FEDERAL SYNTHETIC MINOR NSR
INDIAN COUNTRY APPLICATION

New Mexico Gas Company > Redonda Compressor Station

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

New Mexico Gas Company (NMGC) owns and operates Redonda Compressor Station, located on the Laguna Pueblo in New Mexico, UTM Zone 13, 307.500 km easting, 3863.000 km northing (Latitude: 34° 53' 28.175" N, Longitude: 107° 6' 23.760" W). The facility is an existing facility with the following equipment located at the site:

- One 70 bbl used oil tank;
- One 70 bbl wastewater tank (not a source of air emissions);
- One 143 bbl Ethylene Glycol and lube oil tank;
- One pressurized mercaptan bullet tank (not a source of air emissions);
- One 47 bbl pipeline liquids tank;
- One natural gas fired Waukesha L 7042 GL, maximum rated capacity of 1478 horsepower;
- One natural gas fired Waukesha L 7044 GSI, maximum rated capacity of 1680 horsepower; and
- One natural gas fired Baldor/GM emergency generator driven by a 50.8 horsepower natural gas fired engine (to be installed).

NMGC acquired the Redonda Compressor Station in early 2009 as a part of the acquisition of all assets belonging to the PNM Resources gas utility business. The records transferred to NMGC as a part of that purchase showed that PNM resources considered the Redonda Compressor Station a minor source and reported the station as such in submissions to the EPA region 6. Based on those documents, NMGC had identified the Redonda Compressor Station as a minor source to be registered with EPA in accordance with 40 CFR 49.160. While compiling the necessary documentation to meet the March 1st, 2013 minor source registration, it was discovered that the facility (Unit 2, specifically) was operating with a catalyst that was not "enforceable as a practical matter," and therefore the facility's Potential to Emit may have been above major source thresholds. On February 27, 2013, NMGC voluntarily disclosed this information to the United States (US) Environmental Protection Agency (EPA) and is applying for a synthetic minor source permit under both the Title V (Part 71) and Prevention of Significant Deterioration (PSD) permitting programs to seek federally enforceable conditions limiting the facility's potential to emit by requiring the use of the currently existing catalyst.

The majority of the emissions at the station are from natural gas fired engines. Units 1 and 2 were constructed and/or re-constructed before July 1, 2008 and are not subject to the engine emission standards and corresponding control requirements found under New Source Performance Standards (NSPS) JJJJ. As such, NMGC is seeking a synthetic minor New Source Review (NSR) permit to establish federally enforceable limitations to lower the source's Potential to Emit (PTE). With a federally enforceable permit condition, the facility's PTE of all regulated pollutants are below the applicable major source thresholds of 100 tons per year (tpy) and 250 tpy under the Part 71 and PSD programs, respectively. As a result, Redonda Compressor Station is applying to be an existing synthetic minor source under the Federal Minor New Source Review Program in Indian Country.

This application is being submitted in accordance with 40 CFR §49.158 and includes EPA Form SYNMIN (*Synthetic Minor Application*) and the required supporting documentation. In accordance with Form SYNMIN, the following elements are addressed in this application:

- Proposed limitation and its effect on actual, allowable and potential to emit (demonstrated in the emission calculations);
- Proposed testing, monitoring, recordkeeping and reporting requirements to demonstrate compliance;
- Description of control efficiency provided by the control devices;

- Emission calculations of criteria pollutants, greenhouse gases (GHG) and hazardous air pollutants (HAPs) for actual, allowable and potential to emit; and
- Supporting data including manufacturer's data, control device data and certifications, and other information used in emission calculations.

This table below summarizes the facility's source status before and after the control.

Table 1.1: Pre- and Post-Control Facility Status

	Pre-Control	Post-Control
Nox	Major	Minor
CO	Major	Minor
VOC	Minor	Minor
Formaldehyde	Minor	Minor
Total HAPs	Minor	Minor
Greenhouse Gas	Minor	Minor

2. EPA REGISTRATION FOR EXISTING SOURCES (FORM SYNMIN)

A completed EPA FORM SYNMIN for the Redonda Compressor Station is included here. Attachments required by this form are included as subsequent sections in this document.

The following items from the SYNMIN form are addressed as follows:

Item 1: The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
Addressed in: Table 1.1 and Section 3.1

Item 2: The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate compliance.
Addressed in: Section 3.2

Item 3: A description of estimated efficiency of air pollution control equipment including documentation of manufacturer specifications and guarantees.
Addressed in: Section 3.3 and manufacturer's guarantee included in Appendix A

Item 4: Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
Addressed in: Sections 4 (Current Actual Emission Calculations), 5 (Total Allowable Emission Calculations), 6 (Potential to Emit Calculations), and Appendix A.

Item 5: Estimates of the potential emissions of Greenhouse Gas (GHG) Pollutants.
Addressed in: Sections 4 (Current Actual Emission Calculations), 5 (Total Allowable Emission Calculations), 6 (Potential to Emit Calculations) 7.3, and Appendix A.

Item 6: Estimates of the potential emissions of Hazardous Air Pollutants (HAPs).
Addressed in: Sections 4 (Current Actual Emission Calculations), 5 (Total Allowable Emission Calculations), 6 (Potential to Emit Calculations), and Appendix A.

OMB Control No. Pending
Approval expires Pending

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 8 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 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

For more information, visit:
http://www.epa.gov/region08/air/permitting/tmnsr.html

The Tribal Environmental Contact for the specific reservation:

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

R8airpermitting@epa.gov

A. GENERAL INFORMATION

Company Name	**Source Name**	
New Mexico Gas Company, Inc. (NMGC)	Redonda Compressor Station	
Company Contact or Owner Name		Title
Peter Ford		Engineering Manager
Mailing Address		
P.O. Box 97500 Albuquerque NM 87199-7500 - or - 7120 Wyoming Blvd., NE, Suite 20, Albuquerque NM 87109		
Email Address		
peter.ford@nmgco.com		
Telephone Number	Facsimile Number	
(505) 697-3510		

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.
☑ **Item 6 –** Estimates of the potential emissions of Hazardous Air Pollutants (HAPs) if seeking a synthetic minor limit for HAPs.

The public reporting and recordkeeping burden for this collection of information is estimated to average 6 hours per response. Send comments on the Agency's need for this information, the accuracy of the 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

Use this form to provide general and summary information about the synthetic minor NSR source (source or plant) on Tribal lands and to indicate the emissions limitations requested. Submit this form once, in addition to FORM NEW, for each synthetic minor NSR source on Tribal lands.

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

3.1. PROPOSED EMISSION LIMITATION

NMGC's Redonda Compressor Station is located on the Laguna Indian Reservation located outside of Rio Puerco, New Mexico. Redonda compresses pipeline quality natural gas for pipeline transportation to end users. Operations at Redonda also include some incidental liquids/oil removal from the natural gas; some odorizing liquids are also stored on-site in storage vessels. NMGC has not included mobile sources as they are considered activities that are exempt as stated at 40 CFR §49.153(c).

Redonda's engines only operate when the compression is needed to handle specific quantities of gas within the pipeline. The requested synthetic minor permit limits have been based on 8,760 hours of operation as it is critical that NMGC can provide the maximum level of service possible to their customers; however, as demonstrated by the actual emission calculations included as part of this application, it is rare for both engines to operate simultaneously for extended periods of time.

Unit 2 at Redonda is currently equipped with a catalyst. This catalyst is designed to provide an 86% reduction in NOx and CO emissions, and a 84% control efficiency for VOCs. NMGC is seeking a synthetic minor New Source Review (NSR) permit to establish federally enforceable limitations to lower the source's Potential to Emit (PTE) by requiring the use of the catalyst on Unit 2, as well as recordkeeping and reporting requirements to demonstrate the reduction efficiency of the federally enforceable catalyst on Unit 2.

3.2. PROPOSED COMPLIANCE DEMONSTRATION

In accordance with the requirements on form SYNMIN, NMGC is proposing testing, monitoring, recordkeeping and reporting requirements to demonstrate compliance with all applicable regulations and air quality permits.

3.2.1. Initial Compliance Test

To demonstrate compliance with permitted emission limits, NMGC is proposing an initial performance test of Unit 2 within 60 days of receipt of permit. The test will be conducted in accordance with EPA Reference Method 19 for NOx and CO, contained in 40 CFR Part 60, Appendix A, and with the requirements of Subpart A, General Provisions, 60.8(f). Alternative test methods may be requested by NMGC.

NMGC is proposing to demonstrate the NOx and CO reduction efficiency across the catalyst bed within 90 days of receipt of permit and annually thereafter. NMGC will utilize a properly calibrated portable analyzer, and the test will be conducted at 90% or greater of full load. The test will also include the exhaust volume flow rate (dscf) and the NOx and CO emission rate (lb/hr).

3.2.2. Periodic Compliance Testing

NMGC proposes annual testing of NOx and CO reduction efficiency across the catalyst bed on Unit 2. NMGC will utilize a properly calibrated portable analyzer, and the test will be conducted at 90% or greater of full load. The test will also include the exhaust volume flow rate (dscf) and the NOx and CO emission rate (lb/hr).

Unit 2 is also equipped with an air fuel ratio (AFR) controlling device. NMGC will demonstrate proper operation of the AFR annually by measuring and recording exhaust oxygen or NOx concentrations with a properly calibrated portable analyzer.

3.2.3. Monitoring

NMGC has, and will continue, to monitor the hours of operation of both units.

3.2.4. Recordkeeping

NMGC will keep all records relating to compliance testing and demonstration for a minimum of two (2) years. These will be made available to the EPA upon request.

3.2.5. Reporting

NMGC proposes to notify EPA Region 6 at least thirty (30) days prior to the compliance test date and allow a representative of EPA to be present during the testing. NMGC will provide EPA Region 6 with a testing protocol at least thirty (30) days in advance of the proposed test.

3.2.6. Quality Assurance Procedures

NMGC utilizes a third-party contractor to perform required emission tests. NMGC will only contract with emission testing firms that comply with all required Quality Assurance procedures and methods specified within applicable regulations.

3.3. CONTROL EFFICIENCY

As demonstrated in emission calculations, and verified through manufacturer's guarantees included in this application, Unit 2 is controlled by a catalyst that provides a 86.3% reduction in NOx, 86.1% reduction in CO and 84% reduction in VOC. NMGC will maintain the catalyst and the engine to ensure proper ongoing efficiency. Detailed emission calculations and supporting data regarding these emissions reductions is included in Appendix A of this application.

As required in EPA's form SYNMIN, NMGC is presenting the facility's current actual emissions. These emissions are presented for informational purposes only, and are not intended to be an enforceable limit. Detailed emission calculations and supporting documentation can be found in Appendix A of this application.

Unit 2 is currently equipped with a catalyst. With this application, this facility is seeking a federally enforceable permit condition requiring the use of controls on Unit 2. As such, NMGC is presenting the post-catalyst emission rates as the actual emissions estimates. The engines may have varying operating hours; for purposes of this application, actual emissions have been calculated using the average operating hours for the units during the previous three (3) years.

Actual Total - Emission Summary

Actual Emission Calculations (based on 3-year average operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	5.76	8.28	10.18	3.12	3.84	0.08	0.10	0.57	0.70	3.40	2459 hours
2	**7044 GSI**	0.95	0.95	0.84	0.84	0.01	0.01	0.19	0.02	0.37	0.05	2.40	261 hours
3	**Baldor Emergency Gen**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 hrs
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	5.64	6.71	9.12	11.01	3.25	4.36	0.27	0.13	0.94	0.75	5.81	4,138.3

Emissions are provided for informational purposes only and are not intended to be an enforceable limit.

Total allowable emissions are represented below. These total allowable emissions represent NMGC's requested permit limits (where permit limits are applicable).

