Table 8a CHP Engine Emissions with biogas/natural gas

Normal Operation, Both Engines Operating

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	15,150	9.88	2	24	0.3	0.12	0.12	0.00135	0.118	0.118	53,020	1.0	0.10	18.47
Fuel heating value =		652 Btu/scf				Based on Mustang estimate of 86.5% biogas at 587 Btu/scf and 13.5% natural gas at 1070 Btu/scf									
Fuel sulfur =		18 ppmv				Based on Mustang estimate of 86.5% biogas at 20 ppmv and 13.5% natural gas at 4.3 ppmv									
Fuel CO_2 fraction =		0.357				Based on Mustang estimate of 86.5% biogas at 0.41 and 13.5% natural gas at 0.0154									

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Fuel heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Normal Operation, One Engine Operating and One Engine Down

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	16,828	9.88	1	24	0.3	0.12	0.12	0.00151	0.118	0.118	53,020	1.0	0.10	21.23
Fuel heating value =		587 Btu/scf				Based on Mustang estimate for 100% biogas									
Fuel sulfur =		20 ppmv				Based on Mustang estimate for 100% biogas									
Fuel CO_2 fraction =		0.410				Based on Mustang estimate for 100% biogas									

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Table 8a CHP Engine Emissions with biogas/natural gas

Start-up

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (start-up)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[c]	PM2.5 (g/bhp-hr)[c]	Combust. CO_2 (g/MMBtu)[c]	CH_4 (g/MMBtu)[c]	N_2O (g/MMBtu)[c]	Pass-through CO_2 (g/scf)[e]
9,232	9.88	3	0.43	0.6	0.00032	0.11800	0.11800	53,020	1.0	0.10	0.80

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel CO_2 fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Catalyst Burn-in

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (SCR catalyst burn-in)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[c]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[b]	PM2.5 (g/bhp-hr)[b]	Combust. CO_2 (g/MMBtu)[b]	CH_4 (g/MMBtu)[b]	N_2O (g/MMBtu)[b]	Pass-through CO_2 (g/scf)[e]
9,232	9.88	0.3	0.12	0.36	0.00032	0.11800	0.11800	53,020	1.0	0.10	0.80

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel CO_2 fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	0.42	0.04	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	6.17E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	0.42	0.06	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	7.87E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Table 8a CHP Engine Emissions with biogas/natural gas

Hourly Emissions per Engine, Start-Up (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
5.72	0.95	1.25	0.03	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	3.25E+02

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	1.25	0.01	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	1.62E+01

Daily Emissions, both Engines Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
49.94	19.97	19.97	2.16	19.64	19.64	5.54E+04	1.05E+00	1.05E-01	2.96E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, One Engine Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
24.97	9.99	9.99	1.34	9.82	9.82	2.77E+04	5.23E-01	5.23E-02	1.89E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
54.62	20.51	20.81	2.14	19.64	19.64	5.54E+04	1.05E+00	1.05E-01	2.93E+04

Annual Op. (hr/year-engine)		Annual Emissions, both Engines (lb/year)[c]									
		CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Start-Up[a]	18	205.99	34.33	44.94	1.05	14.73	14.73	4.16E+04	7.84E-01	7.84E-02	1.17E+04
SCR Catalyst Burn-In[a]	120	249.68	99.87	299.62	1.58	98.21	98.21	2.77E+05	5.23E+00	5.23E-01	3.89E+03
Normal Operation, Both Eng.[b]	7,746	16,117.01	6,446.80	6,446.80	696.73	6,339.36	6,339.36	1.79E+07	3.37E+02	3.37E+01	9.56E+06
Normal Operation, One Eng.[b]	438	911.34	364.54	364.54	48.95	358.46	358.46	1.01E+06	1.91E+01	1.91E+00	6.90E+05
Total	8,322	**17,484.02**	**6,945.54**	**7,155.90**	**748.30**	**6,810.76**	**6,810.76**	**1.92E+07**	**3.62E+02**	**3.62E+01**	**1.03E+07**

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

Table 8b CHP Engine Emissions with biogas/propane

Normal Operation, Both Engines Operating

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	11,704	9.88	2	24	0.3	0.12	0.12	0.00301	0.118	0.118	54,193	1.27	0.17	18.36

Fuel heating value =	844	Btu/scf	Based on Mustang estimate of 86.5% biogas at 587 Btu/scf and 13.5% propane at 2,488 Btu/scf
Fuel sulfur =	40	ppmv	Based on Mustang estimate of 86.5% biogas at 20 ppmv and 13.5% propane at 168.1 ppmv
Fuel CO2 factor =	54,193	g/MMBtu	Based on Mustang estimate of 86.5% biogas at and 13.5% propane [e]
Fuel CH4 factor =	1.27	g/MMBtu	Based on Mustang estimate of 86.5% biogas at and 13.5% propane [f]
Fuel N2O factor =	0.17	g/MMBtu	Based on Mustang estimate of 86.5% biogas at and 13.5% propane [f]
Fuel pass-through CO_2 fraction =	0.355		Based on Mustang estimate of 86.5% biogas at 0.41 and 13.5% propane at 0

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Fuel heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr based on firing biogas and natural gas. Assumed similar for firing biogas and propane. Filterable PM10 and PM2.5 assumed equal to filterable PM.
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engines from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
Propane based on Liquefied Petroleum Gases (LPG) fuel type.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Propane based on Petroleum fuel type.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Normal Operation, One Engine Operating and One Engine Down

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	16,828	9.88	1	24	0.3	0.12	0.12	0.00151	0.118	0.118	53,020	1.0	0.10	21.23

Fuel heating value =	587	Btu/scf	Based on Mustang estimate for 100% biogas
Fuel sulfur =	20	ppmv	Based on Mustang estimate for 100% biogas
Fuel CO_2 fraction =	0.410		Based on Mustang estimate for 100% biogas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engines from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Table 8b CHP Engine Emissions with biogas/propane

Start-up

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (start-up)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[c]	PM2.5 (g/bhp-hr)[c]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
3,970	9.88	3	0.86	0.6	0.01266	0.11800	0.11800	61,710	3.0	0.60	0.00

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel CO_2 fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification for natural gas fuel, assumed same for propane fuel except double for uncontrolled ROC.
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" CO_2 not expected with 100% propane/LPG fuel

Catalyst Burn-in

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (SCR catalyst burn-in)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[c]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[b]	PM2.5 (g/bhp-hr)[b]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
3,970	9.88	0.3	0.12	0.36	0.01266	0.11800	0.11800	61,710	3.0	0.60	0.00

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel CO_2 fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" CO_2 not expected with 100% propane/LPG fuel

Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	0.42	0.08	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	4.74E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	0.42	0.06	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	7.87E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Table 8b **CHP Engine Emissions with biogas/propane**

Hourly Emissions per Engine, Start-Up (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
5.72	1.70	1.25	0.15	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	2.37E+02

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.04	0.42	1.25	0.11	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	0.00E+00

Daily Emissions, both Engines Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
49.94	19.97	19.97	3.73	19.64	19.64	5.66E+04	1.33E+00	1.75E-01	2.27E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, One Engine Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
24.97	9.99	9.99	1.34	9.82	9.82	2.77E+04	5.23E-01	5.23E-02	1.89E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
54.62	21.26	20.81	3.80	19.64	19.64	5.66E+04	1.33E+00	1.75E-01	2.25E+04

