7082	74.2356	0.0555162		8.97052E-05	0.333312		0.0567217	0.609115	0.212778	0.345885	0.0576714	74.2356	8.97052E-05	0.0493278	0.346068		
Oxygen	23.2918	10.9800	0		0	0		0	0	0	0	0	22.5404	0	0	0		
Mass Flow	lb/h	lb/h	lb/h		lb/h	lb/h		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h		
Methane	0	0.0618137	2.72493		0.00101349	0.362440		2.72217	4178.74	1.76749	0.354048	3.09068	3.09068	0.00101349	2.72950	0.360167		
Ethane	0	0.0821728	3.93262		0.00284019	0.109852		3.90791	1339.02	1.04323	0.107035	4.10864	4.10864	0.00284019	3.99711	0.108687		
Propane	0	0.0899360	4.16958		0.00524491	0.0428751		4.09140	595.864	0.505553	0.0417809	4.49680	4.49680	0.00524491	4.44961	0.0419491		
Isobutane	0	0.0261857	1.13213		0.00317307	0.00253281		1.09483	107.708	0.0891743	0.00250865	1.30928	1.30928	0.00317307	1.30359	0.00251613		
n-Butane	0	0.0540855	2.24791		0.00441015	0.00995663		2.16177	194.718	0.159172	0.00974803	2.70427	2.70427	0.00441015	2.69002	0.00983906		
Isopentane	0	0.0223886	0.844354		0.00253662	0.00200381		0.803552	68.8243	0.0526108	0.00197628	1.11943	1.11943	0.00253662	1.11491	0.00198110		
n-Pentane	0	0.0204929	0.748505		0.00369115	0.00185353		0.711236	61.3750	0.0463948	0.00182714	1.02464	1.02464	0.00369115	1.01912	0.00183741		
Isohexane	0	0.0133587	0.456568		0	0.000561825		0.432835	41.7905	0.0298207	0.000557899	0.667935	0.667935	0	0.667375	0.000559680		
Heptane	0	0.00974355	0.305285		0.00158965	0.000293823		0.290434	37.3738	0.0243335	0.000292462	0.487178	0.487178	0.00158965	0.485297	0.000290739		
Octane	0	0.00439741	0.131014		0	0.000120135		0.125163	20.1545	0.0128342	0.000119682	0.219871	0.219871	0	0.219751	0.000119715		
Nonane	0	0.000766928	0.0216974		0	3.36678E-05		0.0208039	3.60048	0.00251138	3.34775E-05	0.0383464	0.0383464	0	0.0383129	3.34421E-05		
Decane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
n-Hexane	0	0.00819132	0.272979		0.000587433	0.000271576		0.258897	26.4287	0.0184505	0.000270081	0.409566	0.409566	0.000587433	0.408708	0.000270682		
Benzene	0	0.000182103	0.00589279		6.58126E-06	0.000570198		0.00558875	0.544673	0.000392942	0.000380094	0.00910513	0.00910513	6.58126E-06	0.00874436	0.000354193		
Toluene	0	0.000426526	0.0128833		0	0.00136718		0.0122536	1.51755	0.00102462	0.000925656	0.0213263	0.0213263	0	0.0204621	0.000864238		
Ethylbenzene	0	3.01668E-05	0.000868573		2.13860E-07	0.000100829		0.000829624	0.125032	8.32702E-05	6.94019E-05	0.00150834	0.00150834	2.13860E-07	0.00145149	5.66306E-05		
o-Xylene	0	0.000103027	0.00291060		2.39879E-06	0.000384590		0.00278322	0.428508	0.000291267	0.000257623	0.00515134	0.00515134	2.39879E-06	0.00492719	0.000221752		
2,2,4-Trimethylpentane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Carbon Dioxide	0	57.2754	0.0380608		1.43244E-05	0.0228610		0.0379507	24.7097	0.0160746	0.0180276	0.0583031	0.0583031	1.43244E-05	0.0383119	0.0199769		
Water	0	33.1327	0.0188426		0.000234784	0.0245311		0.0187871	10.4528	0.00697447	0.0149346	0.0288021	0.0288021	0.000234784	0.0189602	0.00960713		
TEG	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Nitrogen	455.929	455.941	0.00948024		2.27358E-08	0.00194840		0.00947745	41.1427	0.00805250	0.00192560	0.0114260	455.941	2.27358E-08	0.00948360	0.00194239		
Oxygen	138.439	67.4373	0		0	0		0	0	0	0	0	138.439	0	0	0		
Mole Fraction	%	%	%		%	%		%	%	%	%	%	%	%	%	%		
Methane	0	0.0178925	34.6110		11.9309	76.6425		35.0499	79.0434	67.1908	78.3177	34.8146	0.910684	11.9309	32.4403	79.1382		
Ethane	0	0.0126901	26.6497		17.8382	12.3934		26.8452	13.5132	21.1584	12.6321	24.6920	0.645896	17.8382	25.3454	12.7413		
Propane	0	0.00947099	19.2675		22.4629	3.29848		19.1654	4.10056	6.99188	3.36241	18.4283	0.482050	22.4629	19.2397	3.35336		
Isobutane	0	0.00209208	3.96903		10.3101	0.147831		3.89087	0.562337	0.935666	0.153167	4.07070	0.106482	10.3101	4.27634	0.152596		
n-Butane	0	0.00432112	7.88072		14.3296	0.581131		7.68263	1.01661	1.67012	0.595173	8.40788	0.219934	14.3296	8.82441	0.596712		
Isopentane	0	0.00144097	2.38465		6.63973	0.0942175		2.30052	0.289471	0.444702	0.0972048	2.80379	0.0733418	6.63973	2.94634	0.0967898		
n-Pentane	0	0.00131896	2.11395		9.66175	0.0871513		2.03623	0.258139	0.392160	0.0898693	2.56639	0.0671317	9.66175	2.69318	0.0897699		
Isohexane	0	0.000719844	1.07957		0	0.0221168		1.03748	0.147159	0.211037	0.0229742	1.40065	0.0366382	0	1.47659	0.0228934		
Heptane	0	0.000451543	0.620810		2.99606	0.00994750		0.598704	0.113183	0.148099	0.0103577	0.878596	0.0229824	2.99606	0.923429	0.0102277		
Octane	0	0.000178764	0.233708		0	0.00356779		0.226330	0.0535413	0.0685198	0.00371813	0.347833	0.00909864	0	0.366799	0.00369424		
Nonane	0	2.77675E-05	0.0344716		0	0.000890520		0.0335051	0.00851878	0.0119416	0.000926291	0.0540291	0.00141330	0	0.0569564	0.000919119		
Decane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
n-Hexane	0	0.000441396	0.645470		1.28736	0.0106909		0.620562	0.0930644	0.130571	0.0111219	0.858854	0.0224659	1.28736	0.904278	0.0110721		
Benzene	0	1.08257E-05	0.0153721		0.0159117	0.0247635		0.0147788	0.00211598	0.00306786	0.0172680	0.0210643	0.000551002	0.0159117	0.0213443	0.0159836		
Toluene	0	2.14962E-05	0.0284915		0	0.0503373		0.0274703	0.00499795	0.00678180	0.0356515	0.0418267	0.00109410	0	0.0423429	0.0330632		
Ethylbenzene	0	1.31949E-06	0.00166707		0.000380427	0.00322187		0.00161414	0.000357381	0.000478334	0.00231984	0.00256741	6.71585E-05	0.000380427	0.00260679	0.00188028		
o-Xylene	0	4.50636E-06	0.00558639		0.00426712	0.0122891		0.00541512	0.00122481	0.00167314	0.00861136	0.00876833	0.000229362	0.00426712	0.00884890	0.00736273		
2,2,4-Trimethylpentane	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Carbon Dioxide	0	6.04337	0.176223		0.0614685	1.76219		0.178121	0.170377	0.222749	1.45365	0.239400	0.00626223	0.0614685	0.165981	1.60005		
Water	0	8.54029	0.213123		2.46122	4.61933		0.215408	0.176069	0.236098	2.94185	0.288910	0.00755731	2.46122	0.200666	1.87977		
TEG	0	0	0		0	0		0	0	0	0	0	0	0	0	0		
Nitrogen	79	75.5788	0.0689577		0.000153274	0.235948		0.0698823	0.445675	0.175302	0.243932	0.0737067	76.9354	0.000153274	0.0645475	0.244413		

		Comb AIR	Comb Stack	1	2	3	4	5	12	16	17	18	140	140A	143	144	145	150	153
Oxygen		21	9.78642	0		0	0		0	0	0	0	0	20.4507	0	0	0		

Process Streams		Comb AIR	Comb Stack	1	2	3	4	5
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	From Block:	--	REAC-100	MIX-101	RCYL-1	VSSL-101	VLVE-106	VSSL-101
	To Block:	MIX-105	--	VLVE-108	MIX-101	MIX-100	Water Tanks	RCYL-1
Property	Units							
Temperature	°F	70	600	49.4038		70	91.0653	
Pressure	psig	1	0	0		0	1	
Mass Flow	lb/h	594.368	614.181	17.0765		0.0253450	0.584558	
Mass Fraction Vapor	%	100	100	100		100	100	
Enthalpy	MMBtu/h	-0.00108558	-0.328756	-0.0205214		-2.68715E-05	-0.00114182	
Mole Fraction Vapor	%	100	100	100		100	100	
Molecular Weight	lb/lbmol	28.8503	28.5203	34.7959		47.8647	19.8304	
Molar Flow	lbmol/h	20.6018	21.5349	0.490761		0.000529513	0.0294779	
Specific Gravity		0.996124	0.984727	1.20141		1.65264	0.684690	
Dynamic Viscosity	cP	0.0180500	0.0285029	0.00868966		0.00808981	0.0111866	
Kinematic Viscosity	cSt	14.1386	48.2935	5.72674		4.00113	13.2181	
Thermal Conductivity	Btu/(h*ft*°F)	0.0147468	0.0254359	0.0120409		0.0103366	0.0180792	
Std Vapor Volumetric Flow	MMSCFD	0.187633	0.196132	0.00446967		4.82260E-06	0.000268474	
Std Liquid Volumetric Flow	Mbbl/d	0.0470349	0.0499107	0.00264631		3.30680E-06	0.000115752	
Gross Ideal Gas Heating Value	Btu/ft^3	0	5.35453	2007.75		2685.24	1116.14	
CpCv Ratio		1.40096	1.35369	1.16915		1.12294	1.26548	
Compressibility		0.999581	1.00032	0.988113		0.980414	0.996787	
Mass Volume	ft^3/lb	12.5473	27.1407	10.5566		7.92256	18.9274	
Mass Density	lb/ft^3	0.0796987	0.0368450	0.0947272		0.126222	0.0528336	
Net Ideal Gas Heating Value	Btu/ft^3	0	0.970355	1840.64		2472.14	1008.67	

