New Mexico Gas Company - Redonda Compressor Station

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 (shell)	20	ft
Diameter	7	ft
Throughput	4	bbl/day

Uncontrolled Emissions

VOCs	VOCs		
	Negligible	lb/hr	Tanks 4.09d
	Negligible	ton/yr	
HAPs	HAPs		
	5.8219E-05	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	Tanks 4.09d
	0.179725	ton/yr	
HAPs	HAPs		
	1.8185E-03	lb/hr	Tanks 4.09d
	0.01	ton/yr	

Emissions Summary

HAPs (lb/hr)	*HAPs (tpy)*	*VOC (lb/hr*	*VOC (tpy)*
4.2043E-03	0.02	0.12	0.51

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 (ton/year)	
	NOX + THC (g/kw-hr)	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' over 4000 ft.
Altitude at Redonda is ~5370 ft and a deration of 4.1% is applied

Derated Rating (kW)	Emission Factor		Derated Emission Rate (lb/hr)		Derated Uncontrolled Emissions 500hr (ton/year)	
	NOX + THC (g/kw-hr)	CO (g/kW-hr)	NOx (lb/hr)	CO (lb/hr)	NOx (ton/yr	CO (ton/yr)
36.35	7.22	29.47	0.58	2.36	0.14	0.59

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 500hr (tpy)
SO_2	0.000588	0.00026	0.00006
VOC	0.0296	0.01298	0.00325
PM	0.00991	0.00435	0.00109

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 * 3.77 MMScf/ year) /8760 hr/year

Fuel consumption = 3.77 MMScf/yr (430 cf/hr*8760hr/yr)/10^6=3.77 MMcf/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

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	2010, 2011, and 2012
3-Year Average Number of Starts	12	2010, 2011, and 2013
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	'PM2.5/PM10		
23	14	0.25			g/hp-hr	Mfg data 2001
81.7	49.7	0.9	0.2	0.4	lb/hr	Hourly emission rate
357.8	217.8	3.9	0.9	1.6	tpy	Annual emission rate (8760 hrs/yr)
1.1	0.6	0.0	0.0	0.0	tpy	SSM (assuming 52, 30 minute starts per year)

Allowable Emission Calculations

NOx	CO	VOC	SO_2	'PM2.5/PM10		
1.5	1.95	0.15			g/hp-hr	Catalyst controlled emissions (miratech specs)
2.0	3.0	0.5			g/hp-hr	Catalyst controlled with safety factor
7.1	10.7	1.8	0.2	0.4	lb/hr	Hourly emission rate controlled w/safety factor
31.0	47.0	7.7	0.9	1.6	tpy	Annual controlled emission rate (8760 hrs/yr)
32.1	47.7	7.7	0.9	1.6	tpy	Annual emission rate with SSM

Actual Emission Calculations

NOx	CO	VOC	SO_2	'PM2.5/PM10		
7.1	10.7	1.8	0.2	0.4	lb/hr	Hourly emission rate controlled w/safety factor
0.9	1.4	0.2	0.0	0.0	tpy	Annual emission rate (3-year average)
0.2	0.1	0.0	0.0	0.0	tpy	Annual emission rate of SSM (3-year ave)
1.2	1.5	0.2	0.0	0.0	tpy	Annual emission total with SSM (3-year ave)

Sample Calculations

NOx: Catalyst controlled emission factor manufaturer data =1.5 g/hp-hr
1.5 g/hp-hr * 1.33 = 2.0 g/hp-hr (safety factor)
2.0 g/hp-hr * 1611 hp / 453.6 g/lb = 7.1 lb/hr
7.1 lb/hr * 8760 hrs/yr / 2000 lb/ton = 31.0 tons/yr

CO: Catalyst controlled emission factor manufaturer data =1.95 g/hp-hr
1.95 g/hp-hr * 1.55 = 3.0 g/hp-hr (safety factor)
3.0 g/hp-hr * 1611 hp / 453.6 g/lb = 10.7 lb/hr
10.7 lb/hr * 8760 hrs/yr / 2000 lb/ton = 47.0 tons/yr

VOC: Catalyst controlled emission factor manufaturer data =0.25 g/hp-hr
0.25 g/hp-hr * 2.3 = 0.5 g/hp-hr (safety factor)
0.5 g/hp-hr * 1611 hp / 453.6 g/lb = 1.8 lb/hr
1.8 lb/hr * 8760 hrs/yr / 2000 lb/ton = 7.7 tons/yr

SO_2: Fuel sulfur content: 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
0.00714 lb S/Mscf * 13.9 (Mscf/hr) * 64 lb SO_2/32 lb S = 0.19 lb/hr SO_2
0.19 lb/hr * 8760 hrs/yr / 2000 lb/ton = 0.87 tons/yr

PM 2.5/PM10: AP-42 EF = 0.029 lb/MMBtu (EF is the sum of PM2.5, PM10 and PM condensable)
AP-42 EF * Heat input = PM lb/hr
0.029 lb/MMBtu * 12.5 MMBtu/hr = 0.36 lb/hr

