



Entergy Services, Inc
1340 Echelon Parkway
Jackson, Mississippi 39213

Date: May 3, 2016
To: Bill Spell
From: Rick Buckley
Subject: River Bend Station Air Emission Calculations
Criteria Pollutants, Hazardous Air Pollutants and Greenhouse Gases

To support the evaluation of air quality impacts associated with license renewal, this calculation package contains the criteria air pollutant emissions associated with the permitted sources shown in RBS Air Permit 3160-00009-04 and listed in Attachment 1 for the years 2011 through 2015. Insignificant emission sources identified in the air permit were not included in this calculation package as there are no permit conditions to track operational hours or fuel usage for them. This package also contains the calculated direct (combustion sources) and indirect (workforce commuting) greenhouse gas emissions associated with RBS's plant operation for these same years.

Attachment 2 to this calculation package contains an annual emission summary of criteria air pollutant emissions for the years 2011 through 2015 of the permitted sources listed in Attachment 1. Attachment 2 also lists a criteria air pollutant emission summary for each the categorical sources listed below which was utilized to develop the overall annual emission summary.

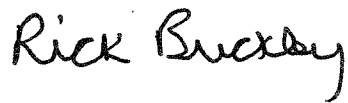
- ≤600 Horsepower Stationary and Portable Diesel Generators
- >600 Horsepower Stationary and Portable Diesel Generators
- Natural Gas-Fired Stationary Generator (Emission Point 09-01)
- Cooling Towers

- Diesel Fuel/Gasoline Tanks

Criteria air pollutant emission calculations for the emission sources shown in Attachment 1 were based on calculated annual fuel usage for diesel fuel combustion sources and operational run times/capacity rating for the one natural gas combustion source (Attachment 3) utilizing the Environmental Protection Agency's emission factors published in AP-42, Compilation of Air Pollutant Emission Factors. Volatile organic compound emissions for the diesel fuel oil and gasoline tanks listed in Attachment 1 were based on the permitted tons per year from all tanks (0.90) shown in River Bend Station Air Permit 3160-00009-04. Particulate matter (PM₁₀) emissions for the cooling towers listed in Attachment 1 were based on the permitted tons per year from all cooling towers (2.80) shown in River Bend Station Air Permit 3160-00009-04.

Attachment 4 contains an annual greenhouse gas (GHG) emission summary of the combustion sources listed in Attachment 1, and from workforce commuting for the years 2011 through 2015. GHG emissions for diesel combustion sources were calculated based on annual fuel usage from all combustion sources, while GHG emissions for the natural gas combustion source was calculated based on annual operational hours. GHG emissions from workforce commuting were calculated based on data furnished by the United States Census Bureau and the Environmental Protection Agency. Attachment 5 contains the supporting calculations for these sources of GHG emissions.

If you have any questions, please contact me at 601-368-5823.

A handwritten signature in black ink that reads "Rick Buckley". The signature is written in a cursive, slightly slanted style.

Rick Buckley
Sr. Project Manager, Environmental

Attachment 1
Permitted Air Emission Sources

<u>Emission Point</u>	<u>Description</u>
2-83	Standby Diesel Generator Engine No. 1
3-83	Standby Diesel Generator Engine No. 2
4-83	High Pressure Core Spray Diesel Engine
09-01	EOF Emergency Generator
10-09	Air Compressor
17-09	Station Blackout Diesel Generator No. 2
26-01	Portable Outage/Maintenance Diesel Engines
7-83	Diesel Fuel Oil Storage Tank (50,000 gallons)
8-83	Diesel Fuel Oil Storage Tank (50,000 gallons)
9-83	Diesel Fuel Oil Storage Tank (50,000 gallons)
14-91	Gasoline Fuel Storage Tank (6,000 gallons)
20-83	Mechanical Draft Cooling Tower A
21-83	Mechanical Draft Cooling Tower B
22-83	Mechanical Draft Cooling Tower C
23-83	Mechanical Draft Cooling Tower D
24-83	Service Water Cooling Tower
25-83	Standby Cooling Tower (Ultimate Heat Sink)

Attachment 2

Annual Air Emissions Inventory Summary, 2011–2015

Year	Annual Emissions (tons/year)					
	SO _x	NO _x	CO	PM ₁₀	VOCs	HAPs
2011	0.4	15.9	4.0	3.5	1.7	0.01
2012	0.1	9.0	2.4	3.1	1.2	0.01
2013	0.3	14.9	3.8	3.4	1.6	0.01
2014	0.2	8.9	2.3	3.3	1.3	0.01
2015	0.6	20.5	5.1	3.8	1.9	0.02

Attachment 2 (Continued)
Annual Air Emissions Inventory Summary, 2011–2015

2011 Annual Emissions (tons/year)						
Emission Source	SO_x	NO_x	CO	PM₁₀	VOCs	HAPs
>600 Horsepower Stationary and Portable Diesel Generators	0.01	10.0	2.7	0.3	0.3	0.005
≤600 Horsepower Stationary and Portable Diesel Generators	0.4	5.8	1.2	0.4	0.5	0.005
EOF Emergency Generator (Stationary)	0.00002	0.1	0.1	0.0004	0.001	0.001
Cooling Towers ^(a)	---	---	---	2.80	---	---
Diesel Fuel/Gasoline Tanks ^(b)	---	---	---	---	0.90	---
Total	0.4	15.9	4.0	3.5	1.7	0.01
2012 Annual Emissions (tons/year)						
Emission Source	SO_x	NO_x	CO	PM₁₀	VOCs	HAPs
>600 Horsepower Stationary and Portable Diesel Generators	0.01	8.3	2.2	0.3	0.2	0.004
≤600 Horsepower Stationary and Portable Diesel Generators	0.04	0.6	0.1	0.04	0.05	0.0005
EOF Emergency Generator (Stationary)	0.00002	0.1	0.1	0.0003	0.001	0.001
Cooling Towers ^(a)	---	---	---	2.80	---	---
Diesel Fuel/Gasoline Tanks ^(b)	---	---	---	---	0.90	---
Total	0.1	9.0	2.4	3.1	1.2	0.01

a. PM₁₀ annual emission based on the permitted tons per year from all cooling towers shown in RBS Air Permit 3160-00009-04.

b. VOC annual emissions based on the permitted tons per year from all tanks shown in RBS Air Permit 3160-00009-04.

Attachment 2 (Continued)
Annual Air Emissions Inventory Summary, 2011–2015

2013 Annual Emissions (tons/year)						
Emission Source	SO_x	NO_x	CO	PM₁₀	VOCs	HAPs
>600 Horsepower Stationary and Portable Diesel Generators	0.01	9.9	2.6	0.3	0.3	0.005
≤600 Horsepower Stationary and Portable Diesel Generators	0.3	4.9	1.1	0.3	0.4	0.004
EOF Emergency Generator (Stationary)	0.00001	0.1	0.1	0.0002	0.001	0.001
Cooling Towers ^(a)	---	---	---	2.80	---	---
Diesel Fuel/Gasoline Tanks ^(b)	---	---	---	---	0.90	---
Total	0.3	14.9	3.8	3.4	1.6	0.01
2014 Annual Emissions (tons/year)						
Emission Source	SO_x	NO_x	CO	PM₁₀	VOCs	HAPs
>600 Horsepower Stationary and Portable Diesel Generators	0.003	5.1	1.4	0.2	0.1	0.002
≤600 Horsepower Stationary and Portable Diesel Generators	0.2	3.7	0.8	0.3	0.3	0.003
EOF Emergency Generator (Stationary)	0.00001	0.05	0.1	0.0002	0.001	0.001
Cooling Towers ^(a)	---	---	---	2.80	---	---
Diesel Fuel/Gasoline Tanks ^(b)	---	---	---	---	0.90	---
Total	0.2	8.9	2.3	3.3	1.3	0.01

a. PM₁₀ annual emission based on the permitted tons per year from all cooling towers shown in RBS Air Permit 3160-00009-04.

b. VOC annual emissions based on the permitted tons per year from all tanks shown in RBS Air Permit 3160-00009-04.