Process Streams		12	16	17	18	140	140A	143	144	145	150	153
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	From Block:	VLVE-108	9H Marcela's Gas	9H Mar Cond	9H Mar Water	MIX-100	MIX-105	--	Condensate Tanks	Water Tanks	Condensate Tanks	Water Tanks
	To Block:	Condensate Tanks	--	MIX-101	VLVE-106	MIX-105	REAC-100	VSSL-101	MIX-100	MIX-100	--	--
Property	Units											
Temperature	°F	50.4352	70.4140	83.6550	91.0555	61.9881	69.4764	70	62	62		
Pressure	psig	1	185	185	10	0	0	0	0	0		
Mass Flow	lb/h	16.7087	6754.51	3.78447	0.556718	19.8123	614.181	0.0253450	19.2257	0.561275		
Mass Fraction Vapor	%	100	100	100	100	100	100	100	100	100		
Enthalpy	MMBtu/h	-0.0201588	-11.3156	-0.00582470	-0.00104685	-0.0234809	-0.0245665	-2.68715E-05	-0.0224083	-0.00104574		
Mole Fraction Vapor	%	100	100	100	100	100	100	100	100	100		
Molecular Weight	lb/lbmol	34.5131	20.4968	23.0796	19.7562	35.8024	29.0322	47.8647	36.6567	19.7847		
Molar Flow	lbmol/h	0.484126	329.540	0.163975	0.0281794	0.553378	21.1552	0.000529513	0.524479	0.0283692		
Specific Gravity		1.19164	0.707698	0.796875	0.682129	1.23616	1.00240	1.65264	1.26566	0.683110		
Dynamic Viscosity	cP	0.00873113	0.0107696	0.0107018	0.0111372	0.00882526	0.0176857	0.00808981	0.00874846	0.0105961		
Kinematic Viscosity	cSt	5.43960	0.887740	0.794579	8.38002	5.79363	14.6873	4.00113	5.60629	12.6916		
Thermal Conductivity	Btu/(h*ft*°F)	0.0121351	0.0178525	0.0173244	0.0181971	0.0123910	0.0146820	0.0103366	0.0121820	0.0169974		
Std Vapor Volumetric Flow	MMSCFD	0.00440924	3.00133	0.00149342	0.000256647	0.00503996	0.192673	4.82260E-06	0.00477676	0.000258376		
Std Liquid Volumetric Flow	Mbbl/d	0.00260103	1.36302	0.000724919	0.000111983	0.00301139	0.0500463	3.30680E-06	0.00289455	0.000113525		
Gross Ideal Gas Heating Value	Btu/ft^3	1992.59	1236.09	1377.56	1137.83	2058.60	53.8489	2685.24	2107.27	1147.03		
CpCv Ratio		1.17059	1.31476	1.29061	1.26688	1.16113	1.38485	1.12294	1.15785	1.27237		
Compressibility		0.987563	0.950063	0.940105	0.994991	0.988335	0.999483	0.980414	0.987769	0.996450		
Mass Volume	ft^3/lb	9.97969	1.32040	1.18933	12.0528	10.5158	13.3026	7.92256	10.2651	19.1862		
Mass Density	lb/ft^3	0.100203	0.757345	0.840809	0.0829681	0.0950946	0.0751730	0.126222	0.0974171	0.0521207		
Net Ideal Gas Heating Value	Btu/ft^3	1826.49	1120.65	1252.63	1029.01	1888.08	49.3886	2472.14	1933.49	1037.78		

R. WEESE PRODUCTION FACILITY
EMISSION CALCULATIONS

R. Weese Production Facility
Tyler County

Source	Description	NOx lb/hr	CO lb/hr	CO_{2e} lb/hr	VOC lb/hr	SO2 lb/hr	H2S lb/hr	PM lb/hr	n-Hexane lb/hr	benzene lb/hr	formaldehyde lb/hr	Total HAPs lb/hr
1S	Four GPU Heaters	0.28	0.23	332.17	0.02	0.002	0.00	0.021		0.0000	0.0002	0.0052
2S	Dehy Reboiler	0.03	0.03	36.24	0.00	0.002	0.00	0.002				0.0000
3S	Dehy Still Vent (Un-controlled)			0.40	1.23				0.0243	0.0389		0.4455
VCU-1	VCU and Pilot (including Water and Condensate tank vapors)[2]	0.04	0.24	76.96	0.26							
TL-1	Condensate Truck Loading				2.74							
TL-2	Water Truck Loading				0.03							
	Haul Roads							10.860				
---	Fugitive VOC			6.92	0.13							
Total		0.35	0.50	452.69	4.41	0.00	0.00	10.88	0.02	0.04	0.00	0.45

Source		NOx tpy	CO tpy	CO_{2e} tpy	VOC tpy	SO2 tpy	H2S tpy	PM tpy	n-Hexane tpy	benzene tpy	formaldehyde tpy	Total HAPs tpy
1S	Four GPU Heaters	1.20	1.01	1455	0.07	0.007	0.00	0.09		0.000	0.001	0.023
2S	Dehy Reboiler	0.13	0.11	159	0.01	0.001	0.00	0.01				0.000
3S	Dehy Still Vent (Un-controlled)			2	5.38				0.106	0.170		1.951
VCU-1	VCU and Pilot (including Water and Condensate tank vapors)[2]	0.20	1.07	337	1.16							
TL-1	Condensate Truck Loading[3]				0.05							
TL-2	Water Truck Loading				0.01							
	Haul Road							0.54				
---	Fugitive VOC			30	0.57							
Total		1.53	2.19	1983	7.24	0.01	0.00	0.64	0.11	0.170	0.001	1.974

[1] See Appendix C for Blowdown Calculations

[2] Condensate and water tanks equipped with Combustor

Combined capture and control effiency of system for controlleding water and condensate tanks is 98%

All emissions from this capture and control system are presented in this line. It is a mixture of un-captured/un-controlled VOCs and combustion products.

[3] Un-Captured Truck Loading Emissions Only. Captured and Controlled emissions represented by the VCUs emisisons

R. Weese Production Facility
Tyler County, WV

'otential Emission Rate

Source 1S (GPU-1 to GPU-4)

Burner Duty Rating	2750.0	Mbtu/hr	FourUnits: Three at at 750 Mbtu/Hr Each and One at 500 Mbtu/hr
Burner Efficiency	98.0	%	
Gas Heat Content (HHV)	1243.3	Btu/scf	
Total Gas Consumption	54169.6	scfd	
H2S Concentration	0.000	Mole %	
Hours of Operation	8760		

NOx	0.2751	lbs/hr	1.205	TPY
CO	0.2311	lbs/hr	1.012	TPY
CO2	330.1	lbs/hr	1446.0	TPY
CO2e	332	lbs/hr	1,455	TPY
VOC	0.0151	lbs/hr	0.066	TPY
SO2	0.0017	lbs/hr	0.007	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0209	lbs/hr	0.092	TPY
CHOH	0.0002	lbs/hr	0.001	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hezane	0.0050	lbs/hr	0.022	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0052	lbs/hr	0.023	TPY

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	**100 Lbs/MMCF**		
CO	**84 Lbs/MMCF**		
CO_2	**120,000 Lbs/MMCF**	**Global Warming Potential =**	**1**
VOC	**5.5 Lbs/MMCF**		
PM	**7.6 Lbs/MMCF**		
SO_2	**0.6 Lbs/MMCF**		
CH_4	**2.3 Lbs/MMCF**	**Global Warming Potential =**	**25**
N_2O	**2.2 Lbs/MMCF**	**Global Warming Potential =**	**310**
HCOH	**0.075 Lbs/MMCF**		
Benzene	**0.0021 Lbs/MMCF**		
n-Hexane	**1.8 Lbs/MMCF**		
Toluene	**0.0034 Lbs/MMCF**		

Triad Hunter, LLC

R. Weese Production Facility
Tyler County

Dehy Burner/Still Vent Emissions
Sources S2 and S3

Reboiler Burner (2S)

Burner Duty Rating	300.0 Mbtu/hr		
Burner Efficiency	98.0 %		
Gas Heat Content (HHV)	1243.3 Btu/scf		
Total Gas Consumption	5909.4 scfd	2.16 MMscf/yr	
H2S Concentration	0.000 Mole %		

NOx	0.0300	lbs/hr	0.131	TPY
CO	0.0252	lbs/hr	0.110	TPY
VOC	0.0017	lbs/hr	0.007	TPY
SO2	0.0001	lbs/hr	0.001	TPY
PM	0.0023	lbs/hr	0.010	TPY
CO_2	36.0	lb/hr	157.7	TPY
CO_{2e}	36.2	lb/hr	158.7	TPY
n-Hexane	0.0000	lb/hr	0.000	TPY

Un-Controlled Still Vent (3S)

From Gri GlyCalc 4.0

Dry Gas Rate	3,000 MCFD
Glycol Circulation Rate	3.0 Gal/Lb H2O
Treating Temperature	65 Deg F
Treating Pressure	420 psi

Total HC	1.2698	lbs/hr	5.562	TPY
Total VOC	1.2282	lbs/hr	5.380	TPY
Total HAP	0.4455	lbs/hr	1.951	TPY
CO_{2e}	0.40	lbs/hr	1.752	TPY
benzene	0.0389	lbs/hr	0.170	TPY
toluene	0.1872	lbs/hr	0.820	TPY
ethyl benzene	0.0000	lbs/hr	0.000	TPY
xylene	0.1951	lbs/hr	0.855	TPY
n-hexane	0.0243	lbs/hr	0.106	TPY

R. Weese Production Facility
Tyler County, WV

Potential Emission Rates

Source VCU-1

Enclosed Combustor (Flare)

Destruction Efficiency	98.0 %		
Gas Heat Content (HHV)	1892.2 Btu/scf[1]		
Max Flow to T-E	8,340 scf/day[1]	3.0441	MMCF/Yr[2]
Max BTUs to Flare	0.66 MMBTU/Hr	5,760	MMBTU/Yr

NOx	0.04	lbs/hr	0.20	tpy
CO	0.24	lbs/hr	1.07	tpy
CO2	76.86	lbs/hr	336.65	tpy
CO2e	76.96	lb/hr	337.05	tpy
VOC	0.26	lb/hr	1.16	tpy
CH4	0.0021	lbs/hr	0.0060	tpy
N2O	0.0001	lbs/hr	0.0006	tpy

[1]BTU content of gas and mass flow is derived from ProMax(tank and condensate truck loading emissions) plus GLYCalc Flash Gas
Promax Flow From Tanks (Stream 144) = 5040 scf/day
GLYCalc Flash Gas Flow = 3900 scf/day
[2] Annual flow assumes daily flow 365 days per year.
VOC emissons are 2% of VOC loading to the combustor [0.02 x(12.515+0.714)]

Factors Used

AP-42 Table 13 NOx		**Lbs/MMBTU**
AP-42 Table 13 CO	**0.068**	**Lbs/MMBTU**
40 CFR 98 Tab CO2	**0.37**	**Lbs/MMBTU**
40 CFR 98 Tab CH4	**116.89**	**Lbs/MMBTU**
40 CFR 98 Tab N2O	**0.0022**	**Lbs/MMBTU**
	0.00022	

VOC emissions equals non-combusted NMNEHC

R. Weese Production Facility

Tyler County, WV

Fugitive VOC Emissions

Volatile Organic Compounds, NMNEHC from gas analysis:	17.21	weight percent
Methane from gas analysis:	61.92	weight percent
Carbon Dioxide from gas analysis:	0.37	weight percent
Gas Density	0.0571	lb/scf