Allowables Total - Emission Summary

Allowables Emission Calculations (controlled emissions, 8760 operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	20.53	8.28	36.27	3.12	13.69	0.08	0.36	0.57	2.50	3.40	
2	**7044 GSI**	7.30	31.97	6.42	28.11	0.11	0.50	0.19	0.83	0.37	1.60	2.40	
3	**Baldor Emergency Gen***	0.53	0.13	2.17	0.54	0.00	0.00	0.00	0.00	0.02	0.07	2.30	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	12.52	52.63	16.86	64.92	3.35	14.69	0.27	1.19	0.95	4.17	8.11	13,327.9

*Assumes 500 hours of operation per year.

A summary of the calculated facility-wide Potential to Emit for Redonda Compressor Station is provided in the table below. Detailed emission calculations including emission factors are provided in Appendix A of this synthetic minor permit application.

PTE Total - Emission Summary

Potential Emission Calculations (uncontrolled, 8760 operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	20.53	8.28	36.27	3.12	13.69	0.08	0.36	0.57	2.50	3.40	
2	**7044 GSI**	53.27	233.33	46.17	202.22	0.71	3.11	0.19	0.83	0.37	1.60	2.40	
3	**Baldor Emergency Gen***	0.53	0.13	2.17	0.54	0.00	0.00	0.00	0.00	0.02	0.07	2.30	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	58.49	253.99	56.62	239.03	3.95	17.30	0.27	1.19	0.95	4.17	8.11	13,327.9

*Assumes 500 hours of operation per year.

This section of the NSR Synthetic Minor application presents the methodology used to quantify the potential to emit (PTE) from the Redonda Compressor Station. Complete documentation of emission factors and computation of Potential to Emit are provided in Appendix A.

7.1. NATURAL GAS-FIRED COMPRESSOR ENGINES

Potential to Emit from the natural gas-fired compressor engine is calculated based on the rated capacity of each engine, and emission factors provided by the manufacturer or obtained from AP-42. Annual emissions are calculated based on continuous operation (8,760 hours per year). A sample calculation for potential annual CO emissions for one of the engines is provided below:

Potential Annual CO Emissions – Compressor Engine

$$= Horsepower\ (hp) x\ Emission\ Factor\ \left(\frac{lb}{hp-hr}\right) x\ \left(\frac{ton}{2{,}000\ lb}\right) x\ 8{,}760 \frac{hr}{yr}$$

$$= 1417\ (hp) x\ 5.84E-03\ \left(\frac{lb}{hp-hr}\right) x\ \left(\frac{ton}{2{,}000\ lb}\right) x\ 8{,}760 \frac{hr}{yr}$$

$$= 36.3\ tpy$$

7.2. TANK CALCULATIONS

Tanks 4.09d was used to calculate emissions from the storage tanks located at the site. Tanks 4.09d estimates working and breathing losses from storage tanks. NMGC is presenting a worst-case scenario for all tanks; even with a worst-case scenario, emissions from the tanks are negligible. Detailed tank calculations is included in Appendix A of this application.

7.3. GREENHOUSE GAS (GHG) CALCULATIONS

The vast majority of Greenhouse Gas (GHG) emissions at this facility results from stationary combustion. GHG emissions resulting from stationary combustion were calculated based on methodologies and emission factors found in 40 CFR 98, Subpart C, Tier 1. This facility is not subject to reporting their GHG's at this time; based on actual operational data, it is not above any applicable GHG reporting threshold. As the vast majority of emissions from this site would be from stationary combustion (and as the site, not subject to GHG reporting, does not have directly measured data from storage tanks as would be required for this source category), and as the site's Potential to Emit for GHG is based on full operation of both units simultaneously (which is highly unlikely), NMGC is presenting only PTE for GHG emissions resulting from the maximum operating hours for the two compressors for the stationary combustion as part of this application. A sample calculation is included below.

$$CO_2 = 1 \times 10\text{-}3 * Fuel * HHV * EF$$

= 1x10-3*221736004.664 scf*.001028 mmBtu/scf *53.02 kg CO2/mmBtu
= 12,085.62 metric tons CO_2. * 1.1023
= 13,322.3 tons per year CO_2

FEDERAL REGULATIONS CITATION	Title	Applies to Entire Facility	Applies to Unit No(s).	Federally Enforceable	Does Not Apply	JUSTIFICATION:
40 CFR Part 49	Indian Country: Air Quality Permitting and Management	X		X		The facility operates on Laguna Indian Reservation and is therefore subject to requirements found in this regulation. However, it is not applicable in its entirety. Subpart A is the tribal authority rule and Laguna has not applied for TAS status. In addition, Subparts D-H and J-M are applicable to FIPs for regions other region 6. Finally, 40 CFR 49.121-139 is applicable to Region 10. As such, only 49 CFR 49.151 – 173 are applicable to sources on Laguna lands.
Title VI – 40 CFR 82	Protection of Stratospheric Ozone	X		X		This regulation establishes a regulation for protection of the stratospheric ozone. The regulation is applicable to facilities which service, maintain or repair class I or class II appliances or disposes of the appliances. NMGC owns appliances containing CFCs and is therefore technically subject to this requirement. NMGC uses only certified technicians for the maintenance, service, repair, and disposal of appliances and maintains the appropriate records for this requirement.
Clean Air Act (CAA) Section 112(r)	Chemical Accident Prevention	X		X		This facility is equipped with a pressurized Mercaptan tank. While Mercaptan is a regulated substance under this regulation, the facility does not have the potential storage on-site of 10,000 pounds and therefore does not have more than a threshold quantity of a regulated substance in a process, as determined under §68.115.
40 CFR 50	NAAQS				X	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 required.
NSPS 40 CFR 60, Subpart A	General Provisions		3	X		This regulation defines general provisions for relevant standards that have been set under this part. The facility would be subject if any other NSPS applies. Unit 3 was manufactured after July 1, 2008, so NSPS JJJJ applies; as another subpart applies, Subpart A also applies.

FEDERAL REGU-LATIONS CITATION	Title	Applies to Entire Facility	Applies to Unit No(s).	Federally Enforce-able	Does Not Apply	JUSTIFICATION:
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for Volatile Organic Liquid Storage Vessels…for Which Construction, Reconstruction or Modification Commenced after July 23, 1984				X	There is not volatile organic liquid storage capacity on-site larger than 75 cubic meters (471 bbls).
NSPS 40 CFR 60, Subpart OOOO					X	All natural gas fired compressors and storage vessels were constructed prior to August 23, 2011. NSPS OOOO does not apply.
NSPS 40 CFR 60, Subpart JJJJ			3	X		Units 1 and 2 were manufactured prior to July 1, 2008. NSPS JJJJ does not apply. Unit 3 is manufactured after July 1 2008, and will comply with applicable requirements of NSPS JJJJ.
NESHAP 40 CFR 61 Subpart A	General Provisions				X	This part applies to the owner or operator of any stationary source for which a standard is prescribed under this part. Based on information gathered after reasonable inquiry, NMGC has determined the regulation does not apply as the facility is not subject to any 40 CFR 61 standards.
NESHAP 40 CFR 63, Subpart HH	National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities				X	This facility is an area source of HAPS and does not process, upgrade of store hydrocarbon liquids. Furthermore, the facility is not equipped with any equipment covered under this regulation.
NESHAP 40 CFR 63, Subpart HHH	National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities				X	The facility is not a major source of HAPs; this regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies to Entire Facility	Applies to Unit No(s).	Federally Enforce-able	Does Not Apply	JUSTIFICATION:
MACT 40 CFR 63, Subpart A	General Provisions	X		X		This regulation defines general provisions for relevant standards that have been set under this part. Subpart A in 40 CFR 63 applies because other subparts apply.
MACT 40 CFR 63, Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)		1-3	X		This regulation defines national emissions standards for HAPs for stationary reciprocating Internal Combustion Engines. The facility is an area source of HAPs, and engines at the facility are subject to this regulation. Engines 1 and 2 are existing remote stationary RICE per 63.6590(a)(1)(i). Per 63.6675, these RICE are "remote stationary RICE" as defined below: (2) Stationary RICE located on a pipeline segment that meets both of the criteria in paragraphs (2)(i) and (ii) of this definition. (i) A pipeline segment with 10 or fewer buildings intended for human occupancy and no buildings with four or more stories within 220 yards (200 meters) on either side of the centerline of any continuous 1–mile (1.6 kilometers) length of pipeline. Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy. (ii) The pipeline segment does not lie within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12–month period. The days and weeks need not be consecutive. The building or area is considered occupied for a full day if it is occupied for any portion of the day. The Baldor/GM units is an emergency or black start stationary RICE with a site rating of less than or equal to 500 hp located at an area source of HAP emissions. NMGC will comply with applicable requirements under NSPS JJJJ for this unit.
40 CFR Part 64	Compliance Assurance Monitoring				X	NMGC seeking a synthetic minor NSR permit to establish federally enforceable limitations to lower the site's PTE. NMGC is employing the use of a catalyst on Unit 2 in order to reduce emissions below major source thresholds. Once the synthetic minor permit is issued, Compliance Assurance Monitoring (CAM) will not apply.
40 CFR Part 71	Federal Operating Permit Programs				X	NMGC is seeking a synthetic minor NSR permit to establish federally enforceable limitations to lower the site's PTE below Part 71 thresholds. This facility is an existing synthetic minor source and upon issuance of the synthetic minor permit, the facility will be a synthetic minor source under this regulation.

APPENDIX A: DETAILED EMISSION CALCULATIONS

New Mexico Gas Company -Redonda Compressor Station

PTE Total - Emission Summary

Potential Emission Calculations (uncontrolled, 8760 operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	20.53	8.28	36.27	3.12	13.69	0.08	0.36	0.57	2.50	3.40	
2	**7044 GSI**	53.27	233.33	46.17	202.22	0.71	3.11	0.19	0.83	0.37	1.60	2.40	
3	**Baldor Emergency Gen***	0.53	0.13	2.17	0.54	0.00	0.00	0.00	0.00	0.02	0.07	2.30	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	58.49	253.99	56.62	239.03	3.95	17.30	0.27	1.19	0.95	4.17	8.11	13,327.9

*Assumes 500 hours of operation per year.

Allowables Total - Emission Summary

Allowables Emission Calculations (controlled emissions, 8760 operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	20.53	8.28	36.27	3.12	13.69	0.08	0.36	0.57	2.50	3.40	
2	**7044 GSI**	7.30	31.97	6.42	28.11	0.11	0.50	0.19	0.83	0.37	1.60	2.40	
3	**Baldor Emergency Gen***	0.53	0.13	2.17	0.54	0.00	0.00	0.00	0.00	0.02	0.07	2.30	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	12.52	52.63	16.86	64.92	3.35	14.69	0.27	1.19	0.95	4.17	8.11	13,327.9

*Assumes 500 hours of operation per year.

Actual Total - Emission Summary

Actual Emission Calculations (based on 3-year average operating hours)

		NO_x (lb/hr)	NO_x (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	SO_2 (lb/hr)	SO_2 (tpy)	CH_2O (lb/hr)	CH_2O (tpy)	HAPs (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	4.69	5.76	8.28	10.10	3.12	3.84	0.08	0.10	0.57	0.70	3.40	2459 hours
2	**7044 GSI**	0.95	0.95	0.84	0.84	0.01	0.01	0.19	0.02	0.37	0.05	2.40	261 hours
3	**Baldor Emergency Gen**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 hrs
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.01	
	Total	5.64	6.71	9.12	11.01	3.25	4.36	0.27	0.13	0.94	0.75	5.81	4,138.3

Emissions are provided for informational purposes only and are not intended to be an enforceable limit.

