1755 Arroyo Drive
Bloomfield, NM 87413
(505) 632-4700
Fax (505) 632-4782

VIA EMAIL: LeDoux.Erica@epa.gov

April 27, 2017

Erica LeDoux
Environmental Engineer
U.S. EPA - Region 6
Multimedia Division Air Permits Section 6MM-AP ()
1445 Ross Avenue
Dallas, TX 75202-2733

RE: 40 CFR 49.158 Synthetic Minor Permit in Indian Country
Williams Four Corners LLC's Ojito Compressor Station

Dear Ms. LeDoux:

In accordance with 40 CFR 49.158, Williams Four Corners LLC (Williams) is pleased to submit the attached Application for Synthetic Minor Limit for the Ojito Compressor Station located in Rio Arriba County, New Mexico on Jicarilla Apache tribal land. The facility is an existing synthetic minor source, as defined in 40 CFR 49, Subpart C. The facility currently operates under the Part 71 Title V permit R6FOPP71-05, issued January 20, 2004. Rather than continue with the Title V permit renewal process, Williams wishes to withdraw the application currently under your review, and instead permit the facility as a synthetic minor source as defined at §49.152(d).

Please contact me at (505) 632-4708 or at Mitch.Morris@williams.com, or Bobby Myers of Cirrus Consulting at (801) 484-4412 or at bmyers@cirrusllc.com should you have any questions regarding this submittal.

Respectfully submitted,

Mitch Morris

Attachment: Ojito synthetic minor application (electronic copy)
cc: Bobby Myers, Cirrus Consulting, LLC (electronic copy)

U.S. ENVIRONMENTAL PROTECTION AGENCY (REGION 6)
APPLICATION FOR FEDERAL SYNTHETIC MINOR PERMIT
(40 CFR PART 49.158)

OJITO COMPRESSOR STATION

Submitted By:

WILLIAMS FOUR CORNERS LLC
1755 Arroyo Drive
Bloomfield, New Mexico 87413

Prepared By:

Cirrus Consulting, LLC
951 Diestel Road
Salt Lake City, Utah 84105
(801) 484-4412

April 2017

Table of Contents

Introduction

Williams Four Corners LLC (WFC) submitted a permit application in July 2008 to the Region 6 Environmental Protection Agency (EPA) Air Permits Section to renew the Part 71 Federal Title V Operating Permit R6FOPP71-05 for the Ojito Compressor Station. The facility is located within the Jicarilla Apache Indian Reservation, and as the Tribe has not developed their own rules and regulations concerning air emission sources, the facility is presently under the jurisdiction of the EPA.

With this application, WFC is requesting to withdraw the Title V renewal application and to accept federally-enforceable limitations through a synthetic minor NSR permit which reduces the facility's PTE to below the Title V "major source" threshold.

The Ojito Compressor Station, originally constructed prior to 1976, is a natural gas compressor station on a natural gas pipeline. This compressor station uses natural gas fired reciprocating engines to drive natural gas compressors in order to boost pipeline line pressure. The facility also includes a pig launcher which collects liquids (consisting of water and hydrocarbons condensed from the natural gas) removed from the pipeline by pigging operations. Emissions occur when the launcher is opened to insert the pig, releasing hydrocarbons, including volatile organic compounds (VOC) to the atmosphere. Previously permitted natural gas dehydrators have been decommissioned and are no longer in service. These dehydrators and the associated flare are not included in this synthetic minor application.

Emission units and control devices included in this permit application are identified in Table 1 below. Insignificant sources are identified in Table 2.

Source Emission Points

Table 1: Emission Units and Control Devices

Emission Unit No.	Unit Description	Control Equipment
1	IC Engine Manufacturer - Cooper Superior, Model 8G825 Horsepower – 800 hp Installed - 1960 Maximum design heat input – 8.1 MMBTU/hr Fuel type - Natural gas Primary use - Compressor drive Serial Number – 275719.	Catalytic Converter and AFR controller
Control Equipment for EU-1	Device Type - Catalytic Converter / Air fuel ratio controller Pollutants Controlled / Control efficiency: NOx - 90%, CO - 80%, VOC - 50%	N/A
2	IC Engine Manufacturer - Cooper Superior, Model 8G825 Horsepower- 800 hp Installed - November 1968 Maximum design heat input – 8.1 MMBTU/hr Fuel type - Natural gas Primary use - Compressor drive Serial Number - 20810	Catalytic Converter and AFR controller
Control Equipment for EU-2	Device Type - Catalytic Converter / Air fuel ratio controller Pollutants Controlled / Control efficiency: NOx - 90%, CO - 80%, VOC - 50%	N/A
3	IC Engine Manufacturer - Cooper Superior, Model 8G825 Horsepower – 800hp Installed March 1994 Maximum design heat input – 8.1 MMBTU/hr Fuel type - Natural gas Primary use - Compressor drive Serial Number - 19835	Catalytic Converter and AFR controller
Control Equipment for EU-3	Device Type - Catalytic Converter / Air fuel ratio controller Pollutants Controlled / Control efficiency: NOx - 90%, CO - 80%, VOC - 50%	N/A

T-11	4200 gal Condensate Storage Tank Manufacturer – American Tank and Steel Model – N-5169 Installed – 1976 Primary use – Storage of natural gas condensate Maximum usage gal/day – 126 Maximum usage gal/yr. – 23,100 Serial Number - N-5169	Fixed Roof
T-12	4200 gal Condensate Storage Tank Manufacturer – American Tank and Steel Model – S-5168 Installed – 1976 Primary use – Storage of natural gas condensate Maximum usage gal/day – 126 Maximum usage gal/yr. – 23,100 Serial Number - S-5168	Fixed Roof
F-1	Valves, Flanges, Seals, etc (piping components) Installed – 1976	None
SSM	Startup, shutdown and maintenance emissions from compressors and associated piping Installed 1976	None
PL	Pig Launcher emissions Installed 1976	None
TL	Truck Loading Emissions	None

Table 2. Insignificant Emission Units

Number	Unit Description	Size	Exemptions to Federal Requirements
1 – IE1	Used Oil Storage Tank	750 gal	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE2	Used Oil Storage Tank	1000 gal	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE3	Ambitrol Storage Tank	100 bbl	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE4	Used Oil Storage Tank	50 gal	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
2 – IE5 & IE6	Water Storage Tank	2@ 100 bbl	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE7	Gasoline Storage Tank	210 bbl	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE8	Lubrication Oil Storage Tank	300 gal	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE9	On-road Diesel Storage Tank	500 gal	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
2 – IE10 & IE11	Methanol Storage Tank	2@ 100 bbl	< 2 tpy 40 CFR § 71.5(c)(11)(ii)
1 – IE12	Emergency Generator	180 hp	< 2 tpy 40 CFR § 71.5(c)(11)(ii)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Application For Synthetic Minor Limit

(Form SYNMIN)

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 6 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6
1445 Ross Ave., suite 1200, MS: 6PD-R
Dallas, TX 75202
R6airpermits@epa.gov

For more information, visit:
http://www2.epa.gov/caa-permitting/tribal-nsr-implementation-epas-south-central-region

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact:

R6airpermits@epa.gov

A. GENERAL INFORMATION

Company Name (Who owns this facility?) **Williams Four Corners LLC**	**Facility Name** **Ojito Compressor Station**
Company Contact (Who is the primary contact for the company that owns this facility?**)** **Mitch Morris**	Title **Environmental Specialist**
Mailing Address **1755 Arroyo Drive, Bloomfield New Mexico 87413**	
Email Address Mitch.Morris@williams.com	
Telephone Number **505-632-4708**	Facsimile Number **505-632-4782**

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

☒ **Item 1 -** The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
☒ **Item 2 -** The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.
☒ **Item 3 -** A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.
☒ **Item 4 -** Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
☒ **Item 5 –** Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants.

provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Instructions

Submit this form in addition to FORM NEW.

1. Who Can Request Federally-Enforceable Limitations Under the Tribal NSR Authority?

The Tribal NSR Rule applies only to sources located within the exterior boundaries of an Indian reservation in the United States of America or other lands as specified in 40 CFR part 49, collectively referred to as "Indian country". So, to use the authority in the Tribal NSR Rule to create federally-enforceable limitations, a source must be located within Indian country. Land ownership status (for example, whether the land is owned by a Tribal member or whether the land is owned in fee or in trust) does not affect how the rule applies.

2. Who Might Want to Request Federally-Enforceable Limitations?

The primary reason for requesting federally-enforceable limitations is to avoid an otherwise applicable federal Clean Air Act program, rule or requirement. Many federal Clean Air Act programs use a source's "potential to emit" (PTE) air pollution to determine which rules or requirements apply. A source's PTE is based on the maximum annual operational (production, throughput, etc) rate of the source taking into consideration the capacity and configuration of the equipment and operations. Emission or operational limits can also be taken into consideration as maximums if they are federally enforceable. So, using a synthetic minor NSR permit to establish federally enforceable limitations can lower a source's PTE and possibly allow the source to avoid certain federal Clean Air Act requirements.

Three examples of federal Clean Air Act programs that use PTE to determine whether they apply are (1) the Prevention of Significant Deterioration (PSD) construction permitting program, (2) the Title V operating permit program, and (3) the Maximum Achievable Control Technology (MACT) program. For example, existing sources that are considered "major" for Title V (meaning they have the potential to emit air pollution at levels defined in that rule as "major") must apply for a Title V operating permit. If a source accepts a federally-enforceable limitation through a synthetic minor NSR permit that reduces their PTE to below the "major" threshold, and the source does not meet any of the other requirements that would trigger applicability to the part 71 program, then the source no longer needs a Title V operating permit. When planning for the construction of a new source or expansion of an existing source, a source can also accept limitations on PTE (using a synthetic minor NSR permit) that allow the source to avoid PSD. Limitations on PTE can similarly help a source to avoid new MACT standards that would otherwise apply to the source.

3. Section B. ATTACHMENTS

This section lists the information that must be attached to the application form for each requested limitation. The requested limitation(s) must be described for each affected emissions unit (or pollutant-generating activity) and pollutant and must be accompanied by the supporting information listed on the form and described below. Note that applicability of many federal Clean Air Act requirements (such as Title V, PSD and MACT) is often based on source-wide emission levels of specific pollutants. In that case, all emissions units at a source and all pollutants regulated by that given rule or regulation must be addressed by this section of the application form.

Item 1 – The requested limitation and its effect on actual emissions or potential to emit must be presented in enough detail to document how the limitation will limit the source's actual or potential emissions as a legal and practical matter and, if applicable, will allow the source to avoid an otherwise applicable requirement. The information presented must clearly explain how the limitation affects each emission unit and each air pollutant from that emission unit. Use the information provided in response to Item 4 below to explain how the limitation affects emissions before and after the limitation is in effect.

Item 2 – For each requested limitation, the application must include proposed testing, monitoring, recordkeeping and reporting that will be used to demonstrate and assure compliance with the limitation. Testing approaches should incorporate and reference appropriate EPA reference methods where applicable. Monitoring should describe the emission, control or process parameters that will be relied on and should address frequency, methods, and quality assurance.

Item 3 – The application must include a description and estimated efficiency of air pollution control equipment under present or anticipated operating conditions. For control equipment that is not proposed to be modified to meet the requested limit, simply note that fact; however, for equipment that is proposed to be modified (e.g. improved efficiency) or newly installed to meet the proposed limit, address both current and future descriptions and efficiencies. Include manufacturer specifications and guarantees for each control device.

Items 4 – Any emission estimates submitted to the Reviewing Authority must be verifiable using currently accepted engineering criteria. The following procedures are generally acceptable for estimating emissions from air pollution sources:

(i) Source-specific emission tests;
(ii) Mass balance calculations;
(iii) Published, verifiable emission factors that are applicable to the source. (i.e., manufacturer specifications).
(iv) Other engineering calculations; or
(v) Other procedures to estimate emissions specifically approved by the Reviewing Authority.

Post-Change Allowable Emissions: A source's allowable emissions for a pollutant is expressed in tpy and generally is calculated by multiplying the allowed hourly emissions rate in pounds per hour (lbs/hr) times allowed hours (which is the number of hours in a year) and dividing by 2,000 (which is the number of pounds in a ton).

Item 5 - New construction projects that have the potential to emit GHG emissions of at least 100,000 tpy CO_2e and 100 or 250 tpy on a mass basis, modifications at existing PSD facilities that increase GHG emissions by at least 75,000 tpy CO_2e and minor sources that increase GHG emissions by at least 100,000 tpy CO_2e and 100 or 250 tpy on a mass basis are subject to PSD permitting requirements, even

if they do not significantly increase emissions of any other pollutant. As such, any requested limits to avoid PSD must take into account greenhouse gases.

Therefore, please include in your permit application estimates of the potential emissions of the following pollutants. More information about GHG permitting and how to calculate CO_2 equivalents (CO_2e), the mass emissions of each individual GHG adjusted for its Global Warming Potential (GWP) can be found at: http://epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf

1. Carbon dioxide (CO_2)
2. Methane (CH_4) and its CO_2e
3. Nitrous oxide (N_2O) and its CO_2e
4. Hydrofluorocarbons (HFCs) and its CO_2e
5. Perfluorocarbons (PFCs) and its CO_2e
6. Sulfur hexafluoride (SF_6) and its CO_2e

Attachment 1: Requested Limitation Items

ATTACHMENT 1 – Requested Limitation Items

This section lists the information that must be attached to the application form for each requested limitation.

Item 1 – Requested Limitations

The Ojito Compressor Station is a natural gas compressor station on a natural gas pipeline. The primary function of the facility is to compress natural gas for pipeline transportation using natural gas fired reciprocating internal combustion engines (RICE) to drive the compressors. These engines are 800 horsepower 4-stroke rich-burn (4SRB) Cooper Superior model 8G825 engines. Each engine utilizes a non-selective catalytic converter to reduce nitrogen oxide (NOx), carbon dioxide (CO2) and volatile organic compound (VOC) emissions. The emissions calculations in Item 4 below establish requested emission limitations (controlled emission rates) as brought forward from the current Part 71 Title V permit R6FOPP71-05.

The facility also includes condensate tanks and a pig launcher, which collect liquids (consisting of water and hydrocarbons condensed from the natural gas) removed from the pipeline by pigging operations, and associated condensate tank emissions. WFC requests a condensate throughput limitation 1,100 barrels of condensate per year.

Finally, an electrical generator driven by a 180-horsepower 4SRB RICE is used to provide electrical power when commercial utility power fails. WFC requests an annual operating limit of 500 hours per year for this emergency generator, thus maintaining its insignificant source status.

In addition, the three compressor engines and the generator will comply with the inspection and maintenance requirements of NESHAP ZZZZ, as described in Attachment 3, Applicable Federal Regulations.

Item 2 – Proposed Testing, Monitoring, Recordkeeping and Reporting

As noted in Item 1, the Ojito Compressor Station has two functions. The first is to compress natural gas using natural gas fired RICE whose combustion emissions are reduced by use of catalytic converters. The current Part 71 Title V permit R6FOPP71-05, which is to be cancelled with the issuance of this requested synthetic minor permit, requires periodic compliance testing to verify proper operation of the catalytic converters by measuring NOx emissions with a properly calibrated portable analyzer. For this synthetic minor permit, WFC proposes to measure both NOx and CO emissions on an annual basis with a properly calibrated portable

analyzer to compare against the requested emissions limitations in Item 1 above. In addition, WFC will monitor the hours of operation of each unit, as well as the hours of operation of the emergency generator. Annually, WFC will quantify annual emissions from the compressor engines using the period test results and the annual hours of operation.

The facility also handles liquids removed from the pipeline via the pig launcher. WFC proposes to monitor condensate throughput on a monthly basis and perform an annual analysis of emissions from these activities based on this throughput.