Emission Source:	Number	Oil & Gas Production*	VOC %	VOC, lb/h	VOC TPY	CO2 lb/H	CO2 TPY	CH4 lb/hr	CH4 TPY	CO2e
Valves:										
Gas/Vapor:	10	0.02700 scf/hr	17.2	0.003	0.012	0.000	0.000	0.010	0.0418	1.045
Light Liquid:	8	0.05000 scf/hr	100.0	0.023	0.100					0.000
Heavy Liquid (Oil):	-	0.00050 scf/hr	100.0	0.000	0.000					
Low Bleed Pneumatic	4	1.39000 scf/hr	17.2	0.055	0.239	0.196	0.860	0.196	0.8604	22.372
Relief Valves:	4	0.04000 scf/hr	17.2	0.002	0.007	0.000	0.000	0.006	0.0248	0.619
Open-ended Lines, gas:	-	0.06100 sfc/hr	17.2	0.000	0.000					0.000
Open-ended Lines, liquid:	-	0.05000 lb/hr	100.0	0.000	0.000					0.000
Pump Seals:										0.000
Gas:	-	0.00529 lb/hr	17.2	0.000	0.000	0.000	0.000	0.000	0.0000	0.000
Light Liquid:	6	0.02866 lb/hr	100.0	0.172	0.753					
Heavy Liquid (Oil):	-	0.00133 lb/hr	100.0	0.000	0.000					
Compressor Seals, Gas:	10	0.01940 lb/hr	17.2	0.033	0.146	0.001	0.003	0.007	0.0300	0.754
Connectors:										0.000
Gas:	90	0.00300 scf/hr	17.2	0.003	0.012	0.000	0.000	0.010	0.0418	1.045
Light Liquid:	12	0.00700 scf/hr	100.0	0.084	0.368					0.000
Heavy Liquid (Oil):	-	0.00030 scf/hr	100.0	0.000	0.000					
Flanges:										0.000
Gas:	90	0.00086 lb/hr	17.2	0.013	0.058	0.000	0.001	0.048	0.2099	5.249
Light Liquid:	12	0.00300 scf/hr	100.0	0.002	0.009					0.000
Heavy Liquid:	0	0.0009 scf/hr	100.0	0.000	0.000					

Fugitive Calculations:

	lb/hr	t/y
VOC	**0.334**	**1.465**
CH4	**0.276**	**1.209**
CO2	**0.001**	**0.005**
CO2e	**7.097**	**31.08**

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

Triad Hunter, LLC

R. Weese Production Facility
Tyler County

Combined Tank Vapor Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N_2	0.074	0.021	0.001	0.058			-		0.0007	
Carbon Dioxide, CO_2	0.239	0.105	0.004	0.295			-		0.0024	
Hydrogen Sulfide, H_2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Water	0.289	0.052	0.002	0.146			-		0.0029	
Oxygen, O_2	0.001	0.000	0.000	0.001			-		0.0000	
Methane, CH_4	34.815	5.585	0.193	15.625	316.6	351.6	3.318		0.3474	
Ethane, C_2H_6	24.692	7.425	0.256	20.771	399.7	436.9	4.119		0.2449	6.568
Propane	18.428	8.126	0.281	22.733	426.6	463.7	4.390	22.733	0.1811	5.051
Iso-Butane	4.071	2.366	0.082	6.619	122.1	132.4	1.261	6.619	0.0395	1.325
Normal Butane	8.408	4.887	0.169	13.671	253.1	274.3	2.604	13.671	0.0813	2.637
Iso Pentane	2.804	2.023	0.070	5.659	103.7	112.2	1.069	5.659	0.0280	1.021
Normal Pentane	2.566	1.852	0.064	5.180	95.1	102.9	0.978	5.180	0.0257	0.925
Hexane	2.260	1.948	0.067	5.448	99.5	107.5	1.023	5.448	0.0223	0.924
Heptane+	1.353	1.356	0.047	3.793	69.0	74.4	0.709	3.793	0.0135	0.621
	100.000	35.746	1.234		1,885.5	2,055.9	19.469	63.104	0.9897	19.071

Ideal Gross (HHV)	2,055.9
Ideal Gross (sat'd)	2,020.8
GPM	-
Real Gross (HHV)	2,077.2
Real Net (LHV)	1,905.1

Triad Hunter, LLC

R. Weese Production Facility
Tyler County

Fuel Gas Composition Information:

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	GPM
Nitrogen, N2	0.446	0.125	0.004	0.609			-		0.0045	
Carbon Dioxide, CO2	0.171	0.075	0.003	0.367			-		0.0017	
Hydrogen Sulfide, H2S	0.000	0.000	0.000	0.000	0.0	0.0	0.000		0.0000	
Helium, He	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	79.139	12.696	0.438	61.921	719.7	799.3	7.542		0.7898	
Ethane, C2H6	13.562	4.078	0.141	19.889	219.5	240.0	2.262		0.1345	3.608
Propane	4.128	1.820	0.063	8.878	95.6	103.9	0.983	8.878	0.0406	1.131
Iso-Butane	0.565	0.328	0.011	1.602	17.0	18.4	0.175	1.602	0.0055	0.184
Normal Butane	1.018	0.592	0.020	2.886	30.6	33.2	0.315	2.886	0.0098	0.319
Iso Pentane	0.285	0.206	0.007	1.003	10.5	11.4	0.109	1.003	0.0029	0.104
Normal Pentane	0.252	0.182	0.006	0.887	9.3	10.1	0.096	0.887	0.0025	0.091
Hexane	0.239	0.206	0.007	1.005	10.5	11.4	0.108	1.005	0.0024	0.098
Heptane+	0.195	0.195	0.007	0.953	9.9	10.7	0.102	0.953	0.0019	0.089
	100.000	20.504	0.708		1,122.7	1,238.3	11.693	17.213	0.9960	5.624

Gas Density (STP) = **0.05706**

Ideal Gross (HHV)	1,238.3
Ideal Gross (sat'd)	1,217.6
GPM	-
Real Gross (HHV)	1,243.3
Real Net (LHV)	1,127.2

FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

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

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	10	3
p =	Number of days per year with precipitation >0.01 in.	157	157

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Produced Water Tanker Truck	10	20	10	0.8	2	300	None	0
2	Condensate Tanker Truck	18	22	10	0.8	1	40	None	0
3									
4									
5									
6									
7									
8									

Source: *AP-42 Fifth Edition – 13.2.2 Unpaved Roads*

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

Where:

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	10	3
S =	Mean vehicle speed (mph)	10	10
W =	Mean vehicle weight (tons)	20	20
w =	Mean number of wheels per vehicle	10	10
p =	Number of days per year with precipitation >0.01 in.	157	157

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	6.48	0.46	6.48	0.46	0.86	0.07	0.86	0.07
2	4.38	0.09	4.38	0.09	0.73	0.01	0.73	0.01
3								
4								
5								
6								
7								
8								
TOTALS	10.86	0.54	10.86	0.54	1.59	0.08	1.59	0.08

FUGITIVE EMISSIONS FROM PAVED HAULROADS

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

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

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	None						
2							
3							
4							
5							
6							
7							
8							

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

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

Where:

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

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF PAVED HAULROAD EMISSIONS

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

Condensate Truck Loading Lost Emissions Per AP-42
R. Weese Production Facility

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

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

Where:

L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded
S= saturation factor (0.6)
P=true vapor pressure of liquid loaded (6.1 psia by converting ProMax RVP to true VP via AP-42)
M= Molecular weight of vapor in lb/lb-mole (estimated at 36.66 by ProMax)
T= temperature of bulk liquid loaded in deg R or 460+deg F (62 Deg F)

Thus, L_L= 12.46[0.6 x 6.1 x 36.66]/[460+62]
L_L= 3.20 lb/1000 gallons loaded

Based on the ProMax model, these emissions are 64.7% VOCs..

Given a maximum loading of 210 BBL (8,820 gallons) a day, uncontrolled VOC emissions are estimated at 18.26 lb of VOC per day [8.82 x 3.20 x .647]. The overall control system is estimated to reduce these emissions greater than 68%. This will be accomplished through a combination of a vapor combustor system with a 98%+ destruction efficiency and trucks having a capture efficiency of 70% per AP-42, Chapter 5.2.2.1.1. Thus, un-captured emissions are estimated at 5.48 lb/day [18.26 x 30%]. With all daily loading taking place within 2 hours, the uncaptured hourly emission rate is conservatively estimated at 2.74 lb/hr.

Maximum annual condensate throughput is 154,800 gallons per year. Thus, un-captured VOC emissions are conservatively estimated at 96.1 pounds per year [154.8 x 3.20 x 30% x 0.647] or 0.05 tons per year.

The captured VOC emissions routed to the enclosed combustor are 6.1 lb/day [8.7 lb/day x 70%] VOC. Annually, captured VOC emissions are estimated at 224 pounds per year (154.8 x 3.20 x 70% x .647) or 0.11 tons per year.

Water Truck Loading Lost Emissions Per AP-42

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

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

Where:

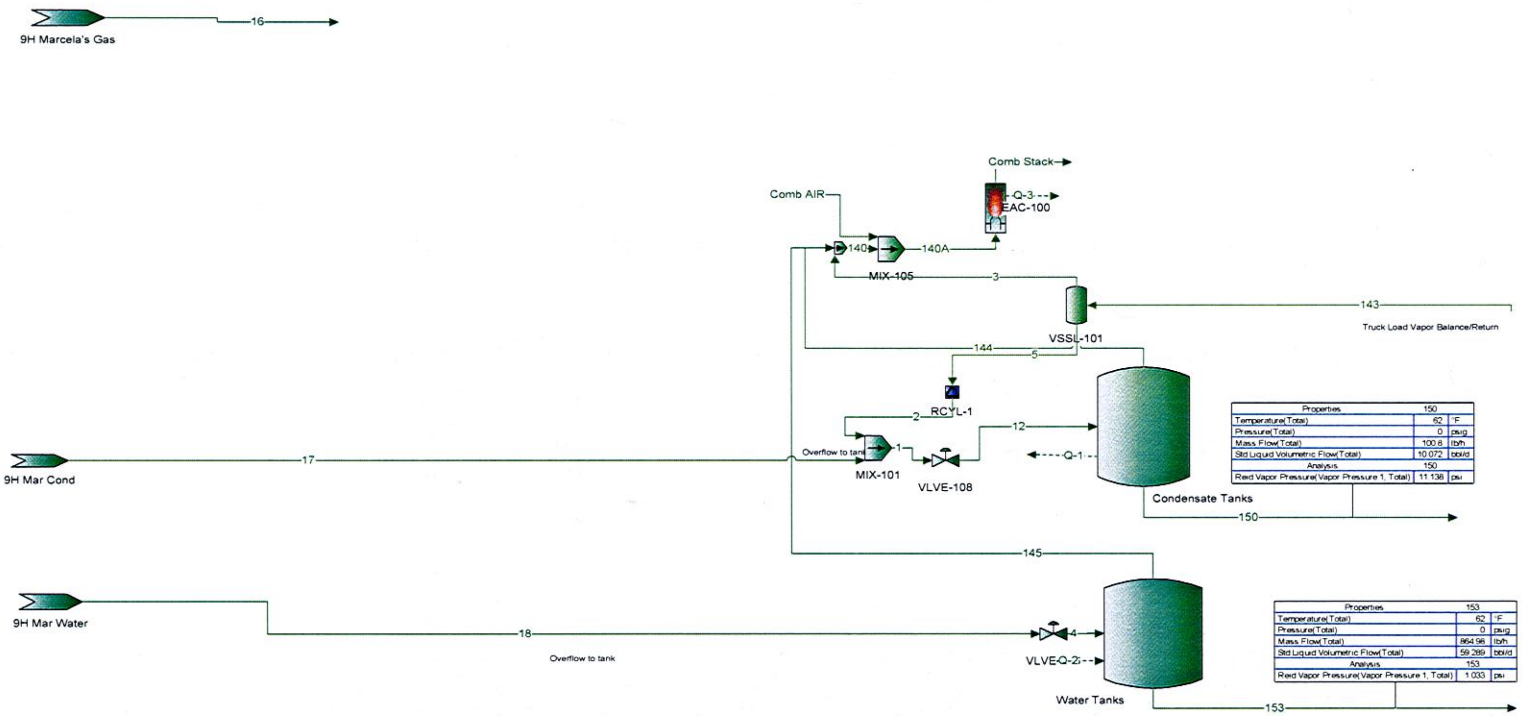
L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded
S= saturation factor (0.6)
P=true vapor pressure of liquid loaded 1.0 psia (by ProMax
M= Molecular weight of vapor in lb/lb-mole (estimated at 19.78 by ProMax)
T= temperature of bulk liquid loaded in deg R or 460+deg F (62 Deg F)

Thus, $L_L = 12.46[0.6 \text{ x } 1.0 \text{ x } 19.78]/[460+62]$
$L_L = 0.28$ lb/1000 gallons loaded

Based on the ProMax model, these emissions are 4.4% VOCs..

