V-UO-000005-2018.00

FED 1132666

Andeavor
1801 California Street, Suite 1200
Denver, CO 80202

andeavor.com

April 10, 2018

RECEIVED APR 11 2018

Part 71 Permit Contact
Air Program, 8P-AR
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, CO 80202

FedEx #771929288168

RE: Wonsits Valley Compressor Station (Uintah County, Utah)
Revised Part 71 Federal Operating Permit Renewal Application
Operating Permit No. V-UO-000005-2000.00

Dear Sir or Madam:

Andeavor, operator of the Wonsits Valley Compressor Station, is submitting the enclosed Title V operating permit application on behalf of Andeavor Field Services LLC. The facility currently operates under Operating Permit No. V-UO-000005-2000.00 which expires on October 10, 2018. According to permit Condition VII.Q.2, the permit renewal application must be submitted at least 6 months prior to the date of expiration of the permit; therefore, the enclosed application is timely submitted.

The application package to renew this permit, pursuant to 40 CFR Part 71, contains a facility narrative (including an Introduction, Process Description and Emission Summary) and the following appendices:

- Appendix A – EPA Part 71 Forms
- Appendix B – Emission Calculations
- Appendix C – Supporting Documentation for Emission Calculations

In addition, Andeavor is requesting that EPA allow alternative test methods for engine emissions testing. This would include alternative testing methods with the FTIR analyzer. The alternative methods for the FTIR analyzer are EPA 40 CFR 63(A), Method 320, and ASTM D 6348-03. These would use Method 320 as an optional alternative method for EPA Methods 4 (moisture content), 7E (NO_x), and 10 (CO) that are currently required by permit Condition V.D.2.(c). FTIR records moisture, NO_x, and CO simultaneously under a single method.

If you have any questions regarding this submittal, please contact me at (303) 454-6685 or Thomas.H.Gibbons@andeavor.com.

Sincerely,

Thomas H. Gibbons

Thomas Gibbons
Environmental Specialist

Encl: Application Package

Federal Operating Permit Renewal Application *for* Wonsits Valley Compressor Station

Uintah County, Utah

Prepared By:

Andeavor
1801 California Street, Suite 1200
Denver, CO 80202

Submitted To:

U.S. Environmental Protection Agency
Air and Radiation Program, 8P-AR
1595 Wynkoop Street
Denver, CO 80202

April 2018

andeavor

Contents

1.0 Introduction

Andeavor, operator of the Wonsits Valley Compressor Station, is submitting this permit application package to the U.S. Environmental Protection Agency, Region 8, on behalf of Andeavor Field Services, LLC (formerly known as QEP Field Services, LLC) for the purpose of renewing the Part 71 Operating Permit for the Wonsits Valley Compressor Station.

The Wonsits Valley Compressor Station is currently operating under Part 71 operating permit V-UO-000005-2000.00, issued to QEP Field Services Company (QEPFS) by EPA Region 8 on September 10, 2013. This permit was issued with an effective date of October 10, 2013, and an expiration date of October 10, 2018.

This application incorporates the following modifications that were submitted to EPA after the original September 10, 2013, issuance date:

- Minor Modification (April 21, 2014): reconstruction of compressor engine unit C207, now subject to NSPS Subpart JJJJ.

Other physical changes to the existing facility include:

- Compressed air, not natural gas, is used to drive pneumatic devices and pumps. Thus, emission unit GP from the original Part 71 permit is not applicable.

- None of the lean-burn compressor engines currently has an oxygen sensor; therefore, the requirement referenced in Condition V.D.2.b to replace oxygen sensors within 2000 hours of engine run time is not applicable.

- Condensate is not currently loaded out from the facility, so insignificant emission unit LO is not currently applicable.

The following sections are included in this application:

- Section 2 of this application includes a process description of the facility.

- Section 3 provides a summary of emissions-related information.

- Section 4 contains a regulatory review of federal air quality regulations.

- Appendix A contains the required EPA Part 71 application forms pertaining to new emissions units that are part of this permit application revision.

- Appendix B contains the detailed emission calculations.

- Appendix C contains supporting data for the emission calculations, including engine specification sheets and gas/liquids analyses.

2.0 Summary of Operation

2.1.1 Facility Location

The Wonsits Valley Compressor Station is located on the Uintah and Ouray Indian Reservation in Uintah County, Utah, 22 miles south of Vernal, Utah, in SE¼NE¼ of Section 12, Township 8 South, Range 21 East. A site location map is provided in Figure 2-1.

The site is in an area classified as attainment for all criteria pollutants.

2.1.2 Process Description

A comingled gas/liquid stream (containing natural gas, condensate, and produced water) flows from the field via two 16-inch pipelines to a slug catcher at the station where the liquids and gas are separated. The liquids gravity feed to a 3-phase separator that separates produced water, condensate, and gas. The separated produced water is fed into a pipeline leaving the site. Condensate is temporarily stored in storage tank (unit T-1, controlled with combustor unit C-1) and is then gravity fed off site to the Battery 4 facility. The gas continues to one of the inlet scrubbers at 100 psig at near ambient temperature. The gas continues through a 24-inch line where it enters the compressors (units C202, C203, C204, C206, or C207). The gas is compressed and discharged at up to 1200 psig and 120°F. After compression, the gas can flow through a discharge cooler during hot weather to cool it to 120°F or bypass the cooler in colder weather. From the cooler, the gas flows through the dehydrator (unit D-1) inlet coalescer filter to take out the lube oil from the gas. The gas then enters the dehydrator absorber (contactor) and bubbles up through lean triethylene glycol (TEG) to take the water out of the gas stream. During this process, water vapor is removed from the gas to a concentration determined by a sales contract. The dry gas then enters the downstream coalescer to catch any TEG carryover. The pipeline quality natural gas exits the contactor, is metered, and is routed off location through a 12-inch pipeline to the Ironhorse Complex Gas Plant. Fuel gas for the station is pulled from the discharge after the dehydrator where it is filtered and separated. The dry fuel gas is then pushed through individual coalescer filters at each engine.

The rich TEG exits the contactor and is regenerated using heat in a vessel known as a reboiler (R-1). A natural gas-fired heater heats the TEG to a set temperature that boils the impurities out of the TEG. The vapors from the reboiler are routed to the BTEX condenser to remove liquids that drain into the distillate tank. Overhead vapors from the BTEX condenser and flash gas from the flash tank are sent to an emission control device (open flare, unit FL-1, with backup combustor, unit C-2) with a control efficiency of at least 95%. The regenerated lean TEG is circulated back through to the contactor.

There are fugitive emissions associated with the potential seeping of gas from connections, seals, flanges and valves. Instrument air is utilized on site for energizing pneumatic equipment.

A facility plot plan is provided as Figure 2-2 and process flow diagram as Figure 2-3.

2.1.3 Emission Controls

Emissions controls for the facility include:

- oxidation catalysts for the five natural gas-fired, lean-burn compressor engines (units C202, C203, C204, C206, and C207);

- an open flare (unit FL-1) to control VOC and HAP emissions from the dehydration unit (unit D-1), with an enclosed combustor (unit C-1) as backup, with destruction efficiencies of at least 95% (flame presence of pilots is monitored continually); and

- an enclosed combustor (unit C-2) to control VOC and HAP emissions from the condensate storage tank (unit T-1) with a destruction efficiency of at least 95% (flame presence of pilot is monitored continually).

3.0 Emissions Summary

The Wonsits Valley Compressor Station emissions estimates include all the sources listed below. A summary of total emissions (allowable with federally enforceable controls) listed by individual pollutant is found in Table 3-1. A summary of emissions (potential to emit with federally enforceable controls) listed by source is found in Table 3-2.

Detailed emission calculations are provided in Appendix B for the following:

- Compressor Engines (five natural gas-fired units)
- TEG Dehydrator (100 MMscfd, controlled with flare and backup combustor)
- Glycol Reboiler (1 MMBtu/hr)
- Condensate Storage Tank (one 500-bbl, controlled with combustor)
- Miscellaneous Chemical Storage Tanks (eight, insignificant)
- Truck Loadout, Condensate (insignificant)
- Equipment Leaks (Fugitives)
- Pigging (insignificant)
- Engine Startups (insignificant)
- Compressor Blowdowns
- Emergency Shutdowns (insignificant)
- Dehydrator Flare
- Tank Vapor Combustor
- Dehydrator Backup Combustor

Table 3-1. Facility Emissions Summary (Federally Enforceable)

Pollutant	Allowable Emissions (tpy)
Nitrogen Oxides (NO_x)	182.7
Carbon Monoxide (CO)	172.9
Volatile Organic Compounds (VOC)	121.8
Sulfur Dioxide (SO_2)	0.5
Particulate Matter, less than 10 µm (PM_{10})	5.8
Formaldehyde [1]	9.8
Lead (Pb)	0
Fluorides (gaseous and particulate)	0
Sulfuric Acid Mist (H_2SO_4)	0
Hydrogen Sulfide (H_2S)	0
Total Reduced Sulfur (TRS)	0
Reduced Sulfur Compounds	0
Total Hazardous Air Pollutants (HAPs)	22.5

[1] Single largest HAP

Table 3-2. Facility Equipment Emissions Inventory

Emission Unit ID	Emission Source Description	NO_x (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)	PM/PM_{10} (tpy)	HCHO [1] (tpy)	Total HAP (tpy)
C202	3406-hp Caterpillar G3612LE 4SLB Compressor Engine, equipped with SCO	32.9	32.9	17.9	0.1	1.1	1.6	2.7
C203	3406-hp Caterpillar G3612LE 4SLB Compressor Engine, equipped with SCO	32.9	32.9	17.9	0.1	1.1	1.6	2.7
C204	3406-hp Caterpillar G3612LE 4SLB Compressor Engine, equipped with SCO	32.9	32.9	17.9	0.1	1 .1	1.6	2.7
C206	3100-hp Waukesha 12V-AT27GL 4SLB Compressor Engine, equipped with SCO	38.9	29.9	11.0	0.1	1.0	2.7	3.6
C207	4554-hp Caterpillar G3616LE 4SLB Compressor Engine, equipped with SCO	44.0	44.0	23.4	0.1	1.5	2.2	3.6
D-1	100-MMscfd TEG Dehydrator, equipped with flare (FL-1), backup combustor (C-2)			15.3				6.1
T-1	500-bbl Condensate Tank, equipped with combustor (C-1)			3.6				0.2
EL	Equipment Leaks			4.8				0.4
CB	Compressor Blowdowns			10.0				0.5
FL-1	Dehydrator Flare	0.7	0.17					
C-1	Tank Vapor Enclosed Combustor	0.4	0.11					
Total		**182.7**	**172.9**	**121.8**	**0.5**	**5.8**	**9.8**	**22.5**

[1] Formaldehyde (HCHO) emissions represent the highest individual HAP.

4.0 Regulatory Review

This section provides a regulatory review of the federal air quality requirements applicable to Wonsits Valley Compressor Station. The purpose of this section is to provide appropriate explanation and rationale regarding the applicability or non-applicability of these regulations to the facility.

40 CFR Part 71 – Operating Permit Requirements (Title V)

The federal operating permit program (Title V of the Federal Clean Air Act) is implemented by regulations codified at 40 CFR Part 71. The facility is a major stationary source with respect to the Part 71 Operating Permit Program. The potential to emit (PTE), considering all federally enforceable controls, of criteria air pollutants exceeds the major source threshold of 100 tpy. In addition, per §63.764(f), a major HAP source subject to 40 CFR Part 63, Subpart HH, is required to apply for a 40 CFR Part 71 operating permit.

It should be noted per Consent Decree 2:08-CV-00167-TS-PMW, 17(b), the existing dehydration unit and engines are subject to the "major source" requirements of 40 CFR Part 63, Subparts HH and ZZZZ; however, the site is a currently synthetic minor source with regard to HAP emissions.

40 CFR Part 52 – Prevention of Significant Deterioration (PSD)

This facility is not a source listed in one of the 28 PSD source categories; therefore PSD requirements are triggered if the PTE exceeds 250 tpy of any criteria pollutant or 100,000 tpy of carbon dioxide equivalent (CO_2e). Based on these thresholds, with the federally enforceable controls, this facility is a synthetic minor stationary source with respect to the Prevention of Significant Deterioration (PSD) Program.

New Source Performance Standards (NSPS)

40 CFR Part 60 Subpart A - General Provisions: New Source Performance Standards (NSPS) Subpart A, General Provisions, applies to any stationary source that contains an affected facility to which a NSPS is applicable. As discussed below, this facility is subject to several NSPS; therefore, the requirements of Subpart A apply.

40 CFR Part 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units: NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989, and that have a maximum design heat input capacity less than 29 megawatts (MW) (100 MMBtu/hr) but greater than or equal to 2.9 MW (10 MMBtu/hr). 40 CFR 60.41c states:

> "Steam generating unit means a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart."

The facility does not contain any heaters that have a maximum design heat input capacity of at least 10 MMBtu/hr; therefore, Subpart Dc does not apply.

40 CFR Part 60 Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984: Per 40 CFR 60.110b(d)(2) and (d)(4), this subpart does not apply to vessels with a design capacity less than or equal to 1,589.874 cubic meters (420,000 gal, 10,000 bbl) used for petroleum or condensate stored, processed, or treated prior to custody transfer or pressure vessels designed to operate in excess of 204.9 kilopascal (kPa) and without emissions to the atmosphere. The potentially subject atmospheric tanks at the facility have capacities of less than 1,589.874 m^3; therefore, the storage tanks are exempt from this subpart.

40 CFR 60 Subpart KKK – Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants: This subpart applies to natural gas processing plants that commenced construction, reconstruction, or modification after January 20, 1984, and on or before August 23, 2011, and include the following facilities located at onshore natural gas processing plants: a compressor station, dehydration unit, underground storage tank, field gas gathering system, or liquefied natural gas unit. A natural gas processing plant is defined in Subpart KKK as "any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both." The facility is a compressor station and not a natural gas processing plant; therefore, the facility is not subject to this subpart.

40 CFR Part 60 Subpart LLL - Standards of Performance for Onshore Natural Gas Processing: SO_2 Emissions: NSPS Subpart LLL applies to the following facilities that process natural gas: each sweetening unit, and each sweetening unit followed by a sulfur recovery unit. The facility does not contain any sweetening units; therefore, Subpart LLL does not apply. The facility is a compressor station and not a natural gas processing plant; therefore, the facility is not subject to this subpart.

40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines: This subpart applies to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE), which commenced construction on or after June 12, 2006, and were manufactured on or after July 1, 2008 (100-500 hp), on or after January 1, 2008 (lean burn, 500-1350 hp), or on or after July 1, 2007 (rich burn, >500 hp and lean burn >1350 hp). Based on the dates of reconstruction (in 2007 and 2014), all compressor engines are subject to this subpart.

40 CFR 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015: This subpart applies to "affected facilities" including but not limited to pneumatic controllers, storage vessels, reciprocating compressors, centrifugal compressors with wet seals, and components at onshore natural gas processing plants, which commenced construction, were modified, or were reconstructed after August 23, 2011, and on

or before September 18, 2015. All equipment at the facility was installed before August 23, 2011; therefore, the facility is not subject to this subpart.

40 CFR 60 Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015: This subpart applies to "affected facilities" including but not limited to pneumatic controllers, pneumatic pumps, storage vessels, reciprocating compressors, centrifugal compressors with wet seals, and components at onshore natural gas processing plants and compressor stations, which commenced construction, were modified, or were reconstructed after September 18, 2015. All equipment at the facility was installed before September 18, 2015; therefore, the facility is not subject to this subpart.

National Emission Standards for Hazardous Air Pollutants (NESHAPS)

40 CFR Part 63 Subpart A – General Provisions: National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart A, General Provisions, apply to any stationary source that contains an affected facility to which a NESHAP is applicable. As discussed below, this facility is subject to a NESHAP; therefore, the requirements of Subpart A apply.

40 CFR 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities: This subpart applies to glycol dehydration units, storage vessels with the potential for flashing and throughput greater than 500 bbl/day, and fugitive equipment at processing plants that are major sources of hazardous air pollutants (HAP) emissions, and triethylene glycol (TEG) dehydration units at area sources of HAP emissions. The facility is not a natural gas processing plant. The facility does not have any storage vessels with a throughput greater than 500 bbl/day.

The TEG dehydrator at this facility is classified as a large glycol dehydration unit, defined as a unit with actual annual average natural gas flow rate of at least 3 MMscfd and actual annual average benzene emissions equal to or greater than 0.90 Mg/yr, including units complying with the 0.9 Mg/yr control option under §63.765(b)(1)(ii). As a major source of HAP emissions, per §63.764(c)(1)(i), the dehydrator must comply with the control requirements for glycol dehydration unit process vents specified in §63.765.

Federally enforceable control requirements for glycol dehydration units are specified in §63.765. The dehydration unit at the Wonsits Valley Compressor Station is complying with the control requirements because the process vent is connected to a control device through closed-vent systems as required by §63.765(b)(1)(i). The offgas from the BTEX condenser is routed to the flare. Flash gas is also sent to the flare.

Per §63.765(b)(1)(i), the control device must be designed and operated in accordance with the requirements of §63.771(d) which, for the dehydrator at this facility equipped with a flare (achieving 95% HAP reduction), stipulates that the control device be designed and operated in accordance with the requirements of §63.11(b).

Monitoring requirements are specified in §63.773(c) and (d). The closed-vent system complies with the monitoring and inspection requirements of §63.773(c). The flare complies with the requirement to continuously monitor and record the presence of the pilot flame, per §63.773(d)(3)(i)(C).

The dehydration units must also demonstrate on-going compliance with the following:

- Recordkeeping requirements in §63.774
- Reporting requirements in §63.775

40 CFR 63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines: This subpart applies to stationary reciprocating internal combustion engines (RICE) at major and area sources of HAPs. The five compressor engines are 4-stroke, lean-burn units, each greater than 500 horsepower. Per Consent Decree Case No. 2:08-CV-00167-TS-PM, the facility is an existing major source under Subpart ZZZZ as of July 3, 2012. As such, the engines are subject to the existing RICE provisions of Subpart ZZZZ and are operated in compliance with all applicable requirements of this subpart.

40 CFR 63 Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters: This subpart applies to industrial, commercial, or institutional boilers or process heaters located at, or part of, a major source of HAP. The facility is a synthetic minor HAP source because there are federally enforceable emission controls that limit HAP emissions to less than major source levels. Consequently, the facility is not a major source of HAP and Subpart DDDDD does not apply.

40 CFR Part 64 - Compliance Assurance Monitoring

Compliance Assurance Monitoring (CAM) requirements apply to a pollutant-specific emissions unit (PSEU) at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:

- The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof);
- The unit uses a control device to achieve compliance with any such emission limitation or standard; and
- The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

Compressor engine C207 has potential pre-control device emission total for CO that is greater than 100 tpy and formaldehyde that is greater than 10 tpy, and uses a control device to achieve compliance; however, since the engine is subject to the CO limitation under NSPS Subpart JJJJ and the formaldehyde surrogate CO limitation under MACT Subpart ZZZZ, it is exempt from CAM per §64.2(b)(1)(i).

The dehydration unit has potential pre-control device VOC emissions that are greater than 100 tpy, and HAP emissions that are greater than 10 tpy each for benzene, toluene, and xylenes and 25 tpy for aggregated HAP emissions. A control device is used to achieve compliance with the HAP limitations of MACT Subpart HH and the Part 71 permit limits. Since the

dehydration unit is subject to the HAP limitations of MACT Subpart HH, it is exempt from CAM per §64.2(b)(1)(i). It is also exempt from CAM per §64.2(b)(1)(vi) because the Part 71 permit specifies a continuous compliance determination method for VOC, as defined in §64.1.

40 CFR Part 68 - Chemical Accident Prevention Provisions

The Chemical Accident Prevention rules under 40 CFR Part 68 require covered facilities to conduct a hazard assessment, develop a prevention program and an emergency response program, and submit a Risk Management Plan (RMP). Facilities must comply if they have "covered" processes involving regulated, highly hazardous substances in excess of specified threshold levels.

The facility does not have any regulated or highly hazardous substances in excess of specified threshold levels. As such, this facility is not subject to this subpart.

Permit Shield

Andeavor is requesting a permit shield for the following regulations that are not currently applicable to Wonsits Valley Compressor Station per 40 CFR 71.6(f).

- 40 CFR Part 52, Prevention of Significant Deterioration (PSD)
- 40 CFR Part 60 Subpart Dc
- 40 CFR Part 60 Subpart Kb
- 40 CFR Part 60 Subpart KKK
- 40 CFR Part 60 Subpart LLL
- 40 CFR Part 60 Subpart OOOO
- 40 CFR Part 60 Subpart OOOOa
- 40 CFR Part 63 Subpart DDDDD
- 40 CFR Part 64, Compliance Assurance Monitoring
- 40 CFR Part 68, Chemical Accident Prevention