Attachment 2 (Continued)
Annual Air Emissions Inventory Summary, 2011–2015

2015 Annual Emissions (tons/year)						
Emission Source	SO_x	NO_x	CO	PM₁₀	VOCs	HAPs
>600 Horsepower Stationary and Portable Diesel Generators	0.01	11.1	3.0	0.3	0.3	0.01
≤600 Horsepower Stationary and Portable Diesel Generators	0.6	9.3	2.0	0.7	0.7	0.01
EOF Emergency Generator (Stationary)	0.00002	0.1	0.1	0.0003	0.001	0.001
Cooling Towers ^(a)	---	---	---	2.80	---	---
Diesel Fuel/Gasoline Tanks ^(b)	---	---	---	---	0.90	---
Total	0.6	20.5	5.1	3.8	1.9	0.02

- a. PM₁₀ annual emission based on the permitted tons per year from all cooling towers shown in RBS Air Permit 3160-00009-04.
- b. VOC annual emissions based on the permitted tons per year from all tanks shown in RBS Air Permit 3160-00009-04.

Attachment 3

Annual Air Emissions Inventory Summary, Supporting Calculations

Emission calculations for the stationary and portable emission points below were based on annual calculated fuel usage (annual operational run hours × fuel capacity rating).

- Emission Point 2-83: Standby Diesel Generator Engine No. 1 (258 gph)
- Emission Point 3-83: Standby Diesel Generator Engine No. 2 (258 gph)
- Emission Point 4-83: High Pressure Core Spray Diesel Engine (200 gph)
- Emission Point 10-09: Air Compressor (22.69 gph)
- Emission Point 17-09: Station Blackout Diesel Generator No. 2 (14 gph)
- Emission Point 26-01: Portable Outage/Maintenance Diesel Engine

Engines associated with Emission Points 2-83, 3-83, 4-83 and one engine associated with Emission Point 26-01 that was brought on site in 2015 are classified as large diesel engines (>600 horsepower). Sources associated with the other emission points, including sources associated with Emission Point 26-01 are classified as small diesel engines (≤600 horsepower), with the exception of Emission Point 09-01 (EOF Emergency Generator) which combusts natural gas.

Table A-1 lists calculated annual fuel usage for the diesel fuel fired emission sources based on operational hours and fuel capacity rating. Table A-2 lists operational hours for the natural gas-fired emission source (Emission Point 09-01). Data to develop Tables A-1 and A-2 was obtained from the following sources:

- Annual operational hours and fuel usage from RBS's air emissions inventory spreadsheet
- Operational capacity values (gallons per hour and MMBTu per hour) from previous air permit applications submitted to the Louisiana Department of Environmental Quality and RBS Air Permit 3160-00009-04

Emission calculations for the diesel fuel fired and natural gas fired combustion sources are included in this attachment.

Table A-1

Combustion Sources Annual Fuel Usage, 2011 – 2015^(a)

Year	Stationary Diesels (>600 HP)	Stationary and Portable Diesels (≤600 HP)
2011	44,828	18,761
2012	37,185	1,918
2013	44,176	15,890
2014	22,934	12,006
2015	49,656	30,192
a. Refer to the following pages associated for a more detailed breakdown of how values shown in this summary were derived.		

Table A-1
Combustion Sources Annual Fuel Usage, 2011 – 2015

2011 Fuel Usage			
Emission Point	Operational Rating (gph)	Operational Hours	Annual Fuel Usage (gallons)
2-83	258	67.5	17,415
3-83	258	41.6	10,733
4-83	200	83.4	16,680
26-01	0	0	0
Total Gallons (>600 Horsepower)			44,828
10-09	22.69	14.0	318
17-09	14.0	18.9	265
26-01	Varies	Varies	18,178
Total Gallons (≤600 Horsepower)			18,761
2012 Fuel Usage			
Emission Point	Operational Rating (gph)	Operational Hours	Annual Fuel Usage (gallons)
2-83	258	55.7	14,371
3-83	258	59.9	15,454
4-83	200	36.8	7,360
26-01	0	0	0
Total Gallons (>600 Horsepower)			37,185
10-09	22.69	22.0	499
17-09	14.0	35.4	496
26-01	Varies	Varies	923
Total Gallons (≤600 Horsepower)			1,918

Table A-1
Combustion Sources Annual Fuel Usage, 2011 – 2015

2013 Fuel Usage			
Emission Point	Operational Rating (gph)	Operational Hours	Annual Fuel Usage (gallons)
2-83	258	55.0	14,190
3-83	258	63.2	16,306
4-83	200	68.4	13,680
26-01	0	0	0
Total Gallons (>600 Horsepower)			44,176
10-09	22.69	40.0	908
17-09	14.0	79.4	1,112
26-01	Varies	Varies	13,870
Total Gallons (≤600 Horsepower)			15,890
2014 Fuel Usage			
Emission Point	Operational Rating (gph)	Operational Hours	Annual Fuel Usage (gallons)
2-83	258	26.8	6,914
3-83	258	33.8	8,720
4-83	200	36.5	7,300
26-01	0	0	0
Total Gallons (>600 Horsepower)			22,934
10-09	22.69	13.0	295
17-09	14.0	18.3	256
26-01	Varies	Varies	11,455
Total Gallons (≤600 Horsepower)			12,006

Table A-1
Combustion Sources Annual Fuel Usage, 2011 – 2015

2015 Fuel Usage			
Emission Point	Operational Rating (gph)	Operational Hours	Annual Fuel Usage (gallons)
2-83	258	73.3	18,911
3-83	258	59.6	15,377
4-83	200	75.8	15,160
26-01	84	2	168
Total Gallons (>600 Horsepower)			49,656
10-09	22.69	10.0	227
17-09	14.0	23.0	322
26-01	Varies	Varies	29,811
Total Gallons (≤600 Horsepower)			30,192