Annual Op. (hr/year-engine)		Annual Emissions, both Engines (lb/year)[c]									
		CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Start-Up[a]	18	205.99	61.17	44.94	5.39	14.73	14.73	4.25E+04	9.96E-01	1.31E-01	8.53E+03
SCR Catalyst Burn-In[a]	120	249.68	99.87	299.62	26.59	98.21	98.21	2.83E+05	6.64E+00	8.75E-01	0.00E+00
Normal Operation, Both Eng.[b]	7,746	16,117.01	6,446.80	6,446.80	1,203.87	6,339.36	6,339.36	1.83E+07	4.28E+02	5.65E+01	7.34E+06
Normal Operation, One Eng.[b]	438	911.34	364.54	364.54	48.95	358.46	358.46	1.01E+06	1.91E+01	1.91E+00	6.90E+05
Total	8,322	17,484.02	6,972.38	7,155.90	1,284.79	6,810.76	6,810.76	1.96E+07	4.55E+02	5.94E+01	8.04E+06

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

Table 8c CHP Engine Emissions

Normal Operation, Both Engines Operating

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation)									
						CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	17,002	9.88	2	24	0.3	0.12	0.12	0.00153	0.118	0.118	53,020	1.0	0.10	20.89
Fuel heating value =		581 Btu/scf		Based on Mustang estimate of 86.5% biogas at 587 Btu/scf and 13.5% landfill gas at 545 Btu/scf											
Fuel sulfur =		20 ppmv		Based on Mustang estimate of 86.5% biogas at 20 ppmv and 13.5% landfill gas at 22 ppmv											
Fuel CO_2 fraction =		0.404		Based on Mustang estimate of 86.5% biogas at 0.41 and 13.5% landfill gas at 36.23%											

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Fuel heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Normal Operation, One Engine Operating and One Engine Down

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation)									
						CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS416vB82	1,573	16,828	9.88	1	24	0.3	0.12	0.12	0.00151	0.118	0.118	53,020	1.0	0.10	21.23
Fuel heating value =		587 Btu/scf		Based on Mustang estimate for 100% biogas											
Fuel sulfur =		20 ppmv		Based on Mustang estimate for 100% biogas											
Fuel CO_2 fraction =		0.410		Based on Mustang estimate for 100% biogas											

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Table 8c CHP Engine Emissions

Start-up

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (start-up)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[c]	PM2.5 (g/bhp-hr)[c]	Combust. CO_2 (g/MMBtu)[c]	CH_4 (g/MMBtu)[c]	N_2O (g/MMBtu)[c]	Pass-through CO_2 (g/scf)[e]
9,232	9.88	3	0.43	0.6	0.00032	0.11800	0.11800	53,020	1.0	0.10	0.80

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel CO_2 fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Catalyst Burn-in

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Emission Factors (SCR catalyst burn-in)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[c]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[b]	PM2.5 (g/bhp-hr)[b]	Combust. CO_2 (g/MMBtu)[b]	CH_4 (g/MMBtu)[b]	N_2O (g/MMBtu)[b]	Pass-through CO_2 (g/scf)[e]
9,232	9.88	0.3	0.12	0.36	0.00032	0.11800	0.11800	53,020	1.0	0.10	0.80

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel CO_2 fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

	Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with biogas/natural gas	1.04	0.42	0.42	0.06	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	7.83E+02
Operating with biogas/propane	1.04	0.42	0.42	0.08	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	4.74E+02
Maximum case for Normal Op. lb/hr	**1.04**	**0.42**	**0.42**	**0.08**	**0.41**	**0.41**	**1.18E+03**	**2.77E-02**	**3.65E-03**	**7.83E+02**

	Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	1.04	0.42	0.42	0.06	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	7.87E+02
	1.04	0.42	0.42	0.06	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	7.87E+02
Max. case for Normal Op. 1 engine lb/hr	**1.04**	**0.42**	**0.42**	**0.06**	**0.41**	**0.41**	**1.15E+03**	**2.18E-02**	**2.18E-03**	**7.87E+02**

Table 8c CHP Engine Emissions

	Hourly Emissions per Engine, Start-Up (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	5.72	0.95	1.25	0.04	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	4.08E+02
	5.72	1.70	1.25	0.15	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	2.37E+02
Maximum case for engine startup lb/hr	**5.72**	**1.70**	**1.25**	**0.15**	**0.41**	**0.41**	**1.18E+03**	**2.77E-02**	**3.65E-03**	**4.08E+02**

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

	Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	1.04	0.42	1.25	0.01	0.41	0.41	1.15E+03	2.18E-02	2.18E-03	1.62E+01
	1.04	0.42	1.25	0.11	0.41	0.41	1.18E+03	2.77E-02	3.65E-03	0.00E+00
Maximum case for SCR burn-in lb/hr	**1.04**	**0.42**	**1.25**	**0.11**	**0.41**	**0.41**	**1.18E+03**	**2.77E-02**	**3.65E-03**	**1.62E+01**

	Daily Emissions, both Engines Normal Operation (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	49.94	19.97	19.97	2.75	19.64	19.64	5.54E+04	1.05E+00	1.05E-01	3.76E+04
	49.94	19.97	19.97	3.73	19.64	19.64	5.66E+04	1.33E+00	1.75E-01	2.27E+04
Max. case for Normal Op. 2 eng. lb/day	**49.94**	**19.97**	**19.97**	**3.73**	**19.64**	**19.64**	**5.66E+04**	**1.33E+00**	**1.75E-01**	**3.76E+04**

Table 8c CHP Engine Emissions

	Daily Emissions, One Engine Normal Operation (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	24.97	9.99	9.99	1.34	9.82	9.82	2.77E+04	5.23E-01	5.23E-02	1.89E+04
	24.97	9.99	9.99	1.34	9.82	9.82	2.77E+04	5.23E-01	5.23E-02	1.89E+04
Max. case for Normal Op. 1 eng. lb/day	**24.97**	**9.99**	**9.99**	**1.34**	**9.82**	**9.82**	**2.77E+04**	**5.23E-01**	**5.23E-02**	**1.89E+04**

	Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
	54.62	20.51	20.81	2.72	19.64	19.64	5.54E+04	1.05E+00	1.05E-01	3.72E+04
	54.62	21.26	20.81	3.80	19.64	19.64	5.66E+04	1.33E+00	1.75E-01	2.25E+04
Maximum case for Normal Op. + 1 SU	**54.62**	**21.26**	**20.81**	**3.80**	**19.64**	**19.64**	**5.66E+04**	**1.33E+00**	**1.75E-01**	**3.72E+04**