FIGURE 2-1
Wonsits Valley Compressor Station Site Map

FIGURE 2-2
Wonsits Valley Compressor Plot Plan

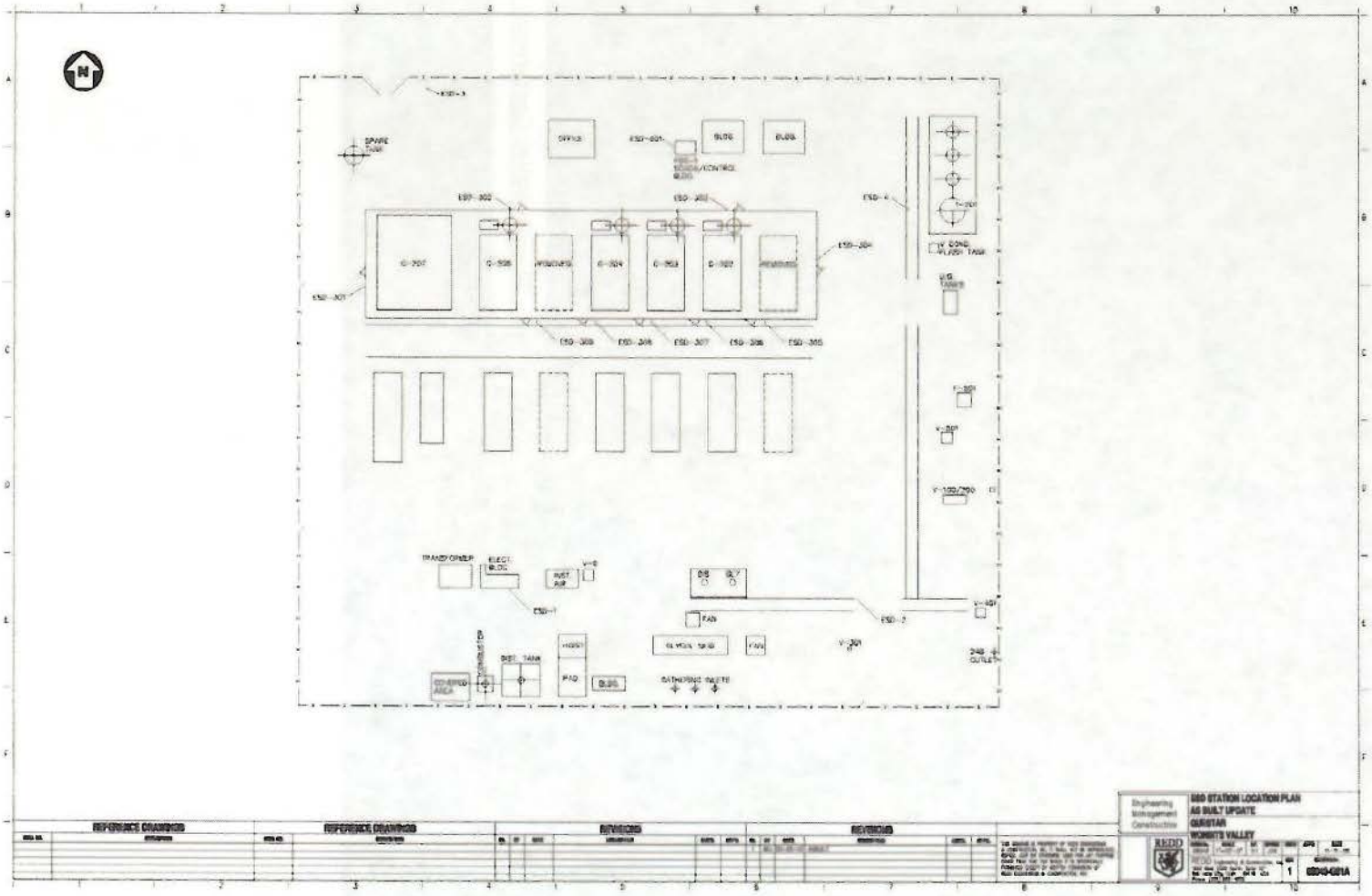
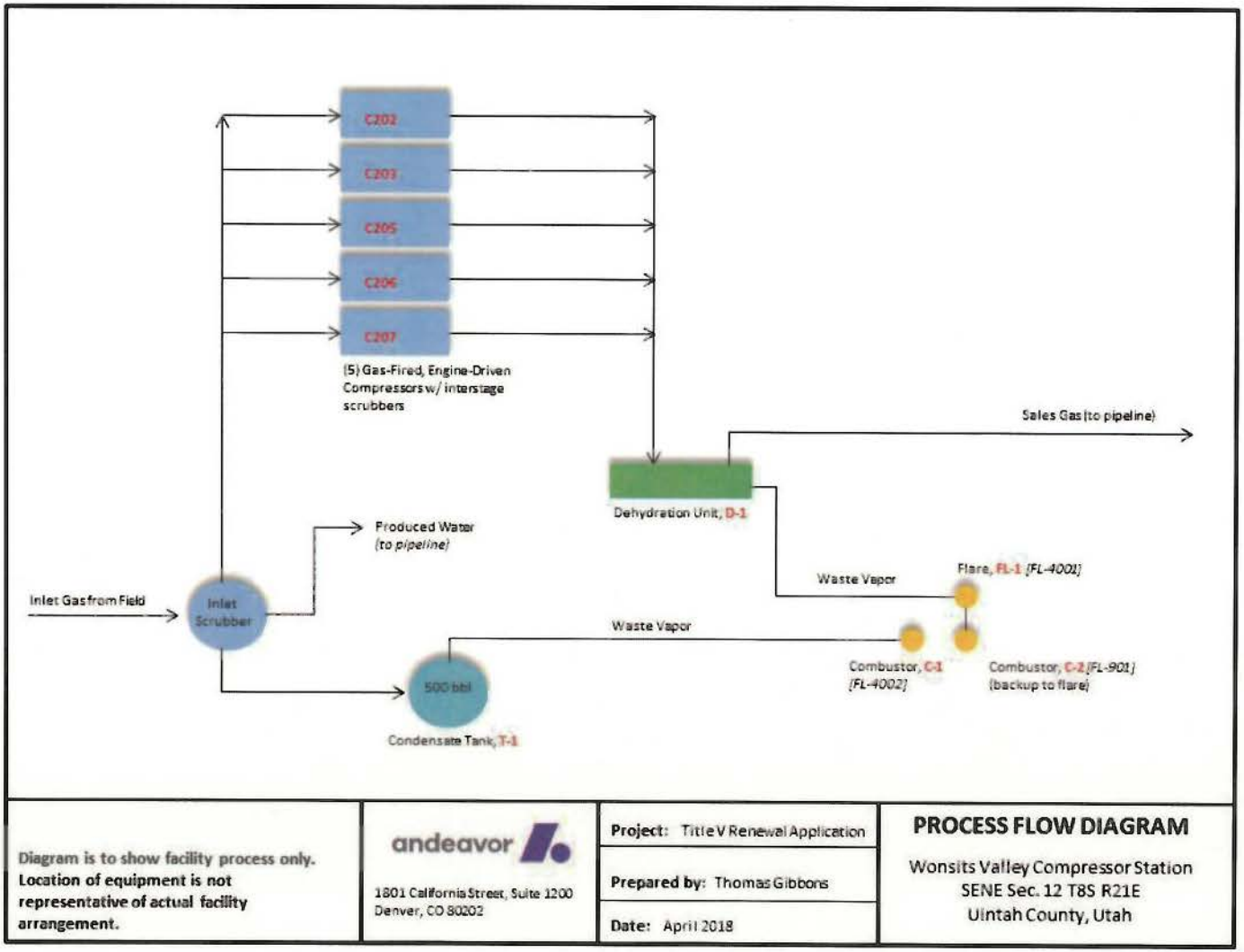


FIGURE 2-3
Simplified Wonsits Valley Facility Simplified Process Flow



Appendices

APPENDIX A
EPA Part 71 Forms

- 0_CTAC_5900-02
- 1_GIS_5900-79
- 2_EUD1_5900-80_C202
- 3_EUD1_5900-80_C203
- 4_EUD1_5900-80_C204
- 5_EUD1_5900-80_C206
- 6_EUD1_5900-80_C207
- 7_EUD2_5900-81_D-1
- 8_EUD2_5900-81_T-1
- 9_EUD2_5900-81_EL
- 10_EUD2_5900-81_CB
- 11_EUD2_5900-81_FL-1
- 12_EUD2_5900-81_C-1
- 13_EMISS_5900-84_C202
- 14_EMISS_5900-84_C203
- 15_EMISS_5900-84_C204
- 16_EMISS_5900-84_C206
- 17_EMISS_5900-84_C207
- 18_EMISS_5900-84_D-1
- 19_EMISS_5900-84_T-1
- 20_EMISS_5900-84_EL
- 21_EMISS_5900-84_CB
- 22_EMISS_5900-84_FL-1
- 23_EMISS_5900-84_C-1
- 24_PTE_5900-85
- 25_IE_5900-83
- 26_I-COMP_5900-86

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS (CTAC)

This form must be completed, signed by the "Responsible Official" designated for the facility or emission unit, and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by a part 71 permit).

A. Responsible Official

Name: (Last) Gebhardt (First) Michael (MI) P

Title Vice President, Mid-Continent Gathering and Processing

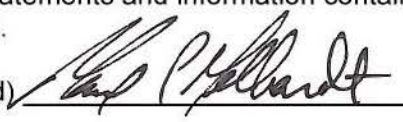
Street or P.O. Box 1801 California St., Suite 1200

City Denver State CO ZIP 80202 - _____

Telephone (303) 454 - 6625 Ext. _____ Facsimile (____) ____ - _____

B. Certification of Truth, Accuracy and Completeness (to be signed by the responsible official)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed) 

Name (typed) Michael P. Gebhardt Date: 4 / 9 / 18

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
GENERAL INFORMATION AND SUMMARY (GIS)

A. Mailing Address and Contact Information

Facility name Wonsits Valley Compressor Station

Mailing address: Street or P.O. Box 1801 California St., Suite 1200

City Denver State CO ZIP 80202 -

Contact person: Thomas Gibbons Title Environmental Specialist

Telephone (303) 454 - 6685 Ext.

Facsimile ( ) -

B. Facility Location

C. Owner

Name Andeavor Field Services LLC Street/P.O. Box 1801 California St., Suite 1200

City Denver State CO ZIP 80202 -

Telephone (303) 454 - 6685 Ext

D. Operator

Name *Same as owner* Street/P.O. Box

City State ZIP -

Telephone ( ) - Ext

E. Application Type

Mark only one permit application type and answer the supplementary question appropriate for the type marked.

___ Initial Permit _X_ Renewal ___ Significant Mod ___ Minor Permit Mod(MPM)

___ Group Processing, MPM ___ Administrative Amendment

For initial permits, when did operations commence? _____ /_____ /_____

For permit renewal, what is the expiration date of current permit? __10_/_10_/_2018____

F. Applicable Requirement Summary

Mark the types of applicable requirements that apply:

___ SIP ___ FIP/TIP ___ PSD ___Non-attainment NSR

_X_ Minor source NSR _X_ Section 111 ___ Phase I acid rain ___Phase II acid rain

___ Stratospheric ozone ___ OCS regulations _X_ NESHAP _X_ Sec. 112(d) MACT

___ Sec. 112(g) MACT ___ Early reduction of HAP ___ Sec 112(j) MACT ___ RMP [Sec.112(r)]

___ Section 129 ___ NAAQS, increments or visibility but for temporary sources (This is rare)

Is the source subject to the Deepwater Port Act? ___YES _X_NO

Has a risk management plan been registered? ___YES _X_NO Agency _____

Phase II acid rain application submitted? ___YES _X_NO If YES, Permitting Authority _____

G. Source-Wide PTE Restrictions and Generic Applicable Requirements

Cite and describe any emissions-limiting requirements and/or facility-wide "generic" applicable requirements.

40 CFR Part 60 Subpart A – General Provisions
40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
40 CFR Part 63 Subpart A – General Provisions
40 CFR 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities
40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

H. Process Description

List processes, products, and SIC codes for the facility.

Process	Products	SIC
Oil & Gas Extraction	Crude Petroleum and Natural Gas	1311

I. Emission Unit Identification

Assign an emissions unit ID and describe each emissions unit at the facility. Control equipment and/or alternative operating scenarios associated with emissions units should by listed on a separate line. Applicants may exclude from this list any insignificant emissions units or activities.

Emissions Unit ID	Description of Unit
C202	3406-hp Caterpillar G3612LE Compressor Engine, 4-Stroke Lean-Burn RICE; Serial No. 1YG00023; natural gas-fired; equipped with SCO; Installed: 9/2007, Reconstructed: 9/2007
C203	3406-hp Caterpillar G3612LE Compressor Engine, 4-Stroke Lean-Burn RICE; Serial No. 1YG00022; natural gas-fired; equipped with SCO; Installed: 9/2007, Reconstructed: 9/2007
C204	3406-hp Caterpillar G3612LE Compressor Engine, 4-Stroke Lean-Burn RICE; Serial No. 1YG00034; natural gas-fired; equipped with SCO; Installed: 9/2007, Reconstructed: 9/2007
C206	3100-hp Waukesha 12V-AT27GL Compressor Engine, 4-Stroke Lean-Burn RICE; Serial No. C-13271/2; natural gas-fired; equipped with SCO; Installed: 3/2001, Reconstructed: 6/2007
C207	4554-hp Caterpillar G3616LE Compressor Engine, 4-Stroke Lean-Burn RICE; Serial No. BLB00215; natural gas-fired; equipped with SCO; Installed: 6/2008, Reconstructed: 1/2014
D-1	100-MMscfd TEG Dehydrator; equipped with flare, backup combustor
T-1	500-bbl Condensate Tank, 21900 bbl/yr; vapors controlled by enclosed combustor (C-1)
EL	Equipment Leaks
CB	Compressor Blowdowns
FL-1	Dehydrator Flare (primary control for D-1)
C-1	Enclosed Combustor (control for condensate tank, T-1)
C-2	Enclosed Combustor (backup control for dehydrator, D-1)

J. Facility Emissions Summary

Enter potential to emit (PTE) for the facility as a whole for each regulated air pollutant listed below. Enter the name of the single HAP emitted in the greatest amount and its PTE. For all pollutants, stipulations to major source status may be indicated by entering "major" in the space for PTE. Indicate the total actual emissions for fee purposes for the facility in the space provided. Applications for permit modifications need not include actual emissions information.

NOx 183.1 tons/yr VOC 133.2 tons/yr SO2 0.4 tons/yr
tons/yr

PM-10 5.9 tons/yr CO 173.1 tons/yr Lead 0 tons/yr

Total HAP 23.0 tons/yr

Single HAP with greatest amount formaldehyde PTE 9.8 tons/yr

Total of regulated pollutants (for fee calculation), Sec. F, line 5 of form FEE N/A tons/yr

K. Existing Federally-Enforceable Permits

Permit number(s) V-UO-000005-2000.00 Permit type Part 71 Permitting authority EPA

Permit number(s) _____ Permit type _____ Permitting authority _____

L. Emission Unit(s) Covered by General Permits

Emission unit(s) subject to general permit Not Applicable

Check one: ___ Application made ___ Coverage granted

General permit identifier _____ Expiration Date ____/____/____

M. Cross-referenced Information

Does this application cross-reference information? ___ YES _X_ NO (If yes, see instructions)

INSTRUCTIONS FOLLOW

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID ___C202___ Description_3406-hp, 4SLB compressor engine_____

SIC Code (4-digit) __1311_____ SCC Code_20200254__

B. Emissions Unit Description

Primary use __Natural Gas Compressor Engine_____ Temporary Source ___Yes _X_No

Manufacturer ___Caterpillar_____ Model No. _G3612LE_____

Serial Number __1YG00023_____ Installation Date__9_/__/_2007_

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input ___25.7____MM BTU/hr Max. Design Heat Input ___25.7___MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	Negligible	Negligible	1113 Btu/scf (HHV)

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	23 Mscf	202 MMscf

E. Associated Air Pollution Control Equipment

Emissions unit ID C202 Device type Selective Catalytic Oxidation (SCO)

Air pollutant(s) Controlled CO, HCHO, VOC, HAPs Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date 9/__/2007 Control efficiency (%) 60% (CO), 50% (VOC), 81% HCHO, 50% HAP

Efficiency estimation method SCO manufacturer and stack testing

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID ____C203____ Description 3406-hp, 4SLB compressor engine

SIC Code (4-digit) 1311 SCC Code 20200254

B. Emissions Unit Description

Primary use Natural Gas Compressor Engine Temporary Source ___Yes _X_No

Manufacturer Caterpillar Model No. G3612LE

Serial Number 1YG00022 Installation Date 9 / / 2007

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input 25.7 MM BTU/hr Max. Design Heat Input 25.7 MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	Negligible	Negligible	1113 Btu/scf (HHV)

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	23 Mscf	202 MMscf

E. Associated Air Pollution Control Equipment

Emissions unit ID C203 Device type Selective Catalytic Oxidation (SCO)

Air pollutant(s) Controlled CO, HCHO, VOC, HAPs Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date 10/_/2007 Control efficiency (%) 60% (CO), 50% (VOC), 81% HCHO, 50% HAP

Efficiency estimation method SCO manufacturer and stack testing

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____._____ Inside stack diameter (ft) _____._____

Stack temp (°F) _____._____ Design stack flow rate (ACFM) _____._____

Actual stack flow rate (ACFM) _____._____ Velocity (ft/sec) _____._____

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID ___C204___ Description_3406-hp, 4SLB compressor engine_____

SIC Code (4-digit) __1311_____ SCC Code_20200254__

B. Emissions Unit Description

Primary use __Natural Gas Compressor Engine_____ Temporary Source ___Yes _X_No

Manufacturer ___Caterpillar_____ Model No. _G3612LE_____

Serial Number __1YG00034_____ Installation Date__9_/__/_2007_

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input ___25.7____MM BTU/hr Max. Design Heat Input ___25.7___MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	Negligible	Negligible	1113 Btu/scf (HHV)

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	23 Mscf	202 MMscf

E. Associated Air Pollution Control Equipment

Emissions unit ID C204 Device type Selective Catalytic Oxidation (SCO)

Air pollutant(s) Controlled CO, HCHO, VOC, HAPs Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date 9/ /2007 Control efficiency (%) 60% (CO), 50% (VOC), 81% HCHO, 50% HAP

Efficiency estimation method SCO manufacturer and stack testing

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID C206 Description 3100-hp, 4SLB compressor engine

SIC Code (4-digit) 1311 SCC Code 20200254

B. Emissions Unit Description

Primary use Natural Gas Compressor Engine Temporary Source ___Yes _X_No

Manufacturer Waukesha Model No. 12V-AT27GL

Serial Number C-13271/2 Installation Date 3 / / 2001

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input 22.9 MM BTU/hr Max. Design Heat Input 22.9 MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	Negligible	Negligible	1113 Btu/scf (HHV)

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	21 Mscf	180 MMscf

E. Associated Air Pollution Control Equipment

Emissions unit ID C206 Device type Selective Catalytic Oxidation (SCO)

Air pollutant(s) Controlled CO, HCHO, VOC, HAPs Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date 4/ /2001 Control efficiency (%) 55% (CO), 50% (VOC), 45% HCHO, 50% HAP

Efficiency estimation method SCO manufacturer and stack testing

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID C207 Description 4554-hp, 4SLB compressor engine

SIC Code (4-digit) 1311 SCC Code 20200254

B. Emissions Unit Description

Primary use Natural Gas Compressor Engine Temporary Source ___Yes _X_No

Manufacturer Caterpillar Model No. G3616LE

Serial Number BLB00215 Installation Date 6 / / 2008

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input 34.2 MM BTU/hr Max. Design Heat Input 34.2 MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	Negligible	Negligible	1113 Btu/scf (HHV)

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	31 Mscf	269 MMscf

E. Associated Air Pollution Control Equipment

Emissions unit ID C207 Device type Selective Catalytic Oxidation (SCO)

Air pollutant(s) Controlled CO, HCHO, VOC, HAPs Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date 6/ /2008 Control efficiency (%) 60% (CO), 50% (VOC), 81% HCHO, 50% HAP

Efficiency estimation method SCO manufacturer and stack testing

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)

EMISSIONS UNIT DESCRIPTION FOR VOC EMITTING SOURCES (EUD-2)

A. General Information

Emissions unit ID D-1 Description 100-MMscfd TEG Dehydration Unit
SIC Code (4-digit) 1311 SCC Code 31000227

B. Emissions Unit Description

Equipment type TEG Dehydration Unit Temporary source: ___Yes _X_No

Manufacturer Gas Conditioners Inc. Model No. N/A

Serial No. 39-1-08 Installation date __/__/ N/A

Articles being coated or degreased N/A

Application method N/A

Overspray (surface coating) (%) _____ Drying method_____

No. of dryers N/A Tank capacity (degreasers) (gal) _____

C. Associated Air Pollution Control Equipment

Emissions unit ID FL-1 Device Type Open Flare

Manufacturer John Zink Model No_____

Serial No. VC-9122090 Installation date 3 / 28 / 2012

Control efficiency (%) 95 Capture efficiency (%) _____.___

Air pollutant(s) controlled VOC, CH4, HAP Efficiency estimation method design

D. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____.____

E. VOC-containing Substance Data

List each VOC-containing substance consumed, processed or produced at the emissions unit that is emitted into the air. In the name column, if providing a brand name, include the name of the manufacture; if the substance contains HAP, list the constituent HAP.

Substance Name (Chemical, Brand Name)	CAS No.	Substance Type	Actual Usage (gal/yr)	Max Usage (gal/day)	Max Usage (gal/year)	VOC Content (lb/gal)
Flash Tank Vent & Reboiler Vent Emissions	N/A	Natural Gas	63.6 MMscfd *(CY2017)*	100 MMscfd	36,500 MMscf/yr	33.9 lb/MMscf *(uncontrolled air emissions)*

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)

EMISSIONS UNIT DESCRIPTION FOR VOC EMITTING SOURCES (EUD-2)

A. General Information

Emissions unit ID T-1 Description 500-bbl condensate storage tank

SIC Code (4-digit) 1311 SCC Code 40400311

B. Emissions Unit Description

Equipment type Condensate Storage Tank Temporary source: ___Yes _X_No

Manufacturer Sivalls Model No. ___
N/A
Serial No. 98424 Installation date__/__/ 2001

Articles being coated or degreased N/A

Application method N/A

Overspray (surface coating) (%) _____ Drying method_____

No. of dryers N/A Tank capacity (degreasers) (gal) 21,000

C. Associated Air Pollution Control Equipment

Emissions unit ID C-1 Device Type Enclosed Combustor

Manufacturer Cimarron Model No_____

Serial No. 53000709 Installation date 2 / / 2012

Control efficiency (%) 95 Capture efficiency (%) _____.___

Air pollutant(s) controlled VOC, CH4, HAP Efficiency estimation method design

D. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____	Velocity (ft/sec) _____._____

E. VOC-containing Substance Data

List each VOC-containing substance consumed, processed or produced at the emissions unit that is emitted into the air. In the name column, if providing a brand name, include the name of the manufacture; if the substance contains HAP, list the constituent HAP.

Substance Name (Chemical, Brand Name)	CAS No.	Substance Type	Actual Usage (gal/yr)	Max Usage (gal/day)	Max Usage (gal/year)	VOC Content (lb/gal)
Condensate	N/A	condensate	5456 bbl *(CY2017)*	60 bbl/day	21,900 bbl/yr	4.81 *(uncontrolled air emissions)*

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)

EMISSIONS UNIT DESCRIPTION FOR VOC EMITTING SOURCES (EUD-2)

A. General Information

Emissions unit ID EL Description Fugitive Equipment Leaks

SIC Code (4-digit) 1311 SCC Code 31000220

B. Emissions Unit Description

Equipment type Fugitive Equipment Leaks Temporary source: ___Yes _X_No

Manufacturer N/A Model No. N/A

Serial No. N/A Installation date __/__/ N/A

Articles being coated or degreased N/A

Application method
N/A

Overspray (surface coating) (%) _____ Drying method _____

No. of dryers N/A Tank capacity (degreasers) (gal) _____

C. Associated Air Pollution Control Equipment

Emissions unit ID N/A Device Type N/A

Manufacturer N/A Model No N/A

Serial No. N/A Installation date ___/__/____

Control efficiency (%) N/A Capture efficiency (%) _____.___

Air pollutant(s) controlled N/A Efficiency estimation method N/A

D. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____.____

E. VOC-containing Substance Data

List each VOC-containing substance consumed, processed or produced at the emissions unit that is emitted into the air. In the name column, if providing a brand name, include the name of the manufacture; if the substance contains HAP, list the constituent HAP.

Substance Name (Chemical, Brand Name)	CAS No.	Substance Type	Actual Usage (gal/yr)	Max Usage (gal/day)	Max Usage (gal/year)	VOC Content (lb/gal)
Natural Gas	N/A	vapors, liquids	N/A	N/A	N/A	N/A

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)

EMISSIONS UNIT DESCRIPTION FOR VOC EMITTING SOURCES (EUD-2)

A. General Information

Emissions unit ID CB Description Compressor Blowdowns (C202, C203, C204, C206, C207)

SIC Code (4-digit) 1311 SCC Code 31000309

B. Emissions Unit Description

Equipment type Compressors (5) Temporary source: ___Yes _X_No

Manufacturer varies Model No. varies

Serial No. N/A Installation date __/__/ N/A

Articles being coated or degreased N/A

Application method N/A

Overspray (surface coating) (%) _____ Drying method _____

No. of dryers N/A Tank capacity (degreasers) (gal) _____

C. Associated Air Pollution Control Equipment

Emissions unit ID N/A Device Type N/A

Manufacturer N/A Model No N/A

Serial No. N/A Installation date ___/__/____

Control efficiency (%) N/A Capture efficiency (%) _____.___

Air pollutant(s) controlled N/A Efficiency estimation method N/A

D. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____.____

E. VOC-containing Substance Data

List each VOC-containing substance consumed, processed or produced at the emissions unit that is emitted into the air. In the name column, if providing a brand name, include the name of the manufacture; if the substance contains HAP, list the constituent HAP.