Table A-2

Emission Point 09-01 Operational Hours, 2011 – 2015

Year	Emission Point 09-01
2011	39.3
2012	34.5
2013	23.4
2014	21.7
2015	31.3

1. For the emission points listed below, permitted volatile organic compounds tons per year from all tanks listed in River Bend Station Air Permit 3160-00009-04 was utilized as the default value (0.90 tons/year collectively).
 - Emission Point 7-83: Diesel Fuel Oil Storage Tank (50,000 gallons)
 - Emission Point 8-83: Diesel Fuel Oil Storage Tank (50,000 gallons)
 - Emission Point 9-83: Diesel Fuel Oil Storage Tank (50,000 gallons)
 - Emission Point 14-91: Gasoline Fuel Storage Tank (6,000 gallons)
2. For the emission points listed below, permitted particulate matter (PM₁₀) from all cooling towers listed in River Bend Station Air Permit 3160-00009-04 was utilized as the default value (2.80 tons/year collectively).
 - Emission Point 20-83: Mechanical Draft Cooling Tower A
 - Emission Point 21-83: Mechanical Draft Cooling Tower B
 - Emission Point 22-83: Mechanical Draft Cooling Tower C
 - Emission Point 23-83: Mechanical Draft Cooling Tower D
 - Emission Point 24-83: Service Water Cooling Tower
 - Emission Point 25-83: Standby Cooling Tower (Ultimate Heat Sink)

Stationary and Portable Diesels (>600 Horsepower)

Air Emission Calculations

(Emission Points 2-83, 3-83, 4-83 and 26-01)

2011 Stationary Combustion Sources (>600 HP) ^(a)

Enter Fuel Use (gal/yr)

44,828

Enter Fuel Sulfur Content (%)

0.002

Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	1.01	6,276	0.01
NO _x	3.2	6,276	10.0
CO	0.85	6,276	2.7
VOC ^(e)	0.09	6,276	0.3
PM ₁₀	0.1	6,276	0.3
Hazardous Air Pollutants			
Benzene	0.000776	6,276	0.002
Toluene	0.000281	6,276	0.001
Xylenes	0.000193	6,276	0.001
Formaldehyde	0.0000789	6,276	0.0002
Acetaldehyde	0.0000252	6,276	0.0001
Acrolein	0.00000788	6,276	0.00002
Napthalene	0.000130	6,276	0.0004

Criteria Pollutants (Tons/Year)

13.3

Hazardous Air Pollutants (Tons/Year)

0.005

a. Includes Emission Points 2-83, 3-83, 4-83 and 26-01.

b. Emission factors obtained from AP-42 Tables 3.4-1, 3.4-3 and 3.4-4.

c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000

d. AP-42 Emission Factor × MMBtu/yr ÷ 2000 lbs/ton (For SO₂, fuel sulfur content of 0.002 also included in formula).

e. Emission factor includes methane and nonmethane emissions (see AP-42 ,Table 3.4-1, footnote f).

2012 Stationary Combustion Sources (>600 HP) ^(a)

Enter Fuel Use (gal/yr)	37,185
Enter Fuel Sulfur Content (%)	0.002

Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	1.01	5,206	0.01
NO _x	3.2	5,206	8.3
CO	0.85	5,206	2.2
VOC ^(e)	0.09	5,206	0.2
PM ₁₀	0.1	5,206	0.3
Hazardous Air Pollutants			
Benzene	0.000776	5,206	0.002
Toluene	0.000281	5,206	0.001
Xylenes	0.000193	5,206	0.001
Formaldehyde	0.0000789	5,206	0.0002
Acetaldehyde	0.0000252	5,206	0.0001
Acrolein	0.00000788	5,206	0.00002
Napthalene	0.00013	5,206	0.0003

Criteria Pollutants (Tons/Year)	11.0
Hazardous Air Pollutants (Tons/Year)	0.004

- a. Includes Emission Points 2-83, 3-83, 4-83 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.4-1, 3.4-3 and 3.4-4.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2000 lbs/ton (For SO₂, fuel sulfur content of 0.002 also included in formula).
e. Emission factor includes methane and nonmethane emissions (see AP-42 ,Table 3.4-1, footnote f).

2013 Stationary Combustion Sources (>600 HP) ^(a)

Enter Fuel Use (gal/yr)

44,176

Enter Fuel Sulfur Content (%)

0.002

Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	1.01	6,185	0.01
NO _x	3.2	6,185	9.9
CO	0.85	6,185	2.6
VOC ^(e)	0.09	6,185	0.3
PM ₁₀	0.1	6,185	0.3
Hazardous Air Pollutants			
Benzene	0.000776	6,185	0.002
Toluene	0.000281	6,185	0.001
Xylenes	0.000193	6,185	0.001
Formaldehyde	0.0000789	6,185	0.0002
Acetaldehyde	0.0000252	6,185	0.0001
Acrolein	0.00000788	6,185	0.00002
Napthalene	0.00013	6,185	0.0004

Criteria Pollutants (Tons/Year)

13.1

Hazardous Air Pollutants (Tons/Year)

0.005

a. Includes Emission Points 2-83, 3-83, 4-83 and 26-01.

b. Emission factors obtained from AP-42 Tables 3.4-1, 3.4-3 and 3.4-4.

c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000

d. AP-42 Emission Factor × MMBtu/yr ÷ 2000 lbs/ton (For SO₂, fuel sulfur content of 0.002 also included in formula).

e. Emission factor includes methane and nonmethane emissions (see AP-42 ,Table 3.4-1, footnote f).

2014 Stationary Combustion Sources (>600 HP) ^(a)

Enter Fuel Use (gal/yr)

22,934

Enter Fuel Sulfur Content (%)

0.002

Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	1.01	3,211	0.003
NO _x	3.2	3,211	5.1
CO	0.85	3,211	1.4
VOC ^(e)	0.09	3,211	0.1
PM ₁₀	0.1	3,211	0.2
Hazardous Air Pollutants			
Benzene	0.000776	3,211	0.001
Toluene	0.000281	3,211	0.0005
Xylenes	0.000193	3,211	0.0003
Formaldehyde	0.0000789	3,211	0.0001
Acetaldehyde	0.0000252	3,211	0.00004
Acrolein	0.00000788	3,211	0.00001
Napthalene	0.00013	3,211	0.0002

Criteria Pollutants (Tons/Year)

6.8

Hazardous Air Pollutants (Tons/Year)

0.002

a. Includes Emission Points 2-83, 3-83, 4-83 and 26-01.

b. Emission factors obtained from AP-42 Tables 3.4-1, 3.4-3 and 3.4-4.

c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000

d. AP-42 Emission Factor × MMBtu/yr ÷ 2000 lbs/ton (For SO₂, fuel sulfur content of 0.002 also included in formula).

e. Emission factor includes methane and nonmethane emissions (see AP-42 ,Table 3.4-1, footnote f).

2015 Stationary Combustion Sources (>600 HP) ^{a(a)}

<i>Enter Fuel Use (gal/yr)</i>	49,656
<i>Enter Fuel Sulfur Content (%)</i>	0.002

Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	1.01	6,952	0.01
NO _x	3.2	6,952	11.1
CO	0.85	6,952	3.0
VOC ^(e)	0.09	6,952	0.3
PM ₁₀	0.1	6,952	0.3
Hazardous Air Pollutants			
Benzene	0.000776	6,952	0.003
Toluene	0.000281	6,952	0.001
Xylenes	0.000193	6,952	0.001
Formaldehyde	0.0000789	6,952	0.0003
Acetaldehyde	0.0000252	6,952	0.0001
Acrolein	0.00000788	6,952	0.00003
Napthalene	0.00013	6,952	0.0005

Criteria Pollutants (Tons/Year) 14.7

Hazardous Air Pollutants (Tons/Year) 0.01

- a. Includes Emission Points 2-83, 3-83, 4-83 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.4-1, 3.4-3 and 3.4-4.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2000 lbs/ton (For SO₂, fuel sulfur content of 0.002 also included in formula).
e. Emission factor includes methane and nonmethane emissions (see AP-42 ,Table 3.4-1, footnote f).