Item 3 – Air Pollution Control Equipment

The only air pollution control equipment utilized at the Ojito Compressor Station are the catalytic converters on the compressor engines. As described in the emissions calculations in Item 4 below, manufacturer's data from the previous Part 71 Title V applications identified pollutant reduction efficiencies of 90% for NOx, 80% for CO and 50% for VOC. Periodic testing as described in Item 2 will assure that these reduction efficiencies are achieved by meeting the emissions limitations requested in Item 1.

Item 4 – Emissions Estimates

The requested limitations are based on potential to emit calculations presented Attachment 2, Emissions Calculations, along with supporting documentation for these calculations. Unless otherwise noted in the calculations, emission estimates assume operation at full site capacity for 8,760 hours per year. Attachment 2 includes documentation for insignificant emissions. Emissions are determined as follows:

Superior 8G825 Compressor Engines (Units 1-3)

The Nitrogen Oxides (NOx), Carbon Monoxide (CO), and Volatile Organic Compounds (VOC) emission factors for uncontrolled compressor engine emissions were taken from AGA stack test data. The NOx, CO and VOC emission factors for controlled compressor engine emissions were calculated from uncontrolled emissions tuned to the catalyst and the catalyst efficiencies provided by the manufacturer. A safety factor was included. As the fuel for the engines is sweet natural gas, PM10 and SO2 emissions were assumed to be negligible. Emissions for each engine were calculated using a design rate of 800 horsepower and 8760 hours of operation per year.

Hazardous Air Pollutant (HAP) emissions were calculated using GRI-HAPCalc 3.0.

In addition to the emission calculations and GRI-HaPCalc output file, copies of stack test results and the catalyst performance guarantee are provided as supporting documentation.

The facility also utilizes an emergency electrical generator driven by a 180-horsepower Waukesha engine. As an emergency generator, emissions are based on a conservative 500 hours per year of operation. Emissions calculations demonstrate that emissions are well below the significant emissions threshold of 2.0 tpy.

Storage Tanks (Units T-11 and T-12)

Flash emissions from the condensate tanks (Units T-11 and T-12) are calculated using actual condensate ticket sales for the entire station during calendar year 2007 (1100 barrels of flashed condensate total in 2007). ProMax is used to estimate the volume of VOC flashed to the atmosphere. Working and breathing losses were calculated using 1100 barrels of flashed condensate per tank per year using TANKS 4.0.9d.

A safety factor was applied to the calculated flash and working/breathing emissions to provide a margin of safety. This margin of safety allows for future variations in condensate composition and throughput, thus maximizing operational flexibility without exceeding the PSD major modification threshold.

The working and breathing losses for the gasoline, diesel, lubrication oil, ambitrol, and methanol storage tanks (Units IE-1 through IE-11) are also calculated using TANKS 4.0.9d. Based on the emission calculations, all of these tanks are included in this application as insignificant sources. Copies of the ProMax 3.2 and TANKS 4.0.9d output files are provided in this attachment.

Fugitive Emissions (Unit F1)

Fugitive emissions (F1) from leaking pipeline components (valves, flanges, seals, etc.) were calculated using emission factors from the *1993 Protocol for Equipment Leak Emission Estimates* published by the Environmental Protection Agency (EPA). Component counts were based on a survey conducted at a similar station which identified the number of components for each representative unit. The calculations are provided in this appendix.

Startup, Shutdown and Maintenance (SSM) Emissions

Emissions associated with startups, shutdowns and routine maintenance (SSM) from the compressor and piping (Unit SSM) are vented to the atmosphere. SSM emissions from the

compressor occur when high pressure gas is used to purge air from the compressor and associated piping prior to startups. This gas is then vented to atmosphere. Also, after shutdowns, high pressure gas in the compressors and associated piping is released to atmosphere as a safety precaution.

One common reason for compressor startup or shutdown is a change in the amount of compression required from the station due to fluctuations in the pipeline. To prolong the life of equipment and reduce engine emissions, the compressors are shutdown when not needed. It is "routine or predictable" that the compressors at the station will come on-line and drop off-line many times during the course of operation. It is also standard industry practice.

The compressor is also shut down for maintenance of the engine, compressor or other equipment at the station. Maintenance is scheduled based on time in service and/or monitoring of equipment (visual and automated) in accordance with company and standard industry practice. The maintenance is also "routine or predictable".

The VOC and HAP emissions from blowdown of the compressor and piping associated with the facility are calculated from the composition of the gas, the quantity of gas vented during each event, and the number of annual events. The composition of the gas is dependent on the gas in the determined from the most recent extended gas analysis. The quantity of gas vented during each event is determined by Williams engineering. For the compressor, the annual number of blowdown events is estimated from historical data. A safety factor is added because VOC and HAP emissions from each blowdown event are dependent on the composition of the gas in the pipeline, and because the number of blowdowns in a year may vary. Experience indicates the composition of the gas is likely to vary. The use of the safety factor is also designed to ensure an adequate emissions estimate that includes any emissions from other non-blowdown miscellaneous startup, shutdown and maintenance activities. It is estimated the compressor will experience no more than one blowdown per hour.

The SSM emissions identified in this application are routine or predictable startup/shutdown and scheduled maintenance and do not include malfunctions or upsets.

Pig Launcher (Unit PL) Emissions

The facility includes a pig launcher (unit PL), used to remove water from the pipeline during pigging operations. Pigs are periodically inserted and propelled through the pipeline for the purpose of cleaning and/or internally inspecting the pipeline. The pig is inserted into the line (pig launcher), and through the pressure of the natural gas behind it, is propelled downstream, pushing along with it residual material through the pipeline. A small amount of natural gas is

released when the pig launcher is opened to insert the pig, including VOC and HAP constituents in the natural gas.

The pig launcher VOC emissions are fugitive emissions that result from opening valves at the pig launching compartment along the line. The pigging emission calculations assume pig launching operations occur up to 260 times per year.

Truck Loading

Emissions of VOC from the condensate tank truck loading (unit L-1) activities are estimated using emission factors from AP-42 Section 5.2, *Truck Loading*, and the estimated maximum facility-wide condensate and produced water loaded annually. The emission calculations assume submerged loading during transfer operations.

The stabilized condensate liquid truck loading (unit L-1) constituent HAP emissions are based on the TANKS working and breathing loss emission calculations of HAP vapor mass fractions of VOC.

For the Potential To Emit emission calculations, the facility-wide annual volume of liquids loaded is equivalent to the sum of the storage tank annual throughputs from the tank emission calculations described above, resulting in a conservative estimate of facility-wide annual emissions from truck loading activities.

Item 5 – Greenhouse Gas (GHG) Emissions

Although this facility is not an existing PSD facility and this application does not request any new construction or modification, the emissions calculations in Item 4 above address GHG emissions, specifically CO2 and methane (CH4) emissions. Facility-wide GHG emissions are well below regulatory thresholds.

Attachment 2: Emissions Calculations, including Insignificant Emissions

Facility Total Projected Emissions (Criteria Pollutants)

Company: Williams Four Corners LLC
Facility: Ojito Compressor Station
Date/Rev: April 2017, Revision 0

Unit Number	Description	NOX,		CO,		VOC,		SOX,		TSP,		PM10,		PM2.5,	
		pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy
1	Superior 8G825	2.82	12.36	7.05	30.90	0.88	3.86	0.00	0.02	1.28E-01	0.56	0.13	0.56	0.13	0.56
2	Superior 8G825	2.82	12.36	7.05	30.90	0.88	3.86	0.00	0.02	1.28E-01	0.56	0.13	0.56	0.13	0.56
3	Superior 8G825	2.82	12.36	7.05	30.90	0.88	3.86	0.00	0.02	1.28E-01	0.56	0.13	0.56	0.13	0.56
Gen	Waukesha H884U	3.96	0.99	3.42	0.86	0.06	0.01	--	--	--	--	--	--	--	--
T-11	Condensate Tank	--	--	--	--	--	10.08	--	--	--	--	--	--	--	--
T-12	Condensate Tank	--	--	--	--	--	1.02	--	--	--	--	--	--	--	--
F-1	Fugitve Emissions	--	--	--	--	1.37	6.01	--	--	--	--	--	--	--	--
SSM	SSM Emissions	--	--	--	--	--	13.40	--	--	--	--	--	--	--	--
PL	Pig Launcher Emissions	--	--	--	--	--	7.59	--	--	--	--	--	--	--	--
TL	Truck Loading Emissions	--	--	--	--	53.26	0.15	--	--	--	--	--	--	--	--
	Total	12.43	38.07	24.58	93.56	57.34	49.85	0.01	0.05	0.38	1.68	0.38	1.68	0.38	1.68

Facility Total Projected Emissions Hazardous Air Pollutants)

Company: Williams Four Corners LLC
Facility: Ojito Compressor Station
Date/Rev: April 2017, Revision 0

Unit Number	Description	Total HAPs,		Formaldehyde		n-Hexane		Benzene		Toluene		Ethylbenzene		Xylenes		2,2,4 Trimethylpentane	
		pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy
1	Superior 8G825	0.13	0.56	7.38E-02	0.32	--	--	3.89E-02	0.17	1.25E-02	5.46E-02	--	--	2.99E-03	1.31E-02	--	--
2	Superior 8G825	0.13	0.56	7.38E-02	0.32	--	--	3.89E-02	0.17	1.25E-02	5.46E-02	--	--	2.99E-03	1.31E-02	--	--
3	Superior 8G825	0.13	0.56	7.38E-02	0.32	--	--	3.89E-02	0.17	1.25E-02	5.46E-02	--	--	2.99E-03	1.31E-02	--	--
Gen	Waukesha H884U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
T-11	Condensate Tank	--	0.31	--	--	--	2.72E-01	--	3.78E-02	--	0	--	1.10E-03	--	1.17E-03	--	2.29E-03
T-12	Condensate Tank	--	4.92E-02	--	--	--	4.69E-02	--	2.03E-03	--	0	--	6.50E-05	--	7.00E-05	--	1.75E-04
F-1	Fugitve Emissions	3.94E-02	0.17	--	--	2.67E-02	0.12	4.07E-03	1.78E-02	6.47E-03	2.83E-02	2.23E-04	9.78E-04	1.65E-03	7.21E-03	3.00E-04	1.32E-03
SSM	SSM Emissions	--	0.38	--	--	--	0.26	--	3.97E-02	--	6.32E-02	--	2.18E-03	--	1.61E-02	--	2.58E-03
PL	Pig Launcher Emissions	--	0.22	--	--	--	0.15	--	2.25E-02	--	3.58E-02	--	1.24E-03	--	9.12E-03	--	1.46E-03
TL	Truck Loading Emissions	2.56	0.01	--	--	2.44	6.71E-03	0.11	2.90E-04	--	--	3.38E-03	9.30E-06	3.64E-03	1.00E-05	9.11E-03	2.50E-05
	Total	2.99	2.83	0.22	0.97	2.47E+00	0.85	0.23	0.63	4.39E-02	0.29	3.61E-03	5.57E-03	1.43E-02	7.30E-02	9.41E-03	7.84E-03

Green House Gas Emissions Data and Calculations

Sources	Facility Total Emissions				
	CO2, tpy	CH4, tpy	N2O, tpy	GHG, tpy	CO2e, tpy
Engine & Turbine Exhaust	11,200.58	2.11E-01	2.11E-02	11,200.81	11212.14
SSM Blowdowns	0.77	32.20	--	32.97	805.71
Reciprocating Compressor Venting	3.64	152.36	--	156.00	3812.67
Pig Launcher	0.44	18.25	--	18.68	456.57
Equipment Leaks	0.21	8.62	--	8.83	215.69
Natural Gas Pneumatic Device Venting	1.08	45.07	--	46.15	1127.90
Natural Gas Driven Pneumatic Pump Venting	0.05	1.92	--	1.97	48.10
Storage Tanks	0.09	1.08	--	1.16	26.97
Total	11,206.84	259.70	2.11E-02	11,466.56	17,705.74

Engine & Turbine Exhaust Emissions

Unit Numbers	Description	Emission Factors			Emission Rates		
		CO2, kg/MMBtu	CH4, kg/MMBtu	N2O, kg/MMBtu	CO2, tpy	CH4, tpy	N2O, tpy
1	Engine	53.06	1.00E-03	1.00E-04	3,733.53	7.04E-02	7.04E-03
2	Engine	53.06	1.00E-03	1.00E-04	3,733.53	7.04E-02	7.04E-03
3	Engine	53.06	1.00E-03	1.00E-04	3,733.53	7.04E-02	7.04E-03
	Total				11,200.58	2.11E-01	2.11E-02

The emissions factors are taken from 40 CFR 98, Subpart C, Tables C-1 & C-2
Emission Rates (tpy) = kg/MMBtu x 2.2 lb/kg x MMBtu/yr / 2,000 lb/ton

Unit Numbers	Description	Fuel Types	Operating Times, hr/yr	LHV Design Heat Rates, MMBtu/hr	HHV	
					Design Heat Rates, MMBtu/hr	Fuel Usages, MMBtu/yr
1	Engine	Nat. Gas	8,760	6.57	7.30	63,967
2	Engine	Nat. Gas	8,760	6.57	7.30	63,967
3	Engine	Nat. Gas	8,760	6.57	7.30	63,967

The fuel types and operating times are provided by Williams
The LHV design heat rates are taken from manufacturers data
HHV Design Heat Rates (MMBtu/hr) = LHV Design Heat Rates (MMBtu/hr) / 0.9 LHV/HHV
HHV Fuel Usages (MMBtu/yr) = HHV Design Heat Rates (MMBtu/hr) x hr/yr

SSM Blowdown Emissions

Unit Numbers	Description	Total Gas Losses, scf/yr	CO2 Emission Factors, lb/scf	CH4 Emission Factors, lb/scf	Emission Rates	
					CO2, tpy	CH4, tpy
SSM	SSM Blowdowns	1,950,000	0.0008	0.0330	0.77	32.20

The annual blowdown volumes are calculated from data provided by Williams
The CO2 and CH4 emission factors are calculated from the facility extended gas analysis
Emission Rates (tpy) = scf/yr x lb/scf / 2,000 lb/ton

Green House Gas Emissions Data and Calculations

Reciprocating Compressor Venting Emissions

Unit Numbers	Description	Emission Rates	
		CO2, tpy	CH4, tpy
NA	Blowdown Valve Leakage	0.35	14.55
NA	Rod Packing Emissions	3.29	137.81
NA	Isolation Valve Leakage	0.00	0.00
	Total	3.64	152.36

Operating or standby mode - includes blowdown valve leakage through blowdown vent stack
Operating mode - includes rod packing emissions
Non-operating depressurized mode - includes isolation valve leakage through open blowdown vents (without blind flanges)
Rod packing gas emissions assume 4 cylinders per compressor
A combination of equations W-26 & W-36 (Subpart W) is used to calculate reciprocating compressor emissions
As the NMED requires CO2 & CH4 emissions rather than CO2e emissions, it is not necessary to include the global warming potential from equation W-36
CO2 Emission Rates (tpy) = # x scf/hr x hr/yr x (CO2 Mole Percent (%) / 100) x CO2 Density (kg/scf)
x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne
CH4 Emission Rates (tpy) = # x scf/hr x hr/yr x (CH4 Mole Percent (%) / 100) x CH4 Density (kg/scf)
x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne

Unit Numbers	Description	Number of Compressors #	Gas Emissions, scf/hr	Operating Times, hr/yr	CO2 Mole Percents, %	CH4 Mole Percents, %	CO2 Density, kg/scf	CH4 Density, kg/scf
NA	Blowdown Valve Leakage	3	33.5	8,760	0.68	78.11	0.0526	0.0192
NA	Rod Packing Emissions	3	317.2	8,760	0.68	78.11	0.0526	0.0192
NA	Blowdown Valve Leakage (Sta	3	10.5	0	0.68	78.11	0.0526	0.0192