New Mexico Gas Company --Redonda Compressor Station

Waukesha L7044 GSI

Emission Unit:	2		
Source Description:	natural gas-fired reciprocating engine		
Manufacturer:	Waukesha		
Model:	L7044 GSI		
Type	Naturally-aspirated, four-cycle, rich-burn engine with catalytic converter		
3-Year Average Operating Hours	261		
Engine speed	1200	rpm	
Sea level hp	1680	hp	
Elevation	5370	msl	
Derate	4.1%		3% per 1000 ft over 4000 ft
Site hp	1611	hp	

Potential Emission Calculations

NOx	CO	VOC	SO_2		
53.3	46.2	0.7	0.2	lb/hr	Hourly emission rate
233.3	202.2	3.1	0.8	tpy	Annual emission rate (8760 hrs/yr)

Allowable Emission Calculations

NOx	CO	VOC	SO_2		
53.3	46.2	0.7	0.2	lb/hr	Hourly emission rate
86.3	86.1	84.0	0.0	%	Control efficiency
7.3	6.4	0.1	0.2	lb/hr	Hourly emission rate post catalyst
32.0	28.1	0.5	0.8	tpy	Annual emission rate (8760 hrs/yr)

Actual Emission Calculations

NOx	CO	VOC	SO_2		
53.3	46.2	0.7	0.2	lb/hr	Hourly emission rate
86.3	86.1	84.0	0.0	%	Control efficiency
1.0	0.8	0.0	0.0	tpy	Annual emission rate (3-year average)

Sample Calculations

NOx: Manufacturer's emission factor with AFRC = 15 g/hp-hr NOx
Catalytic converter manufacturer's guaranteed NOx reduction = 90%
15 g/hp-hr * (1 - 0.9) = 1.5 g/hp-hr
1.5 g/hp-hr * 1596 hp / 453.6 g/lb = 5.3 lb/hr
5.3 lb/hr * 1.25 = 6.6 lb/hr (25% safety factor)
6.6 lb/hr * 8760 hrs/yr / 2000 lb/ton = 28.9 tons/yr

CO: Manufacturer's emission factor with AFRC = 13 g/hp-hr CO
Catalytic converter manufacturer's guaranteed CO reduction = 85%
13 g/hp-hr * (1 - 0.85) = 1.95 g/hp-hr
1.95 g/hp-hr * 1596 hp / 453.6 g/lb = 6.9 lb/hr
6.9 lb/hr * 1.25 = 8.6 lb/hr (25% safety factor)
8.6 lb/hr * 8760 hrs/yr / 2000 lb/ton = 37.6 tons/yr

VOC: Manufacturer's emission factor with AFRC = 0.2 g/hp-hr VOC
Catalytic converter manufacturer's guaranteed VOC reduction = 50%
0.2 g/hp-hr * (1 - 0.5) = 0.1 g/hp-hr
0.1 g/hp-hr * 1596 hp / 453.6 g/lb = 0.35 lb/hr
0.35 lb/hr * 1.25 = 0.4 lb/hr (25% safety factor)
0.4 lb/hr * 8760 hrs/yr / 2000 lb/ton = 1.9 tons/yr

SO_2: Fuel sulfur content: 5 gr S/100 scf
5 gr/100 scf * 13.6e3 scf/hr / 7000 gr/lb * 64 lb SO_2/32 lb S = 0.19 lb/hr
0.19 lb/hr * 8760 hrs/yr / 2000 lb/ton = 0.85 tons/yr

Gas Engine Exhaust Emission Levels

Waukesha's approach to exhaust emission levels is to offer various stages of emission control technology. This approach allows the customer to select the exhaust emission level required for a particular installation.

The following tables indicate emission levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) SLHV, Waukesha Knock Index* of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Emissions are based on standard engine timing at 91 WKI* with an absolute humidity of 42 grains/lb. Refer to engine specific WKI Power & Timing curves for standard timing. Unless otherwise noted, these emission levels can be achieved across the continuous duty speed range and from 75% to 110% of the ISO Standard Power (continuous duty) rating. ***Contact the local Waukesha* gas engine representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

The tabulated emission levels for GL models are achieved at the standard engine settings. Trade off adjustments can be made to reduce emissions or fuel consumption, but not both. ***Contact the local Waukesha gas engine representative or Waukesha's Sales Engineering Department for more information.***

As an aid in evaluating emission requirements, tables of approximate unit conversion factors for exhaust emission levels are included.

Both G and GSI engines that are manually adjusted have the potential to achieve the same emission values as engines equipped with an air/fuel ratio control device. The exhaust emissions, however, must be monitored and the engine adjusted to compensate for changes in ambient conditions and the heating value of the fuel gas. Particularly with catalytic exhaust after treatment, a Waukesha CEC AFM (Custom Engine Control* Air/Fuel Module) is recommended to achieve optimum emissions control.

Waukesha emission control systems are designed for long life and consistent engine emission levels as listed in the following tables. It must be recognized, however, that engine condition and the quality of engine maintenance have a direct bearing on emission control. **A control system cannot compensate for engine or maintenance deficiencies.**

Some acceptable instruments for site engine adjustment of emissions are portable analyzers with two percent (2%) accuracy, for example:

- Horiba Mexa-201GE CO NDIR Analyzer with 0.5% and 2% ranges
- Teledyne Model 320A Oxygen Analyzer
- ECOM Model AC+
- Testo 335 Combustion Analyzer with overall auto-dilution**.

** Contact local Waukesha Distributor for specific part and ordering information. Reference Waukesha Form M398D, latest revision.

NOTE: Provision to lower the exhaust sample dew point to 40° F or less is required.

APG* Series Emission Levels

MODEL	NO_x SETTING	ENGINE SPEED (RPM)	GRAMS/BHP-HR				% OBSERVED DRY	EXCESS AIR RATIO
			NO_x [1]	CO	NMHC [4]	THC	O_2*	
16V150LTD / APG1000	T.A. Luft NOx	1500	1.0	1.4	0.2	2.4	9.6	1.7
	1/2 T.A. Luft NOx		0.5	1.6	0.2	2.4	9.2	1.7
	1.0 gm NOx	1800	1.0	1.5	0.4	2.2	9.5	1.68
	0.6 gm NOx		0.6	1.60	0.42	2.59	9.5	1.68

* % O_2 is given as a reference number only. APG Series engines are set to a specific NOx value.

NOTE: The above table indicates emission levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running an commercial quality natural gas of 900 BTU/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) SLHV, Waukesha Knock Index of 94 or higher, 93% methane content by volume, and at ISO standard conditions. Emissions are based on standard engine timing at 94 WKI with an absolute humidity of 42 grains/lb. Unless otherwise noted these emission levels can be achieved from 75% to 100% of the ISO Standard Power (continuous duty) rating. ***Contact the local Waukesha gas engine representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

MODEL	NO_x SETTING	ENGINE SPEED (RPM)	LT TEMP °C (°F)	GRAMS/BHP-HR				% OBSERVED DRY	EXCESS AIR RATIO
				NO_x [1]	CO	NMHC [4]	THC	O_2*	
12V220GL / APG2000 & 18V220GL / APG3000	T.A. Luft NOx	1200	45 (113)	1.0	1.7	0.9	5.9	11.8	2.1
			55 (131)	1.0	1.6	0.8	5.1	11.5	2.0
		1500	45 (113)	1.0	1.7	0.9	5.8	11.7	2.1
			55 (131)	1.0	1.8	0.9	6.1	11.2	2.0
	1/2 T.A. Luft NOx	1200	45 (113)	0.5	3.0	1.5	9.9	12.7	2.2
			55 (131)	0.5	3.1	1.6	10.4	12.0	2.1
		1500	45 (113)	0.5	2.4	1.2	8.2	11.6	2.0
			55 (131)	0.5	2.5	1.2	8.1	11.7	2.1

* % O_2 is given as a reference number only. APG Series engines are set to a specific NO_x value.

NOTE: The above table indicates emission levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) SLHV, Waukesha Knock Index of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Emissions are based on standard engine timing at 91 WKI with an absolute humidity of 42 grains/lb. These emission levels can be achieved at 100% of the ISO Standard Power (continuous duty) rating. ***Contact the local Waukesha gas engine representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

VHP* Emission Levels

MODEL	CARBURETOR SETTING	GRAMS/BHP-HR				% OBSERVED DRY		MASS AFR[2]	VOLUME AFR[2]	EXCESS AIR RATIO
		NO_x[1]	CO	NMHC[1]	THC	CO	O_2			
G, GSI	Lowest Manifold (Best Power)	8.5	32.0	0.35	2.3	1.15	0.30	15.5:1	9.3:1	0.97
	Equal NOx & CO	12.0	12.0	0.35	2.3	0.45	0.30	15.9:1	9.6:1	0.99
	Catalytic Conv. Input (3-way[3])	13.0	9.0	0.30	2.0	0.38	0.30	15.95:1	9.6:1	0.99
	Standard (Best Economy)	22.0	1.5	0.25	1.5	0.02	1.35	17.0:1	10.2:1	1.06
F3514GSI F3524GSI L7044GSI	Equal NOx & CO	14.0	14.0	0.25	1.1	0.45	0.30	15.85:1	9.5:1	0.99
	Catalytic Conv. Input (3-way[3])	15.0	13.0	0.20	1.0	0.38	0.30	15.95:1	9.6:1	0.99
L5794GSI	Equal NOx & CO	13.5	13.5	0.45	3.0	0.45	0.30	15.85:1	9.5:1	0.99
	Catalytic Conv. Input (3-way[3])	14.5	11.0	0.45	2.9	0.38	0.30	15.95:1	9.6:1	0.99
GL	Standard	1.5	2.65	1.0	5.5	0.06	9.8	28.0:1	16.8:1	1.74
L5774LT#	Standard	2.6	2.0	0.60	4.0	0.04	8.0	24.7:1	14.8:1	1.54
L5794LT#	Standard	2.6	2.0	0.60	4.0	0.04	7.8	24.5:1	14.7:1	1.52

#L5774LT and L5794LT emission levels are based on 1000 – 1200 rpm operation. For information at all other speeds contact Waukesha's Sales Engineering Department.

275GL+/275GL/AT-GL Emission Levels‡

MODEL	CARBURETOR SETTING	GRAMS/BHP-HR				% OBSERVED DRY		MASS AFR[2]	VOLUME AFR[2]	EXCESS AIR RATIO
		NO_x[1]	CO	NMHC[1]	THC	CO	O_2			
AT25GL	28:1	1.0	2.25	1.0	8.0	0.06	9.8	28.0:1	16.8:1	1.74
AT27GL	28:1	1.5	1.7	0.50	5.0	0.06	9.8	28.0:1	16.8:1	1.74
275GL/AT27GL	32:1	2.0	1.5	0.40	3.5	0.05	11.2	32.0:1	19.2:1	2.00
275GL+	34:1	0.5	1.6	0.6	6.0	0.04	11.6	34:1	20.4	2.12

‡ These AT-GL emission levels are based on 900 – 1000 rpm operation. For information at all other speeds contact Waukesha's Sales Engineering Department.