		Annual Emissions, both Engines (lb/year)[c]								
Annual Op. (hr/year-engine)		CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Start-Up[a]	18	205.99	61.17	44.94	5.39	14.73	14.73	42,485.71	1.00	0.13	14,680.38
SCR Catalyst Burn-In[a]	120	249.68	99.87	299.62	26.59	98.21	98.21	2.83E+05	6.64E+00	8.75E-01	3.89E+03
Normal Operation, Both Eng.[b]	7,746	16,117.01	6,446.80	6,446.80	1,203.87	6,339.36	6,339.36	1.83E+07	4.28E+02	5.65E+01	1.21E+07
Normal Operation, One Eng.[b]	438	911.34	364.54	364.54	48.95	358.46	358.46	1.01E+06	1.91E+01	1.91E+00	6.90E+05
Total	8,322	17,484.02	6,972.38	7,155.90	1,284.79	6,810.76	6,810.76	1.96E+07	4.55E+02	5.94E+01	1.28E+07

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines based on maximum emissions by opeartional case

from the biogas/natural gas case

205.99	34.33	44.94	1.05	14.73	14.73	41,566.00	0.78	0.08	11,687.69
249.68	99.87	299.62	1.58	98.21	98.21	2.77E+05	5.23E+00	5.23E-01	3.89E+03
16,117.01	6,446.80	6,446.80	696.73	6,339.36	6,339.36	1.79E+07	3.37E+02	3.37E+01	9.56E+06
911.34	364.54	364.54	48.95	358.46	358.46	1.01E+06	1.91E+01	1.91E+00	6.90E+05
17,484.02	6,945.54	7,155.90	748.30	6,810.76	6,810.76	1.92E+07	3.62E+02	3.62E+01	1.03E+07
0.00	26.84	0.00	4.34	0.00	0.00	919.71	0.21	0.05	2,992.69
0.00	0.00	0.00	25.01	0.00	0.00	6,131.42	1.41	0.35	0.00
0.00	0.00	0.00	507.14	0.00	0.00	395,782.88	91.09	22.77	2,575,708.76
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	**26.84**	**0.00**	**536.49**	**0.00**	**0.00**	**402,834.01**	**92.71**	**23.18**	**2,578,701.46**

Compound	CAS Number	MRF/AD Tank		Clear Diesel		Red Diesel		Gasoline Tank	
		Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/yr)
Benzene	71432	1.14E-06	0.01	1.14E-06	0.01	2.28E-06	0.02	5.82E-05	0.51
Ethylbenzene	100414	2.28E-06	0.02	1.14E-06	0.01	3.42E-06	0.03	4.57E-06	0.04
n-Hexane	110543	1.14E-06	0.01	1.14E-06	0.01	1.14E-06	0.01	5.25E-05	0.46
Toluene	108883	1.83E-05	0.16	1.14E-06	0.01	2.51E-05	0.22	6.39E-05	0.56
1,2,4-Trimethylbenzene	95636	3.65E-05	0.32	1.14E-06	0.01	4.91E-05	0.43	1.14E-06	0.01
m-Xylene	108383	4.68E-05	0.41	1.14E-06	0.01	6.28E-05	0.55	1.71E-05	0.15
Diesel		8.00E-04	7.01						
	g/s	1.01E-04							

Table 8d MRF CHP Engine Emissions with biogas/propane

Normal Operation, Both Engines Operating

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/sct)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS420B82	1,966	15,264	12.32	2	24	0.2	0.114	0.12	0.00314	0.118	0.118	54,193	1.27	0.17	16.23

Fuel heating value =	807	Btu/scf	Based on Mustang estimate of 86.5% landfill gas at 545 Btu/scf and 13.5% propane at 2,488 Btu/scf
Fuel sulfur =	42	ppmv	Based on Mustang estimate of 86.5% landfill gas at 22 ppmv and 13.5% propane at 168.1 ppmv
Fuel CO2 factor =	54,193	g/MMBtu	Based on Mustang estimate of 86.5% landfill gas at and 13.5% propane[e]
Fuel CH4 factor =	1.27	g/MMBtu	Based on Mustang estimate of 86.5% landfill gas at and 13.5% propane[f]
Fuel N2O factor =	0.17	g/MMBtu	Based on Mustang estimate of 86.5% landfill gas at and 13.5% propane[f]
Fuel pass-through CO_2 fraction =	0.313		Based on Mustang estimate of 86.5% landfill gas at 0.3623 and 13.5% propane at 0

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Fuel heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr based on firing biogas and natural gas. Assumed similar for firing biogas and propane. Filterable PM10 and PM2.5 assumed equal to filterable PM.
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
Propane based on Liquefied Petroleum Gases (LPG) fuel type.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Propane based on Petroleum fuel type.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Normal Operation, One Engine Operating and One Engine Down

Type	Engine Rating (hp)	Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/hr)	Number Engines	Daily Op. (hr/day)	Emission Factors (normal operation) CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/sct)[c]	PM10 (g/bhp-hr)[d]	PM2.5 (g/bhp-hr)[d]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
Jenbacher/GE JMS420B82	1,966	22,602	12.32	1	24	0.2	0.114	0.12	0.00166	0.118	0.118	53,020	1.0	0.10	18.76

Fuel heating value =	545	Btu/scf	Based on Mustang estimate for 100% landfill gas
Fuel sulfur =	22	ppmv	Based on Mustang estimate for 100% landfill gas
Fuel CO_2 fraction =	0.362		Based on Mustang estimate for 100% landfill gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]

[b] Control system vendor specifications

[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x 10^{-3} lb/MMBtu = 9.91 x 10^{-3} lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.

[g] "Pass-through" CO_2 emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Table 8d MRF CHP Engine Emissions with biogas/propane

Start-up

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/ hr)	Emission Factors (start-up)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[b]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[c]	PM2.5 (g/bhp-hr)[c]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
4,951	12.32	0.2	0.114	0.12	0.01266	0.11800	0.11800	61,710	3.0	0.60	0.00

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel CO_2 fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification for natural gas fuel, assumed same for propane fuel except double for uncontrolled ROC.
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" CO_2 not expected with 100% propane/LPG fuel

Catalyst Burn-in

Fuel Input @ Full Load (scfh)[a]	Heat Input @ Full Load (MMBtu/ hr)	Emission Factors (SCR catalyst burn-in)									
		CO (g/bhp-hr)[b]	ROC (g/bhp-hr)[b]	NOx (g/bhp-hr)[c]	SOx (g/scf)[d]	PM10 (g/bhp-hr)[b]	PM2.5 (g/bhp-hr)[b]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
4,951	12.32	0.2	0.114	0.12	0.01266	0.11800	0.11800	61,710	3.0	0.60	0.00

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel CO_2 fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x 10^6 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" CO_2 not expected with 100% propane/LPG fuel

Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
0.87	0.49	0.52	0.11	0.51	0.51	1.47E+03	3.45E-02	4.55E-03	5.46E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
0.87	0.49	0.52	0.08	0.51	0.51	1.44E+03	2.72E-02	2.72E-03	9.35E+02

[a] Except for SOx, CO_2, CH_4 and N_2O, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion CO_2, CH_4 and N_2O hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

Table 8d MRF CHP Engine Emissions with biogas/propane

Hourly Emissions per Engine, Start-Up (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
0.87	0.49	0.52	0.19	0.51	0.51	1.47E+03	3.45E-02	4.55E-03	2.73E+02

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
0.87	0.49	0.52	0.14	0.51	0.51	1.47E+03	3.45E-02	4.55E-03	0.00E+00