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		
Fuel Consumption			
Heat Rate	7780	Btu/hp-hr	Mfg data
Fuel heat value	900	Btu/scf	Nominal; natural gas
Heat Input	12.5	MMBtu/hr	Heat Rate * hp
Fuel consumption	13.9	Mscf/hr	Heat input / fuel heat value
Annual fuel usage	122.0	MMcf/yr	8760 hrs/yr operation
Exhaust Parameters			
Exhaust temp	1152	deg F	Mfg. Data
	11140	lb/hr	Mfg. Data
Stack diameter	1.17	ft	Mfg. Data
Stack height	30	ft	Mfg. Data
Stack flow	7981	acfm	Mfg. Data Flow(lb/hr)*Exhaust Temp(^{o}R)/2250
Stack velocity	124.5	ft/s	Mfg. Data

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	hrs	years 2010,2011,2012
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*	PM2.5/ PM10**		
1.5	2.65	1			g/hp-hr	Mfg. data
4.7	8.3	3.1	0.2	0.1	lb/hr	Hourly emission rate
6.2	9.1	3.1	0.2	0.1	Hourly Emission rate with safety factor	
27.3	39.9	13.7	0.7	0.5	tpy	

* 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

** PM based on AP-42 EF * Heat input = PM lb/hr
(EF is the sum of PM2.5, PM10 and PM condensable)
0.01 lb/MMBtu * 10.3 MMBtu/hr = 0.1 lb/hr

Allowable Emission Calculations equal PTE (no controls)

Actual Emission Calculations (three year average: 2010-2012)

NOx	CO	VOC	SO_2	'PM2.5/PM10	
6.2	9.1	3.1	0.2	0.1	lb/hr
7.7	11.2	3.8	0.2	0.1	tpy

Sample Calculations

NOx: Emission factor manufaturer data =1.5 g/hp-hr
1.5 g/hp-hr * 1.33 = 2.0 g/hp-hr (safety factor)
2.0 g/hp-hr * 1417 hp / 453.6 g/lb = 6.2 lb/hr
6.2 lb/hr * 8760 hrs/yr / 2000 lb/ton = 27.3 tons/yr

CO: Emission factor manufaturer data =2.65 g/hp-hr
2.65 g/hp-hr * 1.1 = 8.3 g/hp-hr (safety factor)
8.3 g/hp-hr * 1417 hp / 453.6 g/lb = 9.1 lb/hr
9.1 lb/hr * 8760 hrs/yr / 2000 lb/ton = 39.9 tons/yr

VOC: Emission factor manufaturer data =1.0 g/hp-hr
1.0 g/hp-hr * 1417 hp / 453.6 g/lb = 3.1 lb/hr
3.1 lb/hr * 8760 hrs/yr / 2000 lb/ton = 13.7 tons/yr

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	100.6	MMcf/yr	8760 hrs/yr operation

Exhaust Parameters

Exhaust temp	725.0	deg F	Mfg Data
	14760.0	lb/hr	Mfg Data
Exhaust flow	7688.2	acfm	Flow(lb/hr)*Exhaust Temp(^{o}R)/2275
Stack diameter	1.17	ft	Design
Exhaust velocity	119.2	ft/sec	Exhaust flow / stack area
Stack height	45	ft	Design

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)*	PM2.5/ PM10 (lb/hr)	PM2.5/ PM10 (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	6.23	27.30	9.11	39.89	3.12	13.69	0.16	0.72	1.05	4.61	5.47	0.10	0.45	
2	**7044 GSI Baldor**	81.68	357.78	49.72	217.78	0.89	3.89	0.20	0.87	0.18	0.77	1.52	0.36	1.59	
3	**Emergency Gen****	0.58	0.14	2.36	0.59	0.01	0.00	0.00	0.00	0.01	0.05	0.07	0.00	0.00	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.02	-	-	
	SSM (Unit 2)	-	1.06	-	0.65	-	-	-	-	-	-	-	-	-	
	Total	88.50	386.28	61.19	258.91	4.14	18.08	0.36	1.59	1.24	5.43	7.08	0.47	2.05	13,623.3

*Formaldehdye (tpy) and total HAPs come from GRI-HAPCalc 3.01 Report. Tpy is converted to lb/hr

**Assumes 500 hours of operation per year except for CH20 and HAP which assumes 8760 hours

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)*	PM2.5/ PM10 (lb/hr)	PM2.5/ PM10 (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	6.23	27.30	9.11	39.89	3.12	13.69	0.16	0.72	1.05	4.61	5.47	0.10	0.45	
2	**7044 GSI Baldor**	7.09	31.03	10.73	47.02	1.76	7.70	0.20	0.87	0.18	0.77	1.52	0.36	1.59	
3	**Emergency Gen***	0.58	0.14	2.36	0.59	0.01	0.00	0.00	0.00	0.01	0.05	0.07	0.00	0.00	
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.02	-	-	
	SSM (Unit 2)	-	1.06	-	0.65	-	-	-	-	-	-	-	-	-	
	Total	13.90	59.54	22.20	88.15	5.01	21.90	0.36	1.59	1.24	5.43	7.08	0.47	2.05	13,623.3