Given a maximum loading of 200 BBL (8,400 gallons) a day, uncontrolled VOC emissions are estimated at 0.10 lb of VOC per day [8.4 x 0.28 x .044]. There is no control on these emissions. Thus, uncaptured emissions are estimated at 0.10 lb/day. With all daily loading taking place within 4 hours, the uncaptured hourly emission rate is conservatively estimated at 0.03 lb/hr.

Maximum annual throughput is 908,000 gallons per year. Thus, un-captured VOC emissions are conservatively estimated at 11.2 pounds per year [908 x 0.28 x 0.044] or less than 0.01 tons per year.



Properties	150	
Temperature(Total)	62	°F
Pressure(Total)	0	psig
Mass Flow(Total)	100.8	lb/h
Std Liquid Volumetric Flow(Total)	10.072	bbl/d
Analysis	150	
Reid Vapor Pressure(Vapor Pressure 1, Total)	11.138	psi

Properties	153	
Temperature(Total)	62	°F
Pressure(Total)	0	psig
Mass Flow(Total)	864.98	lb/h
Std Liquid Volumetric Flow(Total)	59.289	bbl/d
Analysis	153	
Reid Vapor Pressure(Vapor Pressure 1, Total)	1.033	psi

Printed	REVISED	Created
11/6/2015	11/6/2015	RGWSolutions
DRAWN	ROB	
ISSUED	Preliminary	

SIZE	FSCM NO	DWG NO	REV
11*17		R. Weese 110615.pmx	Preliminary
SCALE None		Phase 1	SHEET 2 OF 2

Process Streams		Cond Composistion to match conditions	1	2	7	8	9	9H M Pad Gas	9H M Pad Water	16	16A	17	17A	18	18A
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	MIX-100	C9HM1	GPU	GPU	GPU	--	--	9H M Gas Header	VLVE-102	9HM Water Header	VLVE-101	9H M Cond Header	VLVE-100
	To Block:	MIX-100	C9HM1	GPU	9H M Gas Header	9H M Cond Header	9HM Water Header	MIX-100	MIX-100	VLVE-102	9H Marcela's Gas	VLVE-101	9H Mar Water	VLVE-100	9H Mar Cond
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Methane		0.00469989*	53.9840	53.9840	61.8019	2.30804	0.0434767	61.8711*	0	61.8019	61.8019	0.0434767	0.0434767	2.30804	2.30804
Ethane		0.253107*	17.3436	17.3436	19.8052	3.58100	0.0132379	19.8733*	0	19.8052	19.8052	0.0132379	0.0132379	3.58100	3.58100
Propane		1.94603*	7.76812	7.76812	8.81550	4.73129	0.00516717	8.87077*	0	8.81550	8.81550	0.00516717	0.00516717	4.73129	4.73129
Isobutane		1.65956*	1.42037	1.42037	1.59428	1.86573	0.000297174	1.60036*	0	1.59428	1.59428	0.000297174	0.000297174	1.86573	1.86573
n-Butane		4.94291*	2.58743	2.58743	2.88319	4.58528	0.00119085	2.88347*	0	2.88319	2.88319	0.00119085	0.00119085	4.58528	4.58528
Isopentane		4.91896*	0.945521	0.945521	1.02088	3.52886	0.000236794	1.00207*	0	1.02088	1.02088	0.000236794	0.000236794	3.52886	3.52886
n-Pentane		5.91112*	0.858641	0.858641	0.911318	4.09628	0.000219218	0.886045*	0	0.911318	0.911318	0.000219218	0.000219218	4.09628	4.09628
Isohexane		8.91465*	0.638345	0.638345	0.623957	6.07668	6.56540E-05	0.583746*	0	0.623957	0.623957	6.56540E-05	6.56540E-05	6.07668	6.07668
Heptane		22.1612*	0.785133	0.785133	0.573875	18.4289	3.42053E-05	0.532266*	0	0.573875	0.573875	3.42053E-05	3.42053E-05	18.4289	18.4289
Octane		26.8804*	0.719298	0.719298	0.332545	27.8182	1.39661E-05	0.378538*	0	0.332545	0.332545	1.39661E-05	1.39661E-05	27.8182	27.8182
Nonane		12.8654*	0.303439	0.303439	0.0715936	15.6228	3.92658E-06	0.134381*	0	0.0715936	0.0715936	3.92658E-06	3.92658E-06	15.6228	15.6228
Decane		0*	0	0	0	0	0	0*	0	0	0	0	0	0	0
n-Hexane		7.28005*	0.424148	0.424148	0.396006	5.08935	3.16591E-05	0.365366*	0	0.396006	0.396006	3.16591E-05	3.16591E-05	5.08935	5.08935
Benzene		0.152016*	0.00884276	0.00884276	0.00816332	0.108953	0.000331791	0.00761330*	0	0.00816332	0.00816332	0.000331791	0.000331791	0.108953	0.108953
Toluene		1.05671*	0.0348819	0.0348819	0.0234799	0.927904	0.000686229	0.0224511*	0	0.0234799	0.0234799	0.000686229	0.000686229	0.927904	0.927904
Ethylbenzene		0.196269*	0.00509754	0.00509754	0.00210150	0.211265	4.42173E-05	0.00258689*	0	0.00210150	0.00210150	4.42173E-05	4.42173E-05	0.211265	0.211265
o-Xylene		0.856308*	0.0214210	0.0214210	0.00748181	0.963859	0.000224662	0.0103476*	0	0.00748181	0.00748181	0.000224662	0.000224662	0.963859	0.963859
2,2,4-Trimethylpentane		0*	0	0	0	0	0	0*	0	0	0	0	0	0	0
Carbon Dioxide		0.000537220*	0.320005	0.320005	0.365457	0.0330565	0.00453956	0.366749*	0	0.365457	0.365457	0.00453956	0.00453956	0.0330565	0.0330565
Water		0.000115057*	11.3005	11.3005	0.154598	0.0146052	99.9300	0*	100	0.154598	0.154598	99.9300	99.9300	0.0146052	0.0146052
TEG		0*	0	0	0	0	0	0*	0	0	0	0	0	0	0
Nitrogen		1.33689E-06*	0.531256	0.531256	0.608478	0.00796110	0.000229310	0.608873*	0	0.608478	0.608478	0.000229310	0.000229310	0.00796110	0.00796110
Oxygen		0*	0	0	0	0	0	0*	0	0	0	0	0	0	0

Process Streams		Cond Composistion to match conditions	1	2	7	8	9	9H M Pad Gas	9H M Pad Water	16	16A	17	17A	18	18A
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	--	MIX-100	C9HM1	GPU	GPU	GPU	--	--	9H M Gas Header	VLVE-102	9HM Water Header	VLVE-101	9H M Cond Header	VLVE-100
	To Block:	MIX-100	C9HM1	GPU	9H M Gas Header	9H M Cond Header	9HM Water Header	MIX-100	MIX-100	VLVE-102	9H Marcela's Gas	VLVE-101	9H Mar Water	VLVE-100	9H Mar Cond
Property	**Units**														
Temperature	°F	70*	69.7739	65.3568	90*	90	90	70	70	90	70.4140	90	91.0555	90	83.6550
Pressure	psig	500*	500	430*	430	430	430	500*	500*	430	185	430	10*	430	185
Mass Flow	lb/h	112.110	7746.63	7746.63	6761.61	119.475	865.542	6759.11	875.406	6761.61	6761.61	865.542	865.542	119.475	119.475
Mass Fraction Vapor	%	0	85.8820	85.8356	100	0	0	98.8260	0	100	99.8950	0	0.0643202	0	3.16758
Enthalpy	MMBtu/h	-0.107700	-17.4634	-17.4634	-11.3224	-0.118591	-5.88936	-11.3793	-5.97644	-11.3224	-11.3224	-5.88936	-5.88936	-0.118591	-0.118591
Mole Fraction Vapor	%	0	86.3781	86.3881	100	0	0	99.6417	0	100	99.9757	0	0.0586571	0	10.6380
Molecular Weight	lb/lbmol	92.1983	20.4287	20.4287	20.5133	77.5104	18.0168	20.5198	18.0153	20.5133	20.5133	18.0168	18.0168	77.5104	77.5104
Molar Flow	lbmol/h	1.21596	379.203	379.203	329.620	1.54141	48.0409	329.394	48.5924	329.620	329.620	48.0409	48.0409	1.54141	1.54141
Specific Gravity		0.679347			0.708270	0.639277	0.994804		0.998949	0.708270		0.994804		0.639277	
Dynamic Viscosity	cP	0.375386			0.0115330	0.244918	0.783625		1.00247	0.0115330		0.783625		0.244918	
Kinematic Viscosity	cSt	0.553091			0.420536	0.383480	0.788463		1.00447	0.420536		0.788463		0.383480	
Thermal Conductivity	Btu/(h*ft*°F)	0.0701300			0.0196092	0.0664121	0.354991		0.347101	0.0196092		0.354991		0.0664121	
Std Vapor Volumetric Flow	MMSCFD	0.0110745	3.45364	3.45364	3.00206	0.0140385	0.437538	3*	0.442562	3.00206	3.00206	0.437538	0.437538	0.0140385	0.0140385
Std Liquid Volumetric Flow	Mbbl/d	0.0114*	1.43607	1.43607	1.36375	0.0129091	0.0594029	1.36467	0.06*	1.36375	1.36375	0.0594029	0.0594029	0.0129091	0.0129091
Gross Ideal Gas Heating Value	Btu/ft^3	5061.87	1099.09	1099.09	1236.98	4279.19	50.9979	1239.18	50.31	1236.98	1236.98	50.9979	50.9979	4279.19	4279.19
CpCv Ratio		1.15364	1.43172	1.40988	1.38634	1.20679	1.41510	1.44424	1.39588	1.38634	1.31459	1.41510	1.41728	1.20679	1.18797
Compressibility		0.197035	0.760534	0.771571	0.903263	0.146555	0.0218911	0.872099	0.0261825	0.903263	0.949850	0.0218911	0.00179608	0.146555	0.162858
Mass Volume	ft^3/lb	0.0236015	0.410970	0.478538	0.584091	0.0250808	0.0161174	0.469365	0.0160505	0.584091	1.31904	0.0161174	0.0238574	0.0250808	0.0613485
Mass Density	lb/ft^3	42.3702	2.43327	2.08970	1.71206	39.8711	62.0449	2.13054	62.3034	1.71206	0.758127	62.0449	41.9157	39.8711	16.3003
Net Ideal Gas Heating Value	Btu/ft^3	4691.76	991.020	991.020	1121.47	3961.28	0.651540	1123.55	0	1121.47	1121.47	0.651540	0.651540	3961.28	3961.28

Certificate of Analysis
Number: 2030-13110102-005A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Alan Ball
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Nov. 16, 2013

Field: Triad Hunter LLC
Station Name: Weese Hunter Combine 1001,1002,1003,1110
Sample Point:
Cylinder No: GAS
Analyzed: 11/16/2013 19:05:50 by GR