Stationary and Portable Diesels (≤ 600 Horsepower)

Air Emission Calculations

(Emission Points 10-09, 17-09 and 26-01)

2011 Stationary and Portable Combustion Sources (≤600 HP) ^(a)

<i>Enter Fuel Use (gal/yr)</i>	18,761
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Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	0.29	2,627	0.4
NO _x	4.41	2,627	5.8
CO	0.95	2,627	1.2
VOC ^(e)	0.35	2,627	0.5
PM ₁₀	0.31	2,627	0.4
Hazardous Air Pollutants			
Benzene	0.000933	2,627	0.001
Toluene	0.000409	2,627	0.001
Xylenes	0.000285	2,627	0.0004
1,3-Butadiene	0.0000391	2,627	0.0001
Formaldehyde	0.00118	2,627	0.002
Acetaldehyde	0.000767	2,627	0.001
Acrolein	0.0000925	2,627	0.0001
Napthalene	0.0000848	2,627	0.0001

Criteria Pollutants (Tons/Year) 8.3

Hazardous Air Pollutants (Tons/Year) 0.005

- a. Includes Emission Points 10-09, 17-09 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.3-1 and 3.3-2.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2,000 lbs/ton
e. Utilized AP-42 exhaust emission factor.

2012 Stationary and Portable Combustion Sources (≤600 HP) ^(a)

<i>Enter Fuel Use (gal/yr)</i>	1,918
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Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	0.29	269	0.04
NO _x	4.41	269	0.6
CO	0.95	269	0.1
VOC ^(e)	0.35	269	0.05
PM ₁₀	0.31	269	0.04
Hazardous Air Pollutants			
Benzene	0.000933	269	0.0001
Toluene	0.000409	269	0.0001
Xylenes	0.000285	269	0.00004
1,3-Butadiene	0.0000391	269	0.00001
Formaldehyde	0.00118	269	0.0002
Acetaldehyde	0.000767	269	0.0001
Acrolein	0.0000925	269	0.00001
Napthalene	0.0000848	269	0.00001

Criteria Pollutants (Tons/Year)	0.8
Hazardous Air Pollutants (Tons/Year)	0.0005

- a. Includes Emission Points 10-09, 17-09 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.3-1 and 3.3-2.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2,000 lbs/ton
e. Utilized AP-42 exhaust emission factor.

2013 Stationary and Portable Combustion Sources (≤600 HP) ^(a)

<i>Enter Fuel Use (gal/yr)</i>	15,890
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Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	0.29	2,225	0.3
NO _x	4.41	2,225	4.9
CO	0.95	2,225	1.1
VOC ^(e)	0.35	2,225	0.4
PM ₁₀	0.31	2,225	0.3
Hazardous Air Pollutants			
Benzene	0.000933	2,225	0.001
Toluene	0.000409	2,225	0.0005
Xylenes	0.000285	2,225	0.0003
1,3-Butadiene	0.0000391	2,225	0.00004
Formaldehyde	0.00118	2,225	0.001
Acetaldehyde	0.000767	2,225	0.001
Acrolein	0.0000925	2,225	0.0001
Napthalene	0.0000848	2,225	0.0001

Criteria Pollutants (Tons/Year)

7.0

Hazardous Air Pollutants (Tons/Year)

0.004

- a. Includes Emission Points 10-09, 17-09 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.3-1 and 3.3-2.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2,000 lbs/ton
e. Utilized AP-42 exhaust emission factor.

2014 Stationary Combustion Sources (≤600 HP) ^(a)

<i>Enter Fuel Use (gal/yr)</i>	12,006
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Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	0.29	1,681	0.2
NO _x	4.41	1,681	3.7
CO	0.95	1,681	0.8
VOC ^(e)	0.35	1,681	0.3
PM ₁₀	0.31	1,681	0.3
Hazardous Air Pollutants			
Benzene	0.000933	1,681	0.001
Toluene	0.000409	1,681	0.0003
Xylenes	0.000285	1,681	0.0002
1,3-Butadiene	0.0000391	1,681	0.00003
Formaldehyde	0.00118	1,681	0.001
Acetaldehyde	0.000767	1,681	0.001
Acrolein	0.0000925	1,681	0.0001
Napthalene	0.0000848	1,681	0.0001

Criteria Pollutants (Tons/Year)

5.3

Hazardous Air Pollutants (Tons/Year)

0.003

- a. Includes Emission Points 10-09, 17-09 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.3-1 and 3.3-2.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2,000 lbs/ton
e. Utilized AP-42 exhaust emission factor.

2015 Stationary Combustion Sources (≤600 HP) ^(a)

<i>Enter Fuel Use (gal/yr)</i>	30,192
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Criteria Pollutants	AP-42 Emission Factor (lb/MMBtu) ^(b)	MMBtu/yr ^(c)	tons/yr ^(d)
SO ₂	0.29	4,227	0.6
NO _x	4.41	4,227	9.3
CO	0.95	4,227	2.0
VOC ^(e)	0.35	4,227	0.7
PM ₁₀	0.31	4,227	0.7
Hazardous Air Pollutants			
Benzene	0.00158	4,227	0.003
Toluene	0.000558	4,227	0.001
Xylenes	0.000195	4,227	0.0004
1,3-Butadiene	0.000663	4,227	0.001
Formaldehyde	0.0205	4,227	0.04
Acetaldehyde	0.00279	4,227	0.01
Acrolein	0.00263	4,227	0.006
Napthalene	0.0000971	4,227	0.0002

Criteria Pollutants (Tons/Year) 13.3

Hazardous Air Pollutants (Tons/Year) 0.06

- a. Includes Emission Points 10-09, 17-09 and 26-01.
b. Emission factors obtained from AP-42 Tables 3.3-1 and 3.3-2.
c. Yearly fuel usage × 140,000 Btu/gal ÷ 1,000,000
d. AP-42 Emission Factor × MMBtu/yr ÷ 2,000 lbs/ton
e. Utilized AP-42 exhaust emission factor.