NOTE: The above table indicates emission levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) SLHV, Waukesha Knock Index of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Emissions are based on standard engine timing at 91 WKI with an absolute humidity of 42 grains/lb. Refer to engine specific WKI Power & Timing curves for standard timing. Unless otherwise noted these emission levels can be achieved across the continuous duty speed range and from 75% to 110% of the ISO Standard Power (continuous duty) rating. ***Contact the local Waukesha gas engine representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

Gas Engine Exhaust And Emission Levels	EN: 152888 DATE: 3/11	Ref. S 8403-6

MIRATECH
EMISSIONS SOLUTIONS

Emissions Control Equipment Specification Summary
Ref: New Mexico (Duplicate of KC-930)

APPLICATION

# of Engines:	1
Engine Operation:	*Gas Compression*
Fuel:	*Natural gas*
Lubrication Oil:	*0.6 wt% sulfated ash or less*
Engine Data:	
Engine:	*Waukesha 7044GSI*
Power Output:	*1680HP@ 1200rpm*
Design Exhaust Temp:	*1152F +/- 20 deg F*
Design Exhaust Flow Rate:	*11140 #/hr*
Catalytic Converter System Data:	
Catalytic Converter Model:	MCS-363618-14-C1
Inlet / Outlet Pipe Size:	*14"*
Overall Length:	*36"*
Diameter:	*109"*
Converter Pressure Loss:	*3.69" WC (Housing + Catalyst: Flange to Flange)*
Sound Attenuation	*25-30 dBA*
Catalyst Section Internals:	*304 SS*
Shell / Body Construction:	*CS*
Inlet / Outlet Connection:	*Standard 125# ANSI Bolt Pattern Flanges -- FF*
Instrumentation Ports:	*1 inlet / 1 outlet (1/2" NPT)*
Oxygen Sensor Ports:	*1 outlet (18 mm)*
Temperature Limits:	*750-1250° F (inlet)/1,350° F (outlet)*

EMISSION REQUIREMENTS

Exhaust Gases	Engine Outputs (gm/bhp-hr)	Reduction (%)	Converter Output (gm/bhp-hr)	Area Limits (gm/bhp-hr)
NO_x	12.8	88.3	1.50	1.50
CO	14.0	86.1	1.95	1.95
NMHC	0.25	84.0	0.04	0.04
VOC (nmnehc)	0.15	0.0	0.15	1.00
Formaldehyde	0.05	0.0	0.05	0.05
Oxygen	< 0.3 %	--	--	--

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: David Douthitt Date: 10-16-02

New Mexico Gas Company -Redonda Compressor Station

Waukesha 7042 GL

Emission Unit:	1		
Source Description:	Natural gas-fired reciprocating engine		
Manufacturer:	Waukesha		
Model:	7042 GL		
Type	Turbocharged, four-cycle, lean burn engine		
3-Year Average Operating Hours	2458.33	hrs	
Engine speed	1200	rpm	
Sea level hp	1478	hp	
Elevation	5370	msl	
Derate	4.1%		3% per 1000 ft over 4000 ft
Site hp	1417	hp	

Potential Emission Calculations

NOx	CO	VOC	SO_2 (1)		
1.5	2.65	1		g/hp-hr	Mfg. data
4.7	8.3	3.1	0.082	lb/hr	Hourly emission rate
20.5	36.3	13.7	0.4	tpy	

(1) SO_2 emissions based on fuel sulfur content of 5 gr S/100 scf, or 0.00714 lb S/Mscf.
0.00714 lb S/Mscf * fuel consumption (Mscf/hr) * 64 lb SO_2/32 lb S = lb/hr SO_2

CO2	CH4	N2O

Greenhouse Gases

Allowable Emission Calculations equal PTE (no controls)

Actual Emission Calculations (three year average)

NOx	CO	VOC	SO_2 (1)	
4.7	8.3	3.12	0.082	lb/hr
5.8	10.2	3.8	0.1	tpy

Engine BMEP

Displacement	7040	cubic in.	Mfg data
Engine BMEP	133	psia	(hp * 792,000) / (rpm * displacement)

Fuel Consumption

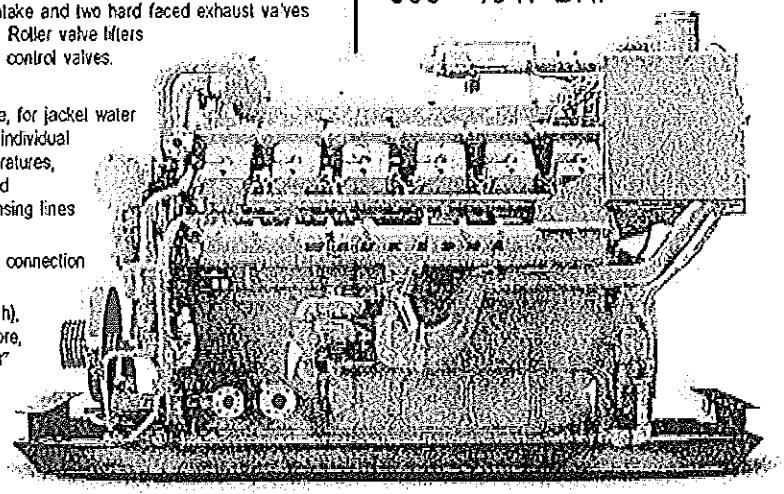
Heat Rate	7292	Btu/hp-hr	Mfg data
Fuel heat value	900	Btu/scf	Nominal; natural gas
Heat Input	10.3	MMBtu/hr	Heat Rate * hp
Fuel consumption	11.5	Mscf/hr	Heat input / fuel heat value
Annual fuel usage	101.5	MMcf/yr	8760 hrs/yr operation

Exhaust Parameters

Exhaust temp	725.0	deg F	Mfg Data
	14760.0	lb/hr	Mfg Data
Exhaust flow	7773.6	acfm	
Stack diameter	1.17	ft	Design
Exhaust velocity	120.5	ft/sec	Exhaust flow / stack area
Stack height	45	ft	Design

L7042GL

VHP™ Series Gas Engine
886 - 1547 BHP



STANDARD EQUIPMENT

AIR CLEANER – Two, dry type with rain shield and service indicator.

BARRING DEVICE – Manual

BEARINGS – Heavy duty, replaceable, precision type.

BREATHER – Closed system

CONNECTING RODS – Drop forged steel, rifle drilled

CONTROL SYSTEM – Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE – Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT – Counterweighted, forged steel, seven main bearings, and dynamically balanced

CYLINDERS – Removable wet type cylinder liners, chrome plated on outer diameter. Induction hardened.

CYLINDER HEADS – Twelve interchangeable. Two hard faced intake and two hard faced exhaust valves per cylinder. Hard faced intake and exhaust valve seat inserts. Roller valve lifters and hydraulic push rods. Includes prechamber and related fuel control valves.

ENGINE ROTATION – Counterclockwise when facing flywheel.

ENGINE MONITORING DEVICES – Engine thermocouples, K-type, for jacket water temperature, lube oil temperature, intake manifold temperature, individual cylinder exhaust temperature and a common pre turbine temperatures, one on each bank. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

EXHAUST OUTLET – Single vertical at rear. Flexible stainless steel connection with 8" (203 mm) pipe flange.

FLYWHEEL – Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88" (810 mm) pilot bore, 30.25" (768 mm) bolt circle, (12) 0.75"–10 tapped holes; or 28.88" (734 mm) pilot bore, 27.25" (692 mm) bolt circle, (12) 0.625"–11 tapped holes and (12) 0.75"–10 tapped holes.

FLYWHEEL HOUSING – No. 00 SAE.

FUEL SYSTEM – Dual natural gas, 4" (102 mm) duplex updraft carburetors. Two Fisher Model 99, 2" (51 mm) gas regulators, 30 – 50 psi (241 – 345 kPa) gas inlet pressure required. Prechamber fuel system and control logic.

GOVERNOR – Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION – Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER – Air-to-water.

LEVELING BOLTS

LIFTING EYES

LUBRICATION – Full pressure. Gear type pump. Full flow filter, 36 gallon (136 litres) capacity, not mounted. Includes flexible connections. Includes lube oil strainer, mounted on engine. Air/gas motor driven prelube pump. Requires final piping.

MANIFOLDS – Exhaust, (2) water cooled.

OIL COOLER – With thermostatic temperature controller and pressure regulating valve. Not mounted

OIL PAN – Base type. 90 gallon (340 litres) capacity including filter and cooler.

PAINT – Oilfield orange primer.

PISTONS – Aluminum with floating pin. 10.5:1 compression ratio. Oil cooled.

SHIPPING SKID – Steel for domestic truck or rail.

TURBOCHARGERS – Two, dry type. Wastegate controlled.

VIBRATION DAMPER – Two, viscous type. Guard included with remote mounted radiator or no radiator.

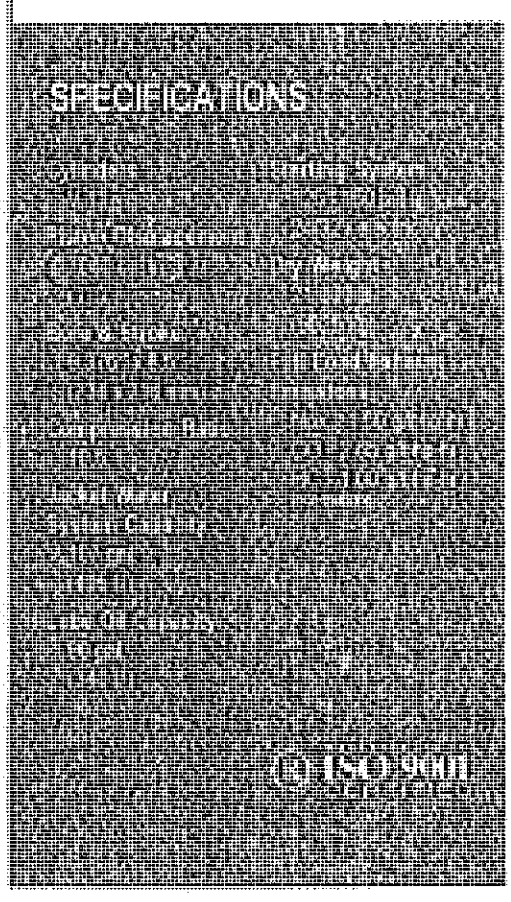
WATER CIRCULATING SYSTEM

Auxiliary Circuit – For oil cooler and intercooler. Pump is belt driven from crankshaft pulley. Includes thermostatic valve.

Engine Jacket – Belt driven water circulating pump, cluster type thermostatic temperature regulating valve, full flow bypass type. Flange connections and mating flanges for (2) 4" (102 mm) inlets and (1) 5" (127 mm) outlet.

WAUKESHA CUSTOM ENGINE CONTROL, DETONATION SENSING MODULE (DSM) – Includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Device is compatible with Waukesha CEC Ignition Module only. Sensors are mounted and wired to engine junction box. Detonation Sensing Module and filter are shipped loose. One 11 ft. cable provided for connection between engine junction box and filter. One each 15 ft. cable provided for connection between filter and DSM and Ignition Module and DSM. One 20 ft. cable provided for power and ground for filter. All cables are shipped loose. Packager is responsible for power supply and ground to the DSM. 24V DC power is required. The DSM meets Canadian Standards Association Class 1, Group D, Division 2, hazardous location requirements.

Model L7042GL Turbocharged and Intercooled, Twelve Cylinder, Lean Combustion, Four-Cycle Gas Engine



POWER RATINGS: L7042GL VHP SERIES GAS ENGINES

Model	I.C. Water Inlet Temp. °F (°C) (Tcra)	C.R.	Brake Horsepower (kWb Output) 800 rpm	900 rpm	1000 rpm	1100 rpm	1200 rpm
High Speed Turbo[1]	85° (29°)	10.5:1	928 (692)	1160 (865)	1289 (961)	1418 (1057)	1547 (1154)
High Speed Turbo[1]	130° (54°)	10.5:1	886 (661)	1108 (826)	1232 (919)	1355 (1010)	1478 (1102)
Low Speed Turbo[2]	85° (29°)	10.5:1	1031 (769)	1160 (865)	1289 (961)	— —	— —
Low Speed Turbo[2]	130° (54°)	10.5:1	985 (735)	1108 (826)	1232 (919)	— —	— —

[1]High speed turbocharger match – 1001-1200 rpm

[2]Low speed turbocharger match – 700-1000 rpm

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tcra (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP178-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV value, with a 91 Waukesha Knock Index®

For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

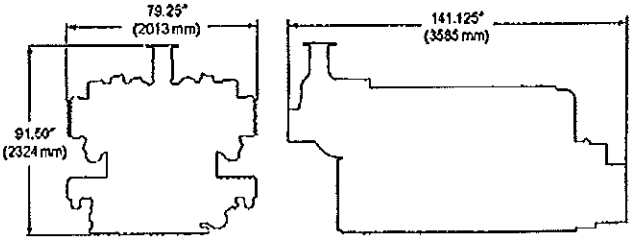
PERFORMANCE: L7042GL VHP SERIES GAS ENGINES

	English	130° F ICW		85° F ICW	
Low NO Settings	RPM	1200	1000	1200	1000
	Power (Bhp)	1478	1232	1547	1289
	BSFC (Btu/bhp-hr)	7155	6815	7180	6840
	NOx (grams/bhp-hr)	0.90	0.90	0.70	0.70
	CO (grams/bhp-hr)	2.75	2.65	2.65	2.55
	NMHC (grams/bhp--hr)	1.00	1.00	1.10	1.10
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	6910	6615	6935	6640
	NOx (grams/bhp-hr)	1.50	1.60	1.30	1.40
	CO (grams/bhp-hr)	3.00	2.75	2.90	2.65
	NMHC (grams/bhp--hr)	0.70	1.00	0.80	1.10