Substance Name (Chemical, Brand Name)	CAS No.	Substance Type	Actual Usage (gal/yr)	Max Usage (gal/day)	Max Usage (gal/year)	VOC Content (lb/gal)
Natural gas venting from compressor blowdowns	N/A	natural gas	N/A	N/A	N/A	See EMISS (EPA Form 5900-84)

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID FL-1 Description Open Flare

SIC Code (4-digit) 1311 SCC Code 31000215

B. Emissions Unit Description

Primary use Flare for Dehydrator Control Temporary Source ___Yes _X_No

Manufacturer John Zink Model No. LHT-1-12-20-X-1/6-X

Serial Number VC-9122090 Installation Date 3 / 28 / 2012

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input 1.3 MM BTU/hr Max. Design Heat Input 1.3 MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas Pilot Fuel	Negligible	Negligible	1113 Btu/scf (HHV)
Dehy Flash Gas & Still Vent Vapors	Negligible	Negligible	1267 Btu/scf

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas Pilot Fuel	N/A	0.051 Mscf/hr	0.45 MMscf/yr
Dehy Flash Gas & Still Vent Vapors	N/A	1.11 Mscf/hr	9.7 MMscf/yr

E. Associated Air Pollution Control Equipment

Emissions unit ID N/A Device type N/A

Air pollutant(s) Controlled N/A Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date ___ /___ /___ Control efficiency (%) N/A

Efficiency estimation method N/A

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

United States Environmental Protection Agency

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID C-1 Description Enclosed Combustor

SIC Code (4-digit) 1311 SCC Code 31000215

B. Emissions Unit Description

Primary use Combustor for Tank Vapor Control Temporary Source ___Yes _X_No

Manufacturer Cimarron Model No. 30" Standard ECD

Serial Number 53000709 Installation Date 12 / / 2003

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input 0.688 MM BTU/hr Max. Design Heat Input 0.688 MM BTU/hr

C. Fuel Data

Primary fuel type(s) Natural Gas Standby fuel type(s) N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas Pilot	Negligible	Negligible	1113 Btu/scf (HHV)
Condensate Tank Vapors	Negligible	Negligible	1710 Btu/scf

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	0.013 Mscf/hr	0.11 MMscf/yr
Condensate Tank Vapors	N/A	0.39 Mscf/hr	3.44 MMscf/yr

E. Associated Air Pollution Control Equipment

Emissions unit ID N/A Device type N/A

Air pollutant(s) Controlled N/A Manufacturer N/A

Model No. N/A Serial No. N/A

Installation date ___ /___ /___ Control efficiency (%) N/A

Efficiency estimation method N/A

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (°F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____.____ Velocity (ft/sec) _____.____

United States Environmental Protection Agency

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C202

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	7.5	32.9	11104-93-1
CO	NA **	7.5	32.9	630-08-0
VOC	NA **	4.1	17.9	NA
SO_2	NA **	0	0.1	7446-09-5
PM_{10}	NA **	0.3	1.1	NA
1,3-Butadiene	NA **	0	0	106-99-0
Acetaldehyde	NA **	0.1	0.5	75-07-0
Acrolein	NA **	0.1	0.3	107-02-8
Benzene	NA **	0	0	71-43-2
Ethylbenzene	NA **	0	0	100-41-4
Formaldehyde	NA **	0.4	1.6	50-00-0
Methanol	NA **	0	0.1	67-56-1
PAH	NA **	0	0	83-32-9
Toluene	NA **	0	0	108-88-3
Xylene	NA **	0	0	1330-20-7

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C203

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	7.5	32.9	11104-93-1
CO	NA **	7.5	32.9	630-08-0
VOC	NA **	4.1	17.9	NA
SO_2	NA **	0	0.1	7446-09-5
PM_{10}	NA **	0.3	1.1	NA
1,3-Butadiene	NA **	0	0	106-99-0
Acetaldehyde	NA **	0.1	0.5	75-07-0
Acrolein	NA **	0.1	0.3	107-02-8
Benzene	NA **	0	0	71-43-2
Ethylbenzene	NA **	0	0	100-41-4
Formaldehyde	NA **	0.4	1.6	50-00-0
Methanol	NA **	0	0.1	67-56-1
PAH	NA **	0	0	83-32-9
Toluene	NA **	0	0	108-88-3
Xylene	NA **	0	0	1330-20-7

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C204

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	7.5	32.9	11104-93-1
CO	NA **	7.5	32.9	630-08-0
VOC	NA **	4.1	17.9	NA
SO_2	NA **	0	0.1	7446-09-5
PM_{10}	NA **	0.3	1.1	NA
1,3-Butadiene	NA **	0	0	106-99-0
Acetaldehyde	NA **	0.1	0.5	75-07-0
Acrolein	NA **	0.1	0.3	107-02-8
Benzene	NA **	0	0	71-43-2
Ethylbenzene	NA **	0	0	100-41-4
Formaldehyde	NA **	0.4	1.6	50-00-0
Methanol	NA **	0	0.1	67-56-1
PAH	NA **	0	0	83-32-9
Toluene	NA **	0	0	108-88-3
Xylene	NA **	0	0	1330-20-7

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C206

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	8.8	38.9	11104-93-1
CO	NA **	6.8	29.9	630-08-0
VOC	NA **	2.5	11.0	NA
SO_2	NA **	0	0.1	7446-09-5
PM_{10}	NA **	0.2	1.0	NA
1,3-Butadiene	NA **	0	0	106-99-0
Acetaldehyde	NA **	0.1	0.4	75-07-0
Acrolein	NA **	0.1	0.3	107-02-8
Benzene	NA **	0	0	71-43-2
Ethylbenzene	NA **	0	0	100-41-4
Formaldehyde	NA **	0.6	2.7	50-00-0
Methanol	NA **	0	0.1	67-56-1
PAH	NA **	0	0	83-32-9
Toluene	NA **	0	0	108-88-3
Xylene	NA **	0	0	1330-20-7

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C207

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	10.0	44.0	11104-93-1
CO	NA **	10.0	44.0	630-08-0
VOC	NA **	5.4	23.4	NA
SO_2	NA **	0	0.1	7446-09-5
PM_{10}	NA **	0.3	1.5	NA
1,3-Butadiene	NA **	0	0	106-99-0
Acetaldehyde	NA **	0.1	0.6	75-07-0
Acrolein	NA **	0.1	0.4	107-02-8
Benzene	NA **	0	0	71-43-2
Ethylbenzene	NA **	0	0	100-41-4
Formaldehyde	NA **	0.5	2.2	50-00-0
Methanol	NA **	0	0.2	67-56-1
PAH	NA **	0	0	83-32-9
Toluene	NA **	0	0	108-88-3
Xylene	NA **	0	0	1330-20-7

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID D-1

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	NA **	1.6	15.3	NA
Benzene	NA **	0.2	1.9	71-43-2
Ethylbenzene	NA **	0	0.1	100-41-4
Toluene	NA **	0.1	2.7	108-88-3
Xylene	NA **	0	1.1	1330-20-7
n-Hexane	NA **	0.1	0.3	110-54-3

QUESTAR Energy Services

Applied Technology Services

1210 D Street, Rock Springs, WY 82901 (307) 352-7292

Meter Name: WONSITS VALLEY COMP. FUEL 301
Field Name: REDWASH GATHERING
Analyst: PHILLIPS

Meter Location #: 006086
Cylinder Pressure: 0
Line Pressure: 1046
Report Date: 09/04/2012 12:39
Sample Dates(s): 09/04/2012 to 09/04/2012
Flowing Temp: 112

Gas Analysis by Chromatograph @14.73

NAME	MOLE%	BTU	SG	GPM
Nitrogen	0.2881	0.0000	0.0028	0.0000
Methane	90.2971	914.1107	0.5002	0.0000
CO2	0.9650	0.0000	0.0147	0.0000
Ethane	4.7038	83.4357	0.0488	1.2577
H2S	0.0000	0.0000	0.0000	0.0000
Propane	1.9810	49.9593	0.0302	0.5456
i-Butane	0.4325	14.0970	0.0087	0.1415
n-Butane	0.5586	18.2654	0.0112	0.1761
i-Pentane	0.2158	8.6539	0.0054	0.0789
n-Pentane	0.1673	6.7221	0.0042	0.0606
Hexanes	0.1796	8.5614	0.0053	0.0738
Heptanes	0.1436	7.9200	0.0050	0.0662
Octanes	0.0676	4.2341	0.0027	0.0346
Nonanes	0.0000	0.0000	0.0000	0.0000
Ideal Total	100.0000	1115.9595	0.6390	2.4351

Gross BTU/Real Cu Ft. @ 60 deg F

Pressure Base =	14.73	14.65	15.025
Dry =	1118.9694	1112.8759	1141.4408
Saturated =	1100.7826	1094.6871	1123.2611
Actual BTU =	1118.9694	1112.8759	1141.4408
Real S.G. =	0.640479	0.640470	0.640514
Compressibility =	0.997310	0.997325	0.997256

Gasoline Content

Pressure Base = 14.73
Propane GPM = 0.5456
Butane GPM = 0.3176
14# Gasoline GPM = 0.3455
26# Gasoline GPM = 0.4847
Total GPM = 2.4351

Sulfur Content

Mercaptans ppm = N/A
H2S ppm = N/A

Dewpoints

H2O #/mmcf = N/A
Hydrocarbon = N/A
@ psig = N/A

Comments

Component	Mol%	Wt%	LV%
Benzene	1.1333	0.8452	0.6758
Toluene	2.9510	2.5958	2.1058
Ethylbenzene	0.2203	0.2233	0.1812
M&P Xylene	2.1580	2.1873	1.7807
O-Xylene	0.3636	0.3685	0.2946
2,2,4-Trimethylpentane	1.3747	1.4991	1.4722

Data File: Wonsit Valley Compressor Page #2

GRI E&P TANK INFORMATION

Component	Mol%	Wt%	LV%
H2S			
O2			
CO2	0.1648	0.0692	0.0599
N2	0.0264	0.0071	0.0062
C1	9.8520	1.5088	3.5573
C2	2.8039	0.8049	1.5979
C3	3.3353	1.4040	1.9580
IC4	1.5152	0.8408	1.0566
NC4	3.1131	1.7274	2.0914
IC5	2.6843	1.8489	2.0934
NC5	2.7802	1.9150	2.1475
Hexanes	3.6946	3.0396	3.2456
Heptanes	18.4092	16.8698	16.3234
Octanes	7.8836	8.5894	8.3989
Nonanes	4.9105	6.0127	5.8954
Benzene	1.1333	0.8452	0.6758
Toluene	2.9510	2.5958	2.1058
E-Benzene	0.2203	0.2233	0.1812
Xylene	2.5216	2.5558	2.0753
n-C6	3.2163	2.6461	2.8184
2,2,4-Trimethylpentane	1.3747	1.4991	1.4722
C10 Plus			
C10 Mole %	27.4103	44.9973	42.2399
Molecular Wt.	174.0560		
Specific Gravity	0.7537		
Total	100.00	100.00	100.00

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	Wonsit Valley Compressor
Analysis Date/Time:	8/9/2011	8:49 AM	Field:	Wonsit Valley
Analyst Initials:	AST		ML#:	QEP FS
Sample Temperature:	60		GC Method:	Quesliq1.M
Sample Pressure:	200		Data File:	QPC34.D
Date Sampled:	8/5/2011		Instrument ID:	1

Component	Mol%	Wt%	LV%
Methane	9.8520	1.5088	3.5573
Ethane	2.8039	0.8049	1.5979
Propane	3.3353	1.4040	1.9580
Isobutane	1.5152	0.8408	1.0566
n-Butane	3.1131	1.7274	2.0914
Neopentane	0.0405	0.0279	0.0331
Isopentane	2.6438	1.8210	2.0603
n-Pentane	2.7802	1.9150	2.1475
2,2-Dimethylbutane	0.1724	0.1418	0.1534
2,3-Dimethylbutane	0.5786	0.4760	0.5053
2-Methylpentane	1.8129	1.4915	1.6035
3-Methylpentane	1.1307	0.9303	0.9834
n-Hexane	3.2163	2.6461	2.8184
Heptanes	19.5425	17.7150	16.9992
Octanes	12.2093	12.6843	11.9769
Nonanes	7.6524	8.7918	8.1519
Decanes plus	27.4103	44.9973	42.2399
Nitrogen	0.0264	0.0071	0.0062
Carbon Dioxide	0.1648	0.0692	0.0599
Total	100.0000	100.0000	100.0000

Global Properties		**Units**
Avg Molecular Weight	104.7501	gm/mole
Pseudocritical Pressure	441.46	psia
Pseudocritical Temperatu	481.32	degF
Specific Gravity	0.70731	gm/ml
Liquid Density	5.8968	lb/gal
Liquid Density	247.67	lb/bbl
Specific Gravity	2.5655	air=1
SCF/bbl	900.23	SCF/bbl
SCF/gal	21.4341	SCF/gal
MCF/gal	0.0214	MCF/gal
gal/MCF	46.675	gal/MCF
Net Heating Value	5257.4	BTU/SCF at 60°F
Net Heating Value	18625.9	BTU/lb at 60°F
Gross Heating Value	4743.0	BTU/SCF at 60°F
Gross Heating Value	20041.7	BTU/lb at 60°F
Gross Heating Value	121868.8	BTU/gal at 60°F
API Gravity	68.55372468	
MON	46.6	
RON	48.1	
RVP	529.396	psia

Component	Mol%	Wt%	LV%
Benzene	0.0174	0.0734	0.0272
Toluene	0.0188	0.0932	0.0350
Ethylbenzene	0.0005	0.0028	0.0010
M&P Xylene	0.0040	0.0229	0.0086
O-Xylene	0.0005	0.0027	0.0010
2,2,4-Trimethylpentane	0.0063	0.0388	0.0176
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0422	0.1914	0.0801
Methylcyclohexane	0.0582	0.3078	0.1304
Description:	Wonsit Valley Comp Inlet		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	1.0785	2.5591	1.0255
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	0.2834	0.4280	0.1733
Methane	90.1296	77.9557	85.1793
Ethane	4.7115	7.6382	7.0446
Propane	2.0675	4.9153	3.1783
Isobutane	0.4107	1.2870	0.7496
n-Butane	0.5215	1.6343	0.9173
Isopentane	0.2116	0.8228	0.4328
n-Pentane	0.1578	0.6140	0.3189
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0686	0.3185	0.1572
Cyclohexane	0.0422	0.1914	0.0801
Other Hexanes	0.1083	0.5033	0.2492
Heptanes	0.0694	0.3773	0.1759
Methylcyclohexane	0.0582	0.3078	0.1304
2,2,4 Trimethylpentane	0.0063	0.0388	0.0176
Benzene	0.0174	0.0734	0.0272
Toluene	0.0188	0.0932	0.0350
Ethylbenzene	0.0005	0.0028	0.0010
Xylenes	0.0045	0.0256	0.0096
C8+ Heavies	0.0337	0.2135	0.0972
Subtotal	100.0000	100.0000	100.0000
Oxygen	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	Wonsit Valley Comp Inlet
Analysis Date/Time:	9/5/2012	3:01 PM	Field:	Wansit Valley
Analyst Initials:	ABK		ML#:	QEP
Instrument ID:	Instrument 1		GC Method:	Quesbtex
Data File:	QPC35.D			
Date Sampled:	8/31/2012			

Component	Mol%	Wt%	LV%
Methane	90.1296	77.9557	85.1793
Ethane	4.7115	7.6382	7.0446
Propane	2.0675	4.9153	3.1783
Isobutane	0.4107	1.2870	0.7496
n-Butane	0.5215	1.6343	0.9173
Neopentane	0.0095	0.0368	0.0202
Isopentane	0.2021	0.7860	0.4126
n-Pentane	0.1578	0.6140	0.3189
2,2-Dimethylbutane	0.0073	0.0341	0.0171
2,3-Dimethylbutane	0.0184	0.0856	0.0421
2-Methylpentane	0.0528	0.2453	0.1222
3-Methylpentane	0.0298	0.1383	0.0678
n-Hexane	0.0686	0.3185	0.1572
Heptanes	0.2123	1.0819	0.4662
Octanes	0.0252	0.1539	0.0701
Nonanes	0.0120	0.0766	0.0326
Decanes plus	0.0015	0.0114	0.0051
Nitrogen	0.2834	0.4280	0.1733
Carbon Dioxide	1.0785	2.5591	1.0255
Oxygen	0.0000	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

Global Properties		Units
Gross BTU/Real CF	1118.0	BTU/SCF at 60°F and14.73 psia
Sat.Gross BTU/Real CF	1099.7	BTU/SCF at 60°F and14.73 psia
Gas Compressibility (Z)	0.9973	
Specific Gravity	0.6420	air=1
Avg Molecular Weight	18.548	gm/mole
Propane GPM	0.566625	gal/MCF
Butane GPM	0.298042	gal/MCF
Gasoline GPM	0.293426	gal/MCF
26# Gasoline GPM	0.458522	gal/MCF
Total GPM	2.644928	gal/MCF
Base Mol%	99.735	%v/v
Sample Temperature:	98	°F
Sample Pressure:	98	psig
H2SLength of Stain Tube	N/A	ppm

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

Emissions Report for: Annual

100 bbl Dehy Drip Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	36.57	699.04	735.61

Vapor Space Outage (ft):	4.0990
Working Losses (lb):	36.5682
Vapor Molecular Weight (lb/lb-mole):	64.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.6573
Annual Net Throughput (gal/yr.):	4,241.8985
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,241.8985
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	735.6060

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

100 bbl Dehy Drip Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations

Standing Losses (lb):	699.0378
Vapor Space Volume (cu ft):	290.5431
Vapor Density (lb/cu ft):	0.0657
Vapor Space Expansion Factor:	0.2237
Vented Vapor Saturation Factor:	0.4486
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	290.5431
Tank Diameter (ft):	9.5000
Vapor Space Outage (ft):	4.0990
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0990
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0990
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0657
Vapor Molecular Weight (lb/lb-mole):	64.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.6573
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2237
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	1.2998
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.6573
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	5.0372
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	6.3370
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.4486
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	5.6573

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

100 bbl Dehy Drip Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 12)	All	53.92	47.99	59.86	51.98	5.6573	5.0372	6.3370	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

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

Identification

User Identification:	100 bbl Dehy Drip Tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 100 bbl Tank Dehy Drip Tank

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	4,241.90
Turnovers:	1.00
Net Throughput(gal/yr):	4,241.90
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

Emissions Report for: Annual

65 gal TEG tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethylene Glycol	0.00	0.01	0.02

Vapor Space Outage (ft):	3.3833
Working Losses (lb):	0.0020
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Annual Net Throughput (gal/yr.):	2,744.9000
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	2,744.9000
Maximum Liquid Height (ft):	7.3000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0163

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

65 gal TEG tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations

Standing Losses (lb):	0.0143
Vapor Space Volume (cu ft):	170.0649
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0415
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	170.0649
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	3.3833
Tank Shell Height (ft):	7.3000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0833
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0833
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0415
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	0.0003
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0003
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0005

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

65 gal TEG tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethylene Glycol	All	53.92	47.99	59.86	51.98	0.0005	0.0003	0.0007	62.0682			62.07	Option 2: A=8.0908, B=2088.9, C=203.5

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

Identification

User Identification:	65 gal TEG tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 65 bbl Tank TEG

Tank Dimensions

Shell Height (ft):	7.30
Diameter (ft):	8.00
Liquid Height (ft) :	7.30
Avg. Liquid Height (ft):	4.00
Volume (gallons):	2,744.90
Turnovers:	1.00
Net Throughput(gal/yr):	2,744.90
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

Emissions Report for: Annual

100 bbl Used EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethylene Glycol	0.01	0.02	0.03

Vapor Space Outage (ft):	4.0990
Working Losses (lb):	0.0077
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Annual Net Throughput (gal/yr.):	10,604.7463
Annual Turnovers:	2.5000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,241.8985
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0321

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

100 bbl Used EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations	
Standing Losses (lb):	0.0244
Vapor Space Volume (cu ft):	290.5431
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0415
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	290.5431
Tank Diameter (ft):	9.5000
Vapor Space Outage (ft):	4.0990
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0990
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0990
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0415
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	0.0003
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0003
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0005

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

100 bbl Used EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethylene Glycol	All	53.92	47.99	59.86	51.98	0.0005	0.0003	0.0007	62.0682			62.07	Option 2: A=8.0908, B=2088.9, C=203.5

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

Identification

User Identification:	100 bbl Used EG Tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 100 bbl Tank Used Ethlylene Glycol

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	4,241.90
Turnovers:	2.50
Net Throughput(gal/yr):	10,604.75
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

Emissions Report for: Annual

100 bbl Used Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	41.54	158.86	200.39

Vapor Space Outage (ft):	4.0990
Working Losses (lb):	41.5365
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Annual Net Throughput (gal/yr.):	18,240.1637
Annual Turnovers:	4.3000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,241.8985
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	200.3943

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

100 bbl Used Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations	
Standing Losses (lb):	158.8578
Vapor Space Volume (cu ft):	290.5431
Vapor Density (lb/cu ft):	0.0231
Vapor Space Expansion Factor:	0.1006
Vented Vapor Saturation Factor:	0.6435
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	290.5431
Tank Diameter (ft):	9.5000
Vapor Space Outage (ft):	4.0990
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0990
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0990
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0231
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1006
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	0.6092
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.2605
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.8697
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6435
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505

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

100 bbl Used Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	53.92	47.99	59.86	51.98	2.5505	2.2605	2.8697	50.0000			207.00	Option 4: RVP=5

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

Identification

User Identification:	100 bbl Used Lube Oil Tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 100 bbl Tank Used Lube Oil

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	4,241.90
Turnovers:	4.30
Net Throughput(gal/yr):	18,240.16
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

Emissions Report for: Annual

100 bbl New Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	407.32	158.86	566.17

Vapor Space Outage (ft):	4.0990
Working Losses (lb):	407.3152
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Annual Net Throughput (gal/yr.):	309,658.5924
Annual Turnovers:	73.0000
Turnover Factor:	0.5776
Maximum Liquid Volume (gal):	4,241.8985
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	566.1730

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

100 bbl New Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations	
Standing Losses (lb):	158.8578
Vapor Space Volume (cu ft):	290.5431
Vapor Density (lb/cu ft):	0.0231
Vapor Space Expansion Factor:	0.1006
Vented Vapor Saturation Factor:	0.6435
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	290.5431
Tank Diameter (ft):	9.5000
Vapor Space Outage (ft):	4.0990
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0990
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0990
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0231
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1006
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	0.6092
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.5505
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.2605
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.8697
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6435
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.5505

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

100 bbl New Lube Oil Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	53.92	47.99	59.86	51.98	2.5505	2.2605	2.8697	50.0000			207.00	Option 4: RVP=5

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

Identification

User Identification:	100 bbl New Lube Oil Tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 100 bbl Tank New Lube Oil

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	4,241.90
Turnovers:	73.00
Net Throughput(gal/yr):	309,658.59
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

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

Emissions Report for: Annual

100 bbl New EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethylene Glycol	0.01	0.02	0.03

Vapor Space Outage (ft):	4.0990
Working Losses (lb):	0.0077
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Annual Net Throughput (gal/yr.):	10,604.7463
Annual Turnovers:	2.5000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,241.8985
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0321

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

100 bbl New EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Annual Emission Calcaulations	
Standing Losses (lb):	0.0244
Vapor Space Volume (cu ft):	290.5431
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0415
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	290.5431
Tank Diameter (ft):	9.5000
Vapor Space Outage (ft):	4.0990
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0990
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0990
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	4.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	62.0682
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Daily Avg. Liquid Surface Temp. (deg. R):	513.5939
Daily Average Ambient Temp. (deg. F):	51.9625
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,452.1184
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0415
Daily Vapor Temperature Range (deg. R):	23.7301
Daily Vapor Pressure Range (psia):	0.0003
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0005
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0003
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0007
Daily Avg. Liquid Surface Temp. (deg R):	513.5939
Daily Min. Liquid Surface Temp. (deg R):	507.6614
Daily Max. Liquid Surface Temp. (deg R):	519.5264
Daily Ambient Temp. Range (deg. R):	23.3583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0005

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

100 bbl New EG Tank - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethylene Glycol	All	53.92	47.99	59.86	51.98	0.0005	0.0003	0.0007	62.0682			62.07	Option 2: A=8.0908, B=2088.9, C=203.5

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

Identification

User Identification:	100 bbl New EG Tank
City:	Salt Lake City
State:	Utah
Company:	QEP Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	QEP Resources Wonsits Valley Compressor Station 100 bbl Tank Ethlylene Glycol

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.50
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	4,241.90
Turnovers:	2.50
Net Throughput(gal/yr):	10,604.75
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

RVP @ 100F	[psia]	70.13	9.26	9.26
Spec. Gravity @ 100F		0.666	0.684	0.684

Total HAPs	3.170	0.724	0.159	0.036
Total HC	133.833	30.555	6.692	1.528
VOCs, C2+	91.912	20.984	4.596	1.049
VOCs, C3+	72.053	16.450	3.603	0.823

Uncontrolled Recovery Info.