Daily Emissions, both Engines Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
41.61	23.72	24.97	5.08	24.55	24.55	7.06E+04	1.66E+00	2.18E-01	2.62E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, One Engine Normal Operation (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
20.80	11.86	12.48	1.98	12.27	12.27	3.46E+04	6.52E-01	6.52E-02	2.24E+04

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]									
CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
41.61	23.72	24.97	5.16	24.55	24.55	7.06E+04	1.66E+00	2.18E-01	2.59E+04

Annual Op. (hr/year-engine)	Annual Emissions, both Engines (lb/year)[c]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Start-Up[a]	18	31.21	17.79	18.72	6.88	18.41	18.41	5.30E+04	1.24E+00	1.64E-01	9.83E+03
SCR Catalyst Burn-In[a]	120	208.04	118.58	124.83	33.16	122.74	122.74	3.53E+05	8.28E+00	1.09E+00	0.00E+00
Normal Operation, Both Eng.[b]	7,746	13,429.13	7,654.61	8,057.48	1,637.99	7,923.19	7,923.19	2.28E+07	5.34E+02	7.05E+01	8.46E+06
Normal Operation, One Eng.[b]	438	759.35	432.83	455.61	72.31	448.02	448.02	1.26E+06	2.38E+01	2.38E+00	8.19E+05
Total	8,322	14,427.74	8,223.81	8,656.64	1,750.34	8,512.36	8,512.36	2.45E+07	5.68E+02	7.41E+01	9.29E+06

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

Table 8e MRF CHP Engine Emissions

	Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	0.87	0.49	0.52	0.08	0.51	0.51	1.44E+03	2.72E-02	2.72E-03	9.35E+02
Operating with NG/propane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum case for Normal Op. lb/hr	**0.87**	**0.49**	**0.52**	**0.08**	**0.51**	**0.51**	**1.44E+03**	**2.72E-02**	**2.72E-03**	**9.35E+02**

	Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	0.87	0.49	0.52	0.08	0.51	0.51	1.44E+03	2.72E-02	2.72E-03	9.35E+02
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max. case for Normal Op. 1 engine lb/hr	**0.87**	**0.49**	**0.52**	**0.08**	**0.51**	**0.51**	**1.44E+03**	**2.72E-02**	**2.72E-03**	**9.35E+02**

	Hourly Emissions per Engine, Start-Up (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	6.93	1.18	1.56	0.05	0.51	0.51	1.44E+03	2.72E-02	2.72E-03	4.88E+02
Operating with NG/propane	0.87	0.49	0.52	0.19	0.51	0.51	1.47E+03	3.45E-02	4.55E-03	2.73E+02
Maximum case for engine startup lb/hr	**6.93**	**1.18**	**1.56**	**0.19**	**0.51**	**0.51**	**1.47E+03**	**3.45E-02**	**4.55E-03**	**4.88E+02**

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

	Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	6.93	1.18	1.56	0.04	0.51	0.51	115619.95	2.18	0.22	469.04
Operating with NG/propane	0.87	0.49	0.52	0.14	0.51	0.51	1471.67	0.03	0.00	0.00
Maximum case for SCR burn-in lb/hr	**6.93**	**1.18**	**1.56**	**0.14**	**0.51**	**0.51**	**1.16E+05**	**2.18E+00**	**2.18E-01**	**4.69E+02**

	Daily Emissions, both Engines Normal Operation (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	41.61	23.72	24.97	3.96	24.55	24.55	6.91E+04	1.30E+00	1.30E-01	4.49E+04
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max. case for Normal Op. 2 eng. lb/day	**41.61**	**23.72**	**24.97**	**3.96**	**24.55**	**24.55**	**6.91E+04**	**1.30E+00**	**1.30E-01**	**4.49E+04**

Table 8e MRF CHP Engine Emissions

	Daily Emissions, One Engine Normal Operation (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	20.80	11.86	12.48	1.98	12.27	12.27	3.46E+04	6.52E-01	6.52E-02	2.24E+04
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max. case for Normal Op. 1 eng. lb/day	**20.80**	**11.86**	**12.48**	**1.98**	**12.27**	**12.27**	**3.46E+04**	**6.52E-01**	**6.52E-02**	**2.24E+04**

	Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Operating with landfill gas	47.68	24.40	26.01	3.93	24.55	24.55	6.91E+04	1.30E+00	1.30E-01	4.44E+04
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum case for Normal Op. + 1 SU	**47.68**	**24.40**	**26.01**	**3.93**	**24.55**	**24.55**	**6.91E+04**	**1.30E+00**	**1.30E-01**	**4.44E+04**

		Annual Emissions, both Engines (lb/year)[c]								
Annual Op. (hr/year-engine)		CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
Start-Up[a]	18	249.65	42.44	56.17	6.88	18.41	18.41	52,980.26	1.24	0.16	17,551.83
SCR Catalyst Burn-In[a]	120	1,664.34	282.94	374.48	33.16	122.74	122.74	2.77E+07	5.23E+02	5.23E+01	1.13E+05
Normal Operation, Both Eng.[b]	7,746	13,429.13	7,654.61	8,057.48	1,278.88	7,923.19	7,923.19	2.23E+07	4.21E+02	4.21E+01	1.45E+07
Normal Operation, One Eng.[b]	438	759.35	432.83	455.61	72.31	448.02	448.02	1.26E+06	2.38E+01	2.38E+00	8.19E+05
Total	**8,322**	**16,102.48**	**8,412.82**	**8,943.74**	**1,391.23**	**8,512.36**	**8,512.36**	**5.14E+07**	**9.69E+02**	**9.69E+01**	**1.54E+07**

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines based on maximum emissions by operational case

Table 9a **AD Flare Emissions**

Type	Heat Input (MMBtu/hr)[a]	Biogas Flow Rate (scfh)[a]	Daily Op. (hr/day)	Emission Factors: CO (lb/MMBtu)[b]	ROC (lb/MMBtu)[c]	NOx (lb/MMBtu)[b]	SOx (g/scf)[d]	PM10 (lb/MMBtu)[b]	PM2.5 (lb/MMBtu)[b]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
John Zink ZTOF	1.23	2,125	1	0.2	0.0027	0.08	0.01506	0.042	0.042	53,020	3.2	0.63	21.23

Biogas sulfur = 200 ppmv

Biogas CO_2 fraction = 0.41 Conservative estimate

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 of biogas to two CHP engines.

[b] Manufacturer's specifications

[c] From SBCAPCD Rule 359

[d] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[g] "Pass-through" CO_2 emission factor [g/scf] = Biogas CO_2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Heat Input (MMBtu/hr)[a]	Biogas Flow Rate (scfh)[a]	Digester Purging Hourly Emissions[b]: CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1.23	2,125	0.25	0.00	0.10	0.07	0.05	0.05	144.33	0.01	0.00	99.45

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 of biogas to two CHP engines.