The number of compressors are provided by Williams
Blowdown valve leakage (33.5 scf/hr) and rod packing emissions occur in operating mode
Blowdown valve leakage (10.5 scf/hr) occurs in standby pressurized mode
Emission factors are the three year rolling average (2012-2014) of all measurements in the Williams Field Services, LLC compressor fleet located at natural gas processing plants
The operating times (the average operating times for all station compressors combined) are provided by Williams
The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The CO2 & CH4 densities (kg/scf) are taken from Subpart W, Paragraph 98.233(v)

Pig Launcher Emissions

Unit Numbers	Description	Total Gas Losses, scf/yr	CO2 Emission Factors, lb/scf	CH4 Emission Factors, lb/scf	Emission Rates	
					CO2, tpy	CH4, tpy
PL	Pig Launcher	1,105,000	0.0008	0.0330	0.44	18.25
	Total				0.44	18.25

The annual blowdown volumes are calculated from data provided by Williams
The CO2 and CH4 emission factors are calculated from the facility extended gas analysis
Emission Rates (tpy) = scf/yr x lb/scf / 2,000 lb/ton

Green House Gas Emissions Data and Calculations

Equipment Leaks Emissions

Unit Numbers	Description	Emission Rates	
		CO2, tpy	CH4, tpy
NA	Valves	0.2	6.6
NA	Connectors	0.0	0.8
NA	Open-Ended Lines	0.0	0.5
NA	Pressure Relief Valves	0.0	0.7
	Total	0.2	8.6

A combination of equations W-31 & W-36 (Subpart W) is used to calculate uncombusted CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions rather than CO2e emissions, it is not necessary to include the global warming potential from equation W-36
CO2 Emission Rate (tpy) = # x scf/hr/component x (CO2 Content (mole %) / 100) x hr/yr x CO2 Density (kg/scf) x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne
CH4 Emission Rate (tpy) = # x scf/hr/component x (CH4 Content (mole %) / 100) x hr/yr x CH4 Density (kg/scf) x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne

Unit Numbers	Description	Number of Components, #	Emission Factors, scf/hr /component	CO2 Contents, mole %	CH4 Contents, mole %	Operating Times, hr/yr	CO2 Density, kg/scf	CH4 Density, kg/scf
NA	Valves	378	0.121	0.68	78.11	8,760	0.0526	0.0192
NA	Connectors	339	0.017	0.68	78.11	8,760	0.0526	0.0192
NA	Open-Ended Lines	103	0.031	0.68	78.11	8,760	0.0526	0.0192
NA	Pressure Relief Valves	25	0.193	0.68	78.11	8,760	0.0526	0.0192

The number of sources are calculated based on the number of compressors and dehydrators at the station (see criteria pollutant and HAP equipment leaks calculations)
The emission factors are taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The operating times are provided by Williams (default is the entire year)
The CO2 & CH4 densities are taken from Subpart W, Paragraph 98.233(v)

Natural Gas Pneumatic Device Venting Emissions

Unit Numbers	Description	Number of Devices, #	Emission Factors, scf/hr/device	Operating Times, hr/yr	Emission Rates	
					CO2, tpy	CH4, tpy
NA	Continuous High Bleed Pneumatic Devices	0	37.3	8,760	0.00	0.00
NA	Intermittent Bleed Pneumatic Devices	23	13.5	8,760	1.07	44.87
NA	Continuous Low Bleed Pneumatic Devices	1	1.39	8,760	0.00	0.20
	Total				1.08	45.07

The number of devices are provided by Williams
The emission factors are taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The operating times are provided by Williams
Equation W-1 (Subpart W) is used to calculate CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions in addition to CO2e emissions, it is necessary to divide by the global warming potentials
CO2 Emission Rates (tpy) = # x scf/hr/device x (CO2 Content (mole %) / 100) x CO2 Conversion Factors (tonne CO2e/scf) x hr/yr x (2,204.6 lb/tonne / 2,000 lb/ton) / CO2 Global Warming Potentials (tonne CO2e/tonne CO2)
CH4 Emission Rates (tpy) = # x scf/hr/device x (CH4 Contents (mole %) / 100) x CH4 Conversion Factors (tonne CO2e/scf) x hr/yr x (2,204.6 lb/tonne / 2,000 lb/ton) / CH4 Global Warming Potentials (tonne CO2e/tonne CH4)

Unit Numbers	Description	CO2 Contents, mole %	CH4 Contents, mole %	CO2 Conversion Factors, tonne CO2e /scf	CH4 Conversion Factors, tonne CO2e /scf	CO2 Global Warming Potentials, tonne CO2e /tonne CO2	CH4 Global Warming Potentials, tonne CO2e /tonne CH4
NA	Continuous High Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25
NA	Continuous Low Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25
NA	Intermittent Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25

The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The conversion factors are taken from Subpart W, Paragraph 98.233(a)
The global warming potentials are taken from 40 CFR Part 98, Table A-1

Green House Gas Emissions Data and Calculations

Natural Gas Driven Pneumatic Pump Venting Emissions

Emission Rates

Unit Number	Description	Number of Pumps, #	Emission Factor, scf/hr/pump	Operating Time, hr/yr	Emission Rates	
					CO2, tpy	CH4, tpy
NA	Pneumatic Pump Venting	1	13.3	8,760	0.05	1.92

The number of pumps are provided by Williams
The emission factor is taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The operating time is provided by Williams (default is the entire year)
Equation W-2 (Subpart W) is used to calculate CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions in addition to CO2e emissions, it is necessary to divide by the global warming potentials
CO2 Emission Rate (tpy) = # x scf/hr/pump x (CO2 Content (mole %) / 100) x CO2 Conversion Factor (tonne CO2e/scf) x hr/yr
x (2,204.6 lb/tonne / 2,000 lb/ton) / CO2 Global Warming Potentials (tonne CO2e/tonne CO2)
CH4 Emission Rate (tpy) = # x scf/hr/pump x (CH4 Content (mole %) / 100) x CH4 Conversion Factor (tonne CO2e/scf) x hr/yr
x (2,204.6 lb/tonne / 2,000 lb/ton) / CH4 Global Warming Potentials (tonne CO2e/tonne CH4)

Unit Number	Description	CO2 Content, mole %	CH4 Content, mole %	CO2 Conversion Factor, tonne CO2e /scf	CH4 Conversion Factor, tonne CO2e /scf	CO2 Global Warming Potential, tonne CO2e /tonne CO2	CH4 Global Warming Potential, tonne CO2e /tonne CH4
NA	Pneumatic Pump Venting	0.68	78.11	5.262E-05	4.790E-04	1	25

The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The conversion factors are taken from Subpart W, Paragraph 98.233(a)
The operating time is provided by Williams (the default is the entire year)
The global warming potentials are taken from 40 CFR Part 98, Table A-1

Storage Tank Emissions

Unit Number	Description	Emission Rates	
		CO2, tpy	CH4, tpy
T11	Storage Tank	8.62E-02	1.08
T12	Storage Tank	0.00	0.00
	Total	0.09	1.08

The emission rates are taken from ProMax output files, as applicable

Green House Gas Emissions Data and Calculations

Gas Stream Composition

Components	Mole Percents, %	Molecular Weights, lb/lb-mole	Component Weights, lb/lb-mole	Weight Percent of Total, %	Emission Factors, lb/scf
Carbon Dioxide	0.6808	44.01	0.30	1.3930	0.0008
Hydrogen Sulfide	0.0000	34.07	0.00	0.0000	0.0000
Nitrogen	0.7255	28.01	0.20	0.9448	0.0005
Methane	78.1110	16.04	12.53	58.2517	0.0330
Ethane	10.8480	30.07	3.26	15.1662	0.0086
Propane	5.5588	44.09	2.45	11.3950	0.0065
IsoButane	0.9025	58.12	0.52	2.4387	0.0014
Normal Butane	1.4859	58.12	0.86	4.0152	0.0023
IsoPentane	0.5070	72.15	0.37	1.7007	0.0010
Normal Pentane	0.3935	72.15	0.28	1.3200	0.0007
Cyclopentane	0.0274	70.14	0.02	0.0894	0.0001
n-Hexane	0.1177	86.17	0.10	0.4715	0.0003
Cyclohexane	0.0559	84.16	0.05	0.2187	0.0001
Other Hexanes	0.2016	86.18	0.17	0.8078	0.0005
Heptanes	0.2047	100.20	0.21	0.9536	0.0005
Methylcyclohexane	0.0588	98.19	0.06	0.2684	0.0002
2,2,4-Trimethylpentane	0.0010	100.21	0.00	0.0047	0.0000
Benzene	0.0198	78.11	0.02	0.0719	0.0000
Toluene	0.0267	92.14	0.02	0.1144	0.0001
Ethylbenzene	0.0008	106.17	0.00	0.0039	0.0000
Xylenes	0.0059	106.17	0.01	0.0291	0.0000
C8+ heavies	0.0667	110.00	0.07	0.3411	0.0002
Total	100.0000		21.51	100.0000	0.0567
VOC			5.21	--	0.0137

Gas stream composition obtained from Ojito extended gas analysis dated 8/1/16

Component Weights (lb/lb-mole) = [Mole Percents (%) / 100] x Molecular Weights (lb/lb-mole)

Weight Percent of Total (%) = 100 x Component Weights (lb/lb-mole) / Total Component Weight (lb/lb-mole)

Emission Factors (lb/scf) = [Mole Percents (%) / 100] x Molecular Weights (lb/lb-mole) / 379.4 scf/lb-mole

Green House Gas Emissions Data and Calculations

Equipment Leaks Emissions

Unit Numbers	Description	Emission Rates	
		CO2, tpy	CH4, tpy
NA	Valves	0.2	6.6
NA	Connectors	0.0	0.8
NA	Open-Ended Lines	0.0	0.5
NA	Pressure Relief Valves	0.0	0.7
	Total	0.2	8.6

A combination of equations W-31 & W-36 (Subpart W) is used to calculate uncombusted CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions rather than CO2e emissions, it is not necessary to include the global warming potential from equation W-36
CO2 Emission Rate (tpy) = # x scf/hr/component x (CO2 Content (mole %) / 100) x hr/yr x CO2 Density (kg/scf) x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne
CH4 Emission Rate (tpy) = # x scf/hr/component x (CH4 Content (mole %) / 100) x hr/yr x CH4 Density (kg/scf) x (2,204.6 lb/tonne / 2,000 lb/ton) / 1,000 kg/tonne

Unit Numbers	Description	Number of Components, #	Emission Factors, scf/hr /component	CO2 Contents, mole %	CH4 Contents, mole %	Operating Times, hr/yr	CO2 Density, kg/scf	CH4 Density, kg/scf
NA	Valves	378	0.121	0.68	78.11	8,760	0.0526	0.0192
NA	Connectors	339	0.017	0.68	78.11	8,760	0.0526	0.0192
NA	Open-Ended Lines	103	0.031	0.68	78.11	8,760	0.0526	0.0192
NA	Pressure Relief Valves	25	0.193	0.68	78.11	8,760	0.0526	0.0192

The number of sources are calculated based on the number of compressors and dehydrators at the station (see criteria pollutant and HAP equipment leaks calculations)
The emission factors are taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The operating times are provided by Williams (default is the entire year)
The CO2 & CH4 densities are taken from Subpart W, Paragraph 98.233(v)

Natural Gas Pneumatic Device Venting Emissions

Unit Numbers	Description	Number of Devices, #	Emission Factors, scf/hr/device	Operating Times, hr/yr	Emission Rates	
					CO2, tpy	CH4, tpy
NA	Continuous High Bleed Pneumatic Devices	0	37.3	8,760	0.00	0.00
NA	Intermittent Bleed Pneumatic Devices	23	13.5	8,760	1.07	44.87
NA	Continuous Low Bleed Pneumatic Devices	1	1.39	8,760	0.00	0.20
	Total				1.08	45.07

The number of devices are provided by Williams
The emission factors are taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The operating times are provided by Williams
Equation W-1 (Subpart W) is used to calculate CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions in addition to CO2e emissions, it is necessary to divide by the global warming potentials
CO2 Emission Rates (tpy) = # x scf/hr/device x (CO2 Content (mole %) / 100) x CO2 Conversion Factors (tonne CO2e/scf) x hr/yr x (2,204.6 lb/tonne / 2,000 lb/ton) / CO2 Global Warming Potentials (tonne CO2e/tonne CO2)
CH4 Emission Rates (tpy) = # x scf/hr/device x (CH4 Contents (mole %) / 100) x CH4 Conversion Factors (tonne CO2e/scf) x hr/yr x (2,204.6 lb/tonne / 2,000 lb/ton) / CH4 Global Warming Potentials (tonne CO2e/tonne CH4)

Unit Numbers	Description	CO2 Contents, mole %	CH4 Contents, mole %	CO2 Conversion Factors, tonne CO2e /scf	CH4 Conversion Factors, tonne CO2e /scf	CO2 Global Warming Potentials, tonne CO2e /tonne CO2	CH4 Global Warming Potentials, tonne CO2e /tonne CH4
NA	Continuous High Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25
NA	Continuous Low Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25
NA	Intermittent Bleed Pneumatic Devices	0.68	78.11	5.262E-05	4.790E-04	1	25

The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The conversion factors are taken from Subpart W, Paragraph 98.233(a)
The global warming potentials are taken from 40 CFR Part 98, Table A-1

Green House Gas Emissions Data and Calculations

Natural Gas Driven Pneumatic Pump Venting Emissions

Emission Rates

Unit Number	Description	Number of Pumps, #	Emission Factor, scf/hr/pump	Operating Time, hr/yr	Emission Rates	
					CO2, tpy	CH4, tpy
NA	Pneumatic Pump Venting	1	13.3	8,760	0.05	1.92

The number of pumps are provided by Williams
The emission factor is taken from Subpart W, Table W-1A (Western U.S. - Gas Service)
The operating time is provided by Williams (default is the entire year)
Equation W-2 (Subpart W) is used to calculate CO2 & CH4 emissions
As the NMED requires CO2 & CH4 emissions in addition to CO2e emissions, it is necessary to divide by the global warming potentials
CO2 Emission Rate (tpy) = # x scf/hr/pump x (CO2 Content (mole %) / 100) x CO2 Conversion Factor (tonne CO2e/scf) x hr/yr
x (2,204.6 lb/tonne / 2,000 lb/ton) / CO2 Global Warming Potentials (tonne CO2e/tonne CO2)
CH4 Emission Rate (tpy) = # x scf/hr/pump x (CH4 Content (mole %) / 100) x CH4 Conversion Factor (tonne CO2e/scf) x hr/yr
x (2,204.6 lb/tonne / 2,000 lb/ton) / CH4 Global Warming Potentials (tonne CO2e/tonne CH4)

Unit Number	Description	CO2 Content, mole %	CH4 Content, mole %	CO2 Conversion Factor, tonne CO2e /scf	CH4 Conversion Factor, tonne CO2e /scf	CO2 Global Warming Potential, tonne CO2e /tonne CO2	CH4 Global Warming Potential, tonne CO2e /tonne CH4
NA	Pneumatic Pump Venting	0.68	78.11	5.262E-05	4.790E-04	1	25

The facility CO2 and CH4 contents are taken from the facility extended gas analysis
The conversion factors are taken from Subpart W, Paragraph 98.233(a)
The operating time is provided by Williams (the default is the entire year)
The global warming potentials are taken from 40 CFR Part 98, Table A-1

Storage Tank Emissions

Unit Number	Description	Emission Rates	
		CO2, tpy	CH4, tpy
T11	Storage Tank	8.62E-02	1.08
T12	Storage Tank	0.00	0.00
	Total	0.09	1.08

The emission rates are taken from ProMax output files, as applicable

Green House Gas Emissions Data and Calculations

Gas Stream Composition

Components	Mole Percents, %	Molecular Weights, lb/lb-mole	Component Weights, lb/lb-mole	Weight Percent of Total, %	Emission Factors, lb/scf
Carbon Dioxide	0.6808	44.01	0.30	1.3930	0.0008
Hydrogen Sulfide	0.0000	34.07	0.00	0.0000	0.0000
Nitrogen	0.7255	28.01	0.20	0.9448	0.0005
Methane	78.1110	16.04	12.53	58.2517	0.0330
Ethane	10.8480	30.07	3.26	15.1662	0.0086
Propane	5.5588	44.09	2.45	11.3950	0.0065
IsoButane	0.9025	58.12	0.52	2.4387	0.0014
Normal Butane	1.4859	58.12	0.86	4.0152	0.0023
IsoPentane	0.5070	72.15	0.37	1.7007	0.0010
Normal Pentane	0.3935	72.15	0.28	1.3200	0.0007
Cyclopentane	0.0274	70.14	0.02	0.0894	0.0001
n-Hexane	0.1177	86.17	0.10	0.4715	0.0003
Cyclohexane	0.0559	84.16	0.05	0.2187	0.0001
Other Hexanes	0.2016	86.18	0.17	0.8078	0.0005
Heptanes	0.2047	100.20	0.21	0.9536	0.0005
Methylcyclohexane	0.0588	98.19	0.06	0.2684	0.0002
2,2,4-Trimethylpentane	0.0010	100.21	0.00	0.0047	0.0000
Benzene	0.0198	78.11	0.02	0.0719	0.0000
Toluene	0.0267	92.14	0.02	0.1144	0.0001
Ethylbenzene	0.0008	106.17	0.00	0.0039	0.0000
Xylenes	0.0059	106.17	0.01	0.0291	0.0000
C8+ heavies	0.0667	110.00	0.07	0.3411	0.0002
Total	100.0000		21.51	100.0000	0.0567
VOC			5.21	--	0.0137

Gas stream composition obtained from Ojito extended gas analysis dated 8/1/16

Component Weights (lb/lb-mole) = [Mole Percents (%) / 100] x Molecular Weights (lb/lb-mole)

Weight Percent of Total (%) = 100 x Component Weights (lb/lb-mole) / Total Component Weight (lb/lb-mole)

Emission Factors (lb/scf) = [Mole Percents (%) / 100] x Molecular Weights (lb/lb-mole) / 379.4 scf/lb-mole

Engine Exhaust Emissions Calculations

Unit Number: 1, 2, 3
Description: Cooper Superior 8G825
Type: Four Stroke Rich Burn (Naturally Aspirated)

Note: The data on this worksheet applies to each individual emissions unit identified above.