Sampled By: AW-GAS
Sample Of: Gas Spot
Sample Date: 11/05/2013
Sample Conditions: 250 psig, @ 65 °F
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.73 psia
Nitrogen	0.446	0.609	
Carbon Dioxide	0.171	0.367	
Methane	79.139	61.888	
Ethane	13.562	19.879	3.638
Propane	4.128	8.873	1.141
Iso-Butane	0.565	1.601	0.185
n-Butane	1.018	2.884	0.322
Iso-Pentane	0.285	1.002	0.104
n-Pentane	0.252	0.886	0.091
i-Hexanes	0.139	0.572	0.055
n-Hexane	0.087	0.357	0.035
Benzene	0.002	0.010	0.001
Cyclohexane	0.011	0.046	0.004
i-Heptanes	0.077	0.368	0.034
n-Heptane	0.032	0.153	0.014
Toluene	0.005	0.021	0.002
i-Octanes	0.058	0.311	0.027
n-Octane	0.010	0.056	0.005
Ethylbenzene	NIL	NIL	NIL
Xylenes	0.002	0.016	0.001
i-Nonanes	0.009	0.085	0.007
n-Nonane	0.002	0.016	0.001
Decane Plus	NIL	NIL	NIL
	100.000	100.000	5.667

GPM TOTAL C2+ 5.667

Physical Properties	Total	C10+
Calculated Molecular Weight	20.51	136.80
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.73 psia & 60°F		
Real Gas Dry BTU	1245.6	7185.4
Water Sat. Gas Base BTU	1224.0	7060.4
Relative Density Real Gas	0.7103	4.7225
Compressibility Factor	0.9965	

Hydrocarbon Laboratory Manager

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

SPL

Certificate of Analysis

Number: 2030-13110102-005A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Alan Ball
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Nov. 16, 2013

Field: Triad Hunter LLC
Station Name: Weese Hunter Combine 1001,1002,1003,1110
Sample Point:
Cylinder No: GAS
Analyzed: 11/16/2013 19:05:50 by GR

Sampled By: AW-GAS
Sample Of: Gas Spot
Sample Date: 11/05/2013
Sample Conditions: 250 psig, @ 65 °F
Method: GPA 2286

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.73 psia
Nitrogen	0.446	0.609	
Carbon Dioxide	0.171	0.367	
Methane	79.139	61.888	
Ethane	13.562	19.879	3.638
Propane	4.128	8.873	1.141
Iso-butane	0.565	1.601	0.185
n-Butane	1.018	2.884	0.322
Iso-pentane	0.285	1.002	0.104
n-Pentane	0.252	0.886	0.091
Hexanes Plus	0.434	2.011	0.186
	100.000	100.000	5.667

GPM TOTAL C2+	5.667
GPM TOTAL C3+	2.029
GPM TOTAL iC5+	0.381

Physical Properties	**Total**	**C6+**
Relative Density Real Gas	0.7103	3.2448
Calculated Molecular Weight	20.51	93.98
Compressibility Factor	0.9965	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.73 psia & 60°F		
Real Gas Dry BTU	1245.6	5129.0
Water Sat. Gas Base BTU	1224.0	5039.8

Hydrocarbon Laboratory Manager

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

Certificate of Analysis
Number: 2030-13110102-005A

Carencro Laboratory
4790 NE Evangeline Thruway
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Iso-Butane	0.565	1.601	0.185
n-Butane	1.018	2.884	0.322
Iso-Pentane	0.285	1.002	0.104
n-Pentane	0.252	0.886	0.091
Hexanes	0.226	0.929	0.090
Heptanes Plus	0.208	1.082	0.096
	100.000	100.000	5.667

GPM TOTAL C2+	5.667
GPM TOTAL C3+	2.029
GPM TOTAL iC5+	0.381

Physical Properties	Total	C7+
Relative Density Real Gas	0.7103	3.5460
Calculated Molecular Weight	20.51	102.70
Compressibility Factor	0.9965	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.73 psia & 60°F		
Real Gas Dry BTU	1245.6	5549.8
Water Sat. Gas Base BTU	1224.0	5453.2

Hydrocarbon Laboratory Manager

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

ATTACHMENT J

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Triad Hunter, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Modification of its General Permit registration for its Weese Station. It is seeking to include equipment at the nearby R. Weese Production Facility with access off of County Route 58 approximately 0.1 miles south of its intersection with State Route 18, just west of Alma in Tyler County, West Virginia. (Lat. 39.42472, Long. -80.82505)

The applicant estimates the following increase in potential emissions of Regulated Air Pollutants will be:

0.27 tons of Particulate Matter per year
9.80 tons of Volatile Organics per year
0.09 tons of n-Hexane per year
0.18 tons of Benzene per year

In addition, the applicant estimates the following decrease in potential emissions of Regulated Air Pollutants:

1.01 tons of Nitrogen Oxides per year
24.20 tons of Carbon Monoxide per year
7,214 tons of Greenhouse Gases per year
0.02 tons of Sulfur Dioxide per year
3.17 tons of Formaldehyde per year

The facility is currently operating. Startup of operation of additional equipment under the modified permit registration is planned to begin on or about the 15th 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, for at least 30 calendar days from the date of publication of this notice.

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

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

By: Mr. Michael Horan, Vice President of Operations
Triad Hunter, LLC
PO Box 430
Reno, Ohio 45773

ATTACHMENT N

Material Safety Data Sheets

Where energy meets innovation.

MATERIAL SAFETY DATA SHEET
NATURAL GAS PIPELINE CONDENSATE

FILE NO.:
MSDS DATE: 02/13/2012

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Natural Gas Pipeline Condensate.

SYNONYMS: Produced Water, Pipeline Drip, Formation Water, Salt Water, Oily Water.

PRODUCT DESCRIPTION: Water extracted from natural gas well production with residual mineral contents and residual hydrocarbons.

PRODUCT CODES: Mixture. See CAS Numbers of Individual Components.

MANUFACTURER: EQT
DIVISION: Waynesburg Operations
ADDRESS: 175 Industry Road
Waynesburg, PA 15370

EMERGENCY PHONE: (800) 926-1759 After hours: (800) 926-1759
CHEMTREC PHONE: (800) 424-9300

CHEMICAL NAME: Water
CHEMICAL FAMILY: Brine Waters
CHEMICAL FORMULA: Mixture
CAS Reg. No.: Mixture

PRODUCT USE: Waste Brine, brine stock for chemical industry, salt brine for ice and snow removal.

PREPARED BY: MSES Consultants, Inc.
609 West Main Street
Clarksburg, WV 26301

SECTION 1 NOTES:

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS No.	% Wt	OSHA PEL	ACGIH TLV
Produced Water	Mixture	> 68	None	N/A
Mineral Variety	N/A	< 32	None	N/A
Gas Condensate	8002-05-9	< 1	500 ppm	N/A
Benzene	71-43-2	< 1	1 ppm	0.5 ppm
Hydrogen Sulfide	7783-06-4	< 1	20 ppm	1 ppm

SECTION 2 NOTES:

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

ROUTES OF ENTRY: Inhalation, ingestion, skin contact

POTENTIAL HEALTH EFFECTS

EYES: Eye contact with vapors may cause eye irritation. Eye contact with liquid may cause irritation and pain. Eye contact with H2S may cause painful irritation and may be indicative of exposure above applicable H2S standards.

SKIN: Skin contact may cause skin irritation and redness. Repeated or prolonged skin contact may cause dermatitis.

INGESTION: Ingestion may cause irritation of the digestive tract that may result in nausea, vomiting and diarrhea. In addition, signs and symptoms of H2S toxicity may be present.

INHALATION: Breathing the mist and vapors may be irritating to the respiratory tract. H2S is irritating and highly toxic if inhaled.

ACUTE HEALTH HAZARDS: Inhalation of high vapor concentrations may have results ranging from dizziness, drowsiness, headache, nausea, to possibly unconsciousness, and death, depending on concentrations and length of exposure. Inhalation of H2S will cause symptoms similar to carbon monoxide poisoning.

CHRONIC HEALTH HAZARDS: Skin, eye and respiratory tract irritation. Gastrointestinal and vascular effects and death may occur at high concentrations. May cause nervous system effects, such as headache, nausea and drowsiness. May contain high concentration of hydrogen sulfide, from which respiratory paralysis and death may occur.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Any condition causing impaired function of the respiratory systems.

CARCINOGENICITY

OSHA: Not Regulated NTP: Not Applicable IARC: Not Applicable

SECTION 3 NOTES:

SECTION 4: FIRST AID MEASURES

EYES: Flush eyes immediately with clean, low-pressure water for at least 15 minutes, occasionally lifting the eyelids. If pain or redness persists after flushing, seek medical attention. If eye is exposed to hot liquid, cover eyes with cloth and seek medical attention immediately.

SKIN: In case of hot liquid exposure, do not remove clothing or treat, wash only unburned area and seek medical attention immediately.

INGESTION: Do not induce vomiting. If spontaneous vomiting occurs, hold the victim's head lower than hips to prevent aspiration of liquid into the lungs. Have exposed individual rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Obtain medical assistance immediately.

INHALATION: Immediately remove person to area of fresh air. Call 911, emergency medical service, or Emergency Phone Numbers(s) provided in Section 1. Give artificial respiration if victim is not breathing. Do not use mouth-to mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.

SECTION 4 NOTES:

SECTION 5: FIRE-FIGHTING MEASURES

FLASH POINT: > 200° F; > 93° C

AUTOIGNITION TEMPERATURE: N/A

NFPA HAZARD CLASSIFICATION
HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0

EXTINGUISHING MEDIA: Water stream, water mist.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area downwind of source. Stop liquids flow and extinguish fire. If gas source cannot be shut off immediately, equipment and surfaces exposed to the fire should be cooled with water to prevent overheating and explosions. Control fire until the natural gas condensate has burned off.

UNUSUAL FIRE AND EXPLOSION HAZARDS: If large amounts of natural gas condensate are present, they are extremely flammable and they can form flammable mixtures with air. Condensate will burn in the open or be explosive in confined spaces. Its vapors are lighter than air and will disperse.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide, and toxic vapors as a result of incomplete combustion.

SECTION 5 NOTES: Generally non-flammable, depending on the amount of natural gas condensate present. If large quantities of natural gas condensate are present, then water may be ineffective on flames and should be used only to keep fire-exposed containers cool. Use water mists to keep the surrounding areas cool.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES:	**Small:**	Evacuate area. Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Ventilate area.
	Large:	Evacuate area. Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Non-essential employees should be evacuated from the exposure area. Persons involved in the control and repair of the leak should be provided with all necessary protective equipment and be properly trained for emergency situations involving this material. Stop leaks only when safe to do so. Stay upwind, and out of low areas. Ventilate closed spaces before entering. Use water spray to cool equipment surfaces, and containers exposed to fire and excessive heat.

SECTION 6 NOTES:

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Handling: Use only with adequate ventilation. Wear appropriate personal protective equipment and use exposure controls as indicated in Section 8. Vent slowly to the atmosphere when opening. Avoid all contact with skin and eyes. Avoid breathing product vapors. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Remove contaminated clothing immediately. Wash with soap and water after working with this product.

Storage: Store in a segregated and approved area. Store in vented containers in a well-ventilated area, away from heat and ignition sources. Use appropriate containment to avoid environmental contamination.

OTHER PRECAUTIONS: Bond and ground containers.

SECTION 7 NOTES:

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

VENTILATION : Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below the flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

RESPIRATORY PROTECTION: Respiratory protection is not required for normal use. In non-emergency situations, use NIOSH approved respiratory protective equipment in situations where airborne concentrations may meet or exceed occupational exposure levels. At excessive concentrations, wear a NIOSH approved full-face self-contained breathing apparatus (SCBA) with supplied air.