[b] Except for SOx and pass-through CO_2, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

Daily Op. (hr/day)	Digester Purging Daily Emissions[a]: CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
1	0.25	0.00	0.10	0.07	0.05	0.05	144.33	0.01	0.00	99.45

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

Annual Op. (hr/year)	Digester Purging Annual Emissions[a]: CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
278	68.65	0.93	27.46	19.62	14.42	14.42	40,122.73	2.42	0.48	27,647.75

[a] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

Table 9a **AD Flare Emissions**

		Hourly Flaring Emissions for One Engine Off-Line[b]									
Heat Input (MMBtu/hr)[a]	Flow Rate (scfh)[a]	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
9.88	17,002	1.98	0.03	0.79	0.56	0.41	0.41	1,154.61	0.07	0.01	795.62

[a] Heat input assumed to be heat input to two CHP engines. Flow rate assumed to be biogas flow rate to two CHP engines.
[b] Except for SOx and pass-through CO_2, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]
SOx and pass-through CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

	Daily Flaring Emissions for One Engine Off-Line[a]									
Daily Op. (hr/day)	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
24	47.41	0.64	18.97	13.55	9.96	9.96	27,710.66	1.67	0.33	19,094.85

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

	Annual Flaring Emissions for Engines Off-Line[a]									
Annual Op. (hr/year)	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
876	1,730.63	23.36	692.25	494.52	363.43	363.43	1,011,439.26	61.04	12.02	696,962.07

[a] Annual operating hours assumes each engine is off-line 5% of the time during a year (438 hrs/engine)
[b] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

Table 9b MRF Flare Emissions

753 SCFM

Type	Heat Input (MMBtu/hr)[a]	Landfill Gas Flow Rate (scfh)[a]	Daily Op. (hr/day)	Emission Factors									
				CO (lb/MMBtu)[b]	ROC (lb/MMBtu)[c]	NOx (lb/MMBtu)[b]	SOx (g/scf)[d]	PM10 (lb/MMBtu)[b]	PM2.5 (lb/MMBtu)[b]	Combust. CO_2 (g/MMBtu)[e]	CH_4 (g/MMBtu)[f]	N_2O (g/MMBtu)[f]	Pass-through CO_2 (g/scf)[g]
John Zink ZTOF	24.64	45,204	1	0.2	0.0027	0.08	0.00166	0.042	0.042	53,020	3.2	0.63	18.76

Landfill gas sulfur = 22 ppmv

Landfill gas CO_2 fraction = 0.3623 Conservative estimate

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester.

[b] Manufacturer's specifications

[c] From SBCAPCD Rule 359

[d] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x 10^{-6} x 64 [lb/lb-mole SO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[g] "Pass-through" CO_2 emission factor [g/scf] = Biogas CO_2 volume fraction [unitless] x 44 [lb/lb-mole CO_2] / 385.5 [scf/lb-mole] x 453.6 g/lb

Heat Input (MMBtu/hr)[a]	Flow Rate (scfh)[a]	Hourly Flaring Emissions for One Engine Off-Line (lb/hr)[b]									
		CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
12.32	22,602	2.46	0.03	0.99	0.08	0.52	0.52	1,439.82	0.09	0.02	934.63

[a] Heat input assumed to be heat input to two CHP engines. Flow rate assumed to be biogas flow rate to two CHP engines.

[b] Except for SOx and pass-through CO_2, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through CO_2 hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

Daily Op. (hr/day)	Daily Flaring Emissions for One Engine Off-Line (lb/day)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
24	59.13	0.80	23.65	1.98	12.42	12.42	34,555.57	2.09	0.41	22,431.15

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

Annual Op. (hr/year)	Annual Flaring Emissions for Engines Off-Line (lb/year)[a]									
	CO	ROC	NOx	SOx	PM10	PM2.5	Combust. CO_2	CH_4	N_2O	Pass-through CO_2
876	2,158.11	29.13	863.25	72.31	453.20	453.20	1,261,278.47	76.12	14.99	818,737.03

[a] Annual operating hours assumes each engine is off-line 5% of the time during a year (438 hrs/engine)

[b] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

Table 10

Emergency Generator Testing Emissions

Equipment	Horsepower	Hours/Day	Fuel Use (gal/hr)	Emission Factors (g/bhp-hr)[a]					Emission Factors (g/gal)		
				CO	ROC	NOx	PM10[b]	PM2.5[b]	CO_2[c]	CH_4[d]	N_2O[d]
Caterpillar D 150-8 150 ekW	239	0.5	11.3	2.6	0.14	0.5	0.02	0.02	10,210	0.41	0.083

[a] Emission factors are Tier 4 emission standards.

[b] PM10 and PM2.5 assumed to be same as PM emission standards.

[c] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[d] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

Equipment	Load Factor	Emission Rates (lb/hr)								
		CO[a]	ROC[a]	NOx[a]	SOx[b]	PM10[a]	PM2.5[a]	CO_2[c]	CH_4[c]	N_2O[c]
Caterpillar D 150-8 150 ekW	1	1.373	0.074	0.264	0.002	0.011	0.011	254.35	0.01	0.00

Diesel Fuel Density = 6.943

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x 10^{-6} x 2 [lb SO_2/lb S]

[c] Emission Rate [lb/hr] = Emission Factor [g/gal] x Fuel Use [gal/hr] / 453.6 [g/lb]

Equipment	Daily Emissions (lb/day)[a]								
	CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Caterpillar D 150-8 150 ekW	0.69	0.04	0.13	0.00	0.01	0.01	127.17	0.01	0.00

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/day]

Equipment	Annual Op. (hr/year)	Annual Emissions (lb/year)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Caterpillar D 150-8 150 ekW	50	68.63	3.70	13.20	0.12	0.53	0.53	12,717.48	0.51	0.10

[a] Annual Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/year]

ST (g/s)	1.7295E-01	9.3127E-03	3.3259E-02	2.9656E-04	1.3304E-03	1.3304E-03
Ann (g/s)			1.8983E-04	1.6927E-06	7.5933E-06	7.5933E-06

Table 11a Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions

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

Identification

User Identification:	MRF/AD Tank
City:	Santa Barbara
State:	California
Company:	Mustang
Type of Tank:	Horizontal Tank
Description:	Diesel Storage tank for MRF & AD equipment.

Tank Dimensions

Shell Length (ft):	27.00
Diameter (ft):	6.00
Volume (gallons):	10,000.00
Turnovers:	24.00
Net Throughput(gal/yr):	240,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

Table 11a Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions

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

MRF/AD Tank - Horizontal Tank
Santa Barbara, California

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
Diesel	All	61.25	55.71	66.96	58.13	0.0058	0.0038	0.0092	130.0000			188.00	Option 1: VP50 = .0065 VP70 = .020
1,2,4-Trimethylbenzene						0.0215	0.0172	0.0268	120.1900	0.0100	0.0456	120.19	Option 2: A=7.04980, B=1573.267, C=203.58
Benzene						1.2180	1.0350	1.4092	78.1100	0.0000	0.0021	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1135	0.0939	0.1372	106.1700	0.0001	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2782	1.7095	2.2887	86.1700	0.0000	0.0004	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3434	0.2686	0.4073	92.1300	0.0003	0.0020	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0058	0.0053	0.0066	134.4372	0.9896	0.9474	189.60	
Xylene (-m)						0.0945	0.0776	0.1146	106.1700	0.0029	0.0081	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)