	Metric	54° C ICW		29° C ICW	
Low NO Settings	RPM	1200	1000	1200	1000
	Power (kWb)	1103	919	1154	962
	BSFC (kJ/kW-hr)	10124	9643	10160	9679
	NOx (g/nm³)	0.37	0.37	0.29	0.29
	CO (g/nm³)	1.14	1.10	1.10	1.05
	NMHC (g/nm³)	0.41	0.41	0.45	0.45
Low Fuel Consumption Settings	BSFC (kJ/kW-hr)	9778	9360	9813	9396
	NOx (g/nm³)	0.62	0.66	0.54	0.58
	CO (g/nm³)	1.24	1.14	1.20	1.10
	NMHC (g/nm³)	0.29	0.41	0.33	0.45

NOTES:

1) Performance ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and Tcra limited to ± 10° F
2) Fuel consumptions based on ISO 3046/1-1995 with a +5% tolerance for commercial quality natural gas having a 900 Btu/ft³ saturated low heat value.
3) Data based on standard conditions of 77° F (25° C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches Hg / 1 kPa water vapor pressure).
4) Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



DRESSER
Waukesha

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Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

Bulletin 7005 0102

AT-GL EMISSION LEVELS ‡

MODEL	CARBURETOR SETTING	GRAMS/BHP-HR				% OBSERVED DRY		MASS AFR [2]	VOLUME AFR [2]	EXCESS AIR RATIO
		NOx [1]	CO	NMHC [4]	THC	CO	O_2			
AT25GL	Standard	1.0	2.25	1.0	8.0	0.06	9.8	28.0:1	16.8:1	1.74
AT27GL	Standard	1.5	1.7	0.5	5.0	0.06	9.8	28.0:1	16.8:1	1.74
	Ultra Lean	1.25	1.5	0.4	3.5	0.05	11.2	32.0:1	19.2:1	2.00

‡ The AT-GL emission levels are based on 900 – 1000 rpm operation. For information at all other speeds contact Waukesha's Sales Engineering Department.

VHP EMISSION LEVELS

MODEL	CARBURETOR SETTING	GRAMS/BHP-HR				% OBSERVED DRY		MASS AFR [2]	VOLUME AFR [2]	EXCESS AIR RATIO
		NOx [1]	CO	NMHC [4]	THC	CO	O_2			
G, GSI	Lowest Manifold (Best Power)	8.5	32.0	0.35	2.3	1.15	0.30	15.5:1	9.3:1	0.97
	Equal NOx & CO	12.0	12.0	0.35	2.3	0.45	0.30	15.9:1	9.6:1	0.99
	Catalytic Conv. Input (3-way[3])	13.0	9.0	0.30	2.0	0.38	0.30	15.95:1	9.6:1	0.99
	Standard (Best Economy)	22.0	1.5	0.25	1.5	0.02	1.35	17.0:1	10.2:1	1.06
F3524GSI, L7044GSI	Equal NOx & CO	14.0	14.0	0.25	1.1	0.45	0.30	15.85:1	9.5:1	0.99
	Catalytic Conv. Input (3-way[3])	15.0	13.0	0.20	1.0	0.38	0.30	15.95:1	9.6:1	0.99
	Standard (Best Economy)	23.0	2.0	0.20	0.8	0.02	1.35	17.0:1	10.2:1	1.06
L5794GSI	Equal NOx & CO	13.5	13.5	0.45	3.0	0.45	0.30	15.85:1	9.5:1	0.99
	Catalytic Conv. Input (3-way[3])	14.5	11.0	0.45	2.9	0.38	0.30	15.95:1	9.6:1	0.99
	Standard (Best Economy)	22.0	3.0	0.35	2.4	0.02	1.35	17.0:1	10.2:1	1.06
GL	Standard	1.5	2.65	1.0	5.5	0.06	9.8	28.0:1	16.8:1	1.74
L5774LT*	Standard	2.8	2.0	0.60	4.0	0.04	8.0	24.7:1	14.8:1	1.54
L5794LT*	Standard	2.6	2.0	0.60	4.0	0.04	7.8	24.5:1	14.7:1	1.52

* L5774LT and L5794LT emission levels are based on 1000 – 1200 rpm operation. For information at all other speeds contact Waukesha's Sales Engineering Department.

NOTE: The above tables indicate emission levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft^3 (35.38 MJ/m^3 [25, V(0; 101.325)]) SLHV, Waukesha Knock Index™ of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Emissions are based on standard engine timing at 91 WKI™ with an absolute humidity of 42 grains/lb. Refer to engine specific WKI™ Power & Timing curves for standard timing. Unless otherwise noted these emission levels can be achieved across the continuous duty speed range and from 75% to 110% of the ISO Standard Power (continuous duty) rating. ***Contact your local Waukesha representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

FORMALDEHYDE EMISSION LEVELS

The following table provides formaldehyde (CH_2O) levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft^3 (35.38 MJ/m^3 [25, V(0; 101.325)]) SLHV, Waukesha Knock Index™ of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Values are based on standard engine timing at 91 WKI™ with an absolute humidity of 42 grains/lb. Refer to engine specific WKI™ Power & Timing curves for standard timing. Unless otherwise noted, these emission levels can be achieved across the continuous duty speed range at the load levels tabulated. ***Contact your local Waukesha representative or Waukesha's Sales Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

MODEL	CARB. SETTING	CH_2O GRAMS/ BHP-HR		% OBSERVED DRY		MASS AFR[2]	VOLUME AFR[2]	EXCESS AIR RATIO
		PERCENT LOAD		CO	O_2			
		100%	75%					
AT25GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
AT27GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
	Ultra Lean	0.18	0.20	0.05	11.2	32.0:1	19.2:1	2.00
VHP G, GSI	Rich Burn	0.05	0.05	0.02 – 1.15	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
VHP Series 4 GSI	Rich Burn	0.05	0.05	0.02 – 0.45	0.30 – 1.35	15.85:1 – 17.0:1	9.5:1 – 10.2:1	0.99 – 1.06
L5774LT L5794LT	Lean Burn	0.22	0.25	0.04	7.8 – 8.0	24.5:1 – 24.7:1	14.7:1 – 14.8:1	1.52 – 1.54
VHP GL	Lean Burn	0.29	0.34	0.06	9.8	28.0:1	16.8:1	1.74
VGF G, GSID	Rich Burn	0.05	0.05	0.20 – 1.1	0.18 – 2.4	15.5:1 – 18.0:1	9.3:1 – 10.8:1	0.97 – 1.12
VGF GL, GLD, GLD/2	Lean Burn	0.19	0.22	0.03 – 0.04	7.8 – 9.0	21.5:1 – 25.4:1	13.9:1 – 15.2:1	1.53 – 1.65
VSG G, GSI, GSID	Rich Burn	0.05	0.05	0.02 – 1.15	0.29 – 2.10	15.5:1 – 17.7:1	9.3:1 – 10.8:1	0.97 – 1.10
F1197G	Rich Burn	0.05	0.05	0.04 – 1.35	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
F817G	Rich Burn	0.05	0.05	0.04 – 1.30	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06

HEAT BALANCE 3

HEAT REJECTION AND OPERATING DATA
MODEL 7042GL
130° F (54° C) I.C. WATER TEMPERATURE
WITH LOW FUEL PRESSURE SYSTEM (1) (2)

1000 RPM	BMEP (psi)	1000 RPM
POWER (BHP)	152	1356
	138	1231
	125	1111
	100	889
	75	667
	50	444
BRAKE SPECIFIC FUEL CONSUMPTION (BTU/BHP-HR)	152	6944
	138	7062
	125	7202
	100	7561
	75	8159
	50	9355
FUEL CONSUMPTION (BTU/HR x 1000)	152	9410
	138	8695
	125	8005
	100	6720
	75	5440
	50	4160
HEAT TO JACKET WATER (BTU/HR x 1000)	152	2515
	138	2350
	125	2185
	100	1850
	75	1580
	50	1277
HEAT TO LUBE OIL (BTU/HR x 1000)	152	354
	138	337
	125	319
	100	287
	75	256
	50	224

1000 RPM	BMEP (psi)	1000 RPM
HEAT TO INTERCOOLER (BTU/HR x 1000)	152	440
	138	382
	125	328
	100	231
	75	140
	50	55
HEAT TO RADIATION (BTU/HR x 1000)	152	307
	138	302
	125	299
	100	295
	75	292
	50	288
EXHAUST TEMPERATURE AFTER TURBINE (+/- 50° F)	152	703
	138	692
	125	685
	100	676
	75	671
	50	663
INDUCTION AIR FLOW (SCFM)	152	2880
	138	2760
	125	2603
	100	2250
	75	1875
	50	1470
EXHAUST GAS FLOW (LB/HR) (4)	152	13240
	138	12400
	125	11570
	100	9985
	75	8305
	50	6520

1200 RPM	BMEP (psi)	1200 RPM
POWER (BHP)	132	1406
	120	1280
	100	1067
	75	800
	50	533
BRAKE SPECIFIC FUEL CONSUMPTION (BTU/BHP-HR)	132	7292
	120	7431
	100	7747
	75	8378
	50	9635
FUEL CONSUMPTION (BTU/HR x 1000)	132	10265
	120	9515
	100	8265
	75	6705
	50	5140
HEAT TO JACKET WATER (BTU/HR x 1000)	132	2720
	120	2545
	100	2260
	75	1905
	50	1550
HEAT TO LUBE OIL (BTU/HR x 1000)	132	396
	120	378
	100	348
	75	310
	50	273

1200 RPM	BMEP (psi)	1200 RPM
HEAT TO INTERCOOLER (BTU/HR x 1000)	132	682
	120	604
	100	384
	75	251
	50	138
HEAT TO RADIATION (BTU/HR X 1000)	132	325
	120	328
	100	321
	75	311
	50	308
EXHAUST TEMPERATURE AFTER TURBINE (+/- 50° F)	132	725
	120	726
	100	716
	75	697
	50	693
INDUCTION AIR FLOW (SCFM)	132	3325
	120	3085
	100	2705
	75	2250
	50	1795
EXHAUST GAS FLOW (LB/HR) (4)	132	14780
	120	13700
	100	12015
	75	9985
	50	7950

NOTES:

1. *All data are based on standard conditions of 100 kPa (29.54 inches Hg.) barometric pressure, 25° C (77° F) ambient and induction air temperature, 30% relative humidity (1 kPa/0.3 inches Hg. water vapor pressure) and 82° C (180° F) engine jacket water outlet temperature, and standard ignition timing.*
2. *Data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions and with changes to ignition timing. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines S6639-6.*
3. *For heat rejection changes due to engine jacket water outlet temperature different from standard (Note 1), refer to S7813-2.*
4. *Exhaust flow, ACFM = $\frac{\text{Exh. Flow, lb/hr} \times (\text{Exh. Temp, °F} + 460)}{2275}$*
5. *Reference C976-18.*
6. *Low pressure (draw thru) fuel system.*

Waukesha PRESTOLITE	HEAT REJECTION AND OPERATING DATA MODEL 7042GL 130° F (54° C) I.C. WATER TEMPERATURE WITH LOW FUEL PRESSURE SYSTEM	EN 112022 DATE 10/93	Ref: S 6124-49

Storage Tanks

Emission units: Tanks
Number of Tanks 4

Used Oil Tank

Volume	63	bbl
Height (shell)	5	ft
Diameter	10	ft
Throughput	2	bbl/day

Uncontrolled Emissions

	VOCs		
VOCs	0.075	lb/hr	Tanks 4.09d
	0.33	ton/yr	

	HAPs		
HAPs	0.002327626	lb/hr	Tanks 4.09d
	0.010	ton/yr	

Ethylene Glycol Tank

Volume	137	bbl
Height	20	ft
Diameter	7	ft
Throughput	4	bbl/day

Uncontrolled Emissions

	VOCs		
VOCs	Negligible	lb/hr	Tanks 4.09d
	Negligible	ton/yr	

	HAPs		
HAPs	1.3973E-03	lb/hr	Tanks 4.09d
	2.55E-04	ton/yr	

Wastewater Tank

Not a source of air emissions.