Vapor	9.5300	[MSCFD]
HC Vapor	9.4300	[MSCFD]
GOR	158.83	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	1.830	0.418	1.830	0.418
4	N2	0.200	0.046	0.200	0.046
5	C1	41.921	9.571	2.096	0.479
6	C2	19.859	4.534	0.993	0.227
7	C3	25.171	5.747	1.259	0.287
8	i-C4	9.094	2.076	0.455	0.104
9	n-C4	14.494	3.309	0.725	0.165
10	i-C5	6.809	1.555	0.340	0.078
11	n-C5	5.263	1.202	0.263	0.060
12	C6	2.581	0.589	0.129	0.029
13	C7	4.627	1.056	0.231	0.053
14	C8	0.658	0.150	0.033	0.008
15	C9	0.144	0.033	0.007	0.002
16	C10+	0.039	0.009	0.002	0.000
17	Benzene	0.538	0.123	0.027	0.006
18	Toluene	0.427	0.097	0.021	0.005
19	E-Benzene	0.011	0.003	0.001	0.000
20	Xylenes	0.109	0.025	0.005	0.001
21	n-C6	1.767	0.403	0.088	0.020
22	224Trimethylp	0.320	0.073	0.016	0.004
	Total	135.862	31.019	6.793	1.551

-- Stream Data ----------

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.1648	0.0141	0.0141	0.9062	0.0000	0.9062
4	N2	28.01	0.0264	0.0002	0.0002	0.1553	0.0000	0.1553
5	C1	16.04	9.8520	0.2804	0.2804	56.9557	0.0000	56.9557
6	C2	30.07	2.8039	0.4485	0.4485	14.3951	0.0000	14.3951
7	C3	44.10	3.3353	1.4848	1.4848	12.4420	0.0000	12.4420
8	i-C4	58.12	1.5152	1.1301	1.1301	3.4103	0.0000	3.4103
9	n-C4	58.12	3.1131	2.6412	2.6412	5.4355	0.0000	5.4355
10	i-C5	72.15	2.6843	2.8118	2.8118	2.0569	0.0000	2.0569
11	n-C5	72.15	2.7802	3.0220	3.0220	1.5900	0.0000	1.5900
12	C6	86.16	3.6946	4.3092	4.3092	0.6697	0.0000	0.6697
13	C7	100.20	18.4092	21.9386	21.9386	1.0398	0.0000	1.0398
14	C8	114.23	7.8836	9.4593	9.4593	0.1292	0.0000	0.1292
15	C9	128.28	4.9105	5.9031	5.9031	0.0255	0.0000	0.0255
16	C10+	174.06	27.4103	32.9789	32.9789	0.0049	0.0000	0.0049
17	Benzene	78.11	1.1333	1.3331	1.3331	0.1501	0.0000	0.1501
18	Toluene	92.13	2.9510	3.5301	3.5301	0.1011	0.0000	0.1011
19	E-Benzene	106.17	0.2203	0.2646	0.2646	0.0023	0.0000	0.0023
20	Xylenes	106.17	2.5216	3.0294	3.0294	0.0225	0.0000	0.0225
21	n-C6	86.18	3.2163	3.7790	3.7790	0.4468	0.0000	0.4468
22	224Trimethylp	114.24	1.3747	1.6416	1.6416	0.0611	0.0000	0.0611
	MW		104.91	120.21	120.21	29.61	0.00	29.61
	Stream Mole Ratio		1.0000	0.8311	0.8311	0.1689	0.0000	0.1689
	Heating Value	[BTU/SCF]				1710.12	0.00	1710.12
	Gas Gravity	[Gas/Air]				1.02	0.00	1.02
	Bubble Pt. @ 100F	[psia]	342.60	18.77	18.77			

****
* Project Setup Information *
****
Project File : Z:\458481_QEP_Part_71_Applications\Wonsits\Emission Calcs\Wonsits_60 bbl Tank Run_20
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 95.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : Uintah Basin
Well Name : QEP - Wonsits Valley Compressor Station
Well ID : Wonsits Valley - 8/5/11
Date : 2012.09.07

****
* Data Input *
****

Separator Pressure : 200.00[psig]
Separator Temperature : 60.00[F]
Ambient Pressure : 12.00[psia]
Ambient Temperature : 60.00[F]
C10+ SG : 0.7537
C10+ MW : 174.056

-- Low Pressure Oil ----------

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.1648
4	N2	0.0264
5	C1	9.8520
6	C2	2.8039
7	C3	3.3353
8	i-C4	1.5152
9	n-C4	3.1131
10	i-C5	2.6843
11	n-C5	2.7802
12	C6	3.6946
13	C7	18.4092
14	C8	7.8836
15	C9	4.9105
16	C10+	27.4103
17	Benzene	1.1333
18	Toluene	2.9510
19	E-Benzene	0.2203
20	Xylenes	2.5216
21	n-C6	3.2163
22	224Trimethylp	1.3747

-- Sales Oil ----------
Production Rate : 60[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 68.6
Reid Vapor Pressure : 10.58[psia]

****
* Calculation Results *
****

-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]

	(vol%)	(lb/hr)
Methane	3.51e+001	1.31e-001
Ethane	1.41e+001	9.83e-002
Propane	1.50e+001	1.53e-001
Isobutane	4.34e+000	5.85e-002
n-Butane	7.44e+000	1.00e-001
Isopentane	2.09e+000	3.50e-002
n-Pentane	2.17e+000	3.63e-002
n-Hexane	8.90e-001	1.78e-002
Cyclohexane	2.34e+000	4.56e-002
Other Hexanes	1.31e+000	2.62e-002
Heptanes	7.53e-001	1.75e-002
Methylcyclohexane	1.83e+000	4.17e-002
2,2,4-Trimethylpentane	2.53e-002	6.70e-004
Benzene	7.77e+000	1.41e-001
Toluene	4.32e+000	9.22e-002
Ethylbenzene	4.30e-002	1.06e-003
Xylenes	4.50e-001	1.11e-002
C8+ Heavies	4.08e-003	1.61e-004
Total Components	100.00	1.01e+000

Propane	3.72e-001	3.27e-001
Isobutane	3.02e-001	2.65e-001
n-Butane	7.65e-001	6.72e-001
Isopentane	7.61e-001	6.69e-001
n-Pentane	7.80e-001	6.86e-001
n-Hexane	1.17e+000	1.03e+000
Cyclohexane	4.32e+000	3.80e+000
Other Hexanes	1.18e+000	1.03e+000
Heptanes	3.39e+000	2.97e+000
Methylcyclohexane	8.34e+000	7.33e+000
2,2,4-Trimethylpentane	1.27e-001	1.12e-001
Benzene	1.62e+001	1.43e+001
Toluene	3.30e+001	2.90e+001
Ethylbenzene	1.33e+000	1.17e+000
Xylenes	1.64e+001	1.44e+001
C8+ Heavies	1.14e+001	1.00e+001
Total Components	100.00	8.79e+001

CONDENSER VENT STREAM

Temperature: 100.00 deg. F
Pressure: 12.00 psia
Flow Rate: 2.46e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.99e+000	9.32e-001
Carbon Dioxide	2.03e+001	5.79e+000
Nitrogen	8.62e-002	1.56e-002
Methane	2.52e+001	2.61e+000
Ethane	1.01e+001	1.97e+000
Propane	1.07e+001	3.06e+000
Isobutane	3.11e+000	1.17e+000
n-Butane	5.33e+000	2.00e+000
Isopentane	1.50e+000	6.99e-001
n-Pentane	1.55e+000	7.25e-001
n-Hexane	6.37e-001	3.56e-001
Cyclohexane	1.67e+000	9.11e-001
Other Hexanes	9.39e-001	5.24e-001
Heptanes	5.39e-001	3.50e-001
Methylcyclohexane	1.31e+000	8.34e-001
2,2,4-Trimethylpentane	1.81e-002	1.34e-002
Benzene	5.56e+000	2.81e+000
Toluene	3.09e+000	1.84e+000
Ethylbenzene	3.08e-002	2.12e-002
Xylenes	3.23e-001	2.22e-001
C8+ Heavies	2.92e-003	3.22e-003
Total Components	100.00	2.69e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.79e+000 scfh

Component	Conc.	Loading

n-Hexane	1.11e-001	1.39e+000
Cyclohexane	3.85e-001	4.71e+000
Other Hexanes	1.24e-001	1.56e+000
Heptanes	2.28e-001	3.32e+000
Methylcyclohexane	5.72e-001	8.17e+000
2,2,4-Trimethylpentane	7.55e-003	1.25e-001
Benzene	1.51e+000	1.72e+001
Toluene	2.31e+000	3.09e+001
Ethylbenzene	7.72e-002	1.19e+000
Xylenes	9.47e-001	1.46e+001
C8+ Heavies	4.05e-001	1.00e+001
Total Components	100.00	3.48e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 100.00 deg. F
Flow Rate: 4.67e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	2.33e+002	999106.
Carbon Dioxide	1.82e-002	4.24e-002	182.
Nitrogen	1.12e-006	2.61e-006	0.
Methane	3.77e-004	8.81e-004	4.
Ethane	3.42e-004	7.99e-004	3.
Propane	4.65e-004	1.09e-003	5.
Isobutane	9.94e-005	2.32e-004	1.
n-Butane	2.32e-004	5.41e-004	2.
Isopentane	5.87e-005	1.37e-004	1.
n-Pentane	6.63e-005	1.55e-004	1.
n-Hexane	2.81e-005	6.57e-005	0.
Cyclohexane	4.35e-004	1.02e-003	4.
Other Hexanes	3.29e-005	7.68e-005	0.
Heptanes	1.58e-005	3.69e-005	0.
Methylcyclohexane	1.94e-004	4.52e-004	2.
2,2,4-Trimethylpentane	3.97e-007	9.28e-007	0.
Benzene	4.20e-002	9.82e-002	420.
Toluene	2.35e-002	5.49e-002	235.
Ethylbenzene	2.11e-004	4.92e-004	2.
Xylenes	3.13e-003	7.32e-003	31.
C8+ Heavies	8.18e-008	1.91e-007	0.
Total Components	100.00	2.34e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 100.00 deg. F
Flow Rate: 2.07e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.13e-002	3.63e-002
Carbon Dioxide	7.04e-002	6.18e-002
Nitrogen	1.10e-004	9.71e-005
Methane	1.01e-002	8.85e-003
Ethane	4.48e-002	3.94e-002

Toluene	3.21e-001	3.36e+001
Ethylbenzene	1.27e-002	1.33e+000
Xylenes	1.60e-001	1.68e+001
C8+ Heavies	1.10e-001	1.15e+001
Total Components	100.00	1.05e+004

FLASH GAS EMISSIONS

Flow Rate: 3.14e+003 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.03e+001	8.98e+001
Carbon Dioxide	3.83e+001	1.40e+002
Nitrogen	6.90e-002	1.60e-001
Methane	9.78e-001	1.30e+000
Ethane	1.30e-001	3.23e-001
Propane	7.24e-002	2.64e-001
Isobutane	1.69e-002	8.13e-002
n-Butane	2.50e-002	1.20e-001
Isopentane	9.51e-003	5.68e-002
n-Pentane	8.18e-003	4.88e-002
n-Hexane	4.11e-003	2.93e-002
Cyclohexane	3.72e-003	2.59e-002
Other Hexanes	5.90e-003	4.20e-002
Heptanes	4.61e-003	3.82e-002
Methylcyclohexane	4.64e-003	3.76e-002
2,2,4-Trimethylpentane	2.87e-004	2.71e-003
Benzene	2.40e-003	1.55e-002
Toluene	2.59e-003	1.97e-002
Ethylbenzene	5.48e-005	4.81e-004
Xylenes	4.78e-004	4.20e-003
C8+ Heavies	2.38e-003	3.35e-002
Total Components	100.00	2.32e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.51e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.95e+001	2.34e+002
Carbon Dioxide	9.22e-001	5.90e+000
Nitrogen	3.87e-003	1.57e-002
Methane	1.12e+000	2.62e+000
Ethane	4.59e-001	2.01e+000
Propane	5.28e-001	3.39e+000
Isobutane	1.70e-001	1.44e+000
n-Butane	3.17e-001	2.68e+000
Isopentane	1.31e-001	1.37e+000
n-Pentane	1.35e-001	1.41e+000

FLASH TANK OFF GAS STREAM

Temperature: 165.00 deg. F
Pressure: 99.70 psia
Flow Rate: 8.60e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.83e-001	2.38e-001
Carbon Dioxide	6.39e+000	6.37e+000
Nitrogen	2.52e-001	1.60e-001
Methane	7.14e+001	2.60e+001
Ethane	9.47e+000	6.45e+000
Propane	5.29e+000	5.28e+000
Isobutane	1.23e+000	1.63e+000
n-Butane	1.82e+000	2.40e+000
Isopentane	6.94e-001	1.14e+000
n-Pentane	5.97e-001	9.76e-001
n-Hexane	3.00e-001	5.85e-001
Cyclohexane	2.72e-001	5.18e-001
Other Hexanes	4.30e-001	8.40e-001
Heptanes	3.36e-001	7.63e-001
Methylcyclohexane	3.38e-001	7.53e-001
2,2,4-Trimethylpentane	2.10e-002	5.43e-002
Benzene	1.75e-001	3.11e-001
Toluene	1.89e-001	3.94e-001
Ethylbenzene	4.00e-003	9.62e-003
Xylenes	3.49e-002	8.39e-002
C8+ Heavies	1.73e-001	6.70e-001
Total Components	100.00	5.56e+001

FLASH TANK GLYCOL STREAM

Temperature: 165.00 deg. F
Flow Rate: 1.87e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.47e+001	9.91e+003
Water	4.17e+000	4.37e+002
Carbon Dioxide	5.63e-002	5.90e+000
Nitrogen	1.50e-004	1.57e-002
Methane	2.51e-002	2.62e+000
Ethane	1.92e-002	2.01e+000
Propane	3.24e-002	3.39e+000
Isobutane	1.37e-002	1.44e+000
n-Butane	2.56e-002	2.68e+000
Isopentane	1.32e-002	1.38e+000
n-Pentane	1.36e-002	1.42e+000
n-Hexane	1.33e-002	1.40e+000
Cyclohexane	4.67e-002	4.88e+000
Other Hexanes	1.51e-002	1.58e+000
Heptanes	3.20e-002	3.35e+000
Methylcyclohexane	8.16e-002	8.54e+000
2,2,4-Trimethylpentane	1.22e-003	1.28e-001
Benzene	1.73e-001	1.81e+001

TEG	9.79e+001	9.91e+003
Water	2.00e+000	2.02e+002
Carbon Dioxide	1.21e-011	1.23e-009
Nitrogen	1.73e-013	1.75e-011
Methane	9.49e-018	9.60e-016
Ethane	3.95e-008	3.99e-006
Propane	3.49e-009	3.53e-007
Isobutane	9.07e-010	9.18e-008
n-Butane	1.24e-009	1.26e-007
Isopentane	1.24e-004	1.26e-002
n-Pentane	1.19e-004	1.20e-002
n-Hexane	9.79e-005	9.91e-003
Cyclohexane	1.71e-003	1.73e-001
Other Hexanes	2.39e-004	2.42e-002
Heptanes	2.03e-004	2.05e-002
Methylcyclohexane	3.67e-003	3.72e-001
2,2,4-Trimethylpentane	2.70e-005	2.74e-003
Benzene	9.09e-003	9.20e-001
Toluene	2.65e-002	2.68e+000
Ethylbenzene	1.38e-003	1.40e-001
Xylenes	2.16e-002	2.18e+000
C8+ Heavies	1.44e-002	1.46e+000
Total Components	100.00	1.01e+004

RICH GLYCOL STREAM

Temperature: 98.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.88e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.42e+001	9.91e+003
Water	4.15e+000	4.37e+002
Carbon Dioxide	1.17e-001	1.23e+001
Nitrogen	1.67e-003	1.76e-001
Methane	2.72e-001	2.86e+001
Ethane	8.04e-002	8.46e+000
Propane	8.24e-002	8.67e+000
Isobutane	2.91e-002	3.06e+000
n-Butane	4.83e-002	5.08e+000
Isopentane	2.39e-002	2.52e+000
n-Pentane	2.28e-002	2.40e+000
n-Hexane	1.88e-002	1.98e+000
Cyclohexane	5.13e-002	5.40e+000
Other Hexanes	2.30e-002	2.42e+000
Heptanes	3.91e-002	4.11e+000
Methylcyclohexane	8.83e-002	9.29e+000
2,2,4-Trimethylpentane	1.73e-003	1.82e-001
Benzene	1.75e-001	1.84e+001
Toluene	3.23e-001	3.40e+001
Ethylbenzene	1.27e-002	1.34e+000
Xylenes	1.60e-001	1.69e+001
C8+ Heavies	1.16e-001	1.22e+001
Total Components	100.00	1.05e+004

Isobutane	4.10e-001	2.62e+003
n-Butane	5.21e-001	3.33e+003
Isopentane	2.11e-001	1.68e+003
n-Pentane	1.58e-001	1.25e+003
n-Hexane	6.85e-002	6.49e+002
Cyclohexane	4.21e-002	3.90e+002
Other Hexanes	1.08e-001	1.03e+003
Heptanes	6.93e-002	7.64e+002
Methylcyclohexane	5.81e-002	6.28e+002
2,2,4-Trimethylpentane	6.29e-003	7.91e+001
Benzene	1.74e-002	1.49e+002
Toluene	1.88e-002	1.90e+002
Ethylbenzene	4.99e-004	5.83e+000
Xylenes	4.49e-003	5.25e+001
C8+ Heavies	3.37e-002	6.31e+002
Total Components	100.00	2.04e+005

DRY GAS STREAM

Temperature: 98.00 deg. F
Pressure: 914.70 psia
Flow Rate: 4.17e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.14e-003	1.41e+001
Carbon Dioxide	1.08e+000	5.20e+003
Nitrogen	2.83e-001	8.72e+002
Methane	9.01e+001	1.59e+005
Ethane	4.71e+000	1.56e+004
Propane	2.07e+000	1.00e+004
Isobutane	4.10e-001	2.62e+003
n-Butane	5.21e-001	3.32e+003
Isopentane	2.11e-001	1.67e+003
n-Pentane	1.58e-001	1.25e+003
n-Hexane	6.84e-002	6.47e+002
Cyclohexane	4.16e-002	3.85e+002
Other Hexanes	1.08e-001	1.02e+003
Heptanes	6.90e-002	7.60e+002
Methylcyclohexane	5.74e-002	6.19e+002
2,2,4-Trimethylpentane	6.29e-003	7.89e+001
Benzene	1.54e-002	1.32e+002
Toluene	1.57e-002	1.59e+002
Ethylbenzene	3.97e-004	4.63e+000
Xylenes	3.24e-003	3.78e+001
C8+ Heavies	3.31e-002	6.20e+002
Total Components	100.00	2.04e+005

LEAN GLYCOL STREAM

Temperature: 98.00 deg. F
Flow Rate: 1.80e+001 gpm

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

Methylcyclohexane	91.90%	8.10%
2,2,4-Trimethylpentane	70.25%	29.75%
Benzene	98.31%	1.69%
Toluene	98.84%	1.16%
Ethylbenzene	99.28%	0.72%
Xylenes	99.50%	0.50%
C8+ Heavies	94.49%	5.51%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	46.35%	53.65%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.91%	99.09%
n-Pentane	0.84%	99.16%
n-Hexane	0.71%	99.29%
Cyclohexane	3.54%	96.46%
Other Hexanes	1.53%	98.47%
Heptanes	0.61%	99.39%
Methylcyclohexane	4.35%	95.65%
2,2,4-Trimethylpentane	2.13%	97.87%
Benzene	5.09%	94.91%
Toluene	8.00%	92.00%
Ethylbenzene	10.48%	89.52%
Xylenes	12.99%	87.01%
C8+ Heavies	12.71%	87.29%

STREAM REPORTS:

WET GAS STREAM

Temperature: 98.00 deg. F
Pressure: 914.70 psia
Flow Rate: 4.17e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.26e-001	2.49e+002
Carbon Dioxide	1.08e+000	5.22e+003
Nitrogen	2.83e-001	8.72e+002
Methane	9.00e+001	1.59e+005
Ethane	4.71e+000	1.56e+004
Propane	2.06e+000	1.00e+004

Calculated Absorber Stages:	1.46	
Specified Dry Gas Dew Point:	3.39	lbs. H2O/MMSCF
Temperature:	98.0	deg. F
Pressure:	900.0	psig
Dry Gas Flow Rate:	100.0000	MMSCF/day
Glycol Losses with Dry Gas:	1.2391	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	59.59	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	4.61	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.68%	94.32%
Carbon Dioxide	99.76%	0.24%
Nitrogen	99.98%	0.02%
Methane	99.98%	0.02%
Ethane	99.95%	0.05%
Propane	99.91%	0.09%
Isobutane	99.88%	0.12%
n-Butane	99.85%	0.15%
Isopentane	99.85%	0.15%
n-Pentane	99.81%	0.19%
n-Hexane	99.70%	0.30%
Cyclohexane	98.66%	1.34%
Other Hexanes	99.77%	0.23%
Heptanes	99.46%	0.54%
Methylcyclohexane	98.58%	1.42%
2,2,4-Trimethylpentane	99.77%	0.23%
Benzene	88.29%	11.71%
Toluene	83.56%	16.44%
Ethylbenzene	79.40%	20.60%
Xylenes	71.99%	28.01%
C8+ Heavies	98.30%	1.70%

FLASH TANK

Flash Control:	Combustion device	
Flash Control Efficiency:	95.00 %	
Flash Temperature:	165.0	deg. F
Flash Pressure:	85.0	psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.95%	0.05%
Carbon Dioxide	48.06%	51.94%
Nitrogen	8.96%	91.04%
Methane	9.18%	90.82%
Ethane	23.71%	76.29%
Propane	39.06%	60.94%
Isobutane	46.89%	53.11%
n-Butane	52.70%	47.30%
Isopentane	54.89%	45.11%
n-Pentane	59.32%	40.68%
n-Hexane	70.45%	29.55%
Cyclohexane	90.40%	9.60%
Other Hexanes	65.32%	34.68%
Heptanes	81.42%	18.58%

n-Pentane	10.4560	0.3726	96.44
n-Hexane	8.6353	0.2061	97.61
Cyclohexane	22.9007	0.3132	98.63
Other Hexanes	10.5072	0.2988	97.16
Heptanes	17.9057	0.2438	98.64
Methylcyclohexane	39.0675	0.3475	99.11
2,2,4-Trimethylpentane	0.7870	0.0148	98.12
Benzene	76.5612	0.6840	99.11
Toluene	137.0442	0.4900	99.64
Ethylbenzene	5.2614	0.0067	99.87
Xylenes	64.3721	0.0669	99.90
C8+ Heavies	46.8456	0.1474	99.69
Total Emissions	687.1317	15.0966	97.80
Total Hydrocarbon Emissions	687.1317	15.0966	97.80
Total VOC Emissions	524.9254	6.9972	98.67
Total HAP Emissions	292.6612	1.4686	99.50
Total BTEX Emissions	283.2389	1.2477	99.56

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	100.00 deg. F
Condenser Pressure:	12.00 psia
Condenser Duty:	8.41e-002 MM BTU/hr
Hydrocarbon Recovery:	7.08 bbls/day
Produced Water:	16.01 bbls/day
Ambient Temperature:	60.00 deg. F
Excess Oxygen:	5.00 %
Combustion Efficiency:	95.00 %
Supplemental Fuel Requirement:	8.41e-002 MM BTU/hr

Component	Emitted	Destroyed
Methane	4.98%	95.02%
Ethane	4.90%	95.10%
Propane	4.52%	95.48%
Isobutane	4.07%	95.93%
n-Butane	3.74%	96.26%
Isopentane	2.56%	97.44%
n-Pentane	2.57%	97.43%
n-Hexane	1.28%	98.72%
Cyclohexane	0.97%	99.03%
Other Hexanes	1.68%	98.32%
Heptanes	0.53%	99.47%
Methylcyclohexane	0.51%	99.49%
2,2,4-Trimethylpentane	0.53%	99.47%
Benzene	0.82%	99.18%
Toluene	0.30%	99.70%
Ethylbenzene	0.09%	99.91%
Xylenes	0.08%	99.92%
C8+ Heavies	0.00%	100.00%

ABSORBER

Other Hexanes	0.8404	20.169	3.6808
Heptanes	0.7635	18.324	3.3441
Methylcyclohexane	0.7529	18.070	3.2978
2,2,4-Trimethylpentane	0.0543	1.303	0.2377
Benzene	0.3105	7.452	1.3600
Toluene	0.3943	9.463	1.7270
Ethylbenzene	0.0096	0.231	0.0422
Xylenes	0.0839	2.014	0.3675
C8+ Heavies	0.6697	16.073	2.9334
Total Emissions	48.8107	1171.456	213.7908
Total Hydrocarbon Emissions	48.8107	1171.456	213.7908
Total VOC Emissions	16.4047	393.712	71.8525
Total HAP Emissions	1.4381	34.514	6.2988
Total BTEX Emissions	0.7983	19.160	3.4968

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.4282	34.277	6.2556
Ethane	0.4210	10.103	1.8438
Propane	0.4170	10.009	1.8266
Isobutane	0.1398	3.355	0.6123
n-Butane	0.2203	5.286	0.9647
Isopentane	0.0917	2.201	0.4018
n-Pentane	0.0851	2.042	0.3726
n-Hexane	0.0470	1.129	0.2061
Cyclohexane	0.0715	1.716	0.3132
Other Hexanes	0.0682	1.637	0.2988
Heptanes	0.0557	1.336	0.2438
Methylcyclohexane	0.0793	1.904	0.3475
2,2,4-Trimethylpentane	0.0034	0.081	0.0148
Benzene	0.1562	3.748	0.6840
Toluene	0.1119	2.685	0.4900
Ethylbenzene	0.0015	0.037	0.0067
Xylenes	0.0153	0.367	0.0669
C8+ Heavies	0.0336	0.808	0.1474
Total Emissions	3.4467	82.721	15.0966
Total Hydrocarbon Emissions	3.4467	82.721	15.0966
Total VOC Emissions	1.5975	38.341	6.9972
Total HAP Emissions	0.3353	8.047	1.4686
Total BTEX Emissions	0.2849	6.837	1.2477