MRF/AD Tank - Horizontal Tank
Santa Barbara, California

Annual Emission Calculations

Standing Losses (lb):	1.0420
Vapor Space Volume (cu ft):	564.4182
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0369
Vented Vapor Saturation Factor:	0.9996
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	564.4182
Tank Diameter (ft):	8.0000
Effective Diameter (ft):	16.5879
Vapor Space Outage (ft):	4.0000
Tank Shell Length (ft):	27.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0008
Daily Avg. Liquid Surface Temp. (deg. R):	520.9532
Daily Average Ambient Temp. (deg. F):	59.1125
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.6025
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insolation Factor (Btu/sqft day):	1,698.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0369
Daily Vapor Temperature Range (deg. R):	22.2831
Daily Vapor Pressure Range (psia):	0.0015
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0008
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0000
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0023
Daily Avg. Liquid Surface Temp. (deg R):	520.9532
Daily Min. Liquid Surface Temp. (deg R):	515.3812
Daily Max. Liquid Surface Temp. (deg R):	526.5293
Daily Ambient Temp. Range (deg. R):	21.1250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9996
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0008
Vapor Space Outage (ft):	4.0000
Working Losses (lb):	5.9669
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0008
Annual Net Throughput (gal/yr.):	240,000.0000
Annual Turnovers:	24.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	7.0089

Table 11a Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions

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

Emissions Report for: Annual

MRF/AD Tank - Horizontal Tank
Santa Barbara, California

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel	5.07	1.94	7.01
Benzene	0.01	0.00	0.01
Toluene	0.12	0.05	0.16
Ethylbenzene	0.02	0.01	0.02
Xylene (-m)	0.29	0.11	0.41
1,2,4-Trimethylbenzene	0.23	0.09	0.32
Unidentified Components	4.39	1.68	6.08
Hexane (-n)	0.00	0.00	0.00

Table 11b **Emergency Generator Diesel Fuel Storage Tank Emissions**

TANKS 4.0 Report

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

Identification

User Identification:	Emergency Generator Tank
City:	
State:	California
Company:	
Type of Tank:	Horizontal Tank
Description:	Diesel tank in skid for emergency generator

Tank Dimensions

Shell Length (ft)	13.00
Diameter (ft)	3.00
Volume (gallons)	402.00
Turnovers	2.50
Net Throughput(gal/yr)	1,005.00
Is Tank Heated (y/n)	N
Is Tank Underground (y/n)	N

Paint Characteristics

Shell Color/Shade	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Setting (psig)	-0.03
Pressure Setting (psig)	0.03

Meteorological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

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

Emergency Generator Tank - Horizontal 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
Distillate fuel oil no. 2	All	60.41	55.15	53.79	52.19	0.0009	0.0001	0.0123	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009

Table 11b **Emergency Generator Diesel Fuel Storage Tank Emissions**

TANKS 4.0 Report

Emergency Generator Tank - Horizontal Tank

Annual Emission Calculations	
Standing Losses (lb):	0.3547
Vapor Space Volume (cu ft):	56.5297
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0818
Vented Vapor Saturation Factor:	0.9993
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	56.5297
Tank Diameter (ft):	3.0000
Effective Diameter (ft):	7.0485
Vapor Space Outage (ft):	1.5000
Tank Shell Length (ft):	13.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0089
Daily Avg. Liquid Surface Temp. (deg. R):	529.1455
Daily Average Ambient Temp. (deg. F):	59.1125
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	521.6625
Tank Paint Solar Absorptance (Shell):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,606.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0818
Daily Vapor Temperature Range (deg. R):	45.2503
Daily Vapor Pressure Range (psia):	0.0062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0089
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0051
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0123
Daily Avg. Liquid Surface Temp. (deg R):	529.1455
Daily Min. Liquid Surface Temp. (deg R):	517.8329
Daily Max. Liquid Surface Temp. (deg R):	540.4581
Daily Ambient Temp. Range (deg. R):	20.3250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9993
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0089
Vapor Space Outage (ft):	1.5000
Working Losses (lb):	0.0276
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0089
Annual Net Throughput (gal/yr.):	1,005.0000
Annual Turnovers:	2.5000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.3823

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

Emissions Report for: Annual

Emergency Generator Tank - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.03	0.35	0.38

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

Emissions Report for: Annual

Emergency Generator Tank - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hexane (-n)	0.00	0.00	0.00
Benzene	0.00	0.00	0.00
Toluene	0.00	0.01	0.01
Ethylbenzene	0.00	0.00	0.00
Distillate fuel oil no. 2	0.03	0.35	0.38
Xylene (-m)	0.00	0.02	0.02
1,2,4-Trimethylbenzene	0.00	0.02	0.02
Unidentified Components	0.02	0.31	0.33

Table 12 Equipment Exhaust Emissions

Equipment	Horsepower	Number	Hours/Day	Fuel Use (gal/hr)	Emission Stds.	Emission Factors (g/bhp-hr)[a] CO	ROC[b]	NOx[b]	PM10[c]	PM2.5[c]	Emission Factor [g/gal] CO_2[d]	CH_4[e]	N_2O[e]
Materials Recovery Facility Building													
Caterpillar M322D Material Handler	173	1	16	2.7	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 966 M Loader	311	2	16	3.1	Tier 4	2.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 938 K Loader	169	1	16	2.7	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 2P-6000 Forklift	61	3	16	1.5	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26
Tennant 800 Sweeper	65	1	24	4	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26
Anaerobic Digestion Facility Building													
CAT 938 M Loader	169	2	8	3.5	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
Outside MRF Facility Building													
Tennant M30 Scrubber-Sweeper	41	1	6	4	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26
Outside AD Facility Building													
Tennant M30 Scrubber-Sweeper	41	1	6	4	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26
Composting Area													
CAT 938 K Loader	169	1	8	2.7	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
Backhus A55 Windrow Turner	235	1	8	12	Tier 4	2.6	0.14	0.3	0.015	0.015	10,210	0.58	0.26

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] CH_4 and N_2O from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

Equipment	Load Factor[c]	Emission Rates Each Unit (lb/hr) CO[a]	ROC[a]	NOx[a]	SOx[b]	PM10[a, d]	PM2.5[a, d]	CO_2[e]	CH_4[e]	N_2O[e]
Materials Recovery Facility Building										
Caterpillar M322D Material Handler	0.3618	0.511	0.019	0.041	0.00056	2.07E-06	2.07E-06	60.77	3.45E-03	1.55E-03
CAT 966 M Loader	0.3618	0.670	0.035	0.074	0.00065	3.72E-06	3.72E-06	69.78	3.96E-03	1.78E-03
CAT 938 K Loader	0.3618	0.499	0.019	0.040	0.00056	2.02E-06	2.02E-06	60.77	3.45E-03	1.55E-03
CAT 2P-6000 Forklift	0.201	0.100	0.005	0.090	0.00031	5.41E-07	5.41E-07	33.76	1.92E-03	8.60E-04
Tennant 800 Sweeper	0.4556	0.242	0.011	0.217	0.00083	1.31E-06	1.31E-06	90.04	5.11E-03	2.29E-03
Anaerobic Digestion Facility Building										
CAT 938 M Loader	0.3618	0.499	0.019	0.040	0.00073	2.02E-06	2.02E-06	78.78	4.48E-03	2.01E-03
Outside MRF Facility Building										
Tennant M30 Scrubber-Sweeper	0.4556	0.152	0.007	0.137	0.00083	8.24E-04	8.24E-04	90.04	5.11E-03	2.29E-03
Outside AD Facility Building										
Tennant M30 Scrubber-Sweeper	0.4556	0.152	0.007	0.137	0.00083	8.24E-04	8.24E-04	90.04	5.11E-03	2.29E-03
Composting Area										
CAT 938 K Loader	0.3618	0.499	0.019	0.040	0.00056	2.02E-06	2.02E-06	60.77	3.45E-03	1.55E-03
Backhus A55 Windrow Turner	0.3953	0.532	0.029	0.061	0.00250	0.00307	0.00307	270.11	1.53E-02	6.88E-03