Stationary Natural Gas
Air Emission Calculations
(Emission Point 09-01)

2011 EOF Emergency Generator (Emission Point 09-01)			
Enter Operational Hours		39.3	
Criteria Pollutant	AP-42 Emission Factor (lb/MMBtu) ^a	Heat Input (MMBTu/hr) ^b	Tons/Year ^c
SO ₂	0.000588	1.989	0.00002
NO _x	2.21	1.989	0.1
CO	3.72	1.989	0.1
VOC	0.0296	1.989	0.001
PM ₁₀	0.00950	1.989	0.0004
Hazardous Air Pollutant			
1,1,2,2-Tetrachloroethane	0.0000253	1.989	0.000001
1,1,2-Trichloroethane	0.0000153	1.989	0.000001
1,1-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloropropane	0.000013	1.989	0.000001
1,3-Butadiene	0.000663	1.989	0.00003
1,3-Dichloropropene	0.0000127	1.989	0.0000005
Acetaldehyde	0.00279	1.989	0.00011
Acrolein	0.00263	1.989	0.00010
Benzene	0.00158	1.989	0.0001
Carbon Tetrachloride	0.0000177	1.989	0.000001
Chlorobenzene	0.0000129	1.989	0.000001
Chloroform	0.0000137	1.989	0.000001
Ethylbenzene	0.0000248	1.989	0.000001
Ethylene Dibromide	0.0000213	1.989	0.000001
Formaldehyde	0.0205	1.989	0.001
Methanol	0.00306	1.989	0.0001
Methylene Chloride	0.000412	1.989	0.00002
Naphthalene	0.0000971	1.989	0.000004
Styrene	0.0000119	1.989	0.0000005
Toluene	0.000558	1.989	0.00002
Vinyl Chloride	0.00000718	1.989	0.0000003
Xylenes	0.000195	1.989	0.00001
Criteria Pollutants (Tons/Year)			0.2
Hazardous Air Pollutants (Tons/Year)			0.001
a. Criteria pollutant and hazardous air pollutant emission factors obtained from AP-42 Table 3.2-3.			
b. MMBTu value based on Cummins 150GGLB 150 kW Generator exhaust emission data sheet.			
c. AP-42 Emission Factor × MMBTu/hours × Operational Hours ÷ 2,000 lbs/ton.			

2012 EOF Emergency Generator (Emission Point 09-01)			
Enter Operational Hours		34.5	
Criteria Pollutant	AP-42 Emission Factor (lb/MMBtu) ^a	Heat Input (MMBTu/hr) ^b	Tons/Year ^c
SO ₂	0.000588	1.989	0.00002
NO _x	2.21	1.989	0.1
CO	3.72	1.989	0.1
VOC	0.0296	1.989	0.001
PM ₁₀	0.00950	1.989	0.0003
Hazardous Air Pollutant			
1,1,2,2-Tetrachloroethane	0.0000253	1.989	0.000001
1,1,2-Trichloroethane	0.0000153	1.989	0.000001
1,1-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloropropane	0.000013	1.989	0.0000004
1,3-Butadiene	0.000663	1.989	0.00002
1,3-Dichloropropene	0.0000127	1.989	0.0000004
Acetaldehyde	0.00279	1.989	0.0001
Acrolein	0.00263	1.989	0.0001
Benzene	0.00158	1.989	0.0001
Carbon Tetrachloride	0.0000177	1.989	0.000001
Chlorobenzene	0.0000129	1.989	0.0000004
Chloroform	0.0000137	1.989	0.0000005
Ethylbenzene	0.0000248	1.989	0.000001
Ethylene Dibromide	0.0000213	1.989	0.000001
Formaldehyde	0.0205	1.989	0.001
Methanol	0.00306	1.989	0.0001
Methylene Chloride	0.000412	1.989	0.00001
Naphthalene	0.0000971	1.989	0.000003
Styrene	0.0000119	1.989	0.0000004
Toluene	0.000558	1.989	0.00002
Vinyl Chloride	0.00000718	1.989	0.0000002
Xylenes	0.000195	1.989	0.00001
Criteria Pollutants (Tons/Year)			0.2
Hazardous Air Pollutants (Tons/Year)			0.001
a. Criteria pollutant and hazardous air pollutant emission factors obtained from AP-42 Table 3.2-3.			
b. MMBTu value based on Cummins 150GGLB 150 kW Generator exhaust emission data sheet.			
c. AP-42 Emission Factor x MMBTu/hours x Operational Hours ÷ 2,000 lbs/ton.			

2013 EOF Emergency Generator (Emission Point 09-01)			
Enter Operational Hours		23.4	
Criteria Pollutant	AP-42 Emission Factor (lb/MMBtu) ^a	Heat Input (MMBTu/hr) ^b	Tons/Year ^c
SO ₂	0.000588	1.989	0.00001
NO _x	2.21	1.989	0.1
CO	3.72	1.989	0.1
VOC	0.0296	1.989	0.001
PM ₁₀	0.00950	1.989	0.0002
Hazardous Air Pollutant			
1,1,2,2-Tetrachloroethane	0.0000253	1.989	0.000001
1,1,2-Trichloroethane	0.0000153	1.989	0.0000004
1,1-Dichloroethane	0.0000113	1.989	0.0000003
1,2-Dichloroethane	0.0000113	1.989	0.0000003
1,2-Dichloropropane	0.000013	1.989	0.0000003
1,3-Butadiene	0.000663	1.989	0.00002
1,3-Dichloropropene	0.0000127	1.989	0.0000003
Acetaldehyde	0.00279	1.989	0.0001
Acrolein	0.00263	1.989	0.0001
Benzene	0.00158	1.989	0.00004
Carbon Tetrachloride	0.0000177	1.989	0.0000004
Chlorobenzene	0.0000129	1.989	0.0000003
Chloroform	0.0000137	1.989	0.0000003
Ethylbenzene	0.0000248	1.989	0.000001
Ethylene Dibromide	0.0000213	1.989	0.0000005
Formaldehyde	0.0205	1.989	0.0005
Methanol	0.00306	1.989	0.0001
Methylene Chloride	0.000412	1.989	0.00001
Naphthalene	0.0000971	1.989	0.000002
Styrene	0.0000119	1.989	0.0000003
Toluene	0.000558	1.989	0.00001
Vinyl Chloride	0.00000718	1.989	0.0000002
Xylenes	0.000195	1.989	0.000005
Criteria Pollutants (Tons/Year)			0.1
Hazardous Air Pollutants (Tons/Year)			0.001
a. Criteria pollutant and hazardous air pollutant emission factors obtained from AP-42 Table 3.2-3.			
b. MMBTu value based on Cummins 150GGLB 150 kW Generator exhaust emission data sheet.			
c. AP-42 Emission Factor x MMBTu/hours x Operational Hours ÷ 2,000 lbs/ton.			

2014 EOF Emergency Generator (Emission Point 09-01)			
Enter Operational Hours		21.7	
Criteria Pollutant	AP-42 Emission Factor (lb/MMBtu) ^a	Heat Input (MMBTu/hr) ^b	Tons/Year ^c
SO ₂	0.000588	1.989	0.00001
NO _x	2.21	1.989	0.05
CO	3.72	1.989	0.1
VOC	0.0296	1.989	0.001
PM ₁₀	0.00950	1.989	0.0002
Hazardous Air Pollutant			
1,1,2,2-Tetrachloroethane	0.0000253	1.989	0.000001
1,1,2-Trichloroethane	0.0000153	1.989	0.0000003
1,1-Dichloroethane	0.0000113	1.989	0.0000002
1,2-Dichloroethane	0.0000113	1.989	0.0000002
1,2-Dichloropropane	0.000013	1.989	0.0000003
1,3-Butadiene	0.000663	1.989	0.00001
1,3-Dichloropropene	0.0000127	1.989	0.0000003
Acetaldehyde	0.00279	1.989	0.0001
Acrolein	0.00263	1.989	0.0001
Benzene	0.00158	1.989	0.00003
Carbon Tetrachloride	0.0000177	1.989	0.0000004
Chlorobenzene	0.0000129	1.989	0.0000003
Chloroform	0.0000137	1.989	0.0000003
Ethylbenzene	0.0000248	1.989	0.000001
Ethylene Dibromide	0.0000213	1.989	0.0000005
Formaldehyde	0.0205	1.989	0.0004
Methanol	0.00306	1.989	0.0001
Methylene Chloride	0.000412	1.989	0.00001
Naphthalene	0.0000971	1.989	0.000002
Styrene	0.0000119	1.989	0.0000003
Toluene	0.000558	1.989	0.00001
Vinyl Chloride	0.00000718	1.989	0.0000002
Xylenes	0.000195	1.989	0.000004
Criteria Pollutants (Tons/Year)			0.1
Hazardous Air Pollutants (Tons/Year)			0.001
a. Criteria pollutant and hazardous air pollutant emission factors obtained from AP-42 Table 3.2-3. b. MMBTu value based on Cummins 150GGLB 150 kW Generator exhaust emission data sheet. c. AP-42 Emission Factor × MMBTu/hours × Operational Hours ÷ 2,000 lbs/ton.			