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	125.1548	6.2556	95.00
Ethane	37.0515	1.8438	95.02
Propane	37.9675	1.8266	95.19
Isobutane	13.4090	0.6123	95.43
n-Butane	22.2396	0.9647	95.66
Isopentane	10.9655	0.4018	96.34

Other Hexanes	1.5585	37.405	6.8264
Heptanes	3.3245	79.789	14.5615
Methylcyclohexane	8.1666	195.998	35.7697
2,2,4-Trimethylpentane	0.1254	3.010	0.5493
Benzene	17.1692	412.061	75.2011
Toluene	30.8943	741.464	135.3172
Ethylbenzene	1.1916	28.599	5.2192
Xylenes	14.6129	350.710	64.0046
C8+ Heavies	10.0256	240.615	43.9123
Total Emissions	108.0687	2593.649	473.3409
Total Hydrocarbon Emissions	108.0687	2593.649	473.3409
Total VOC Emissions	103.4413	2482.592	453.0730
Total HAP Emissions	65.3796	1569.109	286.3625
Total BTEX Emissions	63.8681	1532.833	279.7421

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.2976	31.142	5.6835
Ethane	0.3227	7.745	1.4134
Propane	0.2641	6.339	1.1569
Isobutane	0.0813	1.951	0.3561
n-Butane	0.1201	2.882	0.5260
Isopentane	0.0568	1.362	0.2486
n-Pentane	0.0488	1.171	0.2137
n-Hexane	0.0293	0.703	0.1282
Cyclohexane	0.0259	0.622	0.1135
Other Hexanes	0.0420	1.008	0.1840
Heptanes	0.0382	0.916	0.1672
Methylcyclohexane	0.0376	0.904	0.1649
2,2,4-Trimethylpentane	0.0027	0.065	0.0119
Benzene	0.0155	0.373	0.0680
Toluene	0.0197	0.473	0.0864
Ethylbenzene	0.0005	0.012	0.0021
Xylenes	0.0042	0.101	0.0184
C8+ Heavies	0.0335	0.804	0.1467
Total Emissions	2.4405	58.573	10.6895
Total Hydrocarbon Emissions	2.4405	58.573	10.6895
Total VOC Emissions	0.8202	19.686	3.5926
Total HAP Emissions	0.0719	1.726	0.3149
Total BTEX Emissions	0.0399	0.958	0.1748

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	25.9520	622.849	113.6699
Ethane	6.4540	154.895	28.2684
Propane	5.2829	126.789	23.1390
Isobutane	1.6260	39.023	7.1217
n-Butane	2.4017	57.640	10.5193
Isopentane	1.1351	27.242	4.9717
n-Pentane	0.9760	23.424	4.2749
n-Hexane	0.5855	14.051	2.5643
Cyclohexane	0.5185	12.444	2.2710

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: QEP - Wonsits Valley CS
File Name: \\gecko\ebg\458481_QEP_Part_71_Applications\Wonsits\Emission Calcs\Wonsits_100 scfd TEG Dehy 2012.ddf
Date: September 11, 2012

DESCRIPTION:

Description: 100 MMscf/d TEG Dehydration Unit
Sample Date: 08/31/2012

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.1306	3.135	0.5721
Ethane	0.0983	2.358	0.4304
Propane	0.1529	3.669	0.6696
Isobutane	0.0585	1.404	0.2562
n-Butane	0.1002	2.404	0.4387
Isopentane	0.0350	0.839	0.1532
n-Pentane	0.0363	0.871	0.1589
n-Hexane	0.0178	0.427	0.0779
Cyclohexane	0.0456	1.094	0.1996
Other Hexanes	0.0262	0.629	0.1147
Heptanes	0.0175	0.420	0.0766
Methylcyclohexane	0.0417	1.001	0.1826
2,2,4-Trimethylpentane	0.0007	0.016	0.0029
Benzene	0.1406	3.375	0.6160
Toluene	0.0922	2.212	0.4037
Ethylbenzene	0.0011	0.025	0.0046
Xylenes	0.0111	0.266	0.0485
C8+ Heavies	0.0002	0.004	0.0007
Total Emissions	1.0062	24.148	4.4070
Total Hydrocarbon Emissions	1.0062	24.148	4.4070
Total VOC Emissions	0.7773	18.655	3.4045
Total HAP Emissions	0.2634	6.321	1.1537
Total BTEX Emissions	0.2449	5.879	1.0729

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.6221	62.931	11.4848
Ethane	2.0053	48.126	8.7831
Propane	3.3855	81.252	14.8285
Isobutane	1.4355	34.451	6.2873
n-Butane	2.6759	64.220	11.7202
Isopentane	1.3684	32.843	5.9938
n-Pentane	1.4112	33.869	6.1811
n-Hexane	1.3861	33.266	6.0711
Cyclohexane	4.7100	113.040	20.6297

QEP Field Services Company

Wonsits Valley Compressor Station

Pilot Flow Calculator - Cimarron Combustor

	Cubic Feet per Hour Flow Capacity @ 10 psig			
	Natural Gas	Propane	Butane	
SG =	0.6	1.5	2	
Drill Size #70	21	13.4	11.6	scf/hr
(Discharge = 1.0) Calculated Flow Capacity =	18.45	11.77	10.19	scf/hr
Adjusted Flow Capacity for Discharge Coefficient =	13.84	8.83	7.64	scf/hr
Calculated Total Flow w/Input Discharge Coefficient =	13.84	8.83	7.64	scf/hr
	0.33	0.21	0.18	MSCFD
	15,622	22,709	24,650	BTU/hr

SG =	0.6	13.84	scf/hr
Input Flow Pressure		7	psig
Input Total Jets		1	orifices
Input Discharge Coefficient		0.75	

SECTION IV

PERFORMANCE

The John Zink Vapor Combustion Unit will combust the hydrocarbon vapors from the incoming air/hydrocarbon vapor mixture in order to comply with guaranteed emission limits as stated below.

SUMMARY

GUARANTEED HYDROCARBON EMISSIONS LEVEL
(See Section VI for Performance Guarantee)

95% Destruction Efficiency

ESTIMATED SYSTEM PRESSURE DROPS

10 Inches W. C. estimated at maximum inlet flow conditions. (See Section II, Design Basis)

Pressure drop through 4" burner at 5 scfm is 0.312 inch W.C.
Pressure drop through 4" burner at 150 scfm is 4.9 inch W.C.

UTILITY REQUIREMENTS

Pilot Gas . . . . . 21 SCFH Propane @ 4 PSIG or
54 SCFH of Natural Gas @ 7 PSIG per pilot

Assist Gas . . . . Will be provided by customr. Minimum flowrate will be 5 scfm.

Instrument Air . . . . None

G3616

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Wonsits Valley CS (C207)

CATERPILLAR®

ENGINE SPEED (rpm):	1000	FUEL SYSTEM:	GAV WITH AIR FUEL RATIO CONTROL
COMPRESSION RATIO:	9:1		
AFTERCOOLER WATER INLET (°F):	130	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	190	FUEL:	Gas Analysis
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	42.8-47.0
COOLING SYSTEM:	JW, OC+AC	FUEL METHANE NUMBER:	61.2
IGNITION SYSTEM:	CIS/ADEM3	FUEL LHV (Btu/scf):	1009
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	6590
COMBUSTION:	Low Emission	MAXIMUM INLET AIR TEMPERATURE(°F):	61
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.7	STANDARD RATED POWER:	4735 bhp@1000rpm

RATING		NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
				100%	100%	75%	52%
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	4686	4554	3416	2368
INLET AIR TEMPERATURE			°F	32	61	61	61
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	6749	6781	7106	7694
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	7469	7505	7865	8516
AIR FLOW (77°F, 14.7 psia)	(WET)	(3)(4)	scfm	11840	11537	8910	6347
AIR FLOW	(WET)	(3)(4)	lb/hr	52498	51154	39507	28144
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	71.3	69.4	53.6	39.6
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	878	883	927	996
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	31382	30689	24504	18366
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	54024	52644	40678	29022
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.70	0.70	0.70	0.70
CO		(8)(9)	g/bhp-hr	2.50	2.50	2.50	2.50
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	6.01	6.04	6.28	6.49
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	1.26	1.26	1.31	1.36
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	0.76	0.76	0.79	0.82
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.26	0.26	0.28	0.31
CO2		(8)(9)	g/bhp-hr	438	440	461	500
EXHAUST OXYGEN		(8)(11)	% DRY	11.7	11.7	11.5	11.1
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	48122	47753	41503	34027
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	18600	18566	17594	16699
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	23937	23949	23178	22771
HEAT REJ. TO AFTERCOOLER (AC)		(12)(13)	Btu/min	37441	37441	14954	3356

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW)	(14)	Btu/min	52935
TOTAL AFTERCOOLER CIRCUIT (OC+AC)	(13)(14)	Btu/min	68052
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

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

For notes information consult page three.

PREPARED BY: Ryan Robins, QEP Resources
Data generated by Gas Engine Rating Pro Version 4.01.02
Ref. Data Set DM5563-04-001, Printed 10Sep2012

DRESSER Waukesha

12V275GL
Gas Compression

WVCS - Title V App

Wonsits Valley CS - Uintah County, Utah

QEP Field Services
Ryan Robins ryan.robins@qepres.com 303.405.6688

FUEL COMPOSITION

HYDROCARBONS:		Mole or Volume %
Methane	CH4	90.297
Ethane	C2H6	4.7038
Propane	C3H8	1.981
Iso-Butane	I-C4H10	0.4325
Normal Butane	N-C4H10	0.5586
Iso-Pentane	I-C5H12	0.2158
Normal Pentane	N-C5H12	0.1673
Hexane	C6H14	0.1796
Heptane	C7H16	0.1436
Ethene	C2H4	0
Propene	C3H6	0
	SUM HYDROCARBONS	98.679
NON-HYDROCARBONS:		
Nitrogen	N2	0.2881
Oxygen	O2	0
Helium	He	0
Carbon Dioxide	CO2	0.965
Carbon Monoxide	CO	0
Hydrogen	H2	0
Water Vapor	H2O	0
	TOTAL FUEL	99.932

FUEL:	WVCS Fuel Gas
FUEL PRESSURE RANGE (psig):	45 - 60
FUEL WKI:	79.7
FUEL SLHV (BTU/ft3):	987.56
FUEL SLHV (MJ/Nm3):	38.83
FUEL LHV (BUT/ft3):	1005.05
FUEL LHV (MJ/Nm3):	39.52
FUEL HHV (BUT/ft3):	1111.78
FUEL HHV (MJ/Nm3):	43.72
FUEL DENSITY (SG):	0.64

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1996-02-01[25, V(0;101.325)].
Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. No liquid hydrocarbons are allowed in the fuel. The fuel must not contain any liquid water. Dresser Waukesha recommends both of the following:
1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.
2) A fuel filter separator to be used on all fuels except commercial quality natural gas.
Refer to the 'Fuel and Lubrication' section of 'Technical Data' or contact the Dresser Waukesha Application Engineering Department for additional information on fuels, or LHV and WKI ® calculations.

FUEL CONTAMINANTS

Total Sulfur Compounds	0	% volume
Total Halogen as Cloride	0	% volume
Total Ammonia	0	% volume
Siloxanes		
Tetramethyl silane	0	% volume
Trimethyl silanol	0	% volume
Hexamethyldisiloxane (L2)	0	% volume
Hexamethylcyclotrisiloxane (D3)	0	% volume
Octamethyltrisiloxane (L3)	0	% volume
Octamethylcyclotetrasiloxane (D4)	0	% volume
Decamethyltetrasiloxane (L4)	0	% volume
Decamethylcyclopentasiloxane (D5)	0	% volume
Dodecamethylpentasiloxane (L5)	0	% volume
Dodecamethylcyclohexasiloxane (D6)	0	% volume
Others	0	% volume

Total Sulfur Compounds	0 µg/BTU
Total Halogen as Cloride	0 µg/BTU
Total Ammonia	0 µg/BTU
Total Siloxanes	0 µg/BTU

Calculated fuel contaminant analysis will depend on the entered fuel composition and selected engine model.

No water or hydrocarbon condensates are allowed in the engine. Requires liquids removal.

DRESSER Waukesha

12V275GL
Gas Compression

WVCS - Title V App

Wonsits Valley CS - Uintah County, Utah

QEP Field Services
Ryan Robins ryan.robins@qepres.com 303.405.6688

ENGINE SPEED (rpm):	1000	COOLING SYSTEM:	JW, IC + OC
DISPLACEMENT (in3):	13048	INTERCOOLER WATER INLET (°F):	130
COMPRESSION RATIO:	9:1	JACKET WATER OUTLET (°F):	180
IGNITION SYSTEM:	ESM	JACKET WATER CAPACITY (gal):	100
EXHAUST MANIFOLD:	Insulated Dry Type	AUXILIARY WATER CAPACITY (gal):	30
COMBUSTION:	Lean Burn, Prechamber	LUBE OIL CAPACITY (gal):	220
ENGINE DRY WEIGHT (lbs):	50020	MAX. EXHAUST BACKPRESSURE (in. H2O):	20
AIR/FUEL RATIO SETTING:	ESM	MAX. AIR INLET RESTRICTION (in. H2O):	15
		NOx SELECTION (g/bhp-hr):	1.5

SITE CONDITIONS:

FUEL:	WVCS Fuel Gas	ALTITUDE (ft):	6000
FUEL PRESSURE RANGE (psig):	45 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	77
FUEL HHV (BTU/ft3):	1,111.8	FUEL WKI:	79.7
FUEL LHV (BTU/ft3):	1,005.1		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 77 °F		
			100%	75%	54%
CONTINUOUS ENGINE POWER	BHP	3100	3100	2325	1687
OVERLOAD	% 2/24 hr	0	0	-	-
MECHANICAL EFFICIENCY (LHV)	%	38.3	38.2	36.6	34.4
CONTINUOUS POWER AT FLYWHEEL	BHP	3100	3100	2325	1687
based on no auxiliary engine driven equipment					
FUEL CONSUMPTION					
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	6653	6671	6962	7402
FUEL CONSUMPTION (HHV)	BTU/BHP-hr	7359	7380	7701	8188
FUEL FLOW *based on fuel analysis LHV*	SCFM	359	360	282	217
HEAT REJECTION					
JACKET WATER (JW)	BTU/hr x 1000	2232	2181	1937	1716
LUBE OIL (OC)	BTU/hr x 1000	753	745	723	734
INTERCOOLER (IC)	BTU/hr x 1000	2275	2016	1165	539
EXHAUST	BTU/hr x 1000	7577	7860	6361	5039
RADIATION	BTU/hr x 1000	300	392	398	409
EMISSIONS					
NOx (NO + NO2)	g/bhp-hr	1.5	1.5	1.5	1.5
CO	g/bhp-hr	2.2	2.2	2.5	2.6
THC	g/bhp-hr	3.6	3.6	4.0	4.2
NMHC	g/bhp-hr	0.80	0.80	0.86	0.91
NM, NEHC	g/bhp-hr	0.51	0.51	0.55	0.58
CO2	g/bhp-hr	415	416	434	462
AIR INTAKE / EXHAUST GAS					
INDUCTION AIR FLOW	SCFM	7703	8010	6032	4337
EXHAUST GAS MASS FLOW	lb/hr	33716	35058	26402	18981
EXHAUST GAS FLOW *at exhaust temp, 14.5 psia*	ACFM	20052	20742	16108	12056
EXHAUST TEMPERATURE	°F	893	886	928	985

HEAT EXHANGER SIZING		
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	2531
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	3434

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS		
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	430
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	15
AUX WATER PUMP MIN. DESIGN FLOW	GPM	410
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	17

All data provided per the condtions listed in the notes section on page three.

G3612

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Wonsits Valley CS (C202, C203, C204)

CATERPILLAR®

ENGINE SPEED (rpm):	1000	FUEL SYSTEM:	GAV WITH AIR FUEL RATIO CONTROL
COMPRESSION RATIO:	9:1		
AFTERCOOLER WATER INLET (°F):	130	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	190	FUEL:	Gas Analysis
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	42.8-47.0
COOLING SYSTEM:	JW, OC+AC	FUEL METHANE NUMBER:	61.2
IGNITION SYSTEM:	CIS/ADEM3	FUEL LHV (Btu/scf):	1009
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	6590
COMBUSTION:	Low Emission	MAXIMUM INLET AIR TEMPERATURE(°F):	61
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.7	STANDARD RATED POWER:	3550 bhp@1000rpm

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**52%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	3505	3406	2554	1775
INLET AIR TEMPERATURE			°F	32	61	61	61
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	6776	6809	7124	7650
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	7499	7535	7885	8467
AIR FLOW (77°F, 14.7 psia)	(WET)	(3)(4)	scfm	8991	8753	6712	4775
AIR FLOW	(WET)	(3)(4)	lb/hr	39867	38813	29761	21174
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	70.9	69.1	53.5	38.2
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	860	864	902	946
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	23499	22954	18123	13343
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	41013	39932	30639	21829
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.70	0.70	0.70	0.70
CO		(8)(9)	g/bhp-hr	2.50	2.50	2.50	2.50
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	6.15	6.17	6.32	6.50
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	1.29	1.29	1.32	1.36
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	0.78	0.78	0.80	0.82
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.26	0.27	0.28	0.31
CO2		(8)(9)	g/bhp-hr	440	442	462	497
EXHAUST OXYGEN		(8)(11)	% DRY	12.5	12.4	11.7	10.7
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	36460	36082	31673	29348
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	13995	13966	13220	12448
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	18014	18020	17421	16975
HEAT REJ. TO AFTERCOOLER (AC)		(12)(13)	Btu/min	30381	30381	14197	2266

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW)	(14)	Btu/min	40106
TOTAL AFTERCOOLER CIRCUIT (OC+AC)	(13)(14)	Btu/min	53524
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

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

For notes information consult page three.

APPENDIX C
Supporting Documentation for Emissions Calculations

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Gas Analysis Calculation Sheet

Sample Date: Average of 2017 samples

							LHV BTU Content		HHV BTU Content	
Component	**Mole %**	**Mole Frac.**	**Lb/Lb mole**	**MW**	**VOC**	**HAP**	**Btu/scf**	**Btu/scf*Mole Frac**	**Btu/scf**	**Btu/scf*Mole Frac**
Carbon Dioxide	0.997900789	0.0100	44.01	0.44			0.0	0.00	0.0	0.00
Hydrogen Sulfide	0	0.0000	34.08	0.00			586.8	0.00	637.1	0.00
Nitrogen	0.278778519	0.0028	28.02	0.08			0.0	0.00	0.0	0.00
Methane	90.0995672	0.9010	16.04	14.45			909.4	819.37	1010.0	910.01
Ethane	4.701248283	0.0470	30.07	1.41			1618.7	76.10	1769.6	83.19
Propane	2.158413553	0.0216	44.09	0.95	0.95		2314.9	49.97	2516.1	54.31
Isobutane	0.434084966	0.0043	58.12	0.25	0.25		3000.4	13.02	3251.9	14.12
n-butane	0.599283509	0.0060	58.12	0.35	0.35		3010.8	18.04	3262.3	19.55
Isopentane	0.215817386	0.0022	72.15	0.16	0.16		3699.0	7.98	4000.9	8.63
n-pentane	0.176911941	0.0018	72.15	0.13	0.13		3706.9	6.56	4008.9	7.09
Hexanes	0.165100273	0.0017	86.18	0.14	0.14	0.14	4404.1	7.27	4750.2	7.84
Heptanes	0.112168714	0.0011	100.21	0.11	0.11		5100.3	5.72	5500.4	6.17
C8+ Heavies	0.060724867	0.0006	315.00	0.19	0.19		5796.3	3.52	5794.1	3.52
Totals	**100.00**	**1.0000**		**18.6645**	**2.2816**	**0.1423**		**1007.60**		**1114.43**

VOC wt%	1222.40%
Non-Methane VOC wt%	5416.14%
HAP wt%	76.23%

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Waste Gas BTU Content

100-MMscfd Dehydrator (D-1)					
Component	**Formula**	**Heat of Combustion [Btu/lb]**	**Condenser Vent Loading [lb/hr]**	**Flash Tank Loading [lb/hr]**	**Heat Content [Btu/hr]**
Water	H2O	0	7.70E-01	1.59E-01	0.77
CO2	CO2	0	4.84E+00	5.86E+00	4.84
Nitrogen	N2	0	1.35E-02	1.49E-01	0.01
Methane	CH4	21502	2.17E+00	2.35E+01	526801.17
Ethane	C2H6	20416	1.66E+00	5.81E+00	139034.62
Propane	C3H8	19929	2.40E+00	4.54E+00	110409.06
Isobutane	C4H10	19614	9.25E-01	1.38E+00	46682.25
n-Butane	C4H10	19665	1.60E+00	2.04E+00	59783.20
Isopentane	C5H12	19451	5.65E-01	9.44E-01	37813.31
n-Pentane	C5H12	19499	5.91E-01	8.15E-01	35391.28
n-Hexane	C5H10	19001	2.98E-01	4.82E-01	28159.78
Cyclohexane	C6H14	19391	8.05E-01	4.34E-01	27807.50
Other Hexanes	C6H12	18846	4.35E-01	6.92E-01	31887.87
Heptanes	C6H14	19200	2.97E-01	6.15E-01	31008.30
Methylcyclohexane	C7H16	19250	7.26E-01	6.11E-01	31012.48
2,2,4-Trimethylpentane	C7H14	18797	1.11E-02	4.29E-02	19603.40
Benzene	C6H6	17446	2.37E+00	2.56E-01	21914.55
Toluene	C7H8	17601	1.54E+00	3.13E-01	23111.65
Ethylbenzene	C8H10	17752	1.69E-02	7.25E-03	17880.72
Xylenes	C8H10	17723	1.72E-01	6.21E-02	18823.77
C8+Heavies		19000	2.49E-03	4.68E-01	27892.00

Note: From GLYCalc 4.0 data for Condenser Vent Stream & Flash Tank Off Gas Stream.