EYE PROTECTION:	Wear splash-proof goggles and/or face shield for protection from spray.
SKIN PROTECTION:	Consider wearing long-sleeve, FRC, otherwise normal working clothes should be worn. Wash contaminated clothing prior to reuse. If gloves are required for job operations involving this product, wear nitrile rubber or polyvinylalcohol (PVAL) gloves
SECTION 8 NOTES:	

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Brine water. Colorless to lightly colored. Clear to turbid.
ODOR:	Slight hydrocarbon / rotten egg odor if hydrogen sulfide is present.
PHYSICAL STATE:	Liquid
BOILING POINT:	212° F (100° C)
MELTING POINT:	Not determined
FREEZING POINT:	< 32° C. < 0° C
VAPOR PRESSURE (mmHg):	Not determined
VAPOR DENSITY (AIR = 1):	1.2
SPECIFIC GRAVITY (H2O = 1):	> 1
EVAPORATION RATE:	N/A
SOLUBILITY IN WATER:	This material is aqeous.
PERCENT SOLIDS BY WEIGHT:	< 32%
PERCENT VOLATILE:	< 1% by weight and by volume
VOLATILE ORGANIC COMPOUNDS (VOC):	Not determined
MOLECULAR WEIGHT:	Not determined
VISCOSITY:	Not determined

SECTION 9 NOTES:

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY): Generally non-flammable. Can be flammable, depending on the quantity of natural gas liquids present.

INCOMPATIBILITY (MATERIAL TO AVOID): Oxygen and strong oxidizing material – if natural gas liquids present.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide, carbon monoxide, and various hydrocarbons formed during incomplete combustion.

HAZARDOUS POLYMERIZATION: Polymerization will not occur.

SECTION 10 NOTES:

SECTION 11: TOXICOLOGICAL INFORMATION

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

HYDROGEN SULFIDE: This product contains hydrogen sulfide, which may be fatal if inhaled. Inhalation of a single breath at a concentration of 1000 ppm (0.1%) may cause coma. Hydrogen sulfide is corrosive when moist. Skin contact may cause burns. There is a rapid loss of sense of smell on exposure to gas concentrations above 150 ppm, and this means that the extent of exposure may be underestimated. Perception threshold ranges from 0.5 ppt to 0.1 ppm. It is an irritant and asphyxiant.

SECTION 11 NOTES:

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: Do not discharge into or allow runoff to flow into sewers and natural waterways. Contain spill material and dike for proper disposal. May be hazardous to waterways/wildlife.

SECTION 12 NOTES:

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: This product is not a "listed" hazardous waste. But when disposed of in containers may meet the criteria of being an "ignitable" waste. It is the responsibility of the user to determine if the material disposed of meets federal, state, or local criteria to be defined as a hazardous waste and dispose of accordingly.

SECTION 13 NOTES:

SECTION 14: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION
PROPER SHIPPING NAME: **NOT REGULATED as a Hazardous Material for Transportation.**

SECTION 14 NOTES:

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

US OSHA Hazard Communication Class	This product is hazardous under 29CFR 1910.1200 (Hazard Commiunication). HCS Class: Irritating Substance.
USA Right-to-Know – Federal	None of this product's components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

SECTION 15 NOTES:

SECTION 16: OTHER INFORMATION

OTHER INFORMATION:

PREPARATION INFORMATION:

MSES Consultants, Inc.
609 West Main Street
Clarksburg, WV 26301

DISCLAIMER: This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our Company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

METHANOL
20297

Distributed By:
SAL Chemical
3036 Birch Drive
Weirton, WV 26062
304-748-8200

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Ashland
P.O. Box 2219
Columbus, OH 43216

Regulatory Information Number	1-800-325-3751
Telephone	614-790-3333
Emergency telephone	1-800-ASHLAND (1-800-274-5263)

Product name	METHANOL
Product code	20297
Product Use Description	No data

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid,, colourless

WARNING! FLAMMABLE LIQUID AND VAPOR. MAY AFFECT THE CENTRAL NERVOUS SYSTEM CAUSING DIZZINESS, HEADACHE OR NAUSEA. MAY CAUSE BLINDNESS. HARMFUL IF SWALLOWED. MAY BE HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. PROLONGED OR REPEATED CONTACT MAY DRY THE SKIN AND CAUSE IRRITATION AND BURNS.

Potential Health Effects

Exposure routes

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Skin contact

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms may include redness, burning, drying and cracking of skin, and skin burns. Passage of this material into the body through the skin is possible, and may add to toxic effects from breathing or swallowing.

Ingestion

Swallowing this material may be harmful.

Inhalation

Breathing of vapor or mist is possible. Breathing this material may be harmful. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material:, Skin, lung (for example, asthma-like conditions), Liver, kidney, Central nervous system, pancreas, Heart, Exposure to this material may aggravate any preexisting condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemias.

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:, stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), muscle cramps, pain in the abdomen and lower back, Blurred vision, Shortness of breath, cyanosis (causes blue coloring of the skin and nails from lack of oxygen), visual impairment (including blindness), coma, and death

Target Organs

Exposure to lethal concentrations of methanol has been shown to cause damage to organs including liver, kidneys, pancreas, heart, lungs and brain. Although this rarely occurs, survivors of severe intoxication may suffer from permanent neurological damage., Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals:, liver abnormalities, central nervous system damage, Overexposure to this material (or its components) has been suggested as a cause of the following effects in humans:, visual impairment

Carcinogenicity

Based on the available information, this material cannot be classified with regard to carcinogenicity. This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

Reproductive hazard

Methanol has caused birth defects in laboratory animals, but only when inhaled at extremely high vapor concentrations. The relevance of this finding to humans is uncertain.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components	CAS-No.	Concentration
METHANOL	67-56-1	<=100%

4. FIRST AID MEASURES

Eyes

If symptoms develop, immediately move individual away from exposure and into fresh air. Flush eyes gently with water for at least 15 minutes while holding eyelids apart; seek immediate medical attention.

Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Notes to physician

Hazards: This product contains methanol which can cause intoxication and central nervous system depression. Methanol is metabolized to formic acid and formaldehyde. These metabolites can cause metabolic acidosis, visual disturbances and blindness. Since metabolism is required for these toxic symptoms, their onset may be delayed from 6 to 30 hours following ingestion. Ethanol competes for the same metabolic pathway and has been used to prevent methanol metabolism. Ethanol administration is indicated in symptomatic patients or at blood methanol concentrations above 20 ug/dl. Methanol is effectively removed by hemodialysis.

Treatment: Fomepizole (4-methylpyrazole) is an effective antagonist of alcohol dehydrogenase, and as such, may be used as an antidote in the treatment of ethylene glycol, diethylene glycol and methanol poisoning.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Dry chemical, Alcohol-resistant foam, Carbon dioxide (CO_2)

Hazardous combustion products

May form:, carbon dioxide and carbon monoxide

Precautions for fire-fighting

Material is volatile and readily gives off vapors which may travel along the ground or be moved by ventilation and ignited by pilot lights, flames, sparks, heaters, smoking, electric motors, static discharge or other ignition sources at locations near the material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. During a fire, irritating or toxic decomposition products may be generated.Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). Water may be ineffective for extinguishment unless used under favorable conditions by experienced fire fighters. Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

NFPA Flammable and Combustible Liquids Classification

Flammable Liquid Class IB

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

For personal protection see section 8. Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Pump or vacuum transfer spilled product to clean containers for recovery. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Environmental precautions

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

Methods for cleaning up

Absorb liquid on vermiculite, floor absorbent or other absorbent material.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Static ignition hazard can result from handling and use. Electrically bond and ground all containers, personnel and equipment before transfer or use of material. Special precautions may be necessary to dissipate static electricity for non-conductive containers. Use proper bonding and grounding during product transfer as described in National Fire Protection Association document NFPA 77. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

Storage

Store in a cool, dry, ventilated area, away from incompatible substances.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

METHANOL		67-56-1
ACGIH	time weighted average	200 ppm
ACGIH	Short term exposure limit	250 ppm
NIOSH	Recommended exposure limit (REL):	200 ppm
NIOSH	Recommended exposure limit (REL):	260 mg/m3
NIOSH	Short term exposure limit	250 ppm
NIOSH	Short term exposure limit	325 mg/m3
OSHA Z1	Permissible exposure limit	200 ppm
OSHA Z1	Permissible exposure limit	260 mg/m3

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Eye protection

Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin and body protection

Wear resistant gloves (consult your safety equipment supplier).
To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Respiratory protection

If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH-approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Form	liquid
Colour	colourless
Odour	characteristic, pungent
Boiling point/boiling range	64.70 °C @ 101.32 kPa
Melting point/range	-144.0 °F / -97.8 °C
pH	No data
Flash point	12.00 °C Closed Cup
Evaporation rate	2.10 (n-Butyl Acetate)
Lower explosion limit/Upper explosion limit	7.3 %(V) / 36 %(V)
Vapour pressure	16.931 kPa @ 25 °C
Vapour density	1.110 (AIR=1)
Density	0.792 g/cm3 @ 68 °F / 20 °C 6.6 lb/gal @ 61 °F / 16 °C
Solubility	completely soluble in water
Partition coefficient: n-octanol/water	No data

log Pow	-0.77
Autoignition temperature	725 °F / 385 °C

10. STABILITY AND REACTIVITY

Stability
Stable.

Conditions to avoid
Avoid contact with:

Incompatible products
Avoid contact with:, calcium hypochlorite, hypochlorites, Peroxides, reactive metals such as aluminum and magnesium, sodium, Strong acids, strong bases, Strong oxidizing agents, Zinc

Hazardous decomposition products
carbon dioxide and carbon monoxide

Hazardous reactions
Product will not undergo hazardous polymerization.

Thermal decomposition
No data

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	: LD L0 Human: 300 mg/kg
Acute inhalation toxicity	: LC 50 Rat: 64000 ppm, 4 h
	:
Acute dermal toxicity	: LD 50 Rabbit: 12,800 mg/kg

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

Biodegradability	:	Result: Readily biodegradable.

Bioaccumulation

METHANOL	:	Species: Green algae (Chlorella fusca vacuolata) Exposure time: 24 h Dose: 0.05 mg/l Bioconcentration factor (BCF): 28,400 Method: Static

Ecotoxicity effects

Toxicity to fish

METHANOL	:	no data available

Toxicity to daphnia and other aquatic invertebrates.

METHANOL	:	48 h EC 50 Water flea (Daphnia magna): > 10,000.00 mg/l Method: Static Intoxication

Toxicity to algae

METHANOL	:	no data available

Toxicity to bacteria

METHANOL	:	no data available

Biochemical Oxygen Demand (BOD)

METHANOL	:	no data available

Chemical Oxygen Demand (COD)

METHANOL	:	no data available

Additional ecological information

METHANOL	:	no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution's Environmental Services Group at 800-637-7922.