2015 EOF Emergency Generator (Emission Point 09-01)			
Enter Operational Hours		31.3	
Criteria Pollutant	AP-42 Emission Factor (lb/MMBtu) ^a	Heat Input (MMBTu/hr) ^b	Tons/Year ^c
SO ₂	0.000588	1.989	0.00002
NO _x	2.21	1.989	0.1
CO	3.72	1.989	0.1
VOC	0.0296	1.989	0.001
PM ₁₀	0.00950	1.989	0.0003
Hazardous Air Pollutant			
1,1,2,2-Tetrachloroethane	0.0000253	1.989	0.000001
1,1,2-Trichloroethane	0.0000153	1.989	0.0000005
1,1-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloroethane	0.0000113	1.989	0.0000004
1,2-Dichloropropane	0.000013	1.989	0.0000004
1,3-Butadiene	0.000663	1.989	0.00002
1,3-Dichloropropene	0.0000127	1.989	0.0000004
Acetaldehyde	0.00279	1.989	0.0001
Acrolein	0.00263	1.989	0.0001
Benzene	0.00158	1.989	0.00005
Carbon Tetrachloride	0.0000177	1.989	0.000001
Chlorobenzene	0.0000129	1.989	0.0000004
Chloroform	0.0000137	1.989	0.0000004
Ethylbenzene	0.0000248	1.989	0.000001
Ethylene Dibromide	0.0000213	1.989	0.000001
Formaldehyde	0.0205	1.989	0.001
Methanol	0.00306	1.989	0.0001
Methylene Chloride	0.000412	1.989	0.00001
Naphthalene	0.0000971	1.989	0.000003
Styrene	0.0000119	1.989	0.0000004
Toluene	0.000558	1.989	0.00002
Vinyl Chloride	0.00000718	1.989	0.0000002
Xylenes	0.000195	1.989	0.00001
Criteria Pollutants (Tons/Year)			0.2
Hazardous Air Pollutants (Tons/Year)			0.001
a. Criteria pollutant and hazardous air pollutant emission factors obtained from AP-42 Table 3.2-3.			
b. MMBTu value based on Cummins 150GGLB 150 kW Generator exhaust emission data sheet.			
c. AP-42 Emission Factor × MMBTu/hours × Operational Hours ÷ 2,000 lbs/ton.			

AP-42 Emission Factors

- Natural Gas-Fired Generator - Emission Point 09-01 (Table 3.2-3)
- ≤ 600 Horsepower Stationary and Portable Generators (Tables 3.3-1 and 3.3-2)
- > 600 Horsepower Stationary and Portable Generators (Tables 3.4-1, 3.4-3 and 3.4-4)

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN
 ENGINES^a
 (SCC 2-02-002-53)

Pollutant	Emission Factor (lb/MMBtu) ^b (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO _x ^c 90 - 105% Load	2.21 E+00	A
NO _x ^c <90% Load	2.27 E+00	C
CO ^c 90 - 105% Load	3.72 E+00	A
CO ^c <90% Load	3.51 E+00	C
CO ₂ ^d	1.10 E+02	A
SO ₂ ^e	5.88 E-04	A
TOC ^f	3.58 E-01	C
Methane ^g	2.30 E-01	C
VOC ^h	2.96 E-02	C
PM10 (filterable) ^{i,j}	9.50 E-03	E
PM2.5 (filterable) ^j	9.50 E-03	E
PM Condensable ^k	9.91 E-03	E
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane ^l	2.53 E-05	C
1,1,2-Trichloroethane ^l	<1.53 E-05	E
1,1-Dichloroethane	<1.13 E-05	E
1,2-Dichloroethane	<1.13 E-05	E
1,2-Dichloropropane	<1.30 E-05	E
1,3-Butadiene ^l	6.63 E-04	D
1,3-Dichloropropene ^l	<1.27 E-05	E
Acetaldehyde ^{l,m}	2.79 E-03	C
Acrolein ^{l,m}	2.63 E-03	C
Benzene ^l	1.58 E-03	B
Butyr/isobutyraldehyde	4.86 E-05	D
Carbon Tetrachloride ^l	<1.77 E-05	E

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES
(Concluded)

Pollutant	Emission Factor (lb/MMBtu) ^b (fuel input)	Emission Factor Rating
Chlorobenzene ¹	<1.29 E-05	E
Chloroform ¹	<1.37 E-05	E
Ethane ⁿ	7.04 E-02	C
Ethylbenzene ¹	<2.48 E-05	E
Ethylene Dibromide ¹	<2.13 E-05	E
Formaldehyde ^{1,m}	2.05 E-02	A
Methanol ¹	3.06 E-03	D
Methylene Chloride ¹	4.12 E-05	C
Naphthalene ¹	<9.71 E-05	E
PAH ¹	1.41 E-04	D
Styrene ¹	<1.19 E-05	E
Toluene ¹	5.58 E-04	A
Vinyl Chloride ¹	<7.18 E-06	E
Xylene ¹	1.95 E-04	A

^a Reference 7. Factors represent uncontrolled levels. For NO_x, CO, and PM-10, “uncontrolled” means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, “uncontrolled” means no oxidation control; the data set may include units with control techniques used for NO_x control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM10 = Particulate Matter ≤ 10 microns (μm) aerodynamic diameter. A “<” sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

^b Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10⁶ scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = (\text{lb/MMBtu}) (\text{heat input, MMBtu/hr}) (1/\text{operating HP, 1/hp})$$

^c Emission tests with unreported load conditions were not included in the data set.

^d Based on 99.5% conversion of the fuel carbon to CO₂. CO₂ [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO₂,

C = carbon content of fuel by weight (0.75), D = density of fuel, $4.1 \text{ E}+04 \text{ lb}/10^6 \text{ scf}$, and h = heating value of natural gas (assume 1020 Btu/scf at 60°F).

^e Based on 100% conversion of fuel sulfur to SO₂. Assumes sulfur content in natural gas of 2,000 gr/10⁶ scf.

^f Emission factor for TOC is based on measured emission levels from 6 source tests.

^g Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor.

^h VOC emission factor is based on the sum of the emission factors for all speciated organic compounds. Methane and ethane emissions were not measured for this engine category.

ⁱ No data were available for uncontrolled engines. PM10 emissions are for engines equipped with a PCC.