*Formaldehdye (tpy) and total HAPs come from GRI-HAPCalc 3.01 Report. Tpy is converted to lb/hr

**Assumes 500 hours of operation per year except for CH20 and HAP which assumes 8760 hours

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)	PM2.5/ PM10 (lb/hr)	PM2.5/ PM10 (tpy)	CO_2e (facility wide, tpy)
1	**7042 GL**	6.23	7.66	9.11	11.19	3.12	3.84	0.16	0.20	1.05	1.29	1.54	0.10	0.45	2459 hours
2	**7044 GSI Baldor**	7.09	0.92	10.73	1.40	1.76	0.23	0.20	0.03	0.18	0.02	0.05	0.36	1.59	261 hours
3	**Emergency Gen**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 hrs
	Tanks	-	-	-	-	0.12	0.51	-	-	-	-	0.02	-	-	
	Total	13.32	8.59	19.84	12.60	5.00	4.58	0.36	0.23	1.23	1.32	1.60			4,230.1

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

NMGC--Redonda Compressor Station

CAT G3516

Emission Unit:	NA- previous unit
Source Description:	Natural gas-fired reciprocating engine
Manufacturer:	Caterpillar
Model:	3516
Type	Turbocharged, four-cycle, lean burn engine

Engine speed	1200	rpm	
Sea level hp	1151	hp	
Elevation	5000	msl	
Derate	0.0%		3% per 1000 ft over 4000 ft
Site hp	1151	hp	
Hours of Operation	8760	hr/yr	

Emission Calculations

Uncontrolled Emissions

	NOx	CO	NMHC	SO_2[1]	HCHO		
	1.5	1.8	0.5		0.34	g/hp-hr	Mfg. data,
Hourly Emissions	3.8	4.6	1.2	0.021	0.9	lb/hr	hp*g/hp-hr/453.6 g/lb
Annual Emissions	16.7	20.0	5.4	0.09	3.8	tons/yr	

[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

Engine BMEP

Displacement	7040	cubic in.	Mfg data
Engine BMEP	108	psia	(hp * 792,000) / (rpm * displacement)

Fuel Consumption

Heat Rate	2370	Btu/hp-hr	Mfg data
Fuel heat value	920	Btu/scf	Nominal; natural gas
Heat Input	2.7	MMBtu/hr	Heat Rate * hp
Fuel consumption	3.0	Mscf/hr	Heat input / fuel heat value
Annual fuel usage	26.0	MMcf/yr	8760 hrs/yr operation

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

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 9/28/2016

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)	226,346,955.41429
[HHV] = Default High heat value of the fuel, from Table C-1 (mmBtu/mass or mmBtu/volume)	0.00103

Constants

[1 x 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

[EF] = Fuel-Specific Default CO_2 Emission Factor, from Table C-1 (kg CO_2/mmBtu)	53.06
[CO_2] = Annual CO_2 emissions from combustion of the specified fuel (metric tons)	**12346.2485990**

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)	**0.2326847**

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)	**0.0232685**

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 9/28/2016

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

[GWP_{CH4}] = Global Warming Potential for CH_4	21
[CH_4] = Annual CH_4 emissions from combustion of the specified fuel (metric tons CO_2e)	4.886378073

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

[GWP_{N2O}] = Global Warming Potential for N_2O	310
[N_2O] = Annual N_2O emissions from combustion of the specified fuel (metric tons CO_2e)	7.213224775

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.

The emission factors in the table below should only be used for calculating CH_4 and N_2O emissions from located at a kraft or soda facilities under subpart AA per 98.273(c)(2).

Table AA–2 to Subpart AA of Part 98— Kraft Lime Kiln and Calciner Emissions Factors for Fossil Fuel-Based

Fuel	Fossil fuel-based emissions factors (kg/mm		
	Kraft lime kilns		Kraft ca
	CH_4	N_2O	CH_4
Residual Oil	0.0027	0	0.0027
Distillate Oil			
Natural Gas			
Biogas			
Petroleum coke			NA

[a] Emission factors for kraft calciners are not available.

pulp mill lime kilns

CH_4 and N_2O

Btu HHV)
alciners
N_2O
0.0003
0.0004
0.0001
0.0001
[a]NA

Redonda	Mcf fuel used	
2010	36,482	
2011	19,423	
2012	1,472	
Total	57,377	

	2,010	
Fuel Usage	36.5	MMcf/yr
	32,833.80	MMBtu/yr
CO2 Emissions	1,742,161.43	kg/yr
	1,916.38	ton/yr
CH4 Emissions	0.04	ton/yr
N2O Emissions	0.00	ton/yr

	2,011	
Fuel Usage	19.4	MMcf/yr
	17,480.70	MMBtu/yr
CO2 Emissions	927,525.94	kg/yr
	1,020.28	ton/yr
CH4 Emissions	0.02	ton/yr
N2O Emissions	0.00	ton/yr

	2012	
Fuel Usage	1.5	MMcf/yr
	1,324.80	MMBtu/yr
CO2 Emissions	70,293.89	kg/yr
	77.32	ton/yr
CH4 Emissions	0.00	ton/yr
N2O Emissions	0.00	ton/yr

total GHG	3,017.09