Horsepower Calculations

6,960	ft above MSL	Elevation	
800	hp	Nameplate hp	Mfg. data

Fuel Consumption

8215	Btu/hp-hr	Brake specific fuel consumption	Mfg. data
6.572	MMBtu/hr	Hourly fuel consumption	Btu/hp-hr x Mfg. site-rated hp / 1,000,000
900	Btu/scf	Field gas heating value	Nominal heat content
7,302	scf/hr	Hourly fuel consumption	MMBtu/hr x 1,000,000 / Btu/scf
8,760	hr/yr	Annual operating time	Williams Four Corners LLC
57,571	MMBtu/yr	Annual fuel consumption	MMBtu/hr x hr/yr
63.97	MMscf/yr	Annual fuel consumption	scf/hr x hr/yr / 1,000,000

Steady-State Emission Rates

Pollutants	Emission Factors, g/hp-hr	Uncontrolled Emission Rates, pph	Uncontrolled Emission Rates, tpy	Control Efficiencies, %	Controlled Emission Rates, pph	Controlled Emission Rates, tpy
NOX	16.00	28.22	123.60	90	2.82	12.36
CO	20.00	35.27	154.50	80	7.05	30.90
VOC	1.00	1.76	7.73	50	8.82E-01	3.86

Emission factors taken from AGA test data
Uncontrolled Emission Rates (pph) = g/hp-hr x Mfg. Site-rated hp / 453.59 g/lb
Uncontrolled Emission Rates (tpy) = Uncontrolled Emission Rates (pph) x hr/yr / 2,000 lb/ton
Control efficiencies taken from from previous applications
Controlled Emission Rates (pph) = Uncontrolled Emission Rates (pph) x (1 - (% / 100))
Controlled Emission Rates (tpy) = Uncontrolled Emission Rates (tpy) x (1 - (% / 100))

Pollutants	Emission Factors, lb/MMBtu	Uncontrolled Emission Rates, pph	Uncontrolled Emission Rates, tpy
SO2	5.88E-04	3.86E-03	1.69E-02
TSP	1.94E-02	1.28E-01	0.56
PM10	1.94E-02	1.28E-01	0.56
PM2.5	1.94E-02	1.28E-01	0.56

Emission factors taken from AP-42, Table 3.2-3
Particulate factors include both filterable and condensible emissions
Uncontrolled Emission Rates (pph) = lb/MMBtu x MMBtu/hr
Uncontrolled Emission Rates (tpy) = Uncontrolled Emission Rates (pph) x hr/yr / 2,000 lb/ton

GRI-HAPCalc® 3.0
Engines Report

Facility ID:	**OJITO**	**Notes:**
Operation Type:	**COMPRESSOR STATION**	
Facility Name:	**OJITO COMPRESSOR STATION**	
User Name:		
Units of Measure:	**U.S. STANDARD**	

Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero. These emissions are indicated on the report with a "0". Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".

Engine Unit

Unit Name: SUPERIOR 1

Hours of Operation:	8,760	Yearly
Rate Power:	800	hp
Fuel Type:	FIELD GAS	
Engine Type:	4-Stroke, Rich Burn	
Emission Factor Set:	EPA > FIELD > LITERATURE	
Additional EF Set:	-NONE-	

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Formaldehyde	0.3233	0.04188340 g/bhp-hr	GRI Field
Methanol	0.0515	0.00666670 g/bhp-hr	GRI Field
Benzene	0.1706	0.02210000 g/bhp-hr	GRI Field
Toluene	0.0548	0.00710000 g/bhp-hr	GRI Field
Xylenes(m,p,o)	0.0131	0.00170000 g/bhp-hr	GRI Field
Naphthalene	0.0021	0.00027540 g/bhp-hr	GRI Field
2-Methylnaphthalene	0.0004	0.00005050 g/bhp-hr	GRI Field
Acenaphthylene	0.0001	0.00001890 g/bhp-hr	GRI Field
Acenaphthene	0.0001	0.00001090 g/bhp-hr	GRI Field
Dibenzofuran	0.0000	0.00000570 g/bhp-hr	GRI Field
Fluorene	0.0001	0.00001720 g/bhp-hr	GRI Field
Anthracene	0.0000	0.00000400 g/bhp-hr	GRI Field
Phenanthrene	0.0002	0.00003210 g/bhp-hr	GRI Field
Fluoranthene	0.0001	0.00001260 g/bhp-hr	GRI Field
Pyrene	0.0001	0.00000860 g/bhp-hr	GRI Field
Benz(a)anthracene	0.0000	0.00000180 g/bhp-hr	GRI Field
Chrysene	0.0000	0.00000220 g/bhp-hr	GRI Field
Benzo(a)pyrene	0.0000	0.00000040 g/bhp-hr	GRI Field
Benzo(b)fluoranthene	0.0000	0.00000220 g/bhp-hr	GRI Field
Benzo(k)fluoranthene	0.0000	0.00000220 g/bhp-hr	GRI Field
Benzo(g,h,i)perylene	0.0000	0.00000070 g/bhp-hr	GRI Field
Indeno(1,2,3-c,d)pyrene	0.0000	0.00000050 g/bhp-hr	GRI Field
Dibenz(a,h)anthracene	0.0000	0.00000020 g/bhp-hr	GRI Field

Total	0.6165		
Criteria Pollutants			
CO	70.1070	9.08349210 g/bhp-hr	GRI Field
NMEHC	2.0373	0.26396820 g/bhp-hr	GRI Field
NOx	58.0904	7.52654670 g/bhp-hr	GRI Field
Other Pollutants			
Methane	7.5637	0.98000000 g/bhp-hr	GRI Field
Ethylene	0.9776	0.12666670 g/bhp-hr	GRI Field
Ethane	2.3669	0.30666670 g/bhp-hr	GRI Field
Propylene	0.1852	0.02400000 g/bhp-hr	GRI Field
Propane	0.7409	0.09600000 g/bhp-hr	GRI Field

WHITE SUPERIOR 8G825 05/01/80

ENGINE TEST 98, TEST SITE 20 EXHAUST STACK AREA 30. FT. .529
WHITE SUPERIOR 8G825 RATED 696 HP AT 900 RPM, 4-STROKE NA
SOURCE: PR 15-92 HCR-3.57 NOX-CLH CO-NDIR HC- FID 02-POL FLOW-CB

RUN	1	2	3	4	5
DATE	11/13/78	11/13/78	11/13/78	11/13/78	11/13/78
TIME	1215	1330	1415	1500	1600
OPERATIONAL DATA					
BAROMETER, IN. HG.	26.38	26.34	26.34	26.32	26.32
AMBIENT TEMP. DEG. F	63	58	58	58	58
INLET MAN. TEMP DEG. F	64	61	58	58	58
EXHAUST VEL. FT/SEC	104.02	88.49	74.68	99.20	60.22
SP. HUMIDITY GRAIN/LB	32	22	22	25	22
ENGINE SPEED RPM	879	880	880	880	658
HORSEPOWER	753	647	548	705	478
SCAV. AIR PRES. IN.HG.	-3.7	-5.6	-7.5	-4.6	-6.7
IGNIT. TIME DEG. BTDC	33.0	33.0	33.0	33.0	33.0
FUEL SP. GR. (STP)	.7363	.7363	.7363	.7363	.7363
HI HEAT VALUE BTU/SCF	988	988	988	988	988
LO HEAT VALUE BTU/SCF	895	895	895	895	895
CALC. EXH. FLOW LB/HR	5020	4375	3774	4828	3241
EXHAUST SP. GR. (STP)	.9605	.9617	.9634	.9609	.9658
EXHAUST TEMP. DEG. F	1050	1012	980	1034	891
FUEL FLOW SCF/HR	6455	5684	4898	6212	4048
FUEL MIL. BTU/HR (HHV)	6.374	5.613	4.837	6.134	3.997
FUEL FLOW LB/HR	364	320	276	350	228
AIR FLOW LB/HR (WET)	4657	4054	3498	4478	3013
AIR/FUEL RATIO (WET)	12.8	12.7	12.7	12.8	13.2
BSFC BTU/HP HR (HHV)	8465	8675	8826	8701	8362
EXHAUST H2O PERCENT	17.92	17.95	18.00	17.83	17.39
EMISSIONS AS MEASURED					
NOX PPM	1536.00	1812.00	2169.00	1536.00	3300.00
NO PPM	ND	ND	ND	ND	ND
NO2 PPM	ND	ND	ND	ND	ND
CO2 PERCENT	11.14	11.37	11.73	11.14	11.43
HC PPM	840.00	708.00	415.00	706.00	324.00
CO PPM	6866.00	6007.00	2528.00	7032.00	238.00
02 PERCENT	.10	.14	.20	.12	.77
NO/NOX	ND	ND	ND	ND	ND
NON-METH/TOTAL HC	.344	.329	ND	ND	.289
CALCULATED EMISSIONS					
NOX LB/HR	10.540	10.817	11.142	10.142	14.631
HC LB/HR TOTAL	1.956	1.434	.723	1.582	.487
HC LB/HR NON-METH	.673	.472	ND	ND	.141
CO LB/HR	25.637	19.472	7.029	25.265	.573
NOX LB/MIL BTU	1.654	1.927	2.304	1.653	3.661
HC LB/MIL BTU TOTAL	.307	.256	.150	.258	.122
HC LB/MIL BTU NON-METH	.106	.084	ND	ND	.035
CO LB/MIL BTU	4.022	3.469	1.453	4.119	.143
NOX G/BHP HR	6.349	7.584	9.223	6.526	13.885
HC G/BHP HR TOTAL	1.178	1.006	.599	1.018	.463
HC G/BHP HR NON-METH	.405	.331	ND	ND	.134
CO G/BHP HR	15.443	13.651	5.818	16.256	.543
NOX PPM CORR TO 15 PCT 02	436	515	618	436	967

NOTE: NOX AS NO2 AND BTU AS HHV FOR CALCULATED EMISSIONS

ENGINE TEST 98, TEST SITE 20 EXHAUST STACK AREA SQ. FT. .579
WHITE SUPERIOR 8G825 RATED 696 HP AT 900 RPM, 4-STROKE NA
SOURCE: PR 15-92 HCR-3.57 NOX-CLH CO-NDIR HC- FID 02-POL FLOW-CB

RUN	6	7
DATE	11/13/78	11/13/78
TIME	1640	1720
OPERATIONAL DATA		
BAROMETER, IN. HG.	26.33	26.33
AMBIENT TEMP. DEG. F	55	52
INLET MAN. TEMP DEG. F	54	52
EXHAUST VEL. FT/SEC	79.76	100.64
SP. HUMIDITY GRAIN/LB	20	25
ENGINE SPEED RPM	786	882
HORSEPOWER	628	717
SCAV. AIR PRES. IN.HG.	-5.1	-4.6
IGNIT. TIME DEG. BTDC	33.0	33.0
FUEL SP. GR. (STP)	.7363	.7363
HI HEAT VALUE BTU/SCF	988	988
LO HEAT VALUE BTU/SCF	895	895
CALC. EXH. FLOW LB/HR	3996	4894
EXHAUST SP. GR. (STP)	.9632	.9611
EXHAUST TEMP. DEG. F	992	1036
FUEL FLOW SCF/HR	5200	6235
FUEL MIL. BTU/HR (HHV)	5.135	6.157
FUEL FLOW LB/HR	293	351
AIR FLOW LB/HR (WET)	3703	4543
AIR/FUEL RATIO (WET)	12.6	12.9
BSFC BTU/HP HR (HHV)	8176	8587
EXHAUST H2O PERCENT	18.00	17.66
EMISSIONS AS MEASURED		
NOX PPM	2457.00	1587.00
NO PPM	ND	ND
NO2 PPM	ND	ND
CO2 PERCENT	11.67	11.03
HC PPM	452.00	681.00
CO PPM	3512.00	6784.00
02 PERCENT	.20	.12
NO/NOX	ND	ND
NON-METH/TOTAL HC	ND	.357
CALCULATED EMISSIONS		
NOX LB/HR	13.367	10.641
HC LB/HR TOTAL	.834	1.549
HC LB/HR NON-METH	ND	.553
CO LB/HR	10.347	24.775
NOX LB/MIL BTU	2.603	1.728
HC LB/MIL BTU TOTAL	.163	.252
HC LB/MIL BTU NON-METH	ND	.090
CO LB/MIL BTU	2.015	4.024
NOX G/BHP HR	9.655	6.732
HC G/BHP HR TOTAL	.603	.980
HC G/BHP HR NON-METH	ND	.350
CO G/BHP HR	7.473	15.674
NOX PPM CORR TO 15 PCT 02	700	451

NOTE: NOX AS NO2 AND BTU AS HHV FOR CALCULATED EMISSIONS

1 02

ENGINE TEST 100, TEST SITE 20 EXHAUST STACK AREA SQ. FT. .579
WHITE SUPERIOR 8G825 RATED 696 HP AT 900 RPM, 4-STROKE NA
SOURCE: PR 15-92 HCR-3.57 NOX-CLH CO-NDIR HC- FID O2-POL FLOW-CB