14. TRANSPORT INFORMATION

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.
U.S. DOT - ROAD					
UN 1230	Methanol	3	(6.1)	II	
U.S. DOT - RAIL					
UN 1230	Methanol	3	(6.1)	II	
U.S. DOT - INLAND WATERWAYS					
UN 1230	Methanol	3	(6.1)	II	
TRANSPORT CANADA - ROAD					
UN 1230	METHANOL	3	(6.1)	II	
TRANSPORT CANADA - RAIL					
UN 1230	METHANOL	3	(6.1)	II	
TRANSPORT CANADA - INLAND WATERWAYS					
UN 1230	METHANOL	3	(6.1)	II	
INTERNATIONAL MARITIME DANGEROUS GOODS					
UN 1230	METHANOL	3	(6.1)	II	
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO					
UN 1230	Methanol	3	(6.1)	II	
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER					
UN 1230	Methanol	3	(6.1)	II	
MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES					
UN 1230	METANOL	3	(6.1)	II	

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65
This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SARA Hazard Classification
Fire Hazard
Acute Health Hazard

SARA 313 Component(s)

METHANOL	100.00 %

New Jersey RTK Label Information

METHANOL	67-56-1

Pennsylvania RTK Label Information

METHANOL	67-56-1

Notification status

Australia. Industrial Chemical (Notification and Assessment) Act	y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	y (positive listing)
China. Inventory of Existing Chemical Substances	y (positive listing)
Japan. Kashin-Hou Law List	y (positive listing)
Japan. Kashin-Hou Law List	y (positive listing)
US. Toxic Substances Control Act	y (positive listing)
EU. EINECS	y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List	y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List	y (positive listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	y (positive listing)
Japan. Industrial Safety & Health Law (ISHL) List	y (positive listing)

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	y (positive listing)
Switzerland. Consolidated Inventory	y (positive listing)

Reportable quantity - Product

US. EPA CERCLA Hazardous Substances (40 CFR 302) 5000 lbs

Reportable quantity-Components

METHANOL	67-56-1	5000 lbs

	HMIS	NFPA
Health	1*	1
Flammability	3	3
Physical hazards	0	
Instability		0
Specific Hazard	--	--

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

TRIETHYLENE GLYCOL (515#/DM)
104071

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Ashland P.O. Box 2219 Columbus, OH 43216	Regulatory Information Number	1-800-325-3751
	Telephone	614-790-3333
	Emergency telephone	1-800-ASHLAND (1-800-274-5263)

Product name	TRIETHYLENE GLYCOL (515#/DM)
Product code	104071
Product Use Description	No data

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid, colourless

CAUTION! MAY AFFECT THE CENTRAL NERVOUS SYSTEM CAUSING DIZZINESS, HEADACHE OR NAUSEA. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE IRRITATION.

Potential Health Effects

Exposure routes

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Skin contact

May cause mild skin irritation. Symptoms may include redness and burning of skin. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.Ingestion of medications contaminated with diethylene glycol has caused kidney failure and death in humans. Products containing diethylene glycol should be considered toxic by ingestion.

Inhalation

It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material:, lung (for example, asthma-like conditions), Liver, kidney, Central nervous system

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:, stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), pain in the abdomen and lower back, acute kidney failure (sudden slowing or stopping of urine production), lung edema (fluid buildup in the lung tissue)

Target Organs

Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals:, kidney damage, liver damage, central nervous system damage, Overexposure to this material (or its components) has been suggested as a cause of the following effects in humans:, liver damage, kidney damage

Carcinogenicity

Based on the available information, this material cannot be classified with regard to carcinogenicity. This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

Reproductive hazard

This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies. Harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components	CAS-No.	Concentration
TRIETHYLENE GLYCOL	112-27-6	<=100%
DIETHYLENE GLYCOL	111-46-6	>=1.5-<5%

4. FIRST AID MEASURES

Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is any visual difficulty, seek medical attention.

Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Notes to physician

Hazards: Ingestion or other significant exposure to this material (or a component) may cause metabolic acidosis.

Treatment: Fomepizole (4-methylpyrazole) is an effective antagonist of alcohol dehydrogenase, and as such, may be used as an antidote in the treatment of ethylene glycol, diethylene glycol and methanol poisoning.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Dry chemical, Carbon dioxide (CO2), Alcohol-resistant foam, Water spray

Hazardous combustion products

Alcohols, Aldehydes, carbon dioxide and carbon monoxide, ethers, Hydrocarbons

Precautions for fire-fighting

Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). DO NOT direct a solid stream of water or foam into hot, burning pools of liquid since this may cause frothing and increase fire intensity. Frothing can be violent and possibly endanger any firefighter standing too close to the burning liquid. Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning material with water used for cooling purposes.

NFPA Flammable and Combustible Liquids Classification

Combustible Liquid Class IIIB

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

For personal protection see section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

Environmental precautions

Do not flush into surface water or sanitary sewer system.

Methods for cleaning up

Absorb liquid on vermiculite, floor absorbent or other absorbent material.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

Storage

Store in closed containers in a dry, well-ventilated area. Do not store near extreme heat, open flame, or sources of ignition. Store out of direct sunlight.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

General room ventilation should be adequate for normal conditions of use. However, if unusual operating conditions exist, provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects.

Eye protection

Wear chemical splash goggles when there is the potential for exposure of the eyes to liquid, vapor or mist.

Skin and body protection

Wear normal work clothing including long pants, long-sleeved shirts and foot covering to prevent direct contact of the product with the skin. Launder clothing before reuse. If skin irritation develops, contact your facility health and safety professional or your local safety equipment supplier to determine the proper personal protective equipment for your use.
Wear resistant gloves such as:
polyvinyl chloride

Respiratory protection

Respiratory protection is not required under normal conditions of use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Form	no data available
Colour	colourless
Odour	very faint
Boiling point/boiling range	329 °F / 165 °C @ 1.86 kPa
Melting point/range	19 °F / -7 °C
Sublimation point	no data available
pH	no data available
Flash point	349.99 °F / 176.66 °C Open Cup
Ignition temperature	no data available
Evaporation rate	(<)0.01 n-Butyl Acetate
Lower explosion limit/Upper explosion limit	0.9 %(V) / 9.2 %(V)
Particle size	no data available
Vapour pressure	0.000 kPa @ 77 °F / 25 °C
Relative vapour density	5.2 AIR=1
Density	(+/- 0.01) 1.125 g/cm3 @ 68.00 °F / 20.00 °C 9.36 lb/gal @ 68 °F / 20 °C
Bulk density	() 1.25 kg/m3
Water solubility	completely soluble
Solubility	no data available
Partition coefficient: n-octanol/water	no data available
log Pow	no data available
Autoignition temperature	657 °F / 347 °C
Viscosity, dynamic	no data available
Viscosity, kinematic	no data available
Solids in Solution	no data available
Decomposition temperature	no data available
Burning number	no data available
Dust explosion constant	no data available
Minimum ignition energy	no data available

10. STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid

Heat, flames and sparks.

Incompatible products
Alkaline earth metals, Strong oxidizing agents, Acids, Bases

Hazardous decomposition products
acetaldehyde, Alcohols, Aldehydes, carbon dioxide and carbon monoxide, dioxolanes, ethers, ethylene glycol monomethyl ether, formaldehyde, Hydrocarbons

Hazardous reactions
Product will not undergo hazardous polymerization.

Thermal decomposition
No data

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	: LD 50 Rat : 15,000 - 22,000 mg/kg
Acute inhalation toxicity	: LC 50 Rat: > 3.9 mg/l; 4 h :
Acute dermal toxicity	: LD 50 Rabbit: > 22.6 g/kg

12. ECOLOGICAL INFORMATION

Biodegradability

TRIETHYLENE GLYCOL	: no data available
DIETHYLENE GLYCOL	: 92 % Exposure time: 28 d
Bioaccumulation	: Species: Sheepshead minnow (Cyprinodon variegatus) Exposure time: 28 d Dose: 7.8 mg/l Bioconcentration factor (BCF): 1,700 Method: Flow through

Ecotoxicity effects

Toxicity to fish	:	96 h LC 50 Bluegill (Lepomis macrochirus): > 10,000.00 mg/l Method: Static ; Mortality
Toxicity to daphnia and other aquatic invertebrates.	:	48 h EC 50 Water flea (Daphnia magna): 46,500.00 mg/l Method: Static; Intoxication
Toxicity to algae		
TRIETHYLENE GLYCOL	:	no data available
DIETHYLENE GLYCOL	:	no data available
Toxicity to bacteria		
TRIETHYLENE GLYCOL	:	no data available
DIETHYLENE GLYCOL	:	no data available
Biochemical Oxygen Demand (BOD)		
TRIETHYLENE GLYCOL	:	no data available
DIETHYLENE GLYCOL	:	no data available
Chemical Oxygen Demand (COD)		
TRIETHYLENE GLYCOL	:	no data available
DIETHYLENE GLYCOL	:	no data available
Additional ecological information		
TRIETHYLENE GLYCOL	:	no data available
DIETHYLENE GLYCOL	:	no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution's Environmental Services Group at 800-637-7922.

14. TRANSPORT INFORMATION

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.

U.S. DOT - ROAD

	Not dangerous goods

U.S. DOT - RAIL

	Not dangerous goods

U.S. DOT - INLAND WATERWAYS

	Not dangerous goods

TRANSPORT CANADA - ROAD

	Not dangerous goods

TRANSPORT CANADA - RAIL

	Not dangerous goods

TRANSPORT CANADA - INLAND WATERWAYS

	Not dangerous goods

INTERNATIONAL MARITIME DANGEROUS GOODS

	Not dangerous goods

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

	Not dangerous goods

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

	Not dangerous goods

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

	Not dangerous goods

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65

WARNING! This product contains a chemical known to the State of California to cause cancer.	1,4-DIOXANE

SARA Hazard Classification
Acute Health Hazard

New Jersey RTK Label Information

TRIETHYLENE GLYCOL	112-27-6
DIETHYLENE GLYCOL	111-46-6

Pennsylvania RTK Label Information

TRIETHYLENE GLYCOL	112-27-6
DIETHYLENE GLYCOL	111-46-6

Notification status

Australia. Industrial Chemical (Notification and Assessment) Act	y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	y (positive listing)
China. Inventory of Existing Chemical Substances	y (positive listing)
Japan. Kashin-Hou Law List	y (positive listing)
US. Toxic Substances Control Act	y (positive listing)
EU. EINECS	y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List	y (positive listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	y (positive listing)
Japan. Industrial Safety & Health Law (ISHL) List	y (positive listing)
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	y (positive listing)

	HMIS	NFPA
Health	1*	1
Flammability	1	1
Physical hazards	0	
Instability		0
Specific Hazard	--	--

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

ATTACHMENT O

Emissions Summary Sheets

G70-A EMISSIONS SUMMARY SHEET

R.WEESE SOURCES

Emission Point ID No.	Emission Point Type[1]	Emission Unit Vented Through This Point		Air Pollution Control Device		All Regulated Pollutants - Chemical Name/CAS[2] (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions [3]		Maximum Potential Controlled Emissions [4]		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used [5]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
1E	Upward Vertical Stacks	1S	GPU-1 to GPU-4	None		NOx	0.28	1.20	0.28	1.20	Gas	EE
						CO	0.23	1.01	0.23	1.01	Gas	EE
						VOC	0.02	0.07	0.02	0.07	Gas	EE
						PM	0.021	0.09	0.021	0.09	Solid	EE
						HCOH	0.001	<0.001	0.001	0.001	Gas	EE
						Total HAPs	0.005	0.023	0.005	0.023	Gas	EE
						CO2e	332	1455	332	1455	Gas	EE
2E	Upward Vertical Stack	2S	Re-boiler	None		NOx	0.03	0.13	0.03	0.13	Gas	EE
						CO	0.03	0.11	0.03	0.11	Gas	EE
						VOC	0.00	0.01	0.00	0.01	Gas	EE
						PM	0.002	0.01	0.002	0.01	Solid	EE
						HCOH	0.00	0.00	0.00	0.00	Gas	EE
						Total HAPs	0.00	0.00	0.00	0.00	Gas	EE
						CO2e	36	159	36	159	Gas	EE
3E	Upward Vertical Stack	3S	Still vent	None		NOx					Gas	EE
						CO					Gas	EE
						VOC	1.23	5.38	1.23	5.38	Gas	EE
						PM					Solid	EE
						HCOH					Gas	EE
						Total HAPs	0.45	1.95	0.45	1.95	Gas	EE
						CO2e	0.40	1.75	0.40	1.75	Gas	EE
4E	Upward Vertical Stack	T01 to T06 TL-1, 5 & 5	VCU-1	N/A		NOx			0.04	0.20	Gas	EE
						CO			0.24	1.07	Gas	EE
						VOC			0.26	1.16	Gas	EE
						PM					Solid	EE
						HCOH					Gas	EE
						Total HAPs					Gas	EE
						CO2e			76.96	337	Gas	EE