Diesel Fuel Density = 6.943 lb/gal

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x 10^{-6} x 2 [lb SO_2/lb S]

[c] From OFFROAD 2011 model

Table 12 **Equipment Exhaust Emissions**

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency
[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

Equipment	Daily Emissions (lb/day)[a]								
	CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Materials Recovery Facility Building									
Caterpillar M322D Material Handler	8.17	0.31	0.66	0.01	3.31E-05	3.31E-05	972.38	0.06	0.02
CAT 966 M Loader	21.43	1.11	2.38	0.02	1.19E-04	1.19E-04	2,232.87	0.13	0.06
CAT 938 K Loader	7.98	0.30	0.65	0.01	3.24E-05	3.24E-05	972.38	0.06	0.02
CAT 2P-6000 Forklift	4.80	0.23	4.31	0.01	2.59E-05	2.59E-05	1,620.63	0.09	0.04
Tennant 800 Sweeper	5.80	0.27	5.21	0.02	3.13E-05	3.13E-05	2,160.85	0.12	0.06
Total	**48.18**	**2.22**	**13.21**	**0.07**	**2.42E-04**	**2.42E-04**	**7,959.12**	**0.45**	**0.20**
Anaerobic Digestion Facility Building									
CAT 938 M Loader	7.98	0.30	0.65	0.01	3.24E-05	3.24E-05	1,260.49	0.07	0.03
Total	**7.98**	**0.30**	**0.65**	**0.01**	**0.00**	**0.00**	**1,260.49**	**0.07**	**0.03**
Outside MRF Facility Building									
Tennant M30 Scrubber-Sweeper	0.91	0.04	0.82	5.00E-03	4.94E-03	4.94E-03	540.21	0.03	0.01
Total	**0.91**	**0.04**	**0.82**	**0.00**	**0.00**	**0.00**	**540.21**	**0.03**	**0.01**
Outside AD Facility Building									
Tennant M30 Scrubber-Sweeper	0.91	0.04	0.82	5.00E-03	4.94E-03	4.94E-03	540.21	0.03	0.01
Total	**0.91**	**0.04**	**0.82**	**0.00**	**0.00**	**0.00**	**540.21**	**0.03**	**0.01**
Composting Area									
CAT 938 K Loader	3.99	0.15	0.32	4.50E-03	1.62E-05	1.62E-05	486.19	0.03	0.01
Backhus A55 Windrow Turner	4.26	0.23	0.49	0.02	0.02	0.02	2,160.85	0.12	0.06
Total	**8.25**	**0.38**	**0.82**	**0.02**	**0.02**	**0.02**	**2,647.04**	**0.15**	**0.07**

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

Equipment	Days/Year	Annual Emissions (lb/year)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Materials Recovery Facility Building										
Caterpillar M322D Material Handler	311	2,540.53	96.13	205.99	2.80	0.01	0.01	3.02E+05	17.18	7.70
CAT 966 M Loader	311	6,665.46	345.62	740.61	6.43	0.04	0.04	6.94E+05	39.45	17.68
CAT 938 K Loader	311	2,481.79	93.91	201.23	2.80	0.01	0.01	3.02E+05	17.18	7.70
CAT 2P-6000 Forklift	311	1,492.99	70.61	1,341.67	4.66	0.01	0.01	5.04E+05	28.63	12.83
Tennant 800 Sweeper	311	1,803.01	85.28	1,620.27	6.22	0.01	0.01	6.72E+05	38.18	17.11
Total		**14,983.77**	**691.54**	**4,109.76**	**22.91**	**0.08**	**0.08**	**2.48E+06**	**140.61**	**63.03**
Anaerobic Digestion Facility Building										
CAT 938 M Loader	208	1,659.84	62.80	134.58	2.43	0.01	0.01	2.62E+05	14.89	6.68
Total		**1,659.84**	**62.80**	**134.58**	**2.43**	**0.01**	**0.01**	**2.62E+05**	**14.89**	**6.68**
Outside MRF Facility Building										
Tennant M30 Scrubber-Sweeper	311	284.32	13.45	255.50	1.55	1.54	1.54	1.68E+05	9.54	4.28
Total		**284.32**	**13.45**	**255.50**	**1.55**	**1.54**	**1.54**	**1.68E+05**	**9.54**	**4.28**
Outside AD Facility Building										
Tennant M30 Scrubber-Sweeper	311	284.32	13.45	255.50	1.55	1.54	1.54	1.68E+05	9.54	4.28
Total		**284.32**	**13.45**	**255.50**	**1.55**	**1.54**	**1.54**	**1.68E+05**	**9.54**	**4.28**
Composting Area										
CAT 938 K Loader	311	1,240.89	46.95	100.61	1.40	0.01	0.01	1.51E+05	8.59	3.85

Table 12 **Equipment Exhaust Emissions**

Backhus A55 Windrow Turner	52	221.51	11.93	25.56	1.04	1.28	1.28	1.12E+05	6.38	2.86
Total		221.51	11.93	25.56	1.04	1.28	1.28	1.12E+05	6.38	2.86

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

Table 13 **On-Site Motor Vehicle Exhaust Emissions without CSSR**

Vehicle	Use	Fuel	Segment	Mileage (mpg)[c]	Round-Trip Dist. (mi)	Round-Trips/Day	Miles/ Day	Fuel Use (gal/day)[d]
Freightliner Tractor	Compost Export[a]	CNG	MRF-Compost	6	0.90	4	3.61	0.60
Freightliner Tractor	Compost Export[a]	CNG	MRF-Entrance	6	2.23	4	8.92	1.49
Freightliner Tractor	Recycleables to POLA[b]	CNG	MRF-Entrance	6	2.23	13	28.99	4.83
Ford F350 XL	Utility truck and trailer	Diesel	MRF-Compost	14	0.90	6	5.41	0.39
Ford F350 XL	Utility truck and trailer	Diesel	MRF-Entrance	14	2.23	6	13.38	0.96

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Round trips/day = 90,000 tons/yr / 311 op. days/yr / 22 tons/trip = 13.2 one-way trips/day rounded to 13

[c] Mileage for Freightliner Tractor is diesel-equivalent

[d] Fuel use [gal/day] = Daily mileage (miles/day] / Mileage [mpg]