RUN	1	2	3	4	5
DATE	11/15/78	11/15/78	11/15/78	11/15/78	11/15/78
TIME	1100	1200	1440	1530	1600
OPERATIONAL DATA					
BAROMETER, IN. HG.	30.26	30.26	30.26	30.26	30.26
AMBIENT TEMP. DEG. F	32	35	34	36	35
INLET MAN. TEMP DEG. F	45	ND	ND	ND	ND
EXHAUST VEL. FT/SEC	89.05	70.20	89.47	57.96	75.26
SP. HUMIDITY GRAIN/LB	21	21	23	22	21
ENGINE SPEED RPM	893	885	850	651	775
HORSEPOWER	681	551	729	564 *	667
SCAV. AIR PRES. IN.HG.	-3.5	-5.7	-3.7	-4.1	-4.3
IGNIT. TIME DEG. BTDC	33.0	33.0	33.0	33.0	33.0
FUEL SP. GR. (STP)	.7363	.7363	.7363	.7363	.7363
HI HEAT VALUE BTU/SCF	988	988	988	988	988
LO HEAT VALUE BTU/SCF	895	895	895	895	895
CALC. EXH. FLOW LB/HR	5020	4107	4986	3568	4315
EXHAUST SP. GR. (STP)	.9685	.9685	.9617	.9683	.9612
EXHAUST TEMP. DEG. F	1023	969	1040	898	998
FUEL FLOW SCF/HR	5631	4553	6378	4066	5561
FUEL MIL. BTU/HR (HHV)	5.561	4.496	6.298	4.015	5.491
FUEL FLOW LB/HR	317	256	359	229	313
AIR FLOW LB/HR (WET)	4703	3850	4627	3339	4002
AIR/FUEL RATIO (WET)	14.8	15.0	12.9	14.6	12.8
BSFC BTU/HP HR (HHV)	8165[a]	8160[a]	8640[a]	7119 *	8233[a]
EXHAUST H2O PERCENT	15.70	15.43	17.61	15.93	17.67
EMISSIONS AS MEASURED					
NOX PPM	2280.00	1533.00	1548.00	2844.00	1593.00
NO PPM	2090.00	1386.00	ND	ND	1497.00
NO2 PPM	190.00	147.00	ND	ND	96.00
CO2 PERCENT	10.07	9.85	11.14	10.24	11.08
HC PPM	269.00	907.00	1224.00	534.00	1440.00
CO PPM	559.00	541.00	5438.00	401.00	6866.00
O2 PERCENT	3.00	3.35	.10	2.70	.15
NO/NOX	.917	.904	ND	ND	.940
NON-METH/TOTAL HC	.295	.408	.488	.359	.452
CALCULATED EMISSIONS					
NOX LB/HR	15.932	8.793	10.577	14.092	9.419
HC LB/HR TOTAL	.638	1.765	2.838	.898	2.889
HC LB/HR NON-METH	.188	.720	1.385	.322	1.306
CO LB/HR	2.146	1.708	20.217	1.090	22.101
NOX LB/MIL BTU	2.865	1.956	1.679	3.510	1.715
HC LB/MIL BTU TOTAL	.115	.393	.451	.224	.526
HC LB/MIL BTU NON-METH	.034	.160	.220	.080	.238
CO LB/MIL BTU	.386	.380	3.210	.271	4.025
NOX G/BHP HR	10.612	7.239	6.581	11.334	6.405
HC G/BHP HR TOTAL	.425	1.453	1.766	.722	1.965
HC G/BHP HR NON-METH	.125	.593	.862	.259	.888
CO G/BHP HR	1.430	1.406	12.580	.877	15.030
NOX PPM CORR TO 15 PCT O2	752	515	439	922	453

NOTE: NOx AS NO2 AND BTU AS HHV FOR CALCULATED EMISSIONS
[a] BSFC APPEARS TO BE SOMEWHAT LOW
* HIGH ENGINE TORQUE OVERLOAD

ENGINE TEST 100, TEST SITE 20 EXHAUST STACK AREA SQ. FT. .579
WHITE SUPERIOR 8G825 RATED 696 HP AT 900 RPM, 4-STROKE NA
SOURCE: PR 15-92 HCR-3.57 NOX-CLH CO-NDIR HC- FID O2-POL FLOW-CB

RUN	6
DATE	11/15/78
TIME	1630

OPERATIONAL DATA

BAROMETER, IN. HG.	30.26
AMBIENT TEMP. DEG. F	32
INLET MAN. TEMP DEG. F	ND
EXHAUST VEL. FT/SEC	99.99
SP. HUMIDITY GRAIN/LB	23
ENGINE SPEED RPM	862
HORSEPOWER	789
SCAV. AIR PRES. IN.HG.	-3.3
IGNIT. TIME. DEG. BTDC	33.0
FUEL SP. GR. (STP)	.7363
HI HEAT VALUE BTU/SCF	988
LO HEAT VALUE BTU/SCF	895
CALC. EXH. FLOW LB/HR	5543
EXHAUST SP. GR. (STP)	.9604
EXHAUST TEMP. DEG. F	1048
FUEL FLOW SCF/HR	6988
FUEL MIL. BTU/HR (HHV)	6.901
FUEL FLOW LB/HR	394
AIR FLOW LB/HR (WET)	5150
AIR/FUEL RATIO (WET)	13.1
BSFC BTU/HP HR (HHV)	8746
EXHAUST H2O PERCENT	17.36

EMISSIONS AS MEASURED

NOX PPM	1005.00
NO PPM	ND
NO2 PPM	ND
CO2 PERCENT	10.68
HC PPM	1195.00
CO PPM	8104.00
O2 PERCENT	.07
NO/NOX	ND
NON-METH/TOTAL HC	.491

CALCULATED EMISSIONS

NOX LB/HR	7.668
HC LB/HR TOTAL	3.094
HC LB/HR NON-METH	1.519
CO LB/HR	33.784
NOX LB/MIL BTU	1.111
HC LB/MIL BTU TOTAL	.448
HC LB/MIL BTU NON-METH	.220
CO LB/MIL BTU	4.896
NOX G/BHP HR	4.408
HC G/BHP HR TOTAL	1.779
HC G/BHP HR NON-METH	.873
CO G/BHP HR	19.423
NOX PPM CORR TO 15 PCT O2	285

NOTE: NOX AS NO2 AND BTU AS HHV FOR CALCULATED EMISSIONS

6655 Corporation Pkwy., Ste 160
Fort Worth, TX 76126
Office: | Direct: +1 (307) 675.5083
dcokenour@emittechnologies.com

Prepared For:
Tom Ellis
WILLIAMS FIELD SERVICES

QUOTE: QUO-14683-L3J5
Expires: February 28, 2015

INFORMATION PROVIDED BY SUPERIOR

Engine:	8G825
Horsepower:	800
RPM:	900
Compression Ratio:	N/A
Exhaust Flow Rate:	4957 CFM
Exhaust Temperature:	1330 °F
Reference:	LEBQ9194
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	12.60	22.22	97.34
CO:	7.17	12.65	55.39
THC:	1.43	2.52	11.05
NMHC	0.20	0.35	1.55
NMNEHC:	N/A	N/A	N/A
HCHO:	N/A	N/A	N/A
O2:	N/A		

POST CATALYST EMISSIONS

	% Reduction	Lb/Hr	Tons/Year
NOx:	>90 %	<2.22	<9.73
CO:	>80 %	<2.53	<11.08
VOC:	N/A	<0.00	<0.00

CONTROL EQUIPMENT

Catalyst Housing

Model:	EAH-3050-1212F-2CE0
Manufacturer:	EMIT Technologies, Inc
Element Size:	Round 30.5" x 3.5"
Housing Type:	2 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	6 (0.5" NPT)
Inlet Connections:	12" Flat Face Flange
Outlet Connections:	12" Flat Face Flange
Configuration:	End In / Side Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA
Estimated Lead Time:	2 Weeks to Ship

Catalyst Element

Model:	RE-3050-R
Catalyst Type:	NSCR, Standard Plus Precious Group Metals
Substrate Type:	BRAZED
Manufacturer:	EMIT Technologies, Inc
Element Quantity:	1
Element Size:	Round 30.5" x 3.5"
Estimated Lead Time:	7-10 Business Days to Ship

Emissions Control Equipment Specification Summary

APPLICATION

# of Engines:	*1*
Engine Operation:	*Gas Compression*
Fuel:	*Pipeline Quality Natural Gas*
Lubrication Oil:	*0.5 wt% sulfated ash or less*

Engine Data:

Engine:	*Superior 8G825*
Power Output:	*789 bhp @ 862 rpm*
Exhaust Temp:	*1048° F*
Exhaust Flow Rate:	*5,543 lb/hr*

Combination Catalytic Converter/Silencer System Data:

Catalytic Converter Model:	*EQ-800-10-D2*
Inlet / Outlet Pipe Size:	*10"*
Overall Length:	*37" OAL*
Diameter:	*21.5" dia.*
Weight:	*257 lb.*
System Backpressure :	*9" WC (Housing + Catalyst: Flange to Flange)*
Catalyst Section Internals:	*304 SS*
Shell / Body Construction:	*304 SS*
Inlet / Outlet Connection:	*Standard ANSI Flanges – FF*
Instrumentation Ports:	*2 inlet / 2 outlet (1/2" NPT)*
Oxygen Sensor Ports:	*1 outlet (18 mm)*
Exhaust Noise Attenuation:	*5-10 dB(A)*
Operating Temperature Limits:	*750 - 1,200° F {Inlet]*

EMISSION REQUIREMENTS

Exhaust Gases	Engine Outputs (lb/hr)	Engine Outputs (gm/bhp-hr	Reduction (%)	Converter Output (gm/bhp-hr)	Area Limits (gm/bhp-hr)
NO_X	7.668	4.41	90	< 0.44	N/A
CO	33.7	19.40	80	< 3.88	N/A
NMHC	1.5	0.86	50	< 0.43	N/A
Oxygen	0.07%	0.07%	–	–	–

MIRATECH guarantees the performance of the converter, as stated above, if the engine output emissions and exhaust temperature at the catalyst are maintained as stated above using an air fuel ratio controller and the engine is operated in accordance with the manufacturer's recommended guidelines for maintenance and operations.

By: Wes Meyer

Date: 6/22/2001

Engine Exhaust Emissions Calculations

Unit Number: Gen
Description: Emergency generator, Waukesha RoiLine H884U
Type: Four Stroke Rich Burn (Naturally Aspirated)

Note: The data on this worksheet applies to each individual emissions unit identified above.

Horsepower Calculations

6,960	ft above MSL	Elevation	
180	hp	Nameplate hp	From previous applications
500	hr/yr	Annual operating time	Williams Four Corners LLC

Steady-State Emission Rates

Pollutants	Emission Factors, lb/hp-hr	Uncontrolled Emission Rates, pph	tpy
NOX	2.20E-02	3.96	0.99
CO	1.90E-02	3.42	0.86
VOC	3.09E-04	0.056	0.014

Emission factors taken from AP-42 Section 3.2, Table 3.2-2, 1/95
Uncontrolled Emission Rates (pph) = g/hp-hr x Mfg. Site-rated hp / 453.6 g/lb
Uncontrolled Emission Rates (tpy) = Uncontrolled Emission Rates (pph) x hr/yr / 2,000 lb/ton
SO2 and Particulate (PM10 & PM2.5) emissions are assumed negligible

Table 3.2-2 (English Units). CRITERIA EMISSION FACTORS FOR UNCONTROLLED NATURAL GAS PRIME MOVERS[a]

EMISSION FACTOR RATING: A (except as noted)

Pollutant	Gas Turbines (SCC 2-02-002-01)		2-Cycle Lean Burn (SCC 2-02-002-52)		4-Cycle Lean Burn (SCC 2-02-002-53)		4-Cycle Rich Burn (SCC 2-02-002-54)	
	lb/hp-hr (power output)	lb/MMBtu (fuel input)	lb/hp-hr (power output)	lb/MMBtu (fuel input)	lb/hp-hr (power output)	lb/MMBtu (fuel input)	lb/hp-hr (power output)	lb/MMBtu (fuel input)
NO_x	2.87 E-03	0.34	0.024	2.7	0.026	3.2	0.022	2.3
CO	1.83 E-03	0.17	3.31 E-03	0.38	3.53 E-03	0.42	0.019	1.6
CO_2[b]	0.89	110	0.89	110	0.89	110	0.89	110
TOC	3.97 E-04	0.053	0.013	1.5	0.011	1.2	2.65 E-03	0.27
TNMOC	2.20 E-05	0.002	9.48 E-04	0.11	1.59 E-03	0.18	3.09 E-04	0.03
CH_4	3.75 E-04	0.051	0.012	1.4	9.04 E-03	1.1	2.43 E-03	0.24

[a] References 1-5. Factors are based on entire population. Factors for individual engines from specific manufacturers may vary. SCC = Source Classification Code. TNMOC = total nonmethane organic compounds.

[b] EMISSION FACTOR RATING: B. Based on 100% conversion of the fuel carbon to CO_2. CO_2 [lb/MMBtu] = 3.67*C/E, where C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0239 MMBtu/lb. The uncontrolled CO_2 emission factors are also applicable to natural gas prime movers controlled by combustion modifications, NSCR, and SCR.

Storage Tank Emissions Data and Calculations

Unit Number: Storage tanks
Description: Storage tank emissions summary

Source	Description	Uncontrolled Working / Breathing (W/B) Losses (TANKS) (lb/yr)	Uncontrolled Working / Breathing (W/B) Losses (TANKS) (ton/yr)	Uncontrolled Flash Emissions (HYSYS or VMGSim) (ton/yr)	Total Uncontrolled Emissions (ton/yr)
Tank T11	Condensate Storage Tank (100 bbl)				
VOC	*(including flash emissions)*	2,046.82	1.02	9.05	10.08
Benzene		4.05	2.03E-03	3.58E-02	3.78E-02
Ethylbenzene		0.13	6.50E-05	1.04E-03	1.10E-03
n-Hexane		93.76	4.69E-02	0.22532	0.27
Toluene		0	0	0	0
Xylenes		0.14	7.00E-05	1.10E-03	1.17E-03
2,2,4 Trimethylpentane		0.35	1.75E-04	2.12E-03	2.29E-03
Tank T12	Condensate Storage Tank (100 bbl)				
VOC	*(no flash emissions as this tank*	2,046.82	1.02	0	1.02
Benzene	*is an overflow tank for T-11)*	4.05	2.03E-03	0	2.03E-03
Ethylbenzene		0.13	6.50E-05	0	6.50E-05
n-Hexane	*assume throughput = Tank T-11*	93.76	4.69E-02	0	4.69E-02
Toluene		0	0	0	0
Xylenes		0.14	7.00E-05	0	7.00E-05
2,2,4 Trimethylpentane		0.35	1.75E-04	0	1.75E-04

Bryan Research & Engineering, Inc.