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

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

[2] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases

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

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

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

G70-A EMISSIONS SUMMARY SHEET

NEW WEESE STATION SOURCES

Emission Point ID No.	Emission Point Type[1]	Emission Unit Vented Through This Point		Air Pollution Control Device		All Regulated Pollutants - Chemical Name/CAS[2] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [3]		Maximum Potential Controlled Emissions [4]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [5]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
5E-A	Upward Vertical Stacks	5E-A	S5-A	4C	NSCR	NOx CO VOC PM HCOH Total HAPs CO2e			1.50 0.72 0.15 0.04 0.05 0.07 262	6.56 3.15 0.65 0.18 0.22 0.32 1145	Gas Gas Gas Solid Gas Gas Gas	EE EE EE EE EE EE EE

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

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

[2] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases

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

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

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

ATTACHMENT P

Other Supporting Documentation

Triad Hunter, LLC
Weese Station Modification
and
Addition of R. Weese Production Facility
Regulatory Analysis and Aggregation Assessment

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

1.0 FEDERAL REQUIREMENTS

1.1 PSD and NSR

The combined facilities will be remain a minor source with respect to Prevention of Significant Deterioration (PSD) regulations as they will not have the potential to emit more than the annual emission thresholds of any PSD regulated pollutant.

The facilities are within an area designated as attainment for all criteria pollutants. Additionally, at the potential emission rates, the combined facilities are not subject to the New Source Review (NSR) regulations. Thus, NSR requirements are not applicable to this project.

1.2 Title V Operating Permit Program

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

The combined facilities will be a natural minor source. Additionally, the NSPS programs regulating this facility do not trigger a Title V permit. Hence, a Title V permit will not be required.

1.3 Aggregation

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

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

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

The R. Weese Production Facility receives and manages raw natural gas and associated produced fluids from the on-site wells. After separation of the liquids, the gas will be dehydrated and routed to the nearby Weese Station for compression and injection into a gathering line for transportation to a processing plant owned and operated by MarkWest for further processing.

There will be no gas from any other well pads routed to either R. Weese or Weese Station. As noted above, all gas and liquids from R. Weese will be routed to the Weese Station which is approximately 0.78 miles away. The R. Weese Production Facility and the Weese Station are under common control, within the same SIC Major Group and are on adjacent lease units. Additionally, as gas and liquid flow from the R. Weese well pad is dependent upon the Weese Station, the equipment at both locations should fall under a common permit. No other Triad Hunter well pads or other Triad Hunter facilities in the area should be aggregated with this facility.

The receiving MarkWest Mobley processing plant is under a different SIC Code, has completely separate ownership and there is no sharing of staff between Triad Hunter and MarkWest. In addition, the processing plant is more than 15 miles from the site of this new facility. The MarkWest plant receives gas from various other production facilities and is not dependent upon Weese Station. Additionally, Triad Hunter can, within the confines of any contractual obligations, route gas produced by R. Weese to any of several other processing plants in the region. Thus, there is not a dependency relationship and not all of the criteria are met for aggregation of this facility and the MarkWest Processing Plant. Emissions from the R. Weese Production Facility should not be aggregated with the MarkWest Processing Plant.

1.4 New Source Performance Standards

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

- 40 CFR 60, Subpart K/Ka/Kb – Storage Vessels for Petroleum Liquids/Volatile Organic Liquids
- 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Stations
- 40 CFR 60, Subpart LLL – Onshore Natural Gas Processing Stations: SO_2 Emissions
- 40 CFR 60, Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines
- 40 CFR 60, Subpart OOOO **-** Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

1.4.1 <u>Subpart K/Ka/Kb</u>

These three subparts apply to volatile organic liquid storage tanks of specific sizes constructed in certain timeframes. Their consideration is appropriate due to the presence of the two 400 BBL condensate tanks and a single 210 BBL condensate tank. Subpart K applies to tanks constructed or modified between 1973 and 1978 while Subpart Ka applies to tanks constructed between 1978 and 1984. Subpart Kb applies to storage tanks constructed or modified after 1984. The condensate and produced water tanks at the facility are of new (2010) construction. Thus, Subparts K and Ka are not applicable, but Subpart Kb remains tentatively applicable. However, the capacity of the 400 BBL tanks (16,800 gallons) is below the threshold for regulation under Kb (19,800 gallons or 75 cubic meters). Hence, the rule does not apply to the condensate tanks.

1.4.2 Subpart KKK

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

1.4.3 Subpart LLL

This set of regulations governs emissions from processes used to remove sulfur gases from the field gas stream (sweetening unit) and subsequent sulfur recovery operations. The field gas that will be received by the Everett Weese Production Facility does not contain sufficient sulfur compounds to warrant a sweetening unit. Hence, this rule does not apply.

1.4.4 Subpart IIII

This subpart governs emissions from new compression ignition internal combustion engines CI ICE) manufactured after July 11, 2005. There will be no CI ICE at this facility. Hence, this rule does not apply.

1.4.5 Subpart JJJJ

This subpart governs emissions from new stationary spark ignition internal combustion engines (SI ICE) manufactured after July 1, 2007. There are no changes being sought for natural gas engines driving the gas compressors at the combined R Weese Production Facility and the Weese Station. Hence, this rule remains applicable.

1.4.6 Subpart KKKK

This subpart governs emissions from new stationary combustion turbine engines with a heat input of greater than 10 MMBTU/Hr at HHV fuel and manufactured after February 18, 2005 [40 CFR60.4035(a)]. There will be no combustion turbines at this facility. Hence, this rule does not apply.

1.4.7 Subpart OOOO

This subpart governs emissions from a broad spectrum of operations in the oil and natural gas industries, including operations at processing and fractionation plants. The potentially applicable sections of this rule set restrictions on pneumatic controllers present and set requirements for storage vessels with potential VOC emissions greater than 6 tons per year. This rule applies to the combined R. Weese Production Facility/Weese Station.

One of the key components to this rule [40 CFR 60.5390(b)] is the requirement that all pneumatic controllers located between the well head and a processing plant that are natural gas driven must have a bleed rate of less than 6 scfh. All pneumatic controllers installed at this facility meet these criteria. Emissions from these controllers are included with the fugitive emission calculations (see Attachment C).

This rule also stipulates that storage vessels with VOC emissions equal to or greater than 6 tpy must control those emissions by 95% by October 15, 2013. The condensate tanks at this facility have a combined estimated *uncontrolled* VOC emission rate in excess of this threshold. Although there are multiple tanks, there is a potential that any one tank may exceed the 6 tpy threshold, depending upon the management of condensate at any given time. Thus, emissions from these tanks must be controlled by at least 95%. Triad Hunter meets this requirement through installation of a system that captures all vapors released from the condensate tanks and routes them to an enclosed combustor unit. This unit controls VOC emissions to greater than 95%, fulfilling this regulatory requirement. The control systems presented in this application reduces VOC emissions from the three condensate tanks described above to rates well below the 6 tpy limit and operation of these controls will become part of the permit. As described in 40 CFR 60.5365(e), *…the determination may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority*. Thus, as proper use and operation of this control system is anticipated to become part of the permit, the condensate tanks at this facility will not be regulated under 40 CFR 60, Subpart OOOO.

1.5 National Emission Standards for Hazardous Air Pollutants

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

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

1.5.1 Subpart HH

This Subpart contains MACT standards for major and area source dehydration units located at natural gas production facilities. The proposed dehydration unit for the R. Weese Production Facility potentially falls under this rule. However, as set forth in 40 CFR 63.764(e)(1), since the actual average benzene emissions will be less than 1 ton per year and the annual average flow is anticipated to be less than 85,000 SCMD (3.0 MMSCFD), the facility is, for all practical purposes, exempt from the rule. The facility must maintain records of either the flow to the dehydration unit or the benzene emission determination as required in 40 CFR 63.774(d)(1). A copy of the GRI-GLYCalc modeling input and results demonstrating compliance with the 1 ton per year requirement is provided with the Glycol Dehydration Emission Unit Sheet in Attachment G.

1.5.2 Subpart HHH

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

1.5.3 Subpart ZZZZ

This Subpart governs emissions from a stationary reciprocating internal combustion engine (RICE) located both at major and area source of HAPs. The station will not be a major source of HAPs, but will be considered an area source of HAPs. RICE currently present at the combined facilities meets this rule through compliance with NSPS Subpart JJJJ.

1.5.4 Subpart DDDDD

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

1.6 Chemical Accident Prevention

Subparts B-D of 40 CFR 68 present the requirements for the assessment and subsequent preparation of a Risk Management Plan (RMP) for a facility that stores more than a threshold quantity of a regulated substance listed in 40 CFR 68.130. If a facility stores, handles or processes one or more regulated substances in an amount greater than its corresponding threshold, the facility must prepare and implement an RMP. The R. Weese Production Facility has the potential to store more than 10,000 lbs of a flammable mixture containing several of the substances listed in Table 3 in 40 CFR 68.130. However, an RMP is not required as this facility qualifies for the exclusion provided for remote oil and gas production facilities [40CFR68.115(b)(2)(iii)].

2.0 WEST VIRGINIA STATE REQUIREMENTS

2.1 45 CSR 2

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

2.2 45 CSR 4

This regulation prohibits the emission of objectionable odors. Triad Hunter is obligated to run the station in a manner that does not produce objectionable odors.

2.3 45 CSR 6

This rule establishes emission standards for particulate matter and other requirements for incineration of refuse not subject to or specifically exempted from federal regulation. The combustor units fall under Section 4.1 of this rule. PM emissions from the combustors are expected to be well below the allowable limit of 2.33 lb/hr calculated under this rule.

The combustors must also meet the visible emissions requirements of this rule limiting visible emissions to 20% opacity at all times, with the exception of 40% opacity, for a period or periods aggregating no more than eight (8) minutes during start-up

2.4 45 CSR 10

This regulation limits emissions of sulfur oxides. As the sulfur content of the Inlet Gas contains no measurable sulfur, emissions of sulfur oxides is negligible. Thus, while parts of this rule are applicable to the planned facility, no actions are required on the part of Triad Hunter to attain compliance. The various non-engine combustion units have a design heat input less than 10 MMBTU/Hr and are therefore exempt from the requirements of this rule.

2.5 45 CSR 13

The state regulations applicable to the permitting of the proposed construction are in Title 45 Series 13 of the Code of State Regulations. The combined R. Weese Production Facility and Weese Station have the potential to emit several regulated pollutants in excess of the thresholds that define a Stationary Source.

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

2.6 45 CSR 16

This series of regulations is an incorporation, by reference, of the New Source Performance Standards codified under 40 CFR 60. As discussed under the federal regulations, the proposed facility is subject to Subpart OOOO.

2.7 45 CSR 30

The state regulations applicable to Title V operating permits are in Title 45 Series 30. The planned combined R. Weese Production Facility and Weese Station, with proposed control devices, does not have the potential to emit any regulated pollutant about the threshold that would define it as a major facility. Additionally, although the facility is subject to certain New Source Performance Standards, the NSPS applicable to this facility do not trigger the need to submit a Title V application and obtain a Title V permit. Hence this rule is not applicable.

2.8 Other Applicable Requirements

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