Total: 1,235,023 Btu/hr

Dehy Waste Gas Streams:		
Flash Tank Off Gas Stream	772.0	scf/hr
Condenser Vent Stream	203.0	scf/hr
Total Waste Gas Flow =	**975.0**	scf/hr
Waste Gas Btu Content =	**1267**	**Btu/scf**

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Liquid Analysis

Sample Date: 8/5/2011

Component	Mole %	Mole Frac.	lb/lb-mol	MW	VOC	Weight %
H2S	0.000	0.00000	34.08	0.00		0
Helium	0	0	4.00	0.00		0
Oxygen	0	0	32.00	0.00		0
CO2	0.165	0.001648	44.01	0.07		0.0692
N2	0.0264	0.000264	28.02	0.01		0.0071
Methane	9.852	0.09852	16.04	1.58		1.5088
Ethane	2.804	0.028039	30.07	0.84		0.8049
Propane	3.335	0.033353	44.09	1.47	1.4705	1.404
Isobutane	1.515	0.015152	58.12	0.88	0.8806	0.8408
n-Butane	3.113	0.031131	58.12	1.81	1.8093	1.7274
Isopentane	2.684	0.026843	72.15	1.94	1.9367	1.8489
n-Pentane	2.780	0.027802	72.15	2.01	2.0059	1.915
Cyclopentane	0.000	0	70.13	0.00	0.0000	
n-Hexane	3.216	0.032163	86.18	2.77	2.7718	2.6461
Cyclohexane	0.000	0.00000	84.16	0.00	0.0000	
Other Hexanes	3.695	0.03695	85.00	3.14	3.1404	3.0396
Heptanes	18.409	0.184092	100.20	18.45	18.4460	16.8698
Methycyclohexane	0.000	0.00000	98.18	0.00	0.0000	
2,2,4 Trimethylpentane	1.375	0.01375	114.22	1.57	1.5702	1.4991
Benzene	1.133	0.01133	78.11	0.89	0.8852	0.8452
Toluene	2.951	0.02951	92.14	2.72	2.7191	2.5958
Ethylbenzene	0.220	0.002203	106.17	0.23	0.2339	0.2233
Xylenes	2.522	0.025216	106.17	2.68	2.6772	2.5558
C8+ Heavies	40.204	0.402044	120.00	48.25	48.2453	59.5994
Total	**100.00**	**1.000**		**91.30**	**88.7922**	**100.00**

VOC wt%	97.26%
HAP wt%	12.23%
CO2/VOC fraction (wt%)	0.08%
CH4/VOC fraction (wt%)	1.78%

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Wet Gas Analysis

Sample Date: August 31, 2012

Component	Mole %	Mole Frac.	lb/lb-mol	MW	VOC
H2S	0.000	0.00000	34.08	0.00	
Helium		0	4.00	0.00	
Oxygen	0	0	32.00	0.00	
CO2	1.079	0.010785	44.01	0.47	
N2	0.2834	0.002834	28.02	0.08	
Methane	90.130	0.901296	16.04	14.46	
Ethane	4.712	0.047115	30.07	1.42	
Propane	2.068	0.020675	44.09	0.91	0.9116
Isobutane	0.411	0.004107	58.12	0.24	0.2387
n-Butane	0.522	0.005215	58.12	0.30	0.3031
Isopentane	0.212	0.002116	72.15	0.15	0.1527
n-Pentane	0.158	0.001578	72.15	0.11	0.1139
Cyclopentane	0.000	0	70.13	0.00	0.0000
n-Hexane	0.069	0.000686	86.18	0.06	0.0591
Cyclohexane	0.042	0.00042	84.16	0.04	0.0355
Other Hexanes	0.108	0.00108	85.00	0.09	0.0921
Heptanes	0.069	0.000694	100.20	0.07	0.0695
Methycyclohexane	0.058	0.00058	98.18	0.06	0.0571
2,2,4 Trimethylpentane	0.006	0.00006	114.22	0.01	0.0072
Benzene	0.017	0.00017	78.11	0.01	0.0136
Toluene	0.019	0.000188	92.14	0.02	0.0173
Ethylbenzene	0.001	0.000005	106.17	0.00	0.0005
Xylenes	0.005	0.000045	106.17	0.00	0.0048
C8+ Heavies	0.034	0.000337	120.00	0.04	0.0404
Total	**100.000**	**1.000**		**18.54**	**2.1171**

VOC wt%	11.42%
HAP wt%	4.84%
CO2/VOC fraction (wt%)	22.42%
CH4/VOC fraction (wt%)	682.86%

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Venting during Pig Receiving and Launching

Launcher/receiver #1		
Volume	41.60	cf
Pressure	1030	psi
Number of Vents/yr	1	vents/yr
Vent Volume	3455.48	scf/vent
Annual Vent Volume	3455.48	scf/yr

Launcher/receiver #2		
Volume	5.90	cf
Pressure	1030	psi
Number of Vents/yr	0	vents/yr
Vent Volume	490.08	scf/vent
Annual Vent Volume	0.00	scf/yr

Launcher/receiver #3		
Volume	46.60	cf
Pressure	1030	psi
Number of Vents/yr	12	vents/yr
Vent Volume	3870.81	scf/vent
Annual Vent Volume	46449.68	scf/yr

Launcher/receiver #4		
Volume	10.20	cf
Pressure	1030	psi
Number of Vents/yr	15	vents/yr
Vent Volume	847.26	scf/vent
Annual Vent Volume	12708.87	scf/yr

Gas Vent Rate (scf/year)	Pollutant	Pollutant Fraction (lb/lb mol)	lb/yr	lb/hr	tpy
62614.03	VOC	2.12	349.76	0.040	0.175
62614.03	HAPs	0.10	16.94	0.002	0.008

Notes: Receiver volume based on engineering calculations

Vented volume (scf/release) = Receiver volume (cf) * Receiver pressure (psi) * 1/atmospheric pressure (psi)

lb VOC/yr = vented volume (scf/release) * # of releases * lbmol/379 * Molecular Weight of Gas (lb gas/lb-mol) * % VOC (lb voc/lb gas)

GHG Emissions	tpy
CO_2	0.04
CH_4 (as CO_2e)	29.85
CO_2e	29.9

Notes: CO_2 is based on fraction of CO_2/VOC in liquid (see gas analysis)

CH_4 is based on fraction of CH_4/VOC in liquid (see gas analysis)

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Emissions Unit ID	Actual Emissions (Tons/Year)									
	HAP1 2,2,4 Tri	HAP2 Acetaldehyde	HAP3 Acrolein	HAP4 Benzene	HAP5 Ethylbenzene	HAP6 HCHO	HAP7 Methanol	HAP8 n-C6	HAP9 Toluene	HAP10 Xylenes
C202	---	0.5	0.3	0.0	0.0	1.6	0.1	0.1	0.0	0.0
C203	---	0.5	0.3	0.0	0.0	1.6	0.1	0.1	0.0	0.0
C204	---	0.5	0.3	0.0	0.0	1.6	0.1	0.1	0.0	0.0
C206	---	0.42	0.26	0.02	0.00	2.69	0.13	0.06	0.02	0.01
C207	---	0.6	0.4	0.0	0.0	2.2	0.2	0.1	0.0	0.0
D-1	0.0			1.5	0.1			0.3	2.0	0.8
T-1	0.00			0.00	0.00			0.02	0.00	0.00
EL	0.0			0.0	0.0			0.1	0.1	0.1
FL-1	---			0.0		0.0		0.0	0.0	
C-1	---			0.0		0.0		0.0	0.0	
C-2	---			0.0		0.0		0.0	0.0	
CB	3.4E-02			6.5E-02	2.5E-03			2.8E-01	8.2E-02	2.3E-02
SUBTOTALS	**0.1**	**2.5**	**1.5**	**1.7**	**0.1**	**9.8**	**0.7**	**1.0**	**2.3**	**0.9**

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Misc Storage Tank Emissions

Uncontrolled

Source ID	Description	Capacity	VOC			HAPs			CO_2	CH_4 (as CO_2e)	CO_2e
		barrels	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy	tpy	tpy	tpy
T-2	New EG	100	3.42E-06	0.03	1.50E-05	3.42E-06	3.00E-02	1.50E-05	-	-	-
T-3	New Oil	100	0.06	566	0.28	0.01	57	0.03	-	-	-
T-4	Used Oil	100	0.02	200	0.10	0.002	20	0.01	-	-	-
T-5	Used EG	100	3.42E-06	0.03	1.50E-05	3.42E-06	3.00E-02	1.50E-05	-	-	-
T-6	TEG	65	-	-	-	-	-	-	-	-	-
T-7	Water	100	-	-	-	-	-	-	-	-	-
T-8	Dehy Drip Tank	100	0.08	736	0.37	0.004	31	0.02	0.013	7.29	7
T-9	Dehy Drip Tank	100	0.08	736	0.37	0.004	31	0.02	0.013	7.29	7
	Total	765.00	0.26	2237.8	1.12	0.02	138.28	0.07	0.03	14.58	15

Note: Emissions calculated using EPA Tanks v 4.0.9d

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Engine Startup Emissions (Insignificant Emissions)

Unit ID	Vent Rate scf/event	# Events event/yr	VOC Fraction lb/lb-mol	VOC lb/yr	VOC tpy	HAPs tpy	CH_4 (as CO_2e)	CO_2 tpy	CO_2e tpy
C202	400	32	2.12	71.50	0.036	0.002	6.10	0.008	6.11
C203	400	36	2.12	80.44	0.040	0.002	6.87	0.009	6.88
C204	400	38	2.12	84.91	0.042	0.002	7.25	0.010	7.26
C206	400	43	2.12	96.08	0.048	0.002	8.20	0.011	8.21
C207	400	47	2.12	105.02	0.053	0.003	8.96	0.012	8.98
Total					0.22	0.011	37.38	0.05	37.43

Compressor Blowdowns (Significant Emissions)

Unit ID	Vent Rate scf/event	# Events event/yr	VOC Fraction lb/lb-mol	VOC lb/yr	VOC tpy	HAPs tpy	CH_4 (as CO_2e)	CO_2 tpy	CO_2e tpy
C202	12000	60	2.12	4021.94	2.01	0.10	343.30	0.451	343.75
C203	12000	60	2.12	4021.94	2.01	0.10	343.30	0.451	343.75
C204	12000	60	2.12	4021.94	2.01	0.10	343.30	0.451	343.75
C206	12000	60	2.12	4021.94	2.01	0.10	343.30	0.451	343.75
C207	12000	60	2.12	4021.94	2.01	0.10	343.30	0.451	343.75
Total					10.05	0.49	1716.51	2.25	1718.76

Emergency Shutdowns (Insignificant Emissions)

Vent Rate scf/event	# Events event/yr	VOC Fraction lb/lb-mol	VOC lb/yr	VOC tpy	HAPs tpy	CH_4 (as CO_2e)	CO_2 tpy	CO_2e tpy
12000	2	2.12	134.06	0.067	0.003	11.44	0.015	11.46

Note: All emissions based on conservatively estimated vent rate and representative gas content (%VOC, $\%CH_4$, etc)

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Truck Loading Emissions

AP-42 Chapter 5.2 (1/95) - Transportation and Marketing of Petroleum Liquids
AP-42 Table 5.2-5 Total Uncontrolled Organic Emission Factors for Petroleum Liquid Rail Tank Cars and Tank Trucks (Transit)

$L_L = 12.46 * S * P * M/T$

L_L = Loading loss, lb/1000 gal or liquid loaded
S = Saturation factor
P = True vapor pressure, psia
M = Molecular weight of tank vapors, lb/lb-mole
T = Temperature, °R (°F + 460)

From Table 5.2-1, typical saturation factor = 0.6 for submerged loading
From Table 7.1-2, liquid classified at gasoline RVP=7 at 60°F, M = 68, P = 3.5

L_L (lb/1000 gal)= 12.46 * 0.6 * 3.5 psia * 68 lb/lb-mole * 1/(60 + 460) °R
L_L = 3.42 lb/1000 gal

Emission factor =	3.42	lb/1000 gal (based on gasoline, submerged loading, dedicated normal service)
Loading rate =	60.0	barrels per day
	21,900.0	barrels per year
	2,520	gallons per day (on average)

Emissions	lb/yr	lb/hr	tpy
VOC	3147	0.36	1.57

Emission calculation:

$$\frac{\text{lb}}{1000\ \text{gal}} \times \frac{\text{bbl}}{\text{year}} \times \frac{42\ \text{gal}}{\text{bbl}} = \text{lb/yr}$$

$$\frac{\text{lb}}{\text{year}} \times \frac{\text{ton}}{2000\ \text{lb}} = \text{tpy}$$

Andeavor Field Services, LLC

Wonsits Valley Compressor Station
Emissions Inventory - PTE

Dehydrator Backup Combustor (FL-901), C-2

Source ID Number	C-2	
Make/Model	??	
S/N	??	
Mfg. Date	??	
Fuel Heating Value	1114	Btu/scf
Pilot Flow Rate [1]	51	scf/hr
Flare Heat Input	0.06	MMBtu/hr
Hours Running with Flare Down	266	hr/yr
Actual Operation	8,477	hr/yr

[1] Pilot design rate assumed the same as the flare (FL-1)

Vents to Backup Combustor

Vent ID	Description	Number of Units	Gas Emitted (Mscfd)	Flow Rate (scf/yr)	Vent Heating Value (Btu/scf) (HHV)	Annual Heat Input to Combustor (MMBtu/yr)
D-1	Dehy Vents	1	23.4	259,350.0	1,579.9	409.7

Emissions from Pilot and Igniter

Pollutant	Emission Factor		Nominal Rating	Hrs of Operation	Estimated Emissions		Source of Emission
	(lb/MMscf)	(lb/MMBtu) (HHV)	(MMBtu/hr)	(hrs/yr)	(lb/hr)	(tpy)	Factor
NOx	100.00	0.09	0.06	8477	5.10E-03	0.02	AP-42[1]
CO	84.00	0.08	0.06	8477	4.28E-03	1.8E-02	AP-42[1]
VOC	5.50	0.00	0.06	8477	2.81E-04	1.2E-03	AP-42[2]
SO_2	0.60	0.001	0.06	8477	3.06E-05	1.30E-04	AP-42[2]
PM, PM_{10}, PM_{25} [6]	7.60	0.01	0.06	8477	3.88E-04	1.64E-03	AP-42[2]
Benzene	2.1E-03	0.000002	0.06	8477	1.07E-07	4.54E-07	AP-42[3]
Dichlorobenzene	1.2E-03	0.000001	0.06	8477	6.12E-08	2.59E-07	AP-42[3]
Formaldehyde	7.5E-02	0.000067	0.06	8477	3.83E-06	1.62E-05	AP-42[3]
Hexane	1.8E+00	0.001615	0.06	8477	9.18E-05	3.89E-04	AP-42[3]
Toluene	3.4E-03	0.000003	0.06	8477	1.73E-07	7.35E-07	AP-42[3]

[1] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

[2] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

[3] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

[6] PM includes both condensible and filterable PM. All PM is assumed to be PM2.5, so PM = PM_{10} = PM_{25}

Emissions from Combustion of Waste Gas (NOx and CO)

Pollutant	Emission Factor	Annual Heat Input to Combustor (MMBtu/yr)	Heat Input	Hours of Operation	Estimated Emissions		Source of Emission
	(lb/MMBtu)		(MMBtu/hr)	(hr/yr)	(lb/hr)	(tpy)	Factor
NOx	0.14	409.7	0.048	8477	0.0068	0.03	WY C6S2[7]
CO	0.035	409.7	0.048	8477	0.0017	0.01	WY C6S2[7]

[7] Emission Factors from Wyoming C6S2 - O&G Production Facilities Permitting Guidance.

Potential Controlled / Uncontrolled Emissions

Pollutant	Estimated Emissions		Streams
	(lb/hr)	(tpy)	
NOx	0.0119	0.05	*Pilot and Igniter, Waste Gas*
CO	0.0060	0.03	*Pilot and Igniter, Waste Gas*
VOC	0.0003	1.2E-03	*Pilot and Igniter*
SO_2	0.0000	1.30E-04	*Pilot and Igniter*
PM, PM_{10}, PM_{25}	0.0004	1.64E-03	*Pilot and Igniter*
Benzene	1.07E-07	4.54E-07	*Pilot and Igniter*
Dichlorobenzene	6.12E-08	2.59E-07	*Pilot and Igniter*
Formaldehyde	3.83E-06	1.62E-05	*Pilot and Igniter*
Hexane	9.18E-05	3.89E-04	*Pilot and Igniter*
Toluene	1.73E-07	7.35E-07	*Pilot and Igniter*

Note: These emissions represent the pilot and ignitor gas combustion and emissions created in combustion of vented blowdown vapors. The emissions resulting from the combustion of other source streams routed to this flare for control are shown as the controlled emissions with each respective emission source.

Andeavor Field Services, LLC

Wonsits Valley Compressor Station
Emissions Inventory - PTE

Tank Vapor Combustor (FL-4002), C-1

Source ID Number	C-1	
Make/Model	Cimarron 30"	
S/N	53000709	
Mfg. Date	February 2012	
Fuel Heating Value	1114	Btu/scf
Pilot Flow Rate [1]	13	scf/hr
Pilot Flow Rate [1]	0.11	MMscf/yr
Flare Heat Input	0.01	MMBtu/hr
Actual Operation	8,760	hrs

[1] Pilot design rate based on mfg data

Vents to Combustor

Vent ID	Description	Number of Units	Gas Emitted (Mscfd)	Flow Rate (scf/yr)	Vent Heating Value (Btu/scf) (HHV)	Annual Heat Input to Combustor (MMBtu/yr)	Heat Input to Combustor includes pilot (MMBtu/hr)
T-1 & T-2	Tank Vents	1	2.17	792,050.0	1,579.9	1,251.3	0.16

Emissions from Pilot and Igniter

Pollutant	Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu) (HHV)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
NOx	100.00	0.09	0.01	8760	1.30E-03	0.01	AP-42[1]
CO	84.00	0.08	0.01	8760	1.09E-03	4.8E-03	AP-42[1]
VOC	5.50	0.00	0.01	8760	7.15E-05	3.1E-04	AP-42[2]
SO_2	0.60	0.001	0.01	8760	7.80E-06	3.42E-05	AP-42[2]
PM, PM_{10}, PM_{25} [6]	7.60	0.01	0.01	8760	9.88E-05	4.33E-04	AP-42[2]
Benzene	2.1E-03	0.000002	0.01	8760	2.73E-08	1.20E-07	AP-42[3]
Dichlorobenzene	1.2E-03	0.000001	0.01	8760	1.56E-08	6.83E-08	AP-42[3]
Formaldehyde	7.5E-02	0.000067	0.01	8760	9.75E-07	4.27E-06	AP-42[3]
Hexane	1.8E+00	0.001615	0.01	8760	2.34E-05	1.02E-04	AP-42[3]
Toluene	3.4E-03	0.000003	0.01	8760	4.42E-08	1.94E-07	AP-42[3]

[1] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

[2] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

[3] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

[6] PM includes both condensible and filterable PM. All PM is assumed to be PM2.5, so PM = PM_{10} = PM_{25}

Potential Emissions from Combustion (NOx and CO)

Pollutant	Emission Factor (lb/MMBtu)	Annual Heat Input to Combustor (MMBtu/yr)	Potential Heat Input (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
NOx	0.14	1251.3	0.143	8760	0.0200	0.09	WY C6S2[7]
CO	0.035	1251.3	0.143	8760	0.0050	0.02	WY C6S2[7]

[7] Emission Factors from Wyoming C6S2 - O&G Production Facilities Permitting Guidance.

Potential Controlled / Uncontrolled Emissions

Pollutant	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)
NOx	0.0213	0.09
CO	0.0061	0.03
VOC	0.0001	3.1E-04
SO_2	0.0000	3.42E-05
PM, PM_{10}, PM_{25}	0.0001	4.33E-04
Benzene	2.73E-08	1.20E-07
Dichlorobenzene	1.56E-08	6.83E-08
Formaldehyde	9.75E-07	4.27E-06
Hexane	2.34E-05	1.02E-04
Toluene	4.42E-08	1.94E-07

Note: These emissions represent the pilot and ignitor gas combustion and emissions created in combustion of vented blowdown vapors. The emissions resulting from the combustion of other source streams routed to this flare for control are shown as the controlled emissions with each respective emission source.

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Dehydrator BTEX Flare

Source ID Number	FL-1	
Fuel Heating Value	1114	Btu/scf
Pilot Flow Rate [1]	51	scf/hr
Pilot Flow Rate [1]	0.45	MMscf/yr
Flare Heat Input	0.06	MMBtu/hr
Actual Operation	8760	hrs

[1] Pilot design rate based on mfg data

Vents to Flare

Vent ID	Description	Number of Units	Gas Emitted (Mscfd)	Flow Rate (scf/yr)	Vent Heating Value (Btu/scf) (HHV)	Annual Heat Input to Flare (MMBtu/yr)	Heat Input to Flare, includes pilot (MMBtu/hr)
D-1	Dehy Vents	1	23.4	8,541,000	1,267	10,818.8	1.3

Potential Emissions from Pilot and Igniter

Pollutant	Emission Factor		Nominal Rating	Hrs of Operation	Estimated Emissions		Source of Emission
	(lb/MMscf)	(lb/MMBtu) (HHV)	(MMBtu/hr)	(hrs/yr)	(lb/hr)	(tpy)	Factor
NOx	100.00	0.09	0.06	8760	5.10E-03	0.02	AP-42[1]
CO	84.00	0.08	0.06	8760	4.28E-03	0.02	AP-42[1]
VOC	5.50	0.00	0.06	8760	2.81E-04	0.00	AP-42[2]
SO_2	0.60	0.001	0.06	8760	3.06E-05	1.34E-04	AP-42[2]
PM, PM_{10}, $PM_{2.5}$ [6]	7.60	0.01	0.06	8760	3.88E-04	1.70E-03	AP-42[2]
Benzene	2.1E-03	0.000002	0.06	8760	1.07E-07	4.69E-07	AP-42[3]
Dichlorobenzene	1.2E-03	0.000001	0.06	8760	6.12E-08	2.68E-07	AP-42[3]
Formaldehyde	7.5E-02	0.000067	0.06	8760	3.83E-06	1.68E-05	AP-42[3]
Hexane	1.8E+00	0.001615	0.06	8760	9.18E-05	4.02E-04	AP-42[3]
Toluene	3.4E-03	0.000003	0.06	8760	1.73E-07	7.59E-07	AP-42[3]

[1] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

[2] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

[3] EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

[4] 40 CFR Part 98, Subpart C, Tables C-1 and C-2.

[5] 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-YearTime Horizon).

[6] PM includes both condensible and filterable PM. All PM is assumed to be PM2.5, so PM = PM_{10} = $PM_{2.5}$

Emissions from Combustion of Waste Gas (NOx and CO)

Pollutant	Emission Factor (lb/MMBtu)	Annual Heat Input to Flare (MMBtu/yr)	Potential Heat Input (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
					(lb/hr)	(tpy)	
NOx	0.14	10818.8	1.235	8760	0.1729	0.76	WY C6S2[7]
CO	0.035	10818.8	1.235	8760	0.0432	0.19	WY C6S2[7]

[7] Emission Factors from Wyoming C6S2 - O&G Production Facilities Permitting Guidance.

Potential Controlled / Uncontrolled Emissions

Pollutant	Estimated Emissions	
	(lb/hr)	(tpy)
NOx	0.1780	0.78
CO	0.0475	0.21
VOC	0.0003	0.001
SO_2	0.0000	1.34E-04
PM, PM_{10}, $PM_{2.5}$	0.0004	1.70E-03
Benzene	1.07E-07	4.69E-07
Dichlorobenzene	6.12E-08	2.68E-07
Formaldehyde	3.83E-06	1.68E-05
Hexane	9.18E-05	4.02E-04
Toluene	1.73E-07	7.59E-07

Note: These emissions represent the pilot and ignitor gas combustion and emissions created in combustion of vented blowdown vapors. The emissions resulting from the combustion of other source streams routed to this flare for control are shown as the controlled emissions with each respective emission source.