ProMax® 3.2

with

TSWEET® & PROSIM®

Simulation Report

Project: Ojito Tank Flash 4-5-2017.pmx

licensed to Williams Midstream Natural Gas Liquids, Inc. and Customer's Org

Client Name: Williams
Location: Ojito
Job: Permit Application

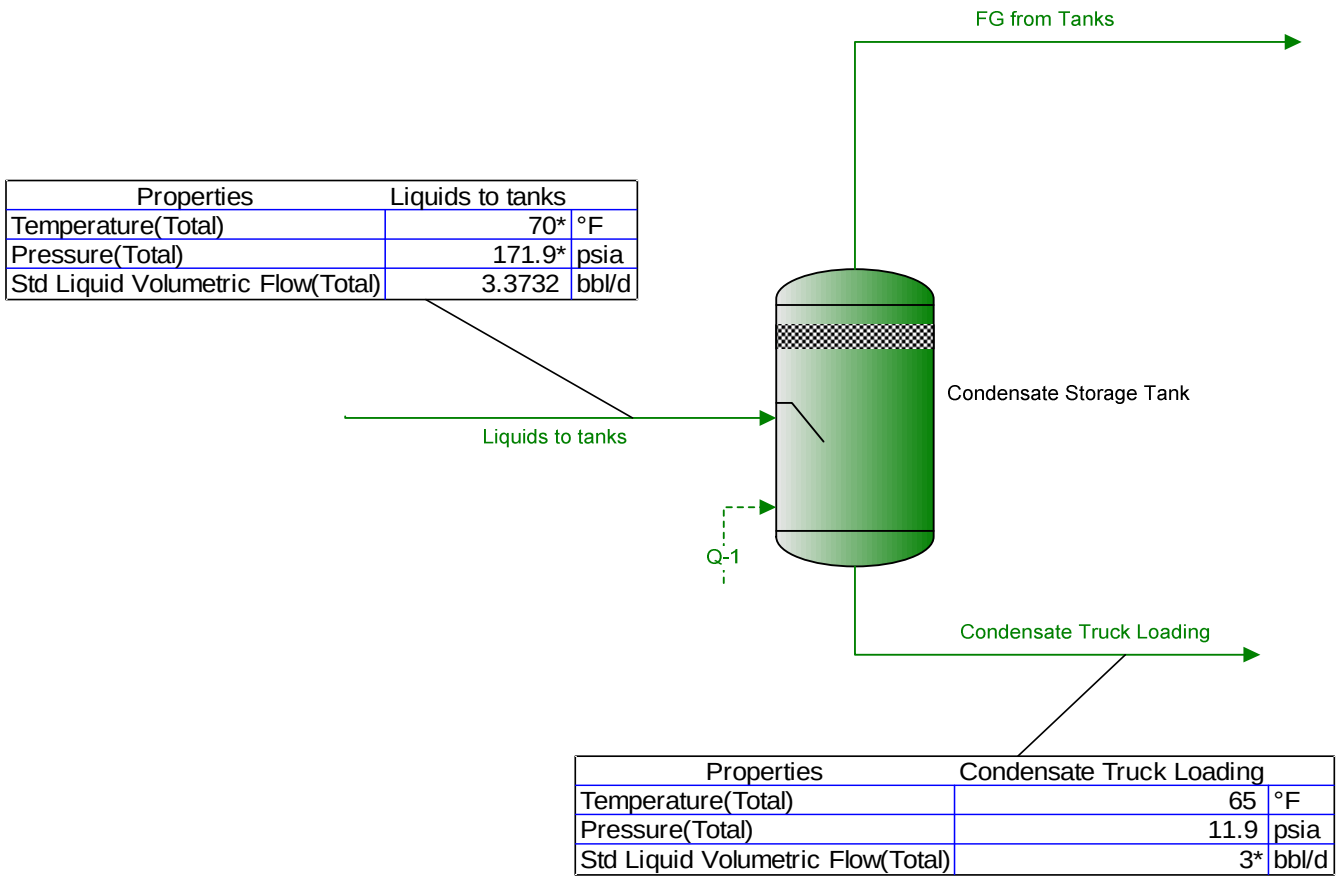
ProMax Filename: C:\Users\khong\Desktop\Ojito Tank Flash 4-5-2017.pmx
ProMax Version: 3.2.13330.0
Simulation Initiated: 4/5/2017 9:19:18 AM

Bryan Research & Engineering, Inc.
Chemical Engineering Consultants
P.O. Box 4747 Bryan, Texas 77805
Office: (979) 776-5220
FAX: (979) 776-4818
mailto:sales@bre.com
http://www.bre.com/

Report Navigator can be activated via the ProMax Navigator Toolbar.
An asterisk (*), throughout the report, denotes a user specified value.
A question mark (?) after a value, throughout the report, denotes an extrapolated or approximate value

Ojito Condensate Flash Emissions

Stream FG from Tanks C3+ Mass Flow =9.053 ton/yr



Properties	Liquids to tanks	
Temperature(Total)	70*	°F
Pressure(Total)	171.9*	psia
Std Liquid Volumetric Flow(Total)	3.3732	bbl/d

Properties	Condensate Truck Loading	
Temperature(Total)	65	°F
Pressure(Total)	11.9	psia
Std Liquid Volumetric Flow(Total)	3*	bbl/d

Process Streams		Condensate Truck Loading	FG from Tanks	Liquids to tanks
Composition	**Status:**	Solved	Solved	Solved
Phase: **Total**	**From Block:**	Condensate Storage Tank	Condensate Storage Tank	--
	To Block:	--	--	Condensate Storage Tank
Mass Fraction				
Nitrogen		0	0	0*
Methane		0.000166370	0.0914968	0.00763299*
Carbon Dioxide		3.82082E-05	0.00733059	0.000634389*
Ethane		0.00156936	0.130823	0.0121363*
Propane		0.0111260	0.251021	0.0307383*
Isobutane		0.0105982	0.0898366	0.0170762*
n-Butane		0.0305920	0.179439	0.0427609*
Isopentane		0.0383959	0.0833232	0.0420689*
n-Pentane		0.0421173	0.0668702	0.0441410*
Isohexane		0.0537157	0.0334483	0.0520587*
n-Hexane		0.0434105	0.0191722	0.0414289*
2,2,4-Trimethylpentane		0.00117485	0.000180200	0.00109353*
Benzene		0.00681456	0.00304708	0.00650655*
Heptane		0.226503	0.0315078	0.210562*
Toluene		0	0	0*
Octane		0.253246	0.0106546	0.233413*
Ethylbenzene		0.00243479	8.82787E-05	0.00224296*
m-Xylene		0.00312129	9.38779E-05	0.00287379*
Nonane		0.0596093	0.000782392	0.0548000*
C10		0.215367	0.000885707	0.197832*
Mass Flow		**lb/h**	**lb/h**	**lb/h**
Nitrogen		0	0	0*
Methane		0.00501389	0.245503	0.250517*
Carbon Dioxide		0.00115148	0.0196694	0.0208208*
Ethane		0.0472959	0.351022	0.398317*
Propane		0.335305	0.673536	1.00884*
Isobutane		0.319398	0.241048	0.560446*
n-Butane		0.921955	0.481469	1.40342*
Isopentane		1.15714	0.223572	1.38071*
n-Pentane		1.26929	0.179425	1.44872*
Isohexane		1.61883	0.0897481	1.70858*
n-Hexane		1.30827	0.0514427	1.35971*
2,2,4-Trimethylpentane		0.0354066	0.000483510	0.0358901*
Benzene		0.205371	0.00817588	0.213547*
Heptane		6.82615	0.0845413	6.91070*
Toluene		0	0	0*
Octane		7.63208	0.0285884	7.66067*
Ethylbenzene		0.0733776	0.000236868	0.0736144*
m-Xylene		0.0940666	0.000251892	0.0943185*
Nonane		1.79645	0.00209930	1.79855*
C10		6.49053	0.00237652	6.49291*
Mole Fraction				
Nitrogen		0	0	0*
Methane		0.00105038	0.240640	0.04324*
Carbon Dioxide		8.79330E-05	0.00702791	0.00131*
Ethane		0.00528621	0.183568	0.03668*
Propane		0.0255555	0.240186	0.06335*
Isobutane		0.0184684	0.0652146	0.0267*
n-Butane		0.0533099	0.130259	0.06686*
Isopentane		0.0539011	0.0487271	0.05299*
n-Pentane		0.0591253	0.0391055	0.0556*
Isohexane		0.0631334	0.0163766	0.0549*
n-Hexane		0.0510215	0.00938692	0.04369*
2,2,4-Trimethylpentane		0.00104172	6.65600E-05	0.00087*
Benzene		0.00883614	0.00164589	0.00757*
Heptane		0.228950	0.0132671	0.19097*
Toluene		0	0	0*
Octane		0.224548	0.00393548	0.1857*
Ethylbenzene		0.00232286	3.50839E-05	0.00192*
m-Xylene		0.00297779	3.73092E-05	0.00246*
Nonane		0.0470740	0.000257385	0.03883*
C10		0.153310	0.000262648	0.12636*

Process Streams		Condensate Truck Loading	FG from Tanks	Liquids to tanks
Properties	**Status:**	Solved	Solved	Solved
Phase: **Total**	**From Block:**	Condensate Storage Tank	Condensate Storage Tank	--
	To Block:	--	--	Condensate Storage Tank
Property	**Units**			
Temperature	°F	65	65*	70*
Pressure	psia	11.9	11.9*	171.9*
Molecular Weight	lb/lbmol	101.284	42.1924	90.8786
Mass Density	lb/ft^3	43.1053	0.0903139	42.0628
Molar Flow	lbmol/h	0.297550	0.0635942	0.361144
Mass Flow	lb/h	30.1371	2.68319	32.8203
Liquid Volumetric Flow	gpm		3.70405	0.0972802
Std Liquid Volumetric Flow	sgpm	0.0875*	0.0108837	0.0983837
Vapor Volumetric Flow	ft^3/h		29.7096	0.780269
Std Vapor Volumetric Flow	MMSCFD	0.00270997	0.000579192	0.00328917

Certificate of Analysis

Number: 2030-16060333-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520
Phone 337-896-3055

Williams Field Services
Williams Field Services
c/o Alpha Bioscience Company
2030 Afton Place
Farmington, NM 87401

July 05, 2016

Field:
Station Name: ENH Reiever
Station Location: RIO Arriba Co, NM
Sample Point:
Analyzed: 07/05/2016 15:11:50 by GR

Sampled By: MM-GAS
Sample Of: Liquid Spot
Sample Date: 06/23/2016 12:30
Sample Conditions: 150 psig, @ 77 °F
Method: GPA-2186M/GPA-2103
Cylinder No: 577

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	28.013	NIL	0.807	NIL
Methane	4.324	16.043	0.805	0.300	1.836
Carbon Dioxide	0.131	44.010	0.067	0.817	0.056
Ethane	3.668	30.069	1.280	0.356	2.458
Propane	6.335	44.096	3.242	0.507	4.372
Iso-Butane	2.670	58.122	1.801	0.563	2.189
n-Butane	6.686	58.122	4.510	0.584	5.280
Iso-Pentane	5.299	72.149	4.437	0.625	4.855
n-Pentane	5.560	72.149	4.656	0.631	5.049
i-Hexanes	5.490	84.675	5.394	0.669	5.517
n-Hexane	4.369	86.175	4.370	0.664	4.501
2,2,4-Trimethylpentane	0.087	114.231	0.115	0.697	0.113
Benzene	0.757	78.114	0.686	0.885	0.530
Heptanes	19.097	94.554	20.956	0.720	19.909
Toluene	NIL	NIL	NIL	NIL	NIL
Octanes	18.570	108.620	23.412	0.734	21.835
Ethylbenzene	0.192	106.167	0.237	0.872	0.186
Xylenes	0.246	106.167	0.303	0.885	0.234
Nonanes	3.883	123.996	5.591	0.753	5.081
Decanes Plus	12.636	123.673	18.138	0.775	15.999
	100.000		100.000		100.000

Calculated Physical Properties	Total	C10+
Specific Gravity at 60°F	0.6840	0.7753
API Gravity at 60°F	75.369	51.010
Molecular Weight	86.161	123.673
Pounds per Gallon (in Vacuum)	5.703	6.464
Pounds per Gallon (in Air)	5.696	6.457
Cu. Ft. Vapor per Gallon @ 14.73 psia	25.058	19.788

Patti L. Pettro

Hydrocarbon Laboratory Manager

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

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520
Phone 337-896-3055

Certificate of Analysis

Number: 2030-16060333-001A

July 05, 2016

Williams Field Services
Williams Field Services
c/o Alpha Bioscience Company
2030 Afton Place
Farmington, NM 87401

Field:		Sampled By:	MM-GAS
Station Name:	ENH Reiever	Sample Of:	Liquid Spot
Station Location:	RIO Arriba Co, NM	Sample Date:	06/23/2016 12:30
Sample Point:		Sample Conditions:	150 psig, @ 77 °F
Analyzed:	07/05/2016 15:11:50 by GR	Method:	GPA-2186M/GPA-2103
		Cylinder No:	577

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	NIL	28.013	NIL	0.807	NIL
Carbon Dioxide	0.131	44.010	0.067	0.817	0.056
Methane	4.324	16.043	0.805	0.300	1.836
Ethane	3.668	30.069	1.280	0.356	2.458
Propane	6.335	44.096	3.242	0.507	4.372
Iso-butane	2.670	58.122	1.801	0.563	2.189
n-Butane	6.686	58.122	4.510	0.584	5.280
Iso-pentane	5.299	72.149	4.437	0.625	4.855
n-Pentane	5.560	72.149	4.656	0.631	5.049
Hexanes	9.859	85.340	9.764	0.667	10.018
Heptanes Plus	55.468	107.856	69.438	0.744	63.887
	100.000		100.000		100.000

Calculated Physical Properties	Total	C7+
Specific Gravity at 60°F	0.6840	0.7436
API Gravity at 60°F	75.369	58.801
Molecular Weight	86.161	107.856
Pounds per Gallon (in Vacuum)	5.703	6.199
Pounds per Gallon (in Air)	5.696	6.192
Cu. Ft. Vapor per Gallon @ 14.73 psia	25.058	21.761

Patti L. Pettro

Hydrocarbon Laboratory Manager

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

Certificate of Analysis

Number: 2030-16060333-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520
Phone 337-896-3055

Williams Field Services
Williams Field Services
c/o Alpha Bioscience Company
2030 Afton Place
Farmington, NM 87401

July 05, 2016

Field:
Station Name: ENH Reiever
Station Location: RIO Arriba Co, NM
Sample Point:

Sampled By: MM-GAS
Sample Of: Liquid Spot
Sample Date: 06/23/2016 12:30
Sample Conditions: 150 psig, @ 77 °F
Cylinder No: 577

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color Visual	Proprietary	Water White			GR	07/05/2016
API Gravity @ 60° F	ASTM D-5002	66.68	°		GR	07/05/2016
Specific Gravity @ 60/60° F	ASTM D-5002	0.7140			GR	07/05/2016
Density @ 60° F	ASTM D-5002	0.7133	g/ml		GR	07/05/2016
Shrinkage Factor	Proprietary	0.9110			GR	07/05/2016
Flash Factor	Proprietary	161.3567	Cu. Ft./S.T. Bbl		GR	07/05/2016

Patti L. Pecoraro

Hydrocarbon Laboratory Manager

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

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

Identification

User Identification:	Ojito T-11 & T-12
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ojito 100 bbl condensate tanks T-11 & T-12

Tank Dimensions

Shell Height (ft):	14.00
Diameter (ft):	7.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	4,200.00
Turnovers:	10.95
Net Throughput(gal/yr):	45,990.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	7.00

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

Ojito T-11 & T-12 - Vertical Fixed Roof Tank
Bloomfield, NM

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
Ojito 07-05-16	All	64.94	53.24	76.64	58.39	7.1163	5.6430	8.8667	62.5281			96.09	
2,2,4-Trimethylpentane (isooctane)						0.6857	0.4887	0.9450	114.2300	0.0012	0.0002	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3372	0.9653	1.8208	78.1100	0.0069	0.0020	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Decane (-n)						0.0374	0.0286	0.0489	142.2900	0.1814	0.0015	142.29	Option 1: VP60 = .033211 VP70 = .041762
Ethylbenzene						0.1286	0.0854	0.1894	106.1700	0.0024	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Heptane (-n)						0.7080	0.4981	0.9910	100.2000	0.2096	0.0320	100.20	Option 3: A=37358, B=8.2585
Hexane (-n)						2.1727	1.6003	2.9030	86.1700	0.0976	0.0458	86.17	Option 2: A=6.876, B=1171.17, C=224.41
i-butane						28.6704	23.0459	35.2667	58.1300	0.0450	0.2785	58.13	Option 1: VP60 = 26.098 VP70 = 31.306
Isopentane						11.2522	8.5746	14.3915	72.1500	0.0444	0.1078	72.15	Option 1: VP60 = 10.005 VP70 = 12.53
n-butane						28.6704	23.0459	35.2667	58.1300	0.0721	0.4462	58.13	Option 1: VP60 = 26.098 VP70 = 31.306
Nonane (-n)						0.0741	0.0558	0.0981	128.2600	0.0559	0.0009	128.26	Option 1: VP60 = .065278 VP70 = .08309
Octane (-n)						0.1666	0.1231	0.2250	114.2300	0.2341	0.0084	114.23	Option 1: VP60 = .145444 VP70 = .188224
Pentane (-n)						7.6199	5.8716	9.7769	72.1500	0.0466	0.0766	72.15	Option 3: A=27691, B=7.558
Xylenes (mixed isomers)						0.1073	0.0710	0.1586	106.1700	0.0030	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11