^j Considered $\leq 1 \mu\text{m}$ in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

^k No data were available for condensable emissions. The presented emission factor reflects emissions from 4SLB engines.

^l Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

^m For rich-burn engines, no interference is suspected in quantifying aldehyde emissions. The presented emission factors are based on FTIR and CARB 430 emissions data measurements.

ⁿ Ethane emission factor is determined by subtracting the VOC emission factor from the NMHC emission factor.

Table 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES^a

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO _x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03 ^d	0.99 ^d	6.68 E-03	0.95	D
SO _x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10 ^b	7.21 E-04	0.10	2.20 E-03	0.31	D
CO ₂ ^c	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC					
Exhaust	0.015	2.10	2.47 E-03	0.35	D
Evaporative	6.61 E-04	0.09	0.00	0.00	E
Crankcase	4.85 E-03	0.69	4.41 E-05	0.01	E
Refueling	1.08 E-03	0.15	0.00	0.00	E

^a References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

^b PM-10 = particulate matter less than or equal to 10 µm aerodynamic diameter. All particulate is assumed to be ≤ 1 µm in size.

^c Assumes 99% conversion of carbon in fuel to CO₂ with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

^d Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION
FACTORS FOR UNCONTROLLED DIESEL ENGINES^a

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene ^b	9.33 E-04
Toluene ^b	4.09 E-04
Xylenes ^b	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene ^{b,c}	<3.91 E-05
Formaldehyde ^b	1.18 E-03
Acetaldehyde ^b	7.67 E-04
Acrolein ^b	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene ^b	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,i)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

^a Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.

^b Hazardous air pollutant listed in the *Clean Air Act*.

^c Based on data from 1 engine.

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES^a

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel ^b (SCC 2-02-004-02)		
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO _x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013 ^c	1.9 ^c	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO _x ^d	8.09 E-03S ₁	1.01S ₁	B	4.06 E-04S ₁ + 9.57 E-03S ₂	0.05S ₁ + 0.895S ₂	B
CO ₂ ^e	1.16	165	B	0.772	110	B
PM	0.0007 ^c	0.1 ^c	B	ND	ND	NA
TOC (as CH ₄)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	f	f	E	3.97 E-03	0.6	E
Nonmethane	f	f	E	1.32 E-03	0.2 ^g	E

^a Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

^b Dual fuel assumes 95% natural gas and 5% diesel fuel.

^c References 8-26. Controlled NO_x is by ignition timing retard.

^d Assumes that all sulfur in the fuel is converted to SO₂. S₁ = % sulfur in fuel oil; S₂ = % sulfur in natural gas. For example, if sulfur content is 1.5%, then S = 1.5.

^e Assumes 100% conversion of carbon in fuel to CO₂ with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

^f Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

^g Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES^a

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene ^b	7.76 E-04
Toluene ^b	2.81 E-04
Xylenes ^b	1.93 E-04
Propylene	2.79 E-03
Formaldehyde ^b	7.89 E-05
Acetaldehyde ^b	2.52 E-05
Acrolein ^b	7.88 E-06

^aBased on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

^bHazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES^a

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene ^b	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,i)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

^a Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

^b Hazardous air pollutant listed in the *Clean Air Act*.

Attachment 4

Annual Greenhouse Gas Emissions Inventory Summary, 2011 - 2015

Metric Tons of Carbon Dioxide Equivalent Emissions, 2011 – 2015				
Year	Diesel Combustion Sources	Workforce Commuting	Natural Gas Combustion Source	Total
2011	651	2,703	0.002	3,354
2012	400	2,703	0.002	3,103
2013	615	2,703	0.001	3,318
2014	358	2,703	0.001	3,061
2015	817	2,703	0.002	3,520

Attachment 5

Annual Greenhouse Gas Inventory Summary, Supporting Calculations

A. Permitted Stationary and Portable Combustion Sources

Carbon dioxide equivalent emissions for the stationary and portable diesels were calculated based on annual total fuel usage of all emission sources within these categories (see Table A-3). Calculations are included in this attachment.

Table A-3					
Total Fuel Usage, 2011 - 2014					
Emission Source	2011	2012	2013	2014	2015
Stationary and Portable Diesels (>600 HP)	44,828	37,185	44,176	22,934	49,656
Stationary and Portable Diesels (≤600 HP)	18,761	1,918	15,890	12,006	30,192
Stationary Natural Gas (Emission Point 09-01)	0.002	0.002	0.001	0.001	0.002
Total	63,589	39,103	60,066	34,940	79,848

B. Workforce Transport

Based on statistical information obtained from the U. S. Census Bureau (USCB), 10.5 percent of U.S. residents carpool to work ([USCB 2014](#)). As of March 2015, there were 63 full-time employees employed at River Bend Station (Table 2.5-1 of RBS Environmental Report), and is being assumed that this employment number remained consistent over previous years. Utilizing the USCB 10.5 percent statistic, it is assumed that approximately "67" of these employees would car pool (636 x 10.5%) to work every day. Therefore, a value of "569" passenger vehicles per day was utilized, which would be considered conservative since the number of employees traveling to the site on weekends would be less than that during the normal work week of Monday - Friday.

Based on information obtained from the Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator, the CO₂e/vehicle/year was estimated to be 4.75 metric tons based on the 2011 average vehicle miles of 11,318 miles per year, and the weighted average combined fuel economy of cars and light trucks at 21.4 miles per gallon ([EPA 2014a](#)). Based on Table A-1 to Subpart A of 40 CFR Part 98, carbon dioxide has a global warming potential (100-year time horizon) of "1" ([EPA 2014a](#)). Therefore, the metric tons of carbon dioxide equivalent (CO_{2e})

emissions that would have been generated during the years of 2011 through 2015 as a result of Waterford 3 employees commuting to and from work would be as follows:

<u>Year</u>	<u>CO₂e metric tons</u> ^(a)
2011	2,703
2012	2,703
2013	2,703
2014	2,703
2015	2,703

a. 569 vehicles × 4.75 metric tons CO₂e/vehicle/year × 1 (GWP)

REFERENCES

EPA (U.S. Environmental Protection Agency). 2014a. Greenhouse Gas Equivalencies Calculator, Calculations and Reference Page. Retrieved from <<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>> (accessed March 16, 2016).

EPA. 2014b. Table A-1 to Subpart A of 40 CFR Part 98. Retrieved from <<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>> (accessed March 16, 2016).

USCB (U.S. Census Bureau). 2014. Random Samplings, Green Stats. Retrieved from <<http://blogs.census.gov/2011/04/20/green-stats/>> (accessed April 24, 2014).