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

R-1 - Dehydrator Reboiler

Emission Factors

NOx:	100	lb/MMscf
CO:	84	lb/MMscf
VOC:	5.5	lb/MMscf
PM:	7.6	lb/MMscf
SO_x:	0.6	lb/MMscf
CO_2:	53.0	kg/MMBtu
CH_4:	1.0E-03	kg/MMBtu
N_2O:	1.0E-04	kg/MMBtu

Notes: Emission Factors provided by AP-42, Tables 1.4-1 & 1.4-2 (7/1998)

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

GHG Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Fuel Heating Value (Btu/scf, HHV)	1,114	Btu/scf
Operating Hours	8760	hr/yr
Fuel Rate	1.00	MMBtu/hr
Annual Fuel Use	7.86	MMscf/yr

Emission Rate (lb/hr)

Unit ID	Unit Type	Fuel Rate	Op Hrs	NOx	CO	VOC	PM10	SOx
		MMBTU/hr	hrs	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
R-1	Dehy Reboiler	1.00	8760	0.09	0.08	0.00	0.01	0.00

Annual Emissions (tpy)

Unit ID	Unit Type	Fuel Rate	Op Hrs	NOx	CO	VOC	PM10	SOx	HAPs
		MMBTU/hr	hrs	tpy	tpy	tpy	tpy	tpy	tpy
R-1	Dehy Reboiler	1.00	8760	0.39	0.33	0.02	0.03	0.00	0.01

Annual CO_2e Emissions (tpy)

Unit ID	Unit Type	Fuel Rate	Op Hrs	CO_2	CH_4 (as CO_2e)	N_2O (as CO_2e)	CO_2e
		MMBTU/hr	hrs	tpy	tpy	tpy	tpy
R-1	Dehy Reboiler	1.00	8760	511.97	0.24	0.29	513

Annual HAP Emissions (tpy)

Pollutant	Emission Factor (lb/MMSCF)	Emission Factor (lb/MMBtu)	Emissions (tpy)
Benzene	2.1E-03	2.1E-06	9.0E-06
Formaldehyde	7.5E-02	7.4E-05	3.2E-04
Hexane	1.8E+00	1.8E-03	7.7E-03
Toluene	3.4E-03	3.3E-06	1.5E-05
Total			0.01

Note: Emission Factors provided by AP-42, Table 1.4-3 (7/2000)

Emission factors converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf per footnote of EPA AP-42, Table 1.4-3

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

R-1 - Dehydrator Reboiler

Emission Factors

NOx:	100	lb/MMscf
CO:	84	lb/MMscf
VOC:	5.5	lb/MMscf
PM:	7.6	lb/MMscf
SO_x:	0.6	lb/MMscf
CO_2:	53.0	kg/MMBtu
CH_4:	1.0E-03	kg/MMBtu
N_2O:	1.0E-04	kg/MMBtu

Notes: Emission Factors provided by AP-42, Tables 1.4-1 & 1.4-2 (7/1998)

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

GHG Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Fuel Heating Value (Btu/scf, HHV)	1,114	Btu/scf
Operating Hours	8760	hr/yr
Fuel Rate	1.00	MMBtu/hr
Annual Fuel Use	7.86	MMscf/yr

Emission Rate (lb/hr)

Unit ID	Unit Type	Fuel Rate	Op Hrs	NOx	CO	VOC	PM10	SOx
		MMBTU/hr	hrs	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
R-1	Dehy Reboiler	1.00	8760	0.09	0.08	0.00	0.01	0.00

Annual Emissions (tpy)

Unit ID	Unit Type	Fuel Rate	Op Hrs	NOx	CO	VOC	PM10	SOx
		MMBTU/hr	hrs	tpy	tpy	tpy	tpy	tpy
R-1	Dehy Reboiler	1.00	8760	0.39	0.33	0.02	0.03	0.00

Annual CO_2e Emissions (tpy)

Unit ID	Unit Type	Fuel Rate	Op Hrs	CO_2	CH_4 (as CO_2e)	N_2O (as CO_2e)	CO_2e
		MMBTU/hr	hrs	tpy	tpy	tpy	tpy
R-1	Dehy Reboiler	1.00	8760	511.97	0.24	0.29	513

Annual HAP Emissions (tpy)

Pollutant	Emission Factor (lb/MMSCF)	Emission Factor (lb/MMBtu)	Emissions (tpy)
Benzene	2.1E-03	2.1E-06	9.0E-06
Formaldehyde	7.5E-02	7.4E-05	3.2E-04
Hexane	1.8E+00	1.8E-03	7.7E-03
Toluene	3.4E-03	3.3E-06	1.5E-05
Total			0.01

Note: Emission Factors provided by AP-42, Table 1.4-3 (7/2000)

Emission factors converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf per footnote of EPA AP-42, Table 1.4-3

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Fugitive Emissions

Component - Service	Emission Factor[1]	Emission Factor	Source Count[2]	Percent VOC[3]	Hours of Operation	Total HC Emission Rate	Total HC Emission Rate	Total VOC Emission Rate	Total VOC Emission Rate	Total HAP Emission Rate	CO_2[4]	CH_4 (as CO_2e)[5]	Total CO_2e Emission Rate [6]
	kg/hr/source	lb/hr/source		wt %	hr/yr	lb/hr	tpy	lb/hr	tpy	tpy	tpy	tpy	tpy
Valves - Gas/Vapor	4.5E-03	9.9E-03	217	11.42%	8760	2.1526	9.43	0.2458	1.08	0.05	0.24	183.75	184.00
Valves - Light Liquids	2.5E-03	5.5E-03	73	100.00%	8760	0.4022	1.76	0.4022	1.76	0.18	0.001	0.78	0.79
Valves - Heavy Liquids	8.4E-06	1.9E-05	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Relief Valves - Gas/Vapor	8.8E-03	1.9E-02	0	11.42%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Relief Valves - Light Liquids	7.5E-03	1.7E-02	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Compressors	8.8E-03	1.9E-02	5	11.42%	8760	0.0970	0.42	0.0111	0.05	0.002	0.01	8.28	8.29
Pump Seals - Light Liquids	1.3E-02	2.9E-02	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Pump Seals - Heavy Liquids	NA	NA	0	100.00%	8760	NA	NA	NA	NA	N/A	N/A	N/A	N/A
Open-End - Gas/Vapor	2.0E-03	4.4E-03	24	11.42%	8760	0.1058	0.46	0.0121	0.05	0.003	0.01	9.03	9.05
Open-End - Light Liquid	1.4E-03	3.1E-03	1	100.00%	8760	0.0031	0.01	0.0031	0.01	0.001	0.00001	0.01	0.01
Open-End - Heavy Liquid	1.4E-04	3.1E-04	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Connectors - Gas/Vapor	2.0E-04	4.4E-04	324	11.42%	8760	0.1426	0.62	0.0163	0.07	0.003	0.02	12.17	12.19
Connectors - Light Liquids	2.1E-04	4.6E-04	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Connectors - Heavy Liquids	7.5E-06	1.7E-05	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Flanges - Gas/Vapor	3.9E-04	8.6E-04	2000	11.42%	8760	1.7200	7.53	0.1964	0.86	0.04	0.19	146.82	147.02
Flanges - Light Liquids	1.1E-04	2.4E-04	850	100.00%	8760	0.2066	0.90	0.2066	0.90	0.09	0.001	0.40	0.40
Flanges - Heavy Liquids	3.9E-07	8.6E-07	0	100.00%	8760	0.0000	0.00	0.0000	0.00	0.00	0.00	0.00	0.00
Totals						4.83	21.16	1.09	4.79	0.38	0.48	361.25	361.73

[1] Emission Factors provided by EPA-453.

[2] Source count based on 2008 Title V Application

[3] Gas analysis based on worst case percent VOC

[4] CO_2 is based on fraction of CO_2/VOC in liquid (see liquid analysis)

[5] CH_4 is based on fraction of CH_4/VOC in liquid (see liquid analysis)

[6] CO2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID:	*T-1*	
Unit Descrip:	*One (1) 500-bbl Condensate Tank*	
Unit Make:	*Sivalls*	
Unit S/N:	*98424*	
Annual Days:	*365*	
Annual Hours:	*8760*	
Annual Throughput:	*21900*	*bbls per year*
Daily Avg. Throughput:	*60.00*	
Waste Gas:	*2.17*	Mscfd
Vapor Heating Value:	*1,580*	Btu/scf
Combustor Operation:	*8,760*	hr/yr
Combustor Control:	*95%*	

Uncontrolled

Pollutant	Emissions		
	lb/hr	lb/yr	tpy
VOC	3.00	26,240	13.12
n-Hexane	0.07	630	0.3150
Benzene	0.02	184	0.0920
Toluene	0.02	136	0.0680
Ethylbenzene	0.00	4	0.0020
Xylenes	0.00	32	0.0160
2,2,4 Trimethylpentane	0.01	112	0.0560
Total HAPs	**0.13**	**1098**	**0.5490**

4.81 lb/bbl (from 2017 actuals)

Note: Emissions calculated using E&P TANKS v 3.0 and site specific liquids anlysis

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

True vapor pressure of liquid and molar weight of vapors based on engineering estimation of liquid RVP.

Controlled

Pollutant	Emissions			tpy w/ downtime*
	lb/hr	lb/yr	tpy	
VOC	0.15	1,312	0.656	0.66
n-Hexane	0.00	32	0.0158	0.02
Benzene	0.00	9	0.0046	0.00
Toluene	0.00	7	0.0034	0.00
Ethylbenzene	0.00	0	0.0001	0.00
Xylenes	0.00	2	0.0008	0.00
2,2,4 Trimethylpentane	0.00	6	0.0028	0.00
Total HAPs	**0.01**	**55**	**0.0275**	**0.03**

Note: Controlled Emissions from the condensate tank using a combustor, which has a 95% destruction efficiency

CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

True vapor pressure of liquid and molar weight of vapors based on engineering estimation of liquid RVP.

**Combustor annual downtime: 0.00 hrs*

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: *D-1*
Unit Descrip: 100 MMscf/d TEG Dehydrator
Unit Make: Gas Conditioners Inc.
Unit S/N: 39-1-08

D-1	
Annual Rate (MMscfd)	100.0
Glycol Pump Type	Electric
Glycol Pump Rate (gpm)	18.0
Operating Hours	8760.0
Flare & Backup Combustor Downtime (hr/yr)	140

Permit Limitation

Uncontrolled

Pollutant	Regenerator (lb/hr)	Flash Tank Off Gas (lb/hr)	Total (lb/hr)	Total (tpy)
Benzene	12.9317	0.2557	13.187	57.761
Toluene	22.686	0.3133	22.999	100.737
Ethylbenzene	0.8366	0.0073	0.844	3.696
Xylenes	9.9629	0.0621	10.025	43.910
n-Hexane	1.0546	0.4816	1.536	6.729
2,2,4-Trimethylpentane	0.093	0.0429	0.136	0.595
Total HAP	**47.5648**	**1.1629**	**48.728**	**213.427**
VOC	**76.0714**	**13.7061**	**89.778**	**393.225**

Notes: Emissions calculated using actual operating parameters and GRI GLYCalc v 4.0.
Uncontrolled emissions include emissions from flash tank off gas and uncontrolled regenerator emissions.
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Controlled

Pollutant	Regenerator (lb/hr)	Flash Gas (lb/hr)	Total (lb/hr)	Total (tpy)	Total w/ downtime (tpy)*
Benzene	0.1186	0.0128	0.131	0.576	1.489
Toluene	0.0769	0.0157	0.093	0.406	2.009
Ethylbenzene	0.0008	0.0004	0.001	0.005	0.064
Xylenes	0.0086	0.0031	0.012	0.051	0.752
n-Hexane	0.0149	0.0241	0.039	0.171	0.276
2,2,4-Trimethylpentane	0.0006	0.0021	0.003	0.012	0.021
Total HAP	**0.2204**	**0.0582**	**0.279**	1.220	**4.612**
VOC	**0.6374**	**0.6853**	**1.323**	5.793	**11.985**

Notes: Controlled Emissions using a condenser and an enclosed flare; values from Flash Gas Emissions and Combustion Off Gas
Glycol pump rate based on actual data from monthly readups (engineering design is 16 gpm, maximum).
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: C207
Unit Descrip: Caterpillar G3616LE
Unit S/N: BLB00215
Unit Start-up: June, 2008
Unit Mfg Date: December 5, 2003
Reconstructed: 1/2014
Engine Type: 4SLB

Emission Factors (uncontrolled)			Source
Site-Rated Horsepower	4554	bhp	*Mfg. data*
Name Plate Horsepower	4735	bhp	*Mfg. data*
NO_x:	1.00	g/hp-hr	*Mfg. data*
CO:	2.50	g/hp-hr	*Mfg. data*
SO_2:	5.88E-04	lb/MMBtu	*AP-42*
VOC:	1.07	g/hp-hr	*Mfg. data*
PM:	9.99E-03	lb/MMBtu	*AP-42*
HCHO:	0.26	g/hp-hr	*Mfg. data*

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

VOC Emission Factor includes NMNEHC from maufacturer data plus HCHO from manufacturer and acrolein and acetaldehyde from AP-42; manufacuter data does not include aldehydes

Exhaust Gas Flow (cfm)	24,273
Fuel Use Rate (scf/hr)	30,668
Annual Fuel Consumption (MMscf/yr)	268.7
Fuel Heating Value (Btu/scf, HHV)	1,114
BSFC @ 100% Load (Btu/hp-hr)	7,505
Heat Input (MMBtu/hr)	34.2
Site Rated Horsepower (bhp)	4,554
Operating Hours	8,760

Source Test Emission Factors		
NOx (g/hp-hr)	Tested 5/16/2017	0.59
NOx (g/hp-hr)	Tested 11/28/2017	0.50
NOx (g/hp-hr)	2017 Test Maximum	0.59
NOx (g/hp-hr)	Permit Limit	1.00
CO (g/hp-hr)	Tested 5/16/2017	0.01
CO (g/hp-hr)	Tested 11/28/2017	0.02
CO (g/hp-hr)	2017 Test Maximum	0.02
CO (g/hp-hr)	Permit Limit	1.00

		Uncontrolled Emissions					Controlled Emissions					
Pollutant	**EF Source**	**Emission Factor**		**Emissions (lb/hr)**	**Op. Hrs**	**tpy**	**Emission Factor**		**Emissions (lb/hr)**	**Op. Hrs**	**tpy**	
NO_x	Manufacturer/Source Testing	1.00	g/hp-hr	10.04	8760	43.97	1.00	g/hp-hr	10.04	8760	43.97	
CO	Manufacturer/Source Testing	2.50	g/hp-hr	25.10	8760	109.94	1.00	g/hp-hr	10.04	8760	43.97	60% control efficiency
SO_2	AP-42, Table 3.2-2	5.88E-04	lb/MMBtu	0.02	8760	0.09	5.88E-04	lb/MMBtu	0.02	8760	0.09	
VOC	Manufacturer	1.07	g/hp-hr	10.70	8760	46.87	0.53	g/hp-hr	5.35	8760	23.44	50% control efficiency
PM	AP-42, Table 3.2-2	9.99E-03	lb/MMBtu	0.34	8760	1.50	9.99E-03	lb/MMBtu	0.34	8760	1.50	
HCHO	Manufacturer	0.26	g/hp-hr	2.61	8760	11.43	0.05	g/hp-hr	0.50	8760	2.20	81% control efficiency
Acetaldehyde	AP-42, Table 3.2-2	8.36E-03	lb/MMBtu	0.29	8760	1.25	4.18E-03	lb/MMBtu	0.14	8760	0.63	50% control efficiency
Acrolein	AP-42, Table 3.2-2	5.14E-03	lb/MMBtu	0.18	8760	0.77	2.57E-03	lb/MMBtu	0.09	8760	0.38	50% control efficiency
Benzene	AP-42, Table 3.2-2	4.40E-04	lb/MMBtu	0.015	8760	0.07	2.20E-04	lb/MMBtu	0.008	8760	0.03	50% control efficiency
Ethylbenzene	AP-42, Table 3.2-2	3.97E-05	lb/MMBtu	0.0014	8760	0.006	1.99E-05	lb/MMBtu	0.0007	8760	0.003	50% control efficiency
Toluene	AP-42, Table 3.2-2	4.08E-04	lb/MMBtu	0.014	8760	0.06	2.04E-04	lb/MMBtu	0.007	8760	0.03	50% control efficiency
Xylene	AP-42, Table 3.2-2	1.84E-04	lb/MMBtu	0.006	8760	0.03	9.20E-05	lb/MMBtu	0.003	8760	0.01	50% control efficiency
Methanol	AP-42, Table 3.2-2	2.50E-03	lb/MMBtu	0.09	8760	0.37	1.25E-03	lb/MMBtu	0.04	8760	0.19	50% control efficiency
n-Hexane	AP-42, Table 3.2-2	1.11E-03	lb/MMBtu	0.04	8760	0.17	5.55E-04	lb/MMBtu	0.02	8760	0.08	50% control efficiency
Total HAPs						**14.16**					**3.56**	

Notes: Controlled Emissions assumes oxidation catalyst removes 80% HCHO, and 50% VOC & other HAPs;
Controlled EFs for NO_x & CO from Consent Decree 2:08-CV-00167-TS-PMW;

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

HAP Emission Factors provided by AP-42, Table 3.2-2 (7/2000).

Greenhouse Gas Emissions

Pollutant	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	EF Source
CO_2	53.02	kg/MMBtu	3995.00	8,760	17498	EPA MRR Table C-1
CH_4 (as CO_2e)	0.001	kg/MMBtu	1.88	8,760	8.25	EPA MRR Table C-2
N_2O (as CO_2e)	0.0001	kg/MMBtu	2.25	8,760	9.83	EPA MRR Table C-2
CO_2e			**3999.13**		**17516**	

Notes: Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: ***C206***
Unit Descrip: *Waukesha 12V AT 27GL*
Unit S/N: *C-13271/2*
Unit Start-up: *March, 2001*
Unit Mfg Date: *December 7, 2000*
Reconstructed: *5/2007*
Engine Type: *4SLB*

Emission Factors (uncontrolled)			Source
Site-Rated Horsepower	3100	bhp	*Mfg. data*
Name Plate Horsepower	3295	bhp	*Mfg. data*
NO_x	1.30	g/hp-hr	*Mfg. data*
CO	2.20	g/hp-hr	*Mfg. data*
SO_2	5.88E-04	lb/MMBtu	*AP-42*
VOC	0.73	g/hp-hr	*Mfg. data*
PM	9.99E-03	lb/MMBtu	*AP-42*
HCHO	5.28E-02	lb/MMBtu	*AP-42*

Note: PM Emission Factor includes condensible and filterable, and PM=PM $_{10}$=PM$_{2.5}$

VOC Emission Factor includes NMNEHC from maufacturer data plus HCHO, acrolein and acetaldehyde from AP-42; manufacuter data does not include aldehydes

Exhaust Gas Flow (cfm)	24,273
Fuel Use Rate (scf/hr)	20,529
Annual Fuel Consumption (MMscf/yr)	179.8
Fuel Heating Value (Btu/scf, HHV)	1,114
BSFC @ 100% Load (Btu/hp-hr, HHV)	7,380
BSFC @ 100% Load (Btu/hp-hr, LHV)	6,671
Heat Input (MMBtu/hr)	22.9
Site Rated Horsepower (bhp)	3,100
Operating Hours	8,760

Source Test Emission Factors		
NOx (g/hp-hr)	Tested 5/15/2017	0.55
NOx (g/hp-hr)	2017 Test Maximum	0.55
NOx (g/hp-hr)	Permit Limit	1.30
CO (g/hp-hr)	Tested 5/15/2017	0.04
CO (g/hp-hr)	2017 Test Maximum	0.04
CO (g/hp-hr)	Permit Limit	1.00

		Uncontrolled Emissions					Controlled Emissions					
Pollutant	EF Source	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	
NO_x	Manufacturer/Source Testing	1.30	g/hp-hr	8.88	8760	38.91	1.30	g/hp-hr	8.88	8760	38.91	
CO	Manufacturer/Source Testing	2.20	g/hp-hr	15.04	8760	65.85	1.00	g/hp-hr	6.83	8760	29.93	55% control efficiency
SO_2	AP-42, Table 3.2-2	5.88E-04	lb/MMBtu	0.01	8760	0.06	5.88E-04	lb/MMBtu	0.01	8760	0.06	
VOC	Manufacturer	0.73	g/hp-hr	5.00	8760	21.91	0.37	g/hp-hr	2.50	8760	10.96	50% control efficiency
PM	AP-42, Table 3.2-2	9.99E-03	lb/MMBtu	0.23	8760	1.00	9.99E-03	lb/MMBtu	0.23	8760	1.00	
HCHO	AP-42, Table 3.2-2	0.05	lb/MMBtu	1.21	8760	5.291	0.09	g/hp-hr	0.62	8760	2.69	##########
Acetaldehyde	AP-42, Table 3.2-2	8.36E-03	lb/MMBtu	0.19	8760	0.84	4.18E-03	lb/MMBtu	0.10	8760	0.42	50% control efficiency
Acrolein	AP-42, Table 3.2-2	5.14E-03	lb/MMBtu	0.12	8760	0.52	2.57E-03	lb/MMBtu	0.06	8760	0.26	50% control efficiency
Benzene	AP-42, Table 3.2-2	4.40E-04	lb/MMBtu	0.010	8760	0.04	2.20E-04	lb/MMBtu	0.005	8760	0.02	50% control efficiency
Ethylbenzene	AP-42, Table 3.2-2	3.97E-05	lb/MMBtu	0.0009	8760	0.004	1.99E-05	lb/MMBtu	0.0005	8760	0.002	50% control efficiency
Toluene	AP-42, Table 3.2-2	4.08E-04	lb/MMBtu	0.009	8760	0.04	2.04E-04	lb/MMBtu	0.005	8760	0.02	50% control efficiency
Xylene	AP-42, Table 3.2-2	1.84E-04	lb/MMBtu	0.004	8760	0.02	9.20E-05	lb/MMBtu	0.002	8760	0.01	50% control efficiency
Methanol	AP-42, Table 3.2-2	2.50E-03	lb/MMBtu	0.06	8760	0.25	1.25E-03	lb/MMBtu	0.03	8760	0.13	50% control efficiency
n-Hexane	AP-42, Table 3.2-2	1.11E-03	lb/MMBtu	0.03	8760	0.11	5.55E-04	lb/MMBtu	0.01	8760	0.06	50% control efficiency
Total HAPs						**7.11**					**3.61**	

Notes: Controlled Emissions assumes oxidation catalyst removes 45% HCHO, and 50% VOC & other HAPs.
Controlled EFs for NO_x & CO from Consent Decree 2:08-CV-00167-TS-PMW.

PM Emission Factor includes condensible and filterable, and PM=PM $_{10}$=PM$_{2.5}$

HAP Emission Factors provided by AP-42, Table 3.2-2 (7/2000)

Greenhouse Gas Emissions

Pollutant	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	EF Source
CO_2	53.02	kg/MMBtu	2674.19	8,760	11713	EPA MRR Table C-1
CH_4 (as CO_2e)	0.001	kg/MMBtu	1.26	8,760	5.52	EPA MRR Table C-2
N_2O (as CO_2e)	0.0001	kg/MMBtu	15.03	8,760	65.83	EPA MRR Table C-2
CO_2e			**2690.48**		**11784**	

Notes: Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: C204
Unit Descrip: Caterpillar G3612LE
Unit S/N: 1YG00034
Unit Start-up: Spetember, 2007
Unit Mfg Date: May 12, 1993
Reconstructed: 9/2007
Engine Type: 4SLB

Emission Factors (uncontrolled)			Source
Site-Rated Horsepower	3406	bhp	*Mfg. data*
Name Plate Horsepower	3550	bhp	*Mfg. data*
NO_x:	1.00	g/hp-hr	*Mfg. data*
CO:	2.50	g/hp-hr	*Mfg. data*
SO_2:	5.88E-04	lb/MMBtu	*AP-42*
VOC:	1.09	g/hp-hr	*Mfg. data*
PM:	9.99E-03	lb/MMBtu	*AP-42*
HCHO:	0.26	g/hp-hr	*Mfg. data*

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

VOC Emission Factor includes NMNEHC from maufacturer data plus HCHO from manufacturer and acrolein and acetaldehyde from AP-42; manufacuter data does not include aldehydes

Exhaust Gas Flow (cfm)	24,273
Fuel Use Rate (scf/hr)	23,029
Annual Fuel Consumption (MMscf/yr)	201.7
Fuel Heating Value (Btu/scf, HHV)	1,114
BSFC @ 100% Load (Btu/hp-hr)	7,535
Heat Input (MMBtu/hr)	25.7
Site Rated Horsepower (bhp)	3,406
Operating Hours	8,760

Source Test Emission Factors		
NOx (g/hp-hr)	Tested 5/15/2017	0.45
NOx (g/hp-hr)	Tested 11/27/2017	0.74
NOx (g/hp-hr)	2017 Test Maximum	0.74
NOx (g/hp-hr)	Permit Limit	1.00
CO (g/hp-hr)	Tested 5/15/2017	0.01
CO (g/hp-hr)	Tested 11/27/2017	0.02
CO (g/hp-hr)	2017 Test Maximum	0.02
CO (g/hp-hr)	Permit Limit	1.00

		Uncontrolled Emissions					Controlled Emissions					
Pollutant	EF Source	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	
NO_x	Manufacturer/Source Testing	1.00	g/hp-hr	7.51	8760	32.89	1.00	g/hp-hr	7.51	8760	32.89	
CO	Manufacturer/Source Testing	2.50	g/hp-hr	18.77	8760	82.22	1.00	g/hp-hr	7.51	8760	32.89	60% control efficiency
SO_2	AP-42, Table 3.2-2	5.88E-04	lb/MMBtu	0.02	8760	0.07	5.88E-04	lb/MMBtu	0.02	8760	0.07	
VOC	Manufacturer	1.09	g/hp-hr	8.16	8760	35.72	0.54	g/hp-hr	4.08	8760	17.86	50% control efficiency
PM	AP-42, Table 3.2-2	9.99E-03	lb/MMBtu	0.26	8760	1.12	9.99E-03	lb/MMBtu	0.26	8760	1.12	
HCHO	Manufacturer	0.26	g/hp-hr	1.95	8760	8.55	0.05	g/hp-hr	0.38	8760	1.64	81% control efficiency
Acetaldehyde	AP-42, Table 3.2-2	8.36E-03	lb/MMBtu	0.21	8760	0.94	4.18E-03	lb/MMBtu	0.11	8760	0.47	50% control efficiency
Acrolein	AP-42, Table 3.2-2	5.14E-03	lb/MMBtu	0.13	8760	0.58	2.57E-03	lb/MMBtu	0.07	8760	0.29	50% control efficiency
Benzene	AP-42, Table 3.2-2	4.40E-04	lb/MMBtu	0.011	8760	0.05	2.20E-04	lb/MMBtu	0.006	8760	0.02	50% control efficiency
Ethylbenzene	AP-42, Table 3.2-2	3.97E-05	lb/MMBtu	0.0010	8760	0.004	1.99E-05	lb/MMBtu	0.0005	8760	0.002	50% control efficiency
Toluene	AP-42, Table 3.2-2	4.08E-04	lb/MMBtu	0.010	8760	0.05	2.04E-04	lb/MMBtu	0.005	8760	0.02	50% control efficiency
Xylene	AP-42, Table 3.2-2	1.84E-04	lb/MMBtu	0.005	8760	0.02	9.20E-05	lb/MMBtu	0.002	8760	0.01	50% control efficiency
Methanol	AP-42, Table 3.2-2	2.50E-03	lb/MMBtu	0.06	8760	0.28	1.25E-03	lb/MMBtu	0.03	8760	0.14	50% control efficiency
n-Hexane	AP-42, Table 3.2-2	1.11E-03	lb/MMBtu	0.03	8760	0.12	5.55E-04	lb/MMBtu	0.01	8760	0.06	50% control efficiency
Total HAPs						**10.59**					**2.67**	

Notes: Controlled Emissions assumes oxidation catalyst removes 80% HCHO, and 50% VOC & other HAPs;
Controlled EFs for NO_x & CO from Consent Decree 2:08-CV-00167-TS-PMW;

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

HAP Emission Factors provided by AP-42, Table 3.2-2 (7/2000).