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

Ojito T-11 & T-12 - Vertical Fixed Roof Tank
Bloomfield, NM

Annual Emission Calcaulations	
Standing Losses (lb):	1,559.5769
Vapor Space Volume (cu ft):	287.8693
Vapor Density (lb/cu ft):	0.0790
Vapor Space Expansion Factor:	0.7176
Vented Vapor Saturation Factor:	0.2617
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	287.8693
Tank Diameter (ft):	7.0000
Vapor Space Outage (ft):	7.4801
Tank Shell Height (ft):	14.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.4801
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.4801
Dome Radius (ft):	7.0000
Shell Radius (ft):	3.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0790
Vapor Molecular Weight (lb/lb-mole):	62.5281
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.1163
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.7176
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	3.2237
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.1163
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	5.6430
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	8.8667
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.2617
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	7.1163
Vapor Space Outage (ft):	7.4801
Working Losses (lb):	487.2416

Vapor Molecular Weight (lb/lb-mole):	62.5281
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.1163
Annual Net Throughput (gal/yr.):	45,990.0000
Annual Turnovers:	10.9500
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,200.0000
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	7.0000
Working Loss Product Factor:	1.0000

Total Losses (lb):	2,046.8185

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

Emissions Report for: Annual

Ojito T-11 & T-12 - Vertical Fixed Roof Tank
Bloomfield, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
n-butane	217.40	695.87	913.27
Isopentane	52.53	168.14	220.67
Pentane (-n)	37.33	119.48	156.81
Hexane (-n)	22.32	71.44	93.76
Ojito 07-05-16	487.24	1,559.58	2,046.82
i-butane	135.68	434.30	569.98
Heptane (-n)	15.61	49.97	65.58
Octane (-n)	4.10	13.13	17.24
Nonane (-n)	0.44	1.39	1.83
Decane (-n)	0.71	2.29	3.00
2,2,4-Trimethylpentane (isooctane)	0.08	0.27	0.35
Benzene	0.97	3.09	4.05
Ethylbenzene	0.03	0.10	0.13
Xylenes (mixed isomers)	0.03	0.11	0.14

Equipment Leaks Emissions Calculations

Unit Number: F1
Description: Valves, Connectors, Seals & Open-Ended Lines

Steady-State Emission Rates

Equipment	Number of Components, # of sources	Emission Factors, kg/hr/source	Emission Factors, lb/hr/source	Uncontrolled TOC Emission Rates, pph	tpy
Valves	378	0.0045	0.0099	3.74	16.39
Connectors	339	0.0002	0.0004	0.15	0.65
Pump Seals	0	0.0024	0.0053	0.00	0.00
Compressor Seals	36	0.0088	0.0194	0.70	3.05
Pressure Relief Valves	25	0.0088	0.0194	0.48	2.12
Open-Ended Lines	103	0.0020	0.0044	0.45	1.99
Total				**5.53**	**24.20**

Number of components based on the numbers of compressors and dehydrators at the station (see next page)
Emission factors taken from the EPA "1995 Protocol for Equipment Leak Emission Estimates"
Emission factors (lb/hr/source) = Emission factors (kg/hr/source) x 2.2 lb/kg
Uncontrolled TOC Emission Rates (pph) = lb/hr/source x # of sources
Uncontrolled TOC Emission Rates (tpy) = Uncontrolled TOC Emission Rates (pph) x 8,760 hr/yr / 2,000 lb/ton

Components	Mole Percents, %	Molecular Weights, lb/lb-mole	Component Weights, lb/lb-mole	Weight Percent of TOC, %	Uncontrolled Emission Rates, pph	tpy
Carbon dioxide	0.6808	44.010				
Hydrogen sulfide	0.0000	34.070				
Nitrogen	0.7255	28.013				
Methane	78.1110	16.043	1253.135	59.641		
Ethane	10.8480	30.070	326.199	15.525		
Propane	5.5588	44.097	245.126	11.666	6.45E-01	2.82
Isobutane	0.9025	58.123	52.456	2.497	1.38E-01	0.60
n-Butane	1.4859	58.123	86.365	4.110	2.27E-01	0.99
Isopentane	0.5070	72.150	36.580	1.741	9.62E-02	0.42
n-Pentane	0.3935	72.150	28.391	1.351	7.47E-02	0.33
Cyclopentane	0.0274	70.134	1.922	0.091	5.05E-03	2.21E-02
n-Hexane	0.1177	86.177	10.143	0.483	2.67E-02	0.12
Cyclohexane	0.0559	84.161	4.705	0.224	1.24E-02	5.42E-02
Other hexanes	0.2016	86.177	17.373	0.827	4.57E-02	0.20
Heptanes	0.2047	100.204	20.512	0.976	5.39E-02	0.24
Methylcyclohexane	0.0588	98.188	5.773	0.275	1.52E-02	6.65E-02
2,2,4-Trimethylpentane	0.0010	114.231	0.114	0.005	3.00E-04	1.32E-03
Benzene	0.0198	78.114	1.547	0.074	4.07E-03	1.78E-02
Toluene	0.0267	92.141	2.460	0.117	6.47E-03	2.83E-02
Ethylbenzene	0.0008	106.167	0.085	0.004	2.23E-04	9.78E-04
Xylenes	0.0059	106.167	0.626	0.030	1.65E-03	7.21E-03
C8+ Heavies	0.0667	114.231	7.619	0.363	2.00E-02	8.78E-02
Total	100.0000		2101.132			
Total VOC				24.834	1.37E+00	6.01

Gas stream composition obtained from Ojito extended gas analysis dated 8/1/16
Component Weights (lb/lb-mole) = (% / 100) * Molecular Weights (lb/lb-mole)
Weight Percent of TOC (%) = 100 x Component Weights (lb/lb-mole) / Total Component Weight (lb/lb-mole)
Uncontrolled Emission Rates (pph) = Total Uncontrolled TOC Emission Rate (pph) x (% / 100)
Uncontrolled Emission Rates (tpy) = Total Uncontrolled TOC Emission Rate (tpy) x (% / 100)

Equipment Leaks Emissions Calculations

Unit Number: F1
Description: Valves, Connectors, Seals & Lines

Number of Compression Units at the Facility: 3
Number of Dehydrators at the Facility: 0

Process Equipment Description	Equipment Count						Instrument Count		
	Valves	Connectors	Pump Seals	Compressor Seals	Pressure Relief Valves	Open-end	Flow	Level	Pressure
Station inlet, meter run to pulsation dampener	17	14	0	0	1	13	3	0	3
Pulsation dampener	12	8	0	0	0	2	0	4	1
Compressor suction header	7	4	0	0	0	3	0	0	1
Suction header feed to instrument gas header	3	1	0	0	0	1	0	0	0
Compressor discharge header and bypass to station discharge	6	5	0	0	0	3	0	1	1
Compressor discharge header and suction header bypass lines	4	2	0	0	0	2	0	0	1
Fuel gas header	2	2	0	0	1	2	0	0	1
Instrument gas header	2	2	0	0	1	2	0	0	0
Station discharge header	9	5	0	0	1	6	0	0	2
Fuel gas recovery header	2	2	0	0	1	2	0	0	0
Fuel gas feed and filter loop	15	9	0	0	0	1	0	4	1
Instrument gas feed and filter loop	9	11	0	0	0	3	0	0	0
Produced water storage tank	1	0	0	0	0	1	0	1	0
ESD panel	12	0	0	0	0	0	0	0	0
Starting gas header	6	2	0	0	1	3	0	0	0
Hot gas header	2	2	0	0	0	2	0	0	0
Volume bottle lop	12	4	0	24	1	2	0	0	1
Components from Compressors	132	177	0	12	18	33	0	12	27
Components from dehydrators	0	0	0	0	0	0	0	0	0
Total	253	250	0	36	25	81	3	22	39
Adjusted Total	378	339	0	36	25	103			

The following additions are included in the Adjusted Total:

1 valve is added for each open end line
2 connectors are added for each flow meter
2 valves, 2 connectors and 1 open end line are added for each level gauge
1 connector is added for each pressure gauge

The component count is based on an evaluation of the Sim Mesa Compressor Station (two stage compression)

Compressor Blowdown Emissions Calculations

Unit Number: SSM
Description: Compressor & Piping Associated With Station

Throughput

3	# of units	Number of units	Williams Four Corners LLC
200	events/yr/unit	Blowdowns per year per unit	Williams Four Corners LLC
3,250	scf/event	Gas loss per blowdown	Williams Four Corners LLC
1,950,000	scf/yr	Annual gas loss	# of units x events/yr/unit x scf/event

Emission Rates

Pollutants	Emission Factors, lb/scf	Uncontrolled, Emission Rates, tpy
VOC	1.374E-02	13.40
2,2,4-Trimethylpentane	2.641E-06	2.58E-03
Benzene	4.076E-05	3.97E-02
Ethylbenzene	2.239E-06	2.18E-03
n-Hexane	2.673E-04	2.61E-01
Toluene	6.484E-05	6.32E-02
Xylene	1.651E-05	1.61E-02

Emission factors calculated from gas composition (see table below)
Uncontrolled Emission Rates (tpy) = scf/yr x lb/scf / 2,000 lb/ton

Gas Composition

Components	Mole Percents, %	Molecular Weights, lb/lb-mole	Emission Factors, lb/scf
Carbon dioxide	0.6808	44.01	7.897E-04
Hydrogen sulfide	0.0000	34.07	0.000E+00
Nitrogen	0.7255	28.01	5.356E-04
Methane	78.1110	16.04	3.302E-02
Ethane	10.8480	30.07	8.598E-03
Propane	5.5588	44.09	6.460E-03
Isobutane	0.9025	58.12	1.383E-03
n-Butane	1.4859	58.12	2.276E-03
Isopentane	0.5070	72.15	9.642E-04
n-Pentane	0.3935	72.15	7.483E-04
Cyclopentane	0.0274	70.14	5.065E-05
n-Hexane	0.1177	86.17	2.673E-04
Cyclohexane	0.0559	84.16	1.240E-04
Other hexanes	0.2016	86.18	4.579E-04
Heptanes	0.2047	100.20	5.406E-04
Methylcyclohexane	0.0588	98.19	1.522E-04
2,2,4-Trimethylpentane	0.0010	100.21	2.641E-06
Benzene	0.0198	78.11	4.076E-05
Toluene	0.0267	92.14	6.484E-05
Ethylbenzene	0.0008	106.17	2.239E-06
Xylenes	0.0059	106.17	1.651E-05
C8+ Heavies	0.0667	110.00	1.934E-04
Total	100.0000		
Total VOC			1.374E-02

Gas stream composition obtained from Ojito extended gas analysis dated 8/1/16
Emission Factors (lb/scf) = (% / 100) x lb/lb-mole / 379.4 scf/lb-mole

Pig Launcher Emissions Calculations

Unit Number: PL
Description: Pig Launcher

Throughput

260	events/yr	Blowdowns per year	Williams Four Corners LLC
4,250	scf/event	Gas loss per blowdown	Williams Four Corners LLC
		2.43 mcf/blowdown + 1.82 mcf per purge	
1,105,000	scf/yr	Annual gas loss	events/yr x scf/event

Emission Rates

Pollutants	Emission Factors, lb/scf	Uncontrolled, Emission Rates, tpy
VOC	1.374E-02	7.59
2,2,4-Trimethylpentane	2.641E-06	1.46E-03
Benzene	4.076E-05	2.25E-02
Ethylbenzene	2.239E-06	1.24E-03
n-Hexane	2.673E-04	1.48E-01
Toluene	6.484E-05	3.58E-02
Xylene	1.651E-05	9.12E-03

Emission factors calculated from gas composition (see table below)
Uncontrolled Emission Rates (tpy) = scf/yr x lb/scf / 2,000 lb/ton

Gas Composition

Components	Mole Percents, %	Molecular Weights, lb/lb-mole	Emission Factors, lb/scf
Carbon dioxide	0.6808	44.01	7.897E-04
Hydrogen sulfide	0.0000	34.07	0.000E+00
Nitrogen	0.7255	28.01	5.356E-04
Methane	78.1110	16.04	3.302E-02
Ethane	10.8480	30.07	8.598E-03
Propane	5.5588	44.09	6.460E-03
Isobutane	0.9025	58.12	1.383E-03
n-Butane	1.4859	58.12	2.276E-03
Isopentane	0.5070	72.15	9.642E-04
n-Pentane	0.3935	72.15	7.483E-04
Cyclopentane	0.0274	70.14	5.065E-05
n-Hexane	0.1177	86.17	2.673E-04
Cyclohexane	0.0559	84.16	1.240E-04
Other hexanes	0.2016	86.18	4.579E-04
Heptanes	0.2047	100.20	5.406E-04
Methylcyclohexane	0.0588	98.19	1.522E-04
2,2,4-Trimethylpentane	0.0010	100.21	2.641E-06
Benzene	0.0198	78.11	4.076E-05
Toluene	0.0267	92.14	6.484E-05
Ethylbenzene	0.0008	106.17	2.239E-06
Xylenes	0.0059	106.17	1.651E-05
C8+ Heavies	0.0667	110.00	1.934E-04
Total	100.0000		
Total VOC			1.374E-02

Gas stream composition obtained from Ojito extended gas analysis dated 08/01/16
Emission Factors (lb/scf) = (% / 100) x lb/lb-mole / 379.4 scf/lb-mole

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

Identification

User Identification:	210 bbl Gasoline
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ojito

Tank Dimensions

Shell Height (ft):	13.00
Diameter (ft):	11.00
Liquid Height (ft) :	12.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	8,530.80
Turnovers:	7.00
Net Throughput(gal/yr):	59,715.59
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
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: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

210 bbl Gasoline - Vertical Fixed Roof Tank
Bloomfield, NM

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 10)	All	64.94	53.24	76.64	58.39	5.7019	4.5407	7.0892	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

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

210 bbl Gasoline - Vertical Fixed Roof Tank
Bloomfield, NM

Annual Emission Calcaulations

Standing Losses (lb):	2,365.2256
Vapor Space Volume (cu ft):	581.0883
Vapor Density (lb/cu ft):	0.0668
Vapor Space Expansion Factor:	0.4751
Vented Vapor Saturation Factor:	0.3511
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	581.0883
Tank Diameter (ft):	11.0000
Vapor Space Outage (ft):	6.1146
Tank Shell Height (ft):	13.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.1146
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1146
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	5.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0668
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.7019
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.4751
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	2.5485
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.7019
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.5407
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	7.0892
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.3511
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	5.7019

Vapor Space Outage (ft):	6.1146
Working Losses (lb):	535.0594
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.7019
Annual Net Throughput (gal/yr.):	59,715.5909
Annual Turnovers:	7.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	8,530.7987
Maximum Liquid Height (ft):	12.0000
Tank Diameter (ft):	11.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,900.2850

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

Emissions Report for: Annual

210 bbl Gasoline - Vertical Fixed Roof Tank
Bloomfield, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	535.06	2,365.23	2,900.28

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

Identification

User Identification:	500 gal Diesel Tank
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Horizontal Tank
Description:	Ojito

Tank Dimensions

Shell Length (ft):		6.00
Diameter (ft):		4.00
Volume (gallons):		500.00
Turnovers:		24.00
Net Throughput(gal/yr):		12,000.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

500 gal Diesel Tank - Horizontal Tank
Bloomfield , NM

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
Distillate fuel oil no. 2	All	64.94	53.24	76.64	58.39	0.0082	0.0054	0.0110	130.0000			188.00	Option 1: VP60 = .0074 VP70 = .009

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

500 gal Diesel Tank - Horizontal Tank
Bloomfield , NM

Annual Emission Calcaulations

Standing Losses (lb):	0.2806
Vapor Space Volume (cu ft):	48.0243
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0847
Vented Vapor Saturation Factor:	0.9991
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	48.0243
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.5293
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0082
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0847
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	0.0056
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0082
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0054
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0110
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9991
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0082
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.3042
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0082
Annual Net Throughput (gal/yr.):	12,000.0000