Mercaptan Tank

Pressurized storage vessel. Not a source of air emissions.

Pipeline Liquids Tank

Volume	47	bbl
Height (shell	10	ft
Diameter	6	ft
Throughput	1	bbl/day

Uncontrolled Emissions

	VOCs		
VOCs	0.041	lb/hr	E&P Tanks
	0.179725	ton/yr	

	HAPs		
HAPs	Negligible	lb/hr	E&P Tanks
	0.01	ton/yr	

Emissions Summary

HAPs (lb/hr)	*HAPs (tpy)*	*VOC (lb/hr*	*VOC (tpy)*
3.7249E-03	0.010	0.116	0.51

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

Identification

User Identification:	Redonda Compressor Station
City:	
State:	New Mexico
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	Unit 4- Pipeline Liquids

Tank Dimensions

Shell Height (ft):	9.46
Diameter (ft):	6.00
Liquid Height (ft) :	9.40
Avg. Liquid Height (ft):	4.73
Volume (gallons):	1,988.17
Turnovers:	10.00
Net Throughput(gal/yr):	19,881.70
Is Tank Heated (y/n):	N

Paint Characteristics

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

Roof Characteristics

Type:	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

Redonda Compressor Station - Vertical Fixed Roof Tank

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 Frad.	Vapor Mass Frad.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	71.00	54.97	87.02	60.49	3.5556	2.6047	4.7659	50.0000			207.00	Option 4: RVP=5
1,2,4-Trimethylbenzene						0.0314	0.0167	0.0564	120.1900	0.0033	0.0001	120.19	Option 2: A=7.04383, B=1573.287, C=208.56
Benzene						1.5722	1.0142	2.3527	78.1100	0.0060	0.0110	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.6197	1.0555	2.4117	84.1600	0.0070	0.0132	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1576	0.0909	0.2624	106.1700	0.0040	0.0007	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.5292	1.6762	3.7081	86.1700	0.0040	0.0118	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane									114.2200	0.0010	0.0000	114.22	
Isopropyl benzene						0.0718	0.0398	0.1242	120.2000	0.0010	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.4609	0.2818	0.7281	92.1300	0.0100	0.0054	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8888	3.8158	3.8360	49.0578	0.9497	0.9558	220.76	
Xylene (-m)						0.1317	0.0756	0.2205	106.1700	0.0140	0.0021	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)

Redonda Compressor Station - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	296.3338
Vapor Space Volume (cu ft):	135.5047
Vapor Density (lb/cu ft):	0.0312

Vapor Space Expansion Factor:	0.3652
Vented Vapor Saturation Factor:	0.5255
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	135.5047
Tank Diameter (ft):	6.0000
Vapor Space Outage (ft):	4.7925
Tank Shell Height (ft):	9.4600
Average Liquid Height (ft):	4.7300
Roof Outage (ft):	0.0625
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0625
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	3.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0312
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5556
Daily Avg. Liquid Surface Temp. (deg. R):	530.6665
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):	520.1642
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.3652
Daily Vapor Temperature Range (deg. R):	64.0977
Daily Vapor Pressure Range (psia):	2.1612
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5556
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.6047
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.7659
Daily Avg. Liquid Surface Temp. (deg R):	530.6665
Daily Min. Liquid Surface Temp. (deg R):	514.6421
Daily Max. Liquid Surface Temp. (deg R):	548.6909
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.5255
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	3.5556
Vapor Space Outage (ft):	4.7925
Working Losses (lb):	63.1169
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5556
Annual Net Throughput (gal/yr.):	19,881.6961
Annual Turnovers:	10.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,988.1696
Maximum Liquid Height (ft):	9.4000
Tank Diameter (ft):	6.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	359.4507

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

Emissions Report for: Annual

Redonda Compressor Station - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	63.12	296.33	359.45
Hexane (-n)	0.74	3.49	4.23
Benzene	0.69	3.25	3.95
Isooctane	0.00	0.00	0.00
Toluene	0.34	1.59	1.93
Ethylbenzene	0.05	0.22	0.26
Xylene (-m)	0.14	0.64	0.77
Isopropyl benzene	0.01	0.02	0.03
1,2,4-Trimethylbenzene	0.01	0.04	0.04
Cyclohexane	0.83	3.91	4.75
Unidentified Components	60.31	283.17	343.49

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

Identification

User Identification:	Redonda Compressor Station1
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ethylene Glycol

Tank Dimensions

Shell Height (ft):	20.85
Diameter (ft):	7.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.42
Volume (gallons):	5,757.70
Turnovers:	10.00
Net Throughput(gal/yr):	57,577.02
Is Tank Heated (y/n):	N

Paint Characteristics

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

Roof Characteristics

Type:	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

Redonda Compressor Station1 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethylene Glycol	All	71.00	54.97	87.02	60.49	0.0019	0.0009	0.0039	62.0700			62.07	Option 2: A=8.7945, B=2615.4, C=244.91

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

Redonda Compressor Station1 - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.3471
Vapor Space Volume (cu ft):	404.1996
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.1161
Vented Vapor Saturation Factor:	0.9990
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	404.1996
Tank Diameter (ft):	7.0000
Vapor Space Outage (ft):	10.5029
Tank Shell Height (ft):	20.8500
Average Liquid Height (ft):	10.4200
Roof Outage (ft):	0.0729
Roof Outage (Cone Roof)	

Roof Outage (ft):	0.0729
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	3.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	62.0700
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0019
Daily Avg. Liquid Surface Temp. (deg. R):	530.6685
Daily Average Ambient Temp. (deg. F):	58.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	520.1642
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1161
Daily Vapor Temperature Range (deg. R):	64.0977
Daily Vapor Pressure Range (psia):	0.0030
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0019
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0009
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0039
Daily Avg. Liquid Surface Temp. (deg R):	530.6685
Daily Min. Liquid Surface Temp. (deg R):	514.6421
Daily Max. Liquid Surface Temp. (deg R):	546.6909
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vaper Saturation Factor	
Vented Vapor Saturation Factor:	0.9990
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0019
Vapor Space Outage (ft):	10.5029
Working Losses (lb):	0.1584
Vapor Molecular Weight (lb/lb-mole):	62.0700
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0019
Annual Net Throughput (gal/yr.):	57,577.0160
Annual Turnovers:	10.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	5,757.7016
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	7.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.5054

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

Emissions Report for: Annual

Redonda Compressor Station1 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethylene Glycol	0.16	0.35	0.51

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

Identification

User Identification:	Redonda
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tenk
Description:	Unit 1- Used Oil Tank

Tank Dimensions

Shell Height (ft):	5.00
Diameter (ft):	10.00
Liquid Height (ft) :	4.75
Avg. Liquid Height (ft):	2.50
Volume (gallons):	2,643.84
Turnovers:	10.00
Net Throughput(gal/yr):	26,438.43
Is Tank Heated (y/n):	N

Paint Characteristics

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

Roof Characteristics

Type:	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

Redonda - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	71.00	54.97	87.02	60.49	3.5556	2.6047	4.7859	50.0000			207.00	Option 4: RVP=5
1,2,4-Trimethylbenzene						0.0314	0.0167	0.0584	120.1900	0.0033	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.5722	1.0142	2.3627	78.1100	0.0060	0.0110	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.6197	1.0555	2.4117	84.1600	0.0070	0.0132	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1576	0.0909	0.2624	106.1700	0.0040	0.0007	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.5292	1.6762	3.7081	86.1700	0.0040	0.0118	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane									114.2200	0.0010	0.0000	114.22	
Isopropyl benzene						0.0718	0.0398	0.1242	120.2000	0.0010	0.0001	120.20	Option 2: A=6.93868, B=1460.793, C=207.78
Toluene						0.4609	0.2818	0.7281	92.1300	0.0100	0.0054	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8888	3.8156	3.8360	49.0578	0.9497	0.9556	220.76	
Xylene (-m)						0.1317	0.0758	0.2205	106.1700	0.0140	0.0021	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)

Redonda - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	571.0160
Vapor Space Volume (cu ft):	204.5308
Vapor Density (lb/cu ft):	0.0312

Vapor Space Expansion Factor:	0.3652
Vented Vapor Saturation Factor:	0.6708
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	204.5308
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	2.6042
Tank Shell Height (ft):	5.0000
Average Liquid Height (ft):	2.5000
Roof Outage (ft):	0.1042
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1042
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0625
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0312
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5556
Daily Avg. Liquid Surface Temp. (deg. R):	530.6665
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):	520.1842
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3187
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.3652
Daily Vapor Temperature Range (deg. R):	64.0977
Daily Vapor Pressure Range (psia):	2.1612
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5558
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.6047
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.7659
Daily Avg. Liquid Surface Temp. (deg R):	530.6665
Daily Min. Liquid Surface Temp. (deg R):	514.8421
Daily Max. Liquid Surface Temp. (deg R):	546.6909
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6708
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	3.5556
Vapor Space Outage (ft):	2.6042
Working Losses (lb):	83.9321
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.5556
Annual Net Throughput (gal/yr.):	26,438.4257
Annual Turnovers:	10.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	2,643.8426
Maximum Liquid Height (ft):	4.7500
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	654.9501

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

Emissions Report for: Annual

Redonda - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Xylene (-m)	0.18	1.23	1.41
Isopropyl benzene	0.01	0.05	0.05
1,2,4-Trimethylbenzene	0.01	0.07	0.08
Cyclohexane	1.11	7.54	8.65
Unidentified Components	80.20	545.66	625.86
Crude oil (RVP 5)	83.93	571.02	654.95
Hexane (-n)	0.99	6.73	7.71
Benzene	0.92	6.27	7.19
Isooctane	0.00	0.00	0.00
Toluene	0.45	3.06	3.52
Ethylbenzene	0.06	0.42	0.48

New Mexico Gas Company --Redonda Compressor Station

Unit 3 - Baldor/GM 2.0 Electric Generator

EMISSION CALCULATION FOR CO and NOx

Rate (lb/hr) = Multiply EF (g/kW-hr) by Rating (kW) and divide by 453.6 to convert g to lb

1 lb = 453.60 gm

Rating (kW)	Emission Factor (EF) Sea Level		Emission Rate (lb/hr)		Uncontrolled Emissions 500 hr	
	NOX + THC (g/kw-h	CO (g/kW-hr)	NOx (lb/hr)	CO (lb/hr)	NOx (ton/yr	CO (ton/yr)
37.90	7.22	29.47	0.60	2.46	0.15	0.62

The manufacturer specifies deration rate of 3% every 1000' above sea level.

Altitude at Redonda is ~5370 ft and a deration of 12% is applied

Derated Rating (kW)	Emission Factor		Derated Emission Rate (lb/hr)		Derated Uncontrolled	
	NOX + THC (g/kw-h	CO (g/kW-hr)	NOx (lb/hr)	CO (lb/hr)	NOx (ton/yr	CO (ton/yr)
33.35	7.22	29.47	0.53	2.17	0.13	0.54

Calculations Basis: Manufacturer's data used for CO and NOx emission factors (see page 13 of 27 in manufacturer's data)

Note: SO_2, VOC and VOC rates from EPA AP42 - Table 3.2-3.

Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines

Pollutant	EF (lb/MMBTU)	Emission Rate (lb/hr	Emission Rate (tpy)
SO_2	0.000588	0.00002	0.00001
VOC	0.0296	0.00103	0.00026
PM	0.00991	0.00035	0.00009

PM = TSP; for this facility and this unit, emissions of PM = PM10 = PM2.5

1 MMBtu = 1020.0 MMScf (per AP-42)

emission rate (lb/hr = (EF lb/MMBtu * 1020 MMBtu/MMScf * 0.3 MMScf/ year) /8760 hr/year

Fuel consumption = 0.30 MMScf/yr

Fuel Type Pipeline quality natural gas

Stack Velocity Calculation

Flow Rate	250	cf/m
Flow Rate	4.17	cf/s
diameter	0.21	ft
Area	0.03	ft^2
Velocity	122.23	ft/s

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PSI 2009 Stationary 60 Hz Emergency "Stand-by[1]" Certified Power Generation Rating Data

Engine	Speed	Freq	Fuel	Duty Cycle	Flywheel power[2,3]		Fan loss		Generator Loss			Electrical Rating[4]		Certification Spec	THC+NOx	CO	bsfc[5]	Catalyst
	RPM	Hz			HP	kW	HP	kW	Efficiency	HP	kW	HP	kW		(g/KW-hr)	(g/kW-hr)	(g/kW-hr)	
1.6L	1800	60	LP	Emergency	27.5	20.5	2	1.5	87%	3.6	2.7	22.0	16.4	40 CFR Part 60 / 90	8.2	39.16	256.2	No
1.6L	1800	60	NG	Emergency	25.0	18.6	2	1.5	87%	3.3	2.4	19.8	14.7	40 CFR Part 60 / 90	6.89	33.7	243.6	No
1.6L	3600	60	LP	Emergency	56.5	42.1	3	2.2	87%	7.3	5.5	46.1	34.4	40 CFR Part 60 / 90	9.14	44.84	266.1	No
1.6L	3600	60	NG	Emergency	52.5	39.1	3	2.2	87%	6.8	5.1	42.7	31.8	40 CFR Part 60 / 90	6.6	37.44	250.8	No
3.0L	1800	60	LP	Emergency	51.5	38.4	3	2.2	87%	6.7	5.0	41.8	31.2	40 CFR Part 60 / 90	9.93	32.66	265.0	No
3.0L	1800	60	NG	Emergency	50.8	37.9	3	2.2	87%	6.6	4.9	41.2	30.7	40 CFR Part 60 / 90	7.22	29.47	255.9	No
4.3L	1800	60	LP	Emergency	71.4	53.2	4.5	3.4	90%	7.1	5.3	59.8	44.6	40 CFR Part 60 / 90	8.17	32.02	234.1	No
4.3L	1800	60	NG	Emergency	66.5	49.6	4.5	3.4	90%	6.7	5.0	55.4	41.3	40 CFR Part 60 / 90	7.03	21.96	225.7	No
5.0L	1800	60	LP	Emergency	88.3	65.8	4.5	3.4	90%	8.8	6.6	74.9	55.9	40 CFR Part 60 / 90	8.68	39.68	248.2	No
5.0L	1800	60	NG	Emergency	83.4	62.2	4.5	3.4	90%	8.3	6.2	70.6	52.6	40 CFR Part 60 / 90	7.72	31.57	238.6	No
5.7L	1800	60	LP	Emergency	113.2	84.4	4.5	3.4	90%	11.3	8.4	97.3	72.6	40 CFR Part 60 / 90	9.66	29.61	232.1	No
5.7L	1800	60	NG	Emergency	104.7	78.1	4.5	3.4	90%	10.5	7.8	89.7	66.9	40 CFR Part 60 / 90	7.72	26.73	229.4	No
8.1L	1800	60	LP	Emergency	164.4	122.6	8.5	6.3	92%	13.2	9.8	142.8	106.5	40 CFR Part 60 & 1048	0.1	0.59	224.0	Yes
8.1L	1800	60	NG	Emergency	155.2	115.7	8.5	6.3	92%	12.4	9.3	134.2	100.1	40 CFR Part 60 & 1048	0.17	0.23	222.8	Yes
8.1L T	1800	60	LP	Emergency	178.9	133.4	11.5	8.6	92%	14.3	10.7	153.1	114.2	40 CFR Part 60 & 1048	0.343	0.175	-	Yes
8.1L T	1800	60	NG	Emergency	202.0	150.6	11.5	8.6	92%	16.2	12.1	174.3	130.0	40 CFR Part 60 & 1048	0.166	0.417	-	Yes
8.1L CAC	1800	60	LP	Emergency	199.0	148.4	14	10.4	92%	15.9	11.9	169.1	126.1	40 CFR Part 60 & 1048	0.343	0.175	243.8	Yes
8.1L CAC	1800	60	NG	Emergency	238.0	177.5	14	10.4	92%	19.0	14.2	205.0	152.8	40 CFR Part 60 & 1048	0.166	0.417	221.5	Yes

[1] Standby and overload ratings based on ISO3046. Continuous ratings based on ISO 8528.
[2] All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.
[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.
[4] Electrical ratings are an estimated based on assumed fan and generator losses and may vary depending on actual equipment losses.
[5] Bsfc is based on 100% gross flywheel power rating and does not include fan or generator losses.

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Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2011.R.01

Today's date 3/26/2013

Use one spreadsheet for each fuel. Make additional copies as needed.

This spreadsheet is protected and contains locked cells to ensure that you do not inadvertently alter any of the included formulas and/or calculations. To remove this protection and alter this spreadsheet, right-click the "worksheet" tab near the bottom of the screen and select "Unprotect Sheet." When prompted for the password, type "GHG" and click "OK." Please note that making changes to an unprotected sheet could result in incorrect calculations and that you are responsible for the accuracy of the data you report to EPA. For additional help, visit the Microsoft Excel Support website (http://office.microsoft.com/en-us/excel-help).

Equation C-1:

$$CO_2 = 1x10^{-3} * Fuel * HHV * EF$$

Equation C-8:

$$CH_4 \text{ or } N_2O = 1x10^{-3} * Fuel * HHV * EF$$

Facility Name:	Redonda Compressor Station
Reporter Name:	New Mexico Gas Company
Unit or Group Name/ ID:	
Configuration Type:	
Fuel/ Fuel Type:	Natural Gas
Reporting Period:	
Comments:	
Unit Type:	General Stationary Fuel Combustion

Fuel Input Data

[Fuel] = Mass or volume of fuel combusted per year, from company records as defined in §98.6 (express mass in short tons for solid fuel, volume in standard cubic feet for gaseous fuel, and volume in gallons for liquid fuel)	221,829,885.584
[HHV] = Default High heat value of the fuel, from Table C-1 (mmBtu/mass or mmBtu/volume)	0.00103

Constants

[1×10^{-3}] = Conversion Factor from kg to metric tons (constant)	0.001

Annual CO_2 Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-1

Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2011.R.01

Today's date 3/28/2013

[EF] = Fuel-Specific Default CO_2 Emission Factor, from Table C-1 (kg CO_2/mmBtu)	53.02
[CO_2] = Annual CO_2 emissions from combustion of the specified fuel (metric tons)	12090.7403086

Enter this value in e-GGRT

Annual CH_4 Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for CH_4, from Table C-2 (kg CH_4/mmBtu)	0.001
[CH_4] = Annual CH_4 emissions from combustion of the specified fuel (metric tons)	0.2280411

Note: If you are reporting CH_4 emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

Annual N_2O Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for N_2O, from Table C-2 (kg N_2O/mmBtu)	0.0001
[N_2O] = Annual N_2O emissions from combustion of the specified fuel (metric tons)	0.0228041

Note: If you are reporting N_2O emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

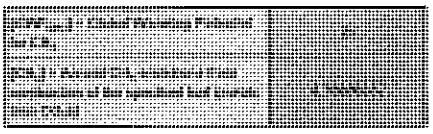
Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2011.R.01

Today's date 3/26/2013

INFORMATION ONLY: Annual CH_4 Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO_2e)



INFORMATION ONLY: Annual N_2O Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO_2e)

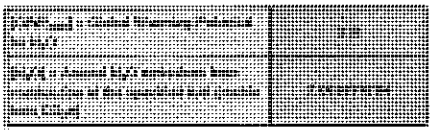


Table C-1 to Subpart C - Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel

Fuel Type	Default High Heat Value	Default CO_2 Emission Factor
Coal and Coke	mmBtu/short ton	kg CO_2 /mmBtu
Anthracite	25.09	103.54
Bituminous	24.93	93.40
Subbituminous	17.25	97.02
Lignite	14.21	96.36
Coke	24.80	102.04
Mixed (Commercial sector)	21.39	95.26
Mixed (Industrial coking)	26.28	93.65
Mixed (Industrial sector)	22.35	93.91
Mixed (Electric Power sector)	19.73	94.38
Natural Gas	mmBtu/scf	kg CO_2 /mmBtu
(Weighted U.S. Average)	1.028E-03	53.02
Petroleum Products	mmBtu/gallon	kg CO_2 /mmBtu
Distillate Fuel Oil No. 1	0.139	73.25
Distillate Fuel Oil No. 2	0.138	73.96
Distillate Fuel Oil No. 4	0.146	75.04
Residual Fuel Oil No. 5	0.140	72.93
Residual Fuel Oil No. 6	0.150	75.10
Used Oil	0.135	74.00
Kerosene	0.135	75.20
Liquefied petroleum gases (LPG)	0.092	62.98
Propane	0.091	61.46
Propylene	0.091	65.95
Ethane	0.069	62.64
Ethanol	0.084	68.44
Ethylene	0.100	67.43
Isobutane	0.097	64.91
Isobutylene	0.103	67.74
Butane	0.101	65.15
Butylene	0.103	67.73
Naphtha (<401 deg F)	0.125	68.02
Natural Gasoline	0.110	66.83
Other Oil (>401 deg F)	0.139	76.22
Pentanes Plus	0.110	70.02
Petrochemical Feedstocks	0.129	70.97
Petroleum Coke	0.143	102.41
Special Naphtha	0.125	72.34
Unfinished Oils	0.139	74.49
Heavy Gas Oils	0.148	74.92
Lubricants	0.144	74.27
Motor Gasoline	0.125	70.22
Aviation Gasoline	0.120	69.25
Kerosene-Type Jet Fuel	0.135	72.22

Table C-1 to Subpart C - Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel

Fuel Type	Default High Heat Value	Default CO_2 Emission Factor
Asphalt and Road Oil	0.158	75.36
Crude Oil	0.138	74.49
Other Fuels (Solid)	**mmBtu/short ton**	**kg CO_2 /mmBtu**
Municipal Solid Waste[1]	9.95	90.70
Tires	26.87	85.97
Plastics	38.00	75.00
Petroleum Coke	30.00	102.41
Other Fuels (Gaseous)	**mmBtu/scf**	**kg CO_2 /mmBtu**
Blast Furnace Gas	9.20E-05	274.32
Coke Oven Gas	5.99E-04	46.85
Propane Gas	2.52E-03	61.46
Fuel Gas [2]	1.39E-03	59.00
Biomass Fuels - Solid	**mmBtu/short ton**	**kg CO_2 /mmBtu**
Wood and Wood Residuals	15.38	93.80
Agricultural Byproducts	8.25	118.17
Peat	8.00	111.84
Solid Byproducts	25.83	105.51
Biomass Fuels - Gaseous	**mmBtu/scf**	**kg CO_2 /mmBtu**
Biogas (Captured methane)	8.41E-04	52.07
Biomass Fuels - Liquid	**mmBtu/gallon**	**kg CO_2 /mmBtu**
Ethanol	0.084	68.44
Biodiesel	0.128	73.84
Rendered Animal Fat	0.125	71.06
Vegetable Oil	0.120	81.55

[1] Use of this default HHV is allowed only for: (a) units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.

[2] Reporters subject to subpart X of this part that are complying with §98.243(d) or subpart Y of this part may only use the default HHV and the default CO_2 emission factor for fuel gas combustion under the conditions prescribed in §98.243(d)(2)(i) and (d)(2)(ii) and §98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.