Stationary and Portable Diesels
Carbon Dioxide Equivalent Emission Calculations

2011 Stationary and Portable Diesels

Enter Fuel Use (gal/yr)	63,589				
Pollutants	Global Warming Potential a	Emission Factor (lb/MMBtu) b	MMBtu/yr ^c	lbs/yr ^d	CO ₂ e metric tons/yr ^e
Carbon Dioxide	1	163.1	8,775	1,431,248	649
Nitrous Oxide	310	0.001	8,775	9	1.2
Methane	21	0.007	8,775	61	0.6
				TOTAL	651

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	73.96 kg/MMBtu	163.1
Nitrous Oxide	0.6 g/MMBtu	0.001
Methane	3 g/MMBtu	0.007

c. Yearly fuel usage × 138,000 Btu/gal ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2012 Stationary and Portable Diesels

<i>Enter Fuel Use (gal/yr)</i>	39,103				
Pollutants	Global Warming Potential a	Emission Factor (lb/MMBtu) b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	163.1	5,396	880,123	399
Nitrous Oxide	310	0.001	5,396	5	0.8
Methane	21	0.007	5,396	38	0.4
				TOTAL	400

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	73.96 kg/MMBtu	163.1
Nitrous Oxide	0.6 g/MMBtu	0.001
Methane	3 g/MMBtu	0.007

c. Yearly fuel usage × 138,000 Btu/gal ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2013 Stationary and Portable Diesels

Enter Fuel Use (gal/yr)	60,066				
Pollutants	Global Warming Potential a	Emission Factor (lb/MMBtu) b	MMBtu/yr ^c	lbs/yr ^d	CO ₂ e metric tons/yr ^e
Carbon Dioxide	1	163.1	8,289	1,351,954	613
Nitrous Oxide	310	0.001	8,289	8	1.2
Methane	21	0.007	8,289	58	0.6
				TOTAL	615

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	73.96 kg/MMBtu	163.1
Nitrous Oxide	0.6 g/MMBtu	0.001
Methane	3 g/MMBtu	0.007

c. Yearly fuel usage × 138,000 Btu/gal ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2014 Stationary and Portable Diesels

<i>Enter Fuel Use (gal/yr)</i>	34,940				
Pollutants	Global Warming Potential a	Emission Factor (lb/MMBtu) b	MMBtu/yr^c	lbs/yr^d	CO₂e metric tons/yr^e
Carbon Dioxide	1	163.1	4,822	786,423	357
Nitrous Oxide	310	0.001	4,822	5	0.7
Methane	21	0.007	4,822	34	0.3
				TOTAL	358

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	73.96 kg/MMBtu	163.1
Nitrous Oxide	0.6 g/MMBtu	0.001
Methane	3 g/MMBtu	0.007

c. Yearly fuel usage × 138,000 Btu/gal ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2015 Stationary and Portable Diesels

<i>Enter Fuel Use (gal/yr)</i>	79,848				
Pollutants	Global Warming Potential a	Emission Factor (lb/MMBtu) b	MMBtu/yr^c	lbs/yr^d	CO₂e metric tons/yr^e
Carbon Dioxide	1	163.1	11,019	1,797,203	815
Nitrous Oxide	310	0.001	11,019	11	1.5
Methane	21	0.007	11,019	77	0.7
				TOTAL	817

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	73.96 kg/MMBtu	163.1
Nitrous Oxide	0.6 g/MMBtu	0.001
Methane	3 g/MMBtu	0.007

c. Yearly fuel usage × 138,000 Btu/gal ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

Stationary Natural Gas (Emission Point 09-01)
Carbon Dioxide Equivalent Emission Calculations

2011 Stationary Natural Gas Generator (Emission Point 09-01)

<i>Enter Operational Hours (hrs/yr)</i>	39.3				
Pollutants	Global Warming Potential ^a	Emission Factor (lb/MMBtu) ^b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	117	0.04	5	0.002
Nitrous Oxide	310	0.0002	0.04	0.00001	0.000001
Methane	21	0.002	0.04	0.0001	0.000001
				TOTAL	0.002

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	53.06 kg/MMBtu	117
Nitrous Oxide	0.1 g/MMBtu	0.0002
Methane	1.0 g/MMBtu	0.002

c. Yearly fuel usage × 1,026 Btu/scf ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2012 Stationary Natural Gas Generator (Emission Point 09-01)

<i>Enter Operational Hours (hrs/yr)</i>	34.5				
Pollutants	Global Warming Potential ^a	Emission Factor (lb/MMBtu) ^b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	117	0.04	4	0.002
Nitrous Oxide	310	0.0002	0.04	0.00001	0.000001
Methane	21	0.002	0.04	0.0001	0.000001
				TOTAL	0.002

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	53.06 kg/MMBtu	117
Nitrous Oxide	0.1 g/MMBtu	0.0002
Methane	1.0 g/MMBtu	0.002

c. Yearly fuel usage × 1,026 Btu/scf ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2013 Stationary Natural Gas Generator (Emission Point 09-01)

<i>Enter Operational Hours (hrs/yr)</i>	23.4				
Pollutants	Global Warming Potential ^a	Emission Factor (lb/MMBtu) ^b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	117	0.02	3	0.001
Nitrous Oxide	310	0.0002	0.02	0.000005	0.000001
Methane	21	0.002	0.02	0.00005	0.000000
				TOTAL	0.001

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	53.06 kg/MMBtu	117
Nitrous Oxide	0.1 g/MMBtu	0.0002
Methane	1.0 g/MMBtu	0.002

c. Yearly fuel usage × 1,026 Btu/scf ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2014 Stationary Natural Gas Generator (Emission Point 09-01)

<i>Enter Operational Hours (hrs/yr)</i>	21.7				
Pollutants	Global Warming Potential ^a	Emission Factor (lb/MMBtu) ^b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	117	0.02	3	0.001
Nitrous Oxide	310	0.0002	0.02	0.000004	0.000001
Methane	21	0.002	0.02	0.00004	0.000000
				TOTAL	0.001

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	53.06 kg/MMBtu	117
Nitrous Oxide	0.1 g/MMBtu	0.0002
Methane	1.0 g/MMBtu	0.002

c. Yearly fuel usage × 1,026 Btu/scf ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

2015 Stationary Natural Gas Generator (Emission Point 09-01)

<i>Enter Operational Hours (hrs/yr)</i>	31.3				
Pollutants	Global Warming Potential ^a	Emission Factor (lb/MMBtu) ^b	MMBtu/yr ^c	lbs/yr ^d	CO₂e metric tons/yr ^e
Carbon Dioxide	1	117	0.03	4	0.002
Nitrous Oxide	310	0.0002	0.03	0.00001	0.000001
Methane	21	0.002	0.03	0.0001	0.000001
				TOTAL	0.002

a. Based on Table A-1 to Subpart A of 40 CFR Part 98 (<https://www.law.cornell.edu/cfr/text/40/part-98/subpart-A/appendix-TableA-1>).

b. Based on Table 1 of EPA's 2015 GHG Emission Factor Hub for Number 2 diesel fuel oil (http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf). Emission factors were converted to lb/MMBtu (see below).

<u>GHG Gas</u>	<u>Emission Factor</u>	<u>lb/MMBtu Conversion</u>
Carbon Dioxide	53.06 kg/MMBtu	117
Nitrous Oxide	0.1 g/MMBtu	0.0002
Methane	1.0 g/MMBtu	0.002

c. Yearly fuel usage × 1,026 Btu/scf ÷ 1,000,000. Btu value based on Table 1 of EPA's 2015 GHG Emission Factor Hub (https://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)

d. Emission factor × MMBtu/yr.

e. Pounds per year ÷ 2.205 pounds × Global Warming Potential.

EPA's Greenhouse Gas Emission Factor Hub

(http://www.epa.gov/sites/production/files/2015-12/documents/emission-factors_nov_2015.pdf)