Annual Turnovers:	24.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.5848

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

Emissions Report for: Annual

500 gal Diesel Tank - Horizontal Tank
Bloomfield , NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.30	0.28	0.58

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

Identification

User Identification:	1000 Lube Oil
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ojito

Tank Dimensions

Shell Height (ft):	7.00
Diameter (ft):	5.50
Liquid Height (ft) :	6.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	1,066.35
Turnovers:	24.00
Net Throughput(gal/yr):	25,592.40
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

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

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

1000 Lube Oil - Vertical Fixed Roof Tank
Bloomfield, NM

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
Residual oil no. 6	All	64.94	53.24	76.64	58.39	0.0000	0.0000	0.0001	190.0000			387.00	Option 1: VP60 = .00004 VP70 = .00006

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

1000 Lube Oil - Vertical Fixed Roof Tank
Bloomfield, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.0037
Vapor Space Volume (cu ft):	71.2749
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0843
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	71.2749
Tank Diameter (ft):	5.5000
Vapor Space Outage (ft):	3.0000
Tank Shell Height (ft):	7.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0000
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0000
Shell Radius (ft):	2.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	190.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0000
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0843
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0000
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0001
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0000

Vapor Space Outage (ft):	3.0000
Working Losses (lb):	0.0058
Vapor Molecular Weight (lb/lb-mole):	190.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0000
Annual Net Throughput (gal/yr.):	25,592.3961
Annual Turnovers:	24.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,066.3498
Maximum Liquid Height (ft):	6.0000
Tank Diameter (ft):	5.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0095

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

Emissions Report for: Annual

1000 Lube Oil - Vertical Fixed Roof Tank
Bloomfield, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Residual oil no. 6	0.01	0.00	0.01

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

Identification

User Identification:	100 bbl Ambitrol/ Glycol
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ojito

Tank Dimensions

Shell Height (ft):	14.00
Diameter (ft):	7.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	4,030.39
Turnovers:	24.00
Net Throughput(gal/yr):	96,729.39
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	0.00

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

100 bbl Ambitrol/ Glycol - Vertical Fixed Roof Tank
Bloomfield, NM

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
Propylene glycol	All	64.94	53.24	76.64	58.39	0.0012	0.0006	0.0023	76.1100			76.11	Option 2: A=8.2082, B=2085.9, C=203.54

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

100 bbl Ambitrol/ Glycol - Vertical Fixed Roof Tank
Bloomfield, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.1481
Vapor Space Volume (cu ft):	287.8693
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0844
Vented Vapor Saturation Factor:	0.9995
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	287.8693
Tank Diameter (ft):	7.0000
Vapor Space Outage (ft):	7.4801
Tank Shell Height (ft):	14.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.4801
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.4801
Dome Radius (ft):	7.0000
Shell Radius (ft):	3.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0012
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0844
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	0.0016
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0012
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0006
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0023
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9995
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0012
Vapor Space Outage (ft):	7.4801

Working Losses (lb):	0.2166
Vapor Molecular Weight (lb/lb-mole):	76.1100
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0012
Annual Net Throughput (gal/yr.):	96,729.3869
Annual Turnovers:	24.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,030.3911
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	7.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.3646

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

Emissions Report for: Annual

100 bbl Ambitrol/ Glycol - Vertical Fixed Roof Tank
Bloomfield, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Propylene glycol	0.22	0.15	0.36

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

Identification

User Identification:	100 bbl Methanol
City:	Bloomfield
State:	NM
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ojito

Tank Dimensions

Shell Height (ft):	14.00
Diameter (ft):	7.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	4,030.39
Turnovers:	24.00
Net Throughput(gal/yr):	96,729.39
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	0.00

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

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

100 bbl Methanol - Vertical Fixed Roof Tank
Bloomfield, NM

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
Methyl alcohol	All	64.94	53.24	76.64	58.39	1.6820	1.1617	2.3895	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

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

100 bbl Methanol - Vertical Fixed Roof Tank
Bloomfield, NM

Annual Emission Calcaulations

Standing Losses (lb):	121.1416
Vapor Space Volume (cu ft):	287.8693
Vapor Density (lb/cu ft):	0.0096
Vapor Space Expansion Factor:	0.2008
Vented Vapor Saturation Factor:	0.6000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	287.8693
Tank Diameter (ft):	7.0000
Vapor Space Outage (ft):	7.4801
Tank Shell Height (ft):	14.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.4801
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.4801
Dome Radius (ft):	7.0000
Shell Radius (ft):	3.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0096
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.6820
Daily Avg. Liquid Surface Temp. (deg. R):	524.6094
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.0642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2008
Daily Vapor Temperature Range (deg. R):	46.7976
Daily Vapor Pressure Range (psia):	1.2278
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.6820
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.1617
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.3895
Daily Avg. Liquid Surface Temp. (deg R):	524.6094
Daily Min. Liquid Surface Temp. (deg R):	512.9100
Daily Max. Liquid Surface Temp. (deg R):	536.3088
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6000
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	1.6820
Vapor Space Outage (ft):	7.4801

Working Losses (lb):	124.1125
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.6820
Annual Net Throughput (gal/yr.):	96,729.3869
Annual Turnovers:	24.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,030.3911
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	7.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	245.2541

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

Emissions Report for: Annual

100 bbl Methanol - Vertical Fixed Roof Tank
Bloomfield, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	124.11	121.14	245.25

Attachment 3: Regulatory Applicability

Attachment 3 – Applicable Federal Regulations

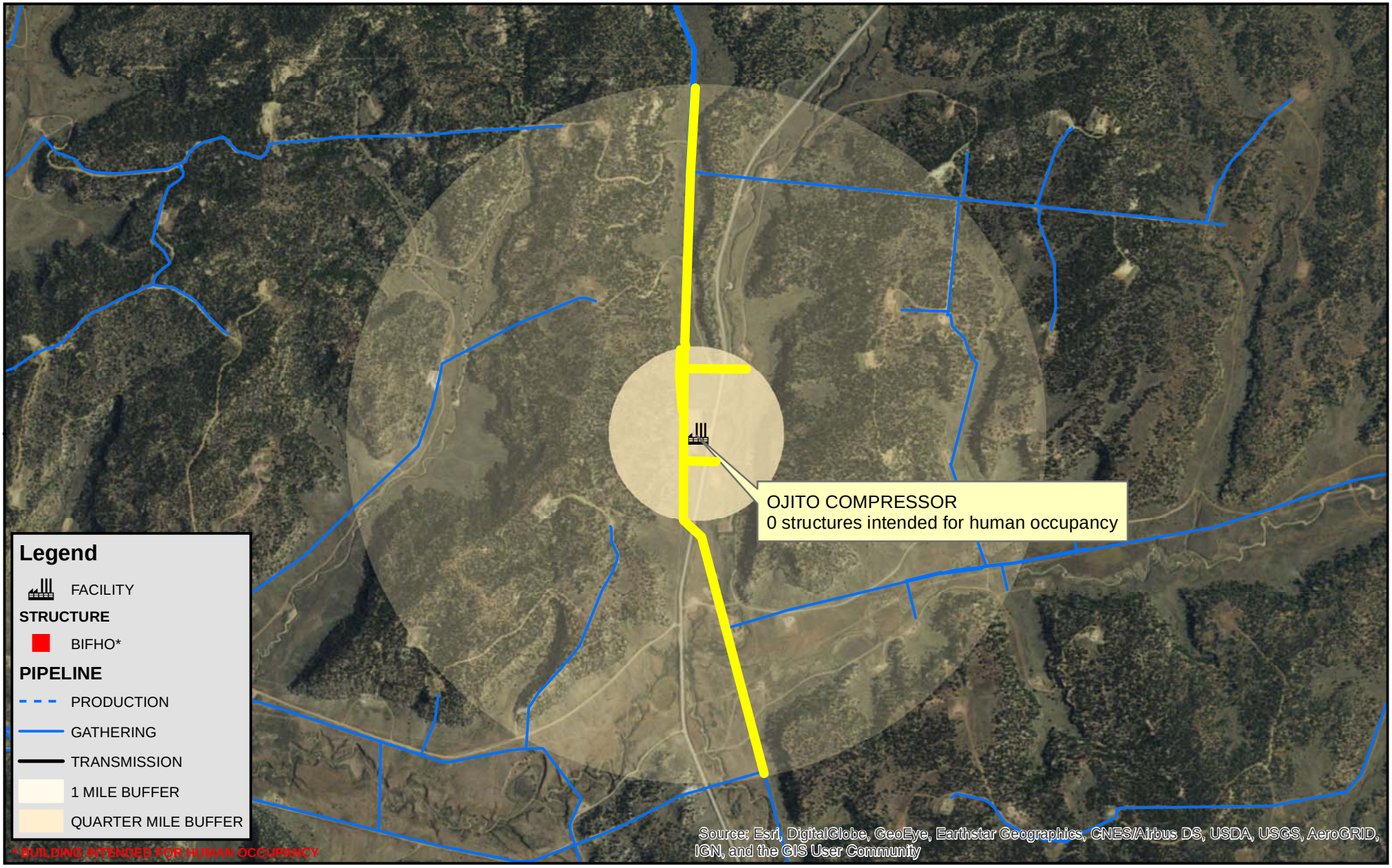
Federal standards and requirements are embodied in Title 40 (Protection of the Environment), Subchapter C (Air Programs) of the CFR, Parts 50 through 99.

FEDERAL REGULATIONS APPLICABILITY CHECKLIST

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 50	NAAQS	No		This regulation defines national ambient air quality standards. For existing sources applying for a synthetic minor source permit pursuant to §49.151(c)(1)(ii), demonstration of compliance with applicable national ambient air quality standards is not applicable.
NSPS 40 CFR 60, Subpart A	General Provisions	No		This regulation is not applicable because no other NSPS applies.
NSPS 40 CFR 60, Subpart K	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978	No		This regulation is not applicable because the petroleum liquids storage tanks at the facility have capacities less than the minimum applicability threshold capacity of 40,000 gallons (§60.110(a)).
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984	No		This regulation is not applicable because the petroleum liquids storage tanks at the facility have capacities less than the minimum applicability threshold capacity of 40,000 gallons (§60.110a(a)).
NSPS 40 CFR 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	No		This regulation is not applicable because the petroleum liquids storage tanks at the facility have capacities less than the minimum applicability threshold capacity of 40,000 gallons (§60.110b(a)).
NSPS 40 CFR 60 Subpart IIII	Standards of performance for **Stationary Compression Ignition Internal Combustion Engines**	No		This regulation is not applicable because the facility is not equipped with stationary CI ICE.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR Part 60 Subpart JJJJ	Standards of Performance for **Stationary Spark Ignition Internal Combustion Engines**	No		This regulation is not applicable because all potentially affected SI RICE (Units 1, 2 & 3 and the emergency generator) had commenced construction prior to the regulatory applicability date of June 12, 2006 (§60.4230(a)(4)).
NSPS 40 CFR Part 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 before September 18, 2015	No		This regulation is not applicable. The existing facility, a natural gas compressor station, is not equipped with "affected" sources that are constructed, modified, or reconstructed after August 23, 2011 and on or before September 18, 2015: gas wells, centrifugal or reciprocating compressors, pneumatic controllers, and storage vessels (§60.5365).
NSPS 40 CFR Part 60 Subpart OOOOa	Standards of Performance for **Crude Oil and Natural Gas Facilities** for which Construction, Modification or Reconstruction Commenced After September 18, 2015	No		This regulation is not applicable. The existing facility, a natural gas compressor station, is not equipped with "affected" sources that are constructed, modified, or reconstructed after September 18, 2015: gas wells, centrifugal or reciprocating compressors, pneumatic controllers, and storage vessels (§60.5365).
NESHAP 40 CFR 61 Subpart A	General Provisions	No		This regulation is not applicable because none of the other 40 CFR Part 61 subparts apply (§61.1(c)). 40 CFR 61, subparts B through FF provide emission standards for hazardous air pollutants by specific source type. The facility is a natural gas compressor station, which is not included as a source category subject to 40 CFR 61; therefore, the regulation does not apply.
NESHAP 40 CFR 61 Subpart V	National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources)	No		This subpart is not applicable because none of the potentially affected equipment at the facility is in VHAP service, as defined in 40 CFR 61.
MACT 40 CFR 63, Subpart A	National Emission Standards for Hazardous Air Pollutants (NESHAP) **General Provisions**	Yes	1, 2, 3 and Gen	This regulation is applicable because 40 CFR 63, Subpart ZZZZ applies (§63.1(b)).

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63.760 Subpart HH	NESHAP for **Oil and Natural Gas Production Facilities**	No		This regulation is not applicable because the facility contains no affected sources. The facility is an area source of HAP as defined by the regulation. Under §63.760(b)(2) for an area source of HAP, an affected source is each triethylene glycol dehydration unit located at the facility. Potentially affected sources at the facility (TEG dehydrators) are no longer in service.
MACT 40 CFR 63 Subpart HHH	NESHAP for **Natural Gas Transmission and Storage Facilities**	No		This regulation is not applicable as the facility is not a natural gas transmission and storage facility as defined by the subpart.
MACT 40 CFR 63 Subpart ZZZZ	NESHAP for **Stationary Reciprocating Internal Combustion Engines** (**RICE MACT**)	Yes	1, 2, 3 and Gen	This regulation applies because the facility is a remote area HAP source as defined by the subpart and is equipped with stationary RICE (Units 1, 2, 3 and Gen) (§63.6580). As per §63.6675 *Remote Stationary RICE* criterion 2, the diagram following this table documents that there are no buildings intended for human occupancy or well-defined outside areas within a 1-mile buffer of the facility. Units 1, 2 and 3 are existing (constructed or reconstructed before June 12, 2006) non-emergency stationary RICE as defined by the subpart (§63.6590(1)(iii)). Therefore, they must meet the requirements of §63.6640(a) and Table 2d paragraph 8. The emergency generator, Gen, must meet the requirements of §63.6640(a) and Table 2d paragraph 5.
MACT 40 CFR 63 Subpart CCCCCC	NESHAP for **Gasoline Dispensing Facilities**	Yes	IE7	This regulation applies. Gasoline tank IE-7 has a monthly throughput of less than 10,000 gallons per month. Records are maintained as required by §63.11116.
40 CFR 64	**Compliance Assurance Monitoring**	No		As with the current Part 71 permit R6FOPP71-05, upon issuance of the synthetic minor NSR permit for which this application is being submitted, the facility will be permitted with federally enforceable limitations to assure the facility is not subject to CAM as per §64.2.
Title VI – 40 CFR 82	**Protection of Stratospheric Ozone**	No		This regulation is not applicable to the facility because it does not produce, manufacture, transform, destroy, import, or export ozone-depleting substances; does not maintain or service motor vehicle air conditioning units or refrigeration equipment; and does not sell, distribute, or offer for sale or distribution any product that contains ozone-depleting substances.
40 CFR 98	**Mandatory Greenhouse Gas Reporting**	No		This regulation is not applicable to the facility because its actual annual CO2e emissions are below the major source threshold as defined in Subpart A, *General Provision*, Subpart C, *General Stationary Fuel Combustion Sources*, and Subpart W, *Petroleum Oil and Natural Gas Systems*. The facility GHG emissions are below the reporting thresholds of the regulations.



OJITO COMPRESSOR

CFR 40 PART 63 SUBPART ZZZZ
FOUR CORNERS AREA GAS GATHERING
STATIONARY RICE ANALYSIS

Date: 3/15/2017

Path: Z:\West_FCA\GAS\2016\EPA_Appendix_ZZZZ\FCA 2016 EPA Appendix ZZZZ.mxd

0 0.125 0.25 0.5 0.75 1 Miles

Attachment 4: Process Flow Diagram

Attachment 4
Ojito Compressor Station
Process Flow Diagram