Table C-2 to Subpart C - Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Fuel Type	Default CH_4 Emission Factor (kg CH_4/mmBtu)	Default N_2O Emission Factor (kg N_2O/mmBtu)
Coal and Coke (All fuel types in Table C-1)	1.1E-02	1.6E-03
Natural Gas	1.0E-03	1.0E-04
Petroleum (All fuel types in Table C-1)	3.0E-03	6.0E-04
Municipal Solid Waste	3.2E-02	4.2E-03
Tires	3.2E-02	4.2E-03
Blast Furnace Gas	2.2E-05	1.0E-04
Coke Oven Gas	4.8E-04	1.0E-04
Biomass Fuels - Solid (All fuel types in Table C-1)	3.2E-02	4.2E-03
Biogas	3.2E-03	6.3E-04
Biomass Fuels - Liquid (All fuel types in Table C-1)	1.1E-03	1.1E-04

Note: Those employing this table are assumed to fall under the IPCC definitions of the "Energy Industry" or "Manufacturing Industries and Construction". In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC "Energy Industry" category may employ a value of 1 g of CH4/mmBtu.

GRI-HAPCalc ® 3.01
Engines Report

Facility ID:	**NMGC**	**Notes:**
Operation Type:	**COMPRESSOR STATION**	
Facility Name:	**NMGC**	
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: BALDOR/GM

Hours of Operation:	8,760 Yearly
Rate Power:	51 hp
Fuel Type:	NATURAL GAS
Engine Type:	4-Stroke, Rich Burn
Emission Factor Set:	FIELD > EPA > LITERATURE
Additional EF Set:	-NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Formaldehyde	0.0489	0.09942890 g/bhp-hr	GRI Field
Methanol	0.0098	0.02000000 g/bhp-hr	GRI Field
Acetaldehyde	0.0045	0.00920800 g/bhp-hr	EPA
1,3-Butadiene	0.0011	0.00218810 g/bhp-hr	EPA
Acrolein	0.0043	0.00867990 g/bhp-hr	EPA
Benzene	0.0026	0.00521450 g/bhp-hr	EPA
Toluene	0.0009	0.00184160 g/bhp-hr	EPA
Ethylbenzene	0.0000	0.00008180 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0003	0.00064360 g/bhp-hr	EPA
Styrene	0.0000	0.00003930 g/bhp-hr	EPA
Naphthalene	0.0002	0.00032050 g/bhp-hr	EPA
Ethylene Dibromide	0.0000	0.00007030 g/bhp-hr	EPA
Vinyl Chloride	0.0000	0.00002370 g/bhp-hr	EPA
Methylene Chloride	0.0001	0.00013600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0000	0.00003730 g/bhp-hr	EPA
1,3-Dichloropropene	0.0000	0.00004190 g/bhp-hr	EPA
Chlorobenzene	0.0000	0.00004260 g/bhp-hr	EPA
Chloroform	0.0000	0.00004520 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0000	0.00005050 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0000	0.00008350 g/bhp-hr	EPA
Carbon Tetrachloride	0.0000	0.00005840 g/bhp-hr	EPA
Total	0.0727		

Criteria Pollutants			
PM	0.0315	0.06405970 g/bhp-hr	EPA
CO	7.1344	14.50000000 g/bhp-hr	GRI Field
NMEHC	0.0481	0.09769010 g/bhp-hr	EPA
NOx	9.0041	18.30000000 g/bhp-hr	GRI Field
SO2	0.0010	0.00194060 g/bhp-hr	EPA
Other Pollutants			
Butryaldehyde	0.0001	0.00016040 g/bhp-hr	EPA
Methane	0.3735	0.75907880 g/bhp-hr	EPA
Ethane	0.1143	0.23234410 g/bhp-hr	EPA
1,2-Dichloroethane	0.0000	0.00003730 g/bhp-hr	EPA
1,2-Dichloropropane	0.0000	0.00004290 g/bhp-hr	EPA
CO2	178.6241	363.03769350 g/bhp-hr	EPA

Unit Name: L 7044 GSI

Hours of Operation: 8,760 Yearly

Rate Power: 1,680 hp

Fuel Type: NATURAL GAS

Engine Type: 4-Stroke, Rich Burn

Emission Factor Set: FIELD > EPA > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Formaldehyde	1.6115	0.09942890 g/bhp-hr	GRI Field
Methanol	0.3242	0.02000000 g/bhp-hr	GRI Field
Acetaldehyde	0.1492	0.00920800 g/bhp-hr	EPA
1,3-Butadiene	0.0355	0.00218810 g/bhp-hr	EPA
Acrolein	0.1407	0.00867990 g/bhp-hr	EPA
Benzene	0.0845	0.00521450 g/bhp-hr	EPA
Toluene	0.0298	0.00184160 g/bhp-hr	EPA
Ethylbenzene	0.0013	0.00008180 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0104	0.00064360 g/bhp-hr	EPA
Styrene	0.0006	0.00003930 g/bhp-hr	EPA
Naphthalene	0.0052	0.00032050 g/bhp-hr	EPA
Ethylene Dibromide	0.0011	0.00007030 g/bhp-hr	EPA
Vinyl Chloride	0.0004	0.00002370 g/bhp-hr	EPA
Methylene Chloride	0.0022	0.00013600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0006	0.00003730 g/bhp-hr	EPA
1,3-Dichloropropene	0.0007	0.00004190 g/bhp-hr	EPA
Chlorobenzene	0.0007	0.00004260 g/bhp-hr	EPA
Chloroform	0.0007	0.00004520 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0008	0.00005050 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0014	0.00008350 g/bhp-hr	EPA
Carbon Tetrachloride	0.0009	0.00005840 g/bhp-hr	EPA
Total	2.4024		
Criteria Pollutants			
PM	1.0383	0.06405970 g/bhp-hr	EPA
CO	235.0150	14.50000000 g/bhp-hr	GRI Field
NMEHC	1.5834	0.09769010 g/bhp-hr	EPA

NOx	296.6051	18.30000000 g/bhp-hr	GRI Field
SO2	0.0315	0.00194060 g/bhp-hr	EPA

Other Pollutants

Butryaldehyde	0.0026	0.00016040 g/bhp-hr	EPA
Methane	12.3031	0.75907880 g/bhp-hr	EPA
Ethane	3.7658	0.23234410 g/bhp-hr	EPA
1,2-Dichloroethane	0.0006	0.00003730 g/bhp-hr	EPA
1,2-Dichloropropane	0.0007	0.00004290 g/bhp-hr	EPA
CO2	5,884.0893	363.03769350 g/bhp-hr	EPA

Unit Name: L7042GL

Hours of Operation: 8,760 Yearly

Rate Power: 1,478 hp

Fuel Type: NATURAL GAS

Engine Type: 4-Stroke, Lean Burn

Emission Factor Set: EPA > FIELD > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Tetrachloroethane	0.0001	0.00000820 g/bhp-hr	EPA
Formaldehyde	2.4848	0.17425810 g/bhp-hr	EPA
Methanol	0.1177	0.00825090 g/bhp-hr	EPA
Acetaldehyde	0.3934	0.02759090 g/bhp-hr	EPA
1,3-Butadiene	0.0126	0.00088120 g/bhp-hr	EPA
Acrolein	0.2419	0.01696380 g/bhp-hr	EPA
Benzene	0.0207	0.00145220 g/bhp-hr	EPA
Toluene	0.0192	0.00134650 g/bhp-hr	EPA
Ethylbenzene	0.0019	0.00013100 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0087	0.00060730 g/bhp-hr	EPA
2,2,4-Trimethylpentane	0.0118	0.00082510 g/bhp-hr	EPA
n-Hexane	0.0522	0.00366340 g/bhp-hr	EPA
Phenol	0.0011	0.00007920 g/bhp-hr	EPA
Styrene	0.0011	0.00007790 g/bhp-hr	EPA
Naphthalene	0.0035	0.00024550 g/bhp-hr	EPA
2-Methylnaphthalene	0.0016	0.00010960 g/bhp-hr	EPA
Acenaphthylene	0.0003	0.00001830 g/bhp-hr	EPA
Biphenyl	0.0100	0.00069970 g/bhp-hr	EPA
Acenaphthene	0.0001	0.00000410 g/bhp-hr	EPA
Fluorene	0.0003	0.00001870 g/bhp-hr	EPA
Phenanthrene	0.0005	0.00003430 g/bhp-hr	EPA
Ethylene Dibromide	0.0021	0.00014620 g/bhp-hr	EPA
Fluoranthene	0.0001	0.00000370 g/bhp-hr	EPA
Pyrene	0.0001	0.00000450 g/bhp-hr	EPA
Chrysene	0.0000	0.00000230 g/bhp-hr	EPA
Benzo(b)fluoranthene	0.0000	0.00000050 g/bhp-hr	EPA
Benzo(e)pyrene	0.0000	0.00000140 g/bhp-hr	EPA
Benzo(g,h,i)perylene	0.0000	0.00000140 g/bhp-hr	EPA
Vinyl Chloride	0.0007	0.00004920 g/bhp-hr	EPA
Methylene Chloride	0.0009	0.00006600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0011	0.00007790 g/bhp-hr	EPA

1,3-Dichloropropene	0.0012	0.00008710 g/bhp-hr	EPA
Chlorobenzene	0.0014	0.00010030 g/bhp-hr	EPA
Chloroform	0.0013	0.00009410 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0015	0.00010500 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0019	0.00013200 g/bhp-hr	EPA
Carbon Tetrachloride	0.0017	0.00012110 g/bhp-hr	EPA
Total	3.3975		

Criteria Pollutants

PM	0.4700	0.03296090 g/bhp-hr	EPA
CO	14.9180	1.04620860 g/bhp-hr	EPA
NMEHC	5.5531	0.38944040 g/bhp-hr	EPA
NOx	192.0047	13.46539810 g/bhp-hr	EPA
SO2	0.0277	0.00194060 g/bhp-hr	EPA

Other Pollutants

Butryaldehyde	0.0048	0.00033330 g/bhp-hr	EPA
Chloroethane	0.0001	0.00000620 g/bhp-hr	EPA
Methane	58.8250	4.12542830 g/bhp-hr	EPA
Ethane	4.9413	0.34653600 g/bhp-hr	EPA
Propane	1.9718	0.13828440 g/bhp-hr	EPA
Butane	0.0255	0.00178550 g/bhp-hr	EPA
Cyclopentane	0.0107	0.00074920 g/bhp-hr	EPA
n-Pentane	0.1224	0.00858090 g/bhp-hr	EPA
Methylcyclohexane	0.0579	0.00405940 g/bhp-hr	EPA
1,2-Dichloroethane	0.0011	0.00007790 g/bhp-hr	EPA
1,2-Dichloropropane	0.0013	0.00008880 g/bhp-hr	EPA
n-Octane	0.0165	0.00115840 g/bhp-hr	EPA
1,2,3-Trimethylbenzene	0.0011	0.00007590 g/bhp-hr	EPA
1,2,4-Trimethylbenzene	0.0007	0.00004720 g/bhp-hr	EPA
1,3,5-Trimethylbenzene	0.0016	0.00011160 g/bhp-hr	EPA
n-Nonane	0.0052	0.00036300 g/bhp-hr	EPA
CO2	5,176.5977	363.03769350 g/bhp-hr	EPA

Certification of Truth, Accuracy and Completeness

Company Name: New Mexico Gas Company

I, _____, hereby certify, based on information and belief formed after reasonable inquiry, the statements and information are true, accurate, and complete.

Signed this ____ day of _____, _____, upon my oath or affirmation.

_____ _____

Signature Date

_____ _____

Printed Name Title

Certification of Truth, Accuracy and Completeness

Company Name: New Mexico Gas Company

I, Peter Ford, hereby certify, based on information and belief formed after reasonable inquiry, the statements and information are true, accurate, and complete.

Signed this 29 day of March, 2013, upon my oath or affirmation.

Signature

Date 3/29/2013

Printed Name Peter Ford

Title Eng Mgr