Greenhouse Gas Emissions

Pollutant	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	EF Source
CO_2	53.02	kg/MMBtu	2999.86	8,760	13139	EPA MRR Table C-1
CH_4 (as CO_2e)	0.001	kg/MMBtu	1.41	8,760	6.20	EPA MRR Table C-2
N_2O (as CO_2e)	0.0001	kg/MMBtu	1.69	8,760	7.39	EPA MRR Table C-2
CO_2e			**3002.96**		**13153**	

Notes: Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: ***C203***
Unit Secrip: *Caterpillar G3612LE*
Unit S/N: *1YG00022*
Unit Start-up: *September, 2007*
Unit Mfg Date: *October 10, 1991*
Reconstructed: *9/2007*
Engine Type: *4SLB*

Emission Factors (uncontrolled)			**Source**
Site-Rated Horsepower	3406	bhp	*Mfg. data*
Name Plate Horsepower	3550	bhp	*Mfg. data*
NO_x:	1.00	g/hp-hr	*Mfg. data*
CO:	2.50	g/hp-hr	*Mfg. data*
SO_2:	5.88E-04	lb/MMBtu	*AP-42*
VOC:	1.09	g/hp-hr	*Mfg. data*
PM:	9.99E-03	lb/MMBtu	*AP-42*
HCHO:	0.26	g/hp-hr	*Mfg. data*

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

VOC Emission Factor includes NMNEHC from maufacturer data plus HCHO from manufacturer and acrolein and acetaldehyde from AP-42; manufacuter data does not include aldehydes

Exhaust Gas Flow (cfm)	24,273
Fuel Use Rate (scf/hr)	23,029
Annual Fuel Consumption (MMscf/yr)	201.7
Fuel Heating Value (Btu/scf, HHV)	1,114
BSFC @ 100% Load (Btu/hp-hr, HHV)	7,535
Heat Input (MMBtu/hr)	25.7
Site Rated Horsepower (bhp)	3,406
Operating Hours	8,760

Source Test Emission Factors		
NOx (g/hp-hr)	Tested 5/17/2017	0.28
NOx (g/hp-hr)	Tested 11/29/2017	0.38
NOx (g/hp-hr)	2017 Test Maximum	0.38
NOx (g/hp-hr)	Permit Limit	1.00
CO (g/hp-hr)	Tested 5/17/2017	2.45E-03
CO (g/hp-hr)	Tested 11/29/2017	0.00
CO (g/hp-hr)	2017 Test Maximum	2.45E-03
CO (g/hp-hr)	Permit Limit	1.00

		Uncontrolled Emissions					Controlled Emissions					
Pollutant	**EF Source**	**Emission Factor**		**Emissions (lb/hr)**	**Op. Hrs**	**tpy**	**Emission Factor**		**Emissions (lb/hr)**	**Op. Hrs**	**tpy**	
NO_x	Manufacturer/Source Testing	1.00	g/hp-hr	7.51	8760	32.89	1.00	g/hp-hr	7.51	8760.00	32.89	
CO	Manufacturer/Source Testing	2.50	g/hp-hr	18.77	8760	82.22	1.00	g/hp-hr	7.51	8760.00	32.89	60% control efficiency
SO_2	AP-42, Table 3.2-2	5.88E-04	lb/MMBtu	0.02	8760	0.07	5.88E-04	lb/MMBtu	0.02	8760.00	0.07	
VOC	Manufacturer	1.09	g/hp-hr	8.18	8760	35.72	0.54	g/hp-hr	4.08	8760	17.86	50% control efficiency
PM	AP-42, Table 3.2-2	9.99E-03	lb/MMBtu	0.26	8760	1.12	9.99E-03	lb/MMBtu	0.26	8760	1.12	
HCHO	Manufacturer	0.26	g/hp-hr	1.95	8760	8.55	0.05	g/hp-hr	0.38	8760	1.64	81% control efficiency
Acetaldehyde	AP-42, Table 3.2-2	8.36E-03	lb/MMBtu	0.21	8760	0.94	4.18E-03	lb/MMBtu	0.11	8760	0.47	50% control efficiency
Acrolein	AP-42, Table 3.2-2	5.14E-03	lb/MMBtu	0.13	8760	0.58	2.57E-03	lb/MMBtu	0.07	8760	0.29	50% control efficiency
Benzene	AP-42, Table 3.2-2	4.40E-04	lb/MMBtu	0.011	8760	0.05	2.20E-04	lb/MMBtu	0.006	8760	0.02	50% control efficiency
Ethylbenzene	AP-42, Table 3.2-2	3.97E-05	lb/MMBtu	0.0010	8760	0.004	1.99E-05	lb/MMBtu	0.0005	8760	0.002	50% control efficiency
Toluene	AP-42, Table 3.2-2	4.08E-04	lb/MMBtu	0.010	8760	0.05	2.04E-04	lb/MMBtu	0.005	8760	0.02	50% control efficiency
Xylene	AP-42, Table 3.2-2	1.84E-04	lb/MMBtu	0.005	8760	0.02	9.20E-05	lb/MMBtu	0.002	8760	0.01	50% control efficiency
Methanol	AP-42, Table 3.2-2	2.50E-03	lb/MMBtu	0.06	8760	0.28	1.25E-03	lb/MMBtu	0.03	8760	0.14	50% control efficiency
n-Hexane	AP-42, Table 3.2-2	1.11E-03	lb/MMBtu	0.03	8760	0.12	5.55E-04	lb/MMBtu	0.01	8760	0.06	50% control efficiency
Total HAPs						**10.59**					**2.67**	

Notes: Controlled Emissions assumes oxidation catalyst removes 80% HCHO, and 50% VOC & other HAPs;
Controlled EFs for NO_x & CO from Consent Decree 2:08-CV-00167-TS-PMW;

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

HAP Emission Factors provided by AP-42, Table 3.2-2 (7/2000).

Greenhouse Gas Emissions 1

Pollutant	**Emission Factor**		**Emissions (lb/hr)**	**Op. Hrs**	**tpy**	**EF Source**
CO_2	53.02	kg/MMBtu	2999.86	8,760	13139	EPA MRR Table C-1
CH_4 (as CO_2e)	0.001	kg/MMBtu	1.41	8,760	6.20	EPA MRR Table C-2
N_2O (as CO_2e)	0.0001	kg/MMBtu	1.69	8,760	7.39	EPA MRR Table C-2
CO_2e			**3002.96**		**13153**	

Notes: Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Unit ID: C202
Unit Descrip: Caterpillar G3612LE
Unit S/N: 1YG00023
Unit Start-up: September, 2007
Unit Mfg Date: October 21, 1991
Reconstructed: 9/2007
Engine Type: 4SLB

Emission Factors (uncontrolled)			Source
Site-Rated Horsepower	3406	bhp	*Mfg. data*
Name Plate Horsepower	3550	bhp	*Mfg. data*
NO_x:	1.00	g/hp-hr	*Mfg. data*
CO:	2.50	g/hp-hr	*Mfg. data*
SO_2:	5.88E-04	lb/MMBtu	*AP-42*
VOC:	1.09	g/hp-hr	*Mfg. data*
PM:	9.99E-03	lb/MMBtu	*AP-42*
HCHO:	0.26	g/hp-hr	*Mfg. data*

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

VOC Emission Factor includes NMNEHC from maufacturer data plus HCHO from manufacturer and acrolein and acetaldehyde from AP-42; manufacuter data does not include aldehydes

Exhaust Gas Flow (cfm)	24,273
Fuel Use Rate (scf/hr)	23,029
Annual Fuel Consumption (MMscf/yr)	201.7
Fuel Heating Value (Btu/scf, HHV)	1,114
BSFC @ 100% Load (Btu/hp-hr, HHV)	7,535
Heat Input (MMBtu/hr)	25.7
Site Rated Horsepower (bhp)	3,406
Operating Hours	8,760

Source Test Emission Factors		
NOx (g/hp-hr)	Tested 5/17/2017	0.40
NOx (g/hp-hr)	Tested 11/29/2017	0.71
NOx (g/hp-hr)	2017 Test Maximum	0.71
NOx (g/hp-hr)	Permit Limit	1.00
CO (g/hp-hr)	Tested 5/17/2017	0.01
CO (g/hp-hr)	Tested 11/29/2017	0.01
CO (g/hp-hr)	2017 Test Maximum	0.01
CO (g/hp-hr)	Permit Limit	1.00

		Uncontrolled Emissions					Controlled Emissions					
Pollutant	EF Source	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	
NO_x	Manufacturer/Source Testing	1.00	g/hp-hr	7.51	8760	32.89	1.00	g/hp-hr	7.51	8760	32.89	
CO	Manufacturer/Source Testing	2.50	g/hp-hr	18.77	8760	82.22	1.00	g/hp-hr	7.51	8760	32.89	60% control efficiency
SO_2	AP-42, Table 3.2-2	5.88E-04	lb/MMBtu	0.02	8760	0.07	5.88E-04	lb/MMBtu	0.02	8760	0.07	
VOC	Manufacturer	1.09	g/hp-hr	8.16	8760	35.72	0.54	g/hp-hr	4.08	8760	17.86	50% control efficiency
PM	AP-42, Table 3.2-2	9.99E-03	lb/MMBtu	0.26	8760	1.12	9.99E-03	lb/MMBtu	0.26	8760	1.12	
HCHO	Manufacturer	0.26	g/hp-hr	1.95	8760	8.55	0.05	g/hp-hr	0.38	8760	1.64	81% control efficiency
Acetaldehyde	AP-42, Table 3.2-2	8.36E-03	lb/MMBtu	0.21	8760	0.94	4.18E-03	lb/MMBtu	0.11	8760	0.47	50% control efficiency
Acrolein	AP-42, Table 3.2-2	5.14E-03	lb/MMBtu	0.13	8760	0.58	2.57E-03	lb/MMBtu	0.07	8760	0.29	50% control efficiency
Benzene	AP-42, Table 3.2-2	4.40E-04	lb/MMBtu	0.011	8760	0.05	2.20E-04	lb/MMBtu	0.006	8760	0.02	50% control efficiency
Ethylbenzene	AP-42, Table 3.2-2	3.97E-05	lb/MMBtu	0.0010	8760	0.004	1.99E-05	lb/MMBtu	0.0005	8760	0.002	50% control efficiency
Toluene	AP-42, Table 3.2-2	4.08E-04	lb/MMBtu	0.010	8760	0.05	2.04E-04	lb/MMBtu	0.005	8760	0.02	50% control efficiency
Xylene	AP-42, Table 3.2-2	1.84E-04	lb/MMBtu	0.005	8760	0.02	9.20E-05	lb/MMBtu	0.002	8760	0.01	50% control efficiency
Methanol	AP-42, Table 3.2-2	2.50E-03	lb/MMBtu	0.06	8760	0.28	1.25E-03	lb/MMBtu	0.03	8760	0.14	50% control efficiency
n-Hexane	AP-42, Table 3.2-2	1.11E-03	lb/MMBtu	0.03	8760	0.12	5.55E-04	lb/MMBtu	0.01	8760	0.06	50% control efficiency
Total HAPs						10.59					2.67	

Notes: Controlled Emissions assumes oxidation catalyst removes 80% HCHO, and 50% VOC & other HAPs;
Controlled EFs for NO_x & CO from Consent Decree 2:08-CV-00167-TS-PMW;

PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

HAP Emission Factors provided by AP-42, Table 3.2-2 (7/2000).

Greenhouse Gas Emissions

Pollutant	Emission Factor		Emissions (lb/hr)	Op. Hrs	tpy	EF Source
CO_2	53.02	kg/MMBtu	2999.86	8,760	13139	EPA MRR Table C-1
CH_4 (as CO_2e)	0.001	kg/MMBtu	1.41	8,760	6.20	EPA MRR Table C-2
N_2O (as CO_2e)	0.0001	kg/MMBtu	1.69	8,760	7.39	EPA MRR Table C-2
CO_2e			3002.96		13,153	

Notes: Emission Factors as per 40 CFR Part 98, Tables C-1 & C-2
CO_2e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1

Andeavor Field Services, LLC

Wonsits Valley Compressor Station

Emissions Inventory - PTE

Uncontrolled Emissions

Emission Source ID	Emission Source Description	NO_x	CO	VOC	PM	SO_2	Total HAPs
		tpy	tpy	tpy	tpy	tpy	tpy
C202	Caterpillar G3612LE	32.89	82.22	35.72	1.12	0.07	10.59
C203	Caterpillar G3612LE	32.89	82.22	35.72	1.12	0.07	10.59
C204	Caterpillar G3612LE	32.89	82.22	35.72	1.12	0.07	10.59
C206	Waukesha 12V AT 27GL	38.91	65.85	21.91	1.00	0.06	7.11
C207	Caterpillar G3616LE	43.97	109.94	46.87	1.50	0.09	14.16
D-1	100-MMscfd TEG Dehydration Unit	-	-	393.23	-	-	213.43
R-1	1.0-MMBtu/hr Dehydrator Reboiler	0.39	0.33	0.02	0.03	0.002	0.01
T-1	500-bbl Condensate Tank	-	-	13.12	-	-	0.55
T-2 - T-9	Misc Chemical Tanks	-	-	1.12	-	-	0.07
EL	Fugitive Equipment Leaks	-	-	4.79	-	-	0.38
FL-1	Flare Emissions from Dehy Control	0.02	0.02	-	-	-	-
C-1	Combustor Emissions from Tank Control	0.01	0.005	-	-	-	-
C-2	Backup Combustor Emissions from Dehy Control	0.05	0.03	0.00	1.64E-03	1.30E-04	4.07E-04
LO	Truck Load Out	-	-	1.57	-	-	-
ES	Engine Start-ups	-	-	0.22	-	-	0.01
CB	Compressor Blowdowns	-	-	10.05	-	-	0.49
ESD	Emergency Shutdowns	-	-	0.067	-	-	0.003
PG	Pigging Emissions	-	-	0.17	-	-	0.01
Total		**182.03**	**422.84**	**600.32**	**5.90**	**0.35**	**268.00**

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$

Uncontrolled emissions from FL-1 and C-1 only include pilot emissions as tanks and dehdrator are not sent to Flare/Combustor when uncontrolled.

Units shaded in blue are insignificant.

Controlled Emissions

Emission Source ID	Emission Source Description	NO_x	CO	VOC	PM	SO_2	Total HAPs
		tpy	tpy	tpy	tpy	tpy	tpy
C202	Caterpillar G3612LE	32.89	32.89	17.86	1.12	0.07	2.67
C203	Caterpillar G3612LE	32.89	32.89	17.86	1.12	0.07	2.67
C204	Caterpillar G3612LE	32.89	32.89	17.86	1.12	0.07	2.67
C206	Waukesha 12V AT 27GL	38.91	29.93	10.96	1.00	0.06	3.61
C207	Caterpillar G3616LE	43.97	43.97	23.44	1.50	0.09	3.56
D-1	100-MMscfd TEG Dehydration Unit	-	-	11.99	-	-	4.61
T-1	500-bbl Condensate Tank	-	-	0.66	-	-	0.03
EL	Fugitive Equipment Leaks	-	-	4.79	-	-	0.38
FL-1	Flare Emissions from Dehy Control	0.02	0.02				
C-1	Combustor Emissions from Tank Control	0.01	0.00				
C-2	Backup Combustor Emissions from Dehy Control	0.05	0.03	0.00	0.00	0.00	0.00
CB	Compressor Blowdowns	-	-	10.05	-	-	0.49
Total		**181.63**	**172.62**	**115.46**	**5.87**	**0.35**	**20.67**

Note: PM Emission Factor includes condensible and filterable; and $PM=PM_{10}=PM_{2.5}$.

APPENDIX B
Emission Calculations

D. SCHEDULE FOR SUBMISSION OF COMPLIANCE CERTIFICATIONS

This section must be completed once by every source. Indicate when you would prefer to submit compliance certifications during the term of your permit (at least once per year).

Frequency of submittal Annual Beginning 1 / 31 / TBD

E. COMPLIANCE WITH ENHANCED MONITORING & COMPLIANCE CERTIFICATION REQUIREMENTS

This section must be completed once by every source. To certify compliance with these, you must be able to certify compliance for every applicable requirement related to monitoring and compliance certification at every unit.

Enhanced Monitoring Requirements: NA In Compliance ____ Not In Compliance

Compliance Certification Requirements: X In Compliance ____ Not In Compliance

B. SCHEDULE OF COMPLIANCE

Complete this section if you answered "NO" to any of the questions in section A. Also, complete this section if required to submit a schedule of compliance by an applicable requirement. Please attach copies of any judicial consent decrees or administrative orders for this requirement.

Unit(s)_____ Requirement_____

Reason for Noncompliance. Briefly explain reason for noncompliance at time of permit issuance or that future-effective requirement will not be met on a timely basis:

Narrative Description of how Source Compliance Will be Achieved. Briefly explain your plan for achieving compliance:

Schedule of Compliance. Provide a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance, including a date for final compliance.

Remedial Measure or Action	Date to be Achieved

C. SCHEDULE FOR SUBMISSION OF PROGRESS REPORTS

Only complete this section if you are required to submit one or more schedules of compliance in section B or if an applicable requirement requires submittal of a progress report. If a schedule of compliance is required, your progress report should start within 6 months of application submittal and subsequently, no less than every six months. One progress report may include information on multiple schedules of compliance.

Contents of Progress Report (describe):

First Report____/____/___ Frequency of Submittal_____

Contents of Progress Report (describe):

First Report____/____/___ Frequency of Submittal_____

Emission Unit ID(s): **TEG Dehydrator (D-1) and Flare (FL-1)**

Applicable Requirement (Description and Citation): **40 CFR Part 63 – Subpart HH per Consent Decree No. 2:08-CV-00167-TS-PMW**

§60.5400a; §60.485a [equipment leak GHG and VOC standards applicable to affected facilities at an onshore natural gas processing plant]

Compliance Methods for the Above (Description and Citation):
Monitoring, recordkeeping, and reporting: per 40 CFR Part 63, Subparts A and HH. Flare (FL-1) is designed and operated per 40 CFR §63.11 meeting 95% control of VOC, with no more than 140 hours downtime per year.

Compliance Status:

_X_ In Compliance: Will you continue to comply up to permit issuance? _X__Yes ____No

___ Not In Compliance: Will you be in compliance at permit issuance? ___Yes ___No

___ Future-Effective Requirement: Do you expect to meet this on a timely basis? ____Yes _____No

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
INITIAL COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION (I-COMP)

SECTION A - COMPLIANCE STATUS AND COMPLIANCE PLAN

Complete this section for each unique combination of applicable requirements and emissions units at the facility. List all compliance methods (monitoring, recordkeeping and reporting) you used to determine compliance with the applicable requirement described above. Indicate your compliance status at this time for this requirement and compliance methods and check "YES" or "NO" to the follow-up question.

Emission Unit ID(s): **C202, C203, C204, C206, C207**

Applicable Requirement (Describe and Cite): **Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines**

Monitoring, recordkeeping, and reporting: per 40 CFR Part 60, Subparts A and JJJJ.

Table 1; Emissions limits for NOx, CO, and VOC: 1.0, 2.0, and 0.7, respectively (g/hp-hr) and 160, 540, and 86, respectively, (ppmvd at 15% O_2).

§60.4243; Conduct annual performance emissions testing for NOx, CO, and VOC.

Compliance Methods for the Above (Description and Citation):
These engines operate under an internally developed maintenance plan.

Compliance Status:

_X_ In Compliance: Will you continue to comply up to permit issuance? _X_ Yes ____ No

___ Not In Compliance: Will you be in compliance at permit issuance? ___ Yes ___ No

___ Future-Effective Requirement: Do you expect to meet this on a timely basis? ____ Yes ____ No

United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
INSIGNIFICANT EMISSIONS (IE)

On this page list each insignificant activity or emission unit. In the "number" column, indicate the number of units in this category. Descriptions should be brief but unique. Indicate which emissions criterion of part 71 is the basis for the exemption.

Number	Description of Activities or Emissions Units	RAP (except HAP)	HAP
1	R-1, 1.0-MMBtu/hr TEG Reboiler	X	X
1	T-2, 100-bbl New Glycol	X	X
1	T-3, 100-bbl New Lube Oil	X	X
1	T-4, 100-bbl Used Lube Oil	X	X
1	T-5, 100-bbl Used Glycol	X	X
1	T-6, 65-bbl Glycol	X	X
1	T-7, 100-bbl Produced Water (slop tank T-201)	X	X
1	T-8, 100-bbl Dehydrator Drip Tank	X	X
1	T-9, 100-bbl Dehydrator Drip Tank	X	X
1	LO, Truck Loadout (condensate)	X	X
1	PG, Pigging Operations	X	X
1	ES, Engine Startups	X	X
1	CB, Compressor Blowdowns	X	X
1	ESD, Emergency Shutdowns	X	X

EPA United States Environmental Protection Agency

OMB No. 2060-0336,
Approval Expires 05/31/2019

Federal Operating Permit Program (40 CFR Part 71)
POTENTIAL TO EMIT (PTE)

For each emissions unit at the facility, list the unit ID and the PTE of each air pollutant listed below and sum the values to determine the total PTE for the facility. It may be helpful to complete form **EMISS** before completing this form. Report each pollutant at each unit to the nearest tenth (0.1) of a ton; values may be reported with greater precision (i.e., more decimal places) if desired. Report facility total PTE for each listed pollutant on this form and in section **J** of form **GIS**. The HAP column is for the PTE of all HAPs for each unit. You may use an attachment to show any pollutants that may be present in major amounts that are not already listed on the form (this is not common).

Emissions Unit ID	Regulated Air Pollutants and Pollutants for which Source is Major (PTE in tons/yr)						
	NOx	VOC	SO2	PM10	CO	Lead	HAP
C202	32.9	17.9	0.1	1.1	32.9		2.7
C203	32.9	17.9	0.1	1.1	32.9		2.7
C204	32.9	17.9	0.1	1.1	32.9		2.7
C206	38.9	11.0	0.1	1.0	29.9		3.6
C207	44.0	23.4	0.1	1.5	44.0		3.6
D-1		15.3					6.1
T-1		3.6					0.2
EL		4.8					0.4
CB		10.0					0.5
FL-1	0.7				0.2		
C-1	0.4				0.1		
FACILITY TOTALS:	**182.7**	**121.8**	**0.5**	**5.8**	**172.9**	**0.0**	**22.5**

Note: Fugitive emissions of criteria pollutants do not count toward applicability.

United States Environmental Protection Agency

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID C-1

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	0.1	0.4	11104-93-1
CO	NA **	0	0.1	630-08-0

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EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID FL-1

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOx	NA **	0.2	0.7	11104-93-1
CO	NA **	0	0.2	630-08-0

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID CB

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	NA **	2.3	10.0	NA
HAP	NA **	0.1	0.5	NA

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID EL

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	NA **	1.1	4.8	NA
HAP	NA **	0.1	0.4	NA

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Federal Operating Permit Program (40 CFR Part 71)
EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID T-1

B. Identification and Quantification of Emissions

For each emissions unit identified above, list each regulated air pollutant or other pollutant for which the source is major, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. See instructions concerning GHGs. Values should be reported to the nearest tenth (0.1) of a ton for yearly values or tenth (0.1) of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	NA **	0.8	3.6	NA
n-Hexane	NA **	0	0.1	110-54-3
Benzene	NA **	0	0	71-43-2
Toluene	NA **	0	0	108-88-3
Ethylbenzene	NA **	0	0	100-41-4
Xylene	NA **	0	0	1330-20-7
2,2,4 Trimethylpentane	NA **	0	0	540-84-1