Vehicle	Use	Emission Factors (g/mi)								
		CO[a]	ROC[b]	NOx[b]	SOx[c]	PM10[b]	PM2.5[b]	CO_2[d]	CH_4[e]	N_2O[e,f]
Freightliner Tractor	Compost Export	1.23E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Freightliner Tractor	Recycleables to POLA	1.23E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Ford F350 XL	Utility truck and trailer	1.71E-01	2.63E-02	4.69E-01	6.75E-03	4.90E-03	4.90E-03	4.93E+02	1.00E-03	2.37E-02

Diesel Fuel HV =	128,450 Btu/gal	
Natural Gas HV =	1,020 Btu/scf	
Natural Gas S =	0.5 grains/100 scf	
Diesel Fuel Density =	6.943 lb/gal	from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
Diesel Fuel Sulfur =	15 ppmw	http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Natural Gas CO_2 EF =	0.054 Kg/scf	

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO_2/g S)

Ford F350 XL calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x 10^{-6} x 453.6 (g/lb) x 2 (g SO_2/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas CO_2 EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

Table 13 On-Site Motor Vehicle Exhaust Emissions without CSSR

Vehicle	Use	Segment	Daily Emissions (lb/day)[a]								
			CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractor	Compost Export	MRF-Compost	9.76E-03	2.94E-03	3.66E-03	5.41E-05	2.31E-04	2.31E-04	9.02E+00	1.56E-02	1.39E-03
Freightliner Tractor	Compost Export	MRF-Entrance	2.41E-02	7.28E-03	9.05E-03	1.34E-04	5.70E-04	5.70E-04	2.23E+01	3.87E-02	3.44E-03
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	7.84E-02	2.36E-02	2.94E-02	4.35E-04	1.85E-03	1.85E-03	7.24E+01	1.26E-01	1.12E-02
Ford F350 XL	Utility truck and trailer	MRF-Compost	2.04E-03	3.14E-04	5.60E-03	8.05E-05	5.85E-05	5.85E-05	5.88E+00	1.19E-05	2.83E-04
Ford F350 XL	Utility truck and trailer	MRF-Entrance	5.04E-03	7.76E-04	1.38E-02	1.99E-04	1.45E-04	1.45E-04	1.45E+01	2.95E-05	6.99E-04
Total			**1.19E-01**	**3.50E-02**	**6.15E-02**	**9.02E-04**	**2.86E-03**	**2.86E-03**	**1.24E+02**	**1.80E-01**	**1.70E-02**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

Vehicle	Use	Segment	Days/Year	Annual Emissions (lb/year)[a]								
				CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractor	Compost Export	MRF-Compost	311	3.03	0.92	1.14	0.02	0.07	0.07	2,803.69	4.86	0.43
Freightliner Tractor	Compost Export	MRF-Entrance	311	7.50	2.26	2.81	0.04	0.18	0.18	6,931.52	12.02	1.07
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	311	24.38	7.35	9.14	0.14	0.58	0.58	22,527.45	39.08	3.48
Ford F350 XL	Utility truck and trailer	MRF-Compost	311	0.63	0.10	1.74	0.03	0.02	0.02	1,829.51	0.00	0.09
Ford F350 XL	Utility truck and trailer	MRF-Entrance	311	1.57	0.24	4.30	0.06	0.04	0.04	4,523.06	0.01	0.22
Total				**37.12**	**10.87**	**19.14**	**0.28**	**0.89**	**0.89**	**38,615.23**	**55.98**	**5.29**

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Table 14 On-Site Motor Vehicle Exhaust Emissions with CSSR

Vehicle	Use	Fuel	Segment	Mileage (mpg)[d]	Round-Trip Dist. (mi)	Round-Trips/Day	Miles/Day	Fuel Use (gal/day)[e]
Freightliner Tractor	Compost Export[a]	CNG	MRF-Compost	6	0.90	4	3.61	0.60
Freightliner Tractor	Compost Export[a]	CNG	MRF-Entrance	6	2.23	4	8.92	1.49
Freightliner Tractor	Recycleables to POLA[b]	CNG	MRF-Entrance	6	2.23	18	40.14	6.69
Tractor/Trailer	CSSR Import[c]	Diesel	MRF-Entrance	6	2.23	7	15.61	2.60
Ford F350 XL	Utility truck and trailer	Diesel	MRF-Compost	14	0.90	6	5.41	0.39
Ford F350 XL	Utility truck and trailer	Diesel	MRF-Entrance	14	2.23	6	13.38	0.96

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 round trips/day rounded to 18

[c] Trips/day are from Project Traffic Study.

[d] Mileage for Freightliner Tractor is diesel-equivalent

[e] Fuel use [gal/day] = Daily mileage [miles/day] / Mileage [mpg]

Vehicle	Use	Emission Factors (g/mi)								
		CO[a]	ROC[b]	NOx[b]	SOx[c]	PM10[b]	PM2.5[b]	CO_2[d]	CH_4[e]	N_2O[e,f]
Freightliner Tractor	Compost Export	1.23E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Freightliner Tractor	Recycleables to POLA	1.23E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Tractor/Trailer	CSSR Import	1.23E+00	5.04E-01	1.91E+00	1.57E-02	3.68E-02	3.39E-02	2.55E+03	1.00E-03	5.53E-02
Ford F350 XL	Utility truck and trailer	1.71E-01	2.63E-02	4.69E-01	6.75E-03	4.90E-03	4.90E-03	4.93E+02	1.00E-03	2.37E-02

Diesel Fuel HV =	128,450	Btu/gal	
Natural Gas HV =	1,020	Btu/scf	
Natural Gas S =	0.5	grains/100 scf	
Diesel Fuel Density =	6.943	lb/gal	
Diesel Fuel Sulfur =	15	ppmw	from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
Natural Gas CO_2 EF =	0.054	Kg/scf	http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO2/g S)
Ford F350 XL and Tractor/trailer calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x 10^{-6} x 453.6 (g/lb) x 2(g SO2/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas CO_2 EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

Table 14 **On-Site Motor Vehicle Exhaust Emissions with CSSR**

Vehicle	Use	Segment	Daily Emissions (lb/day)[a]								
			CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractor	Compost Export	MRF-Compost	9.76E-03	2.94E-03	3.66E-03	5.41E-05	2.31E-04	2.31E-04	9.02E+00	1.56E-02	1.39E-03
Freightliner Tractor	Compost Export	MRF-Entrance	2.41E-02	7.28E-03	9.05E-03	1.34E-04	5.70E-04	5.70E-04	2.23E+01	3.87E-02	3.44E-03
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	1.09E-01	3.27E-02	4.07E-02	6.02E-04	2.57E-03	2.57E-03	1.00E+02	1.74E-01	1.55E-02
Tractor/Trailer	CSSR Import	MRF-Entrance	4.22E-02	1.73E-02	6.59E-02	5.42E-04	1.27E-03	1.17E-03	8.77E+01	3.44E-05	1.90E-03
Ford F350 XL	Utility truck and trailer	MRF-Compost	2.04E-03	3.14E-04	5.60E-03	8.05E-05	5.85E-05	5.85E-05	5.88E+00	1.19E-05	2.83E-04
Ford F350 XL	Utility truck and trailer	MRF-Entrance	5.04E-03	7.76E-04	1.38E-02	1.99E-04	1.45E-04	1.45E-04	1.45E+01	2.95E-05	6.99E-04
Total			**1.92E-01**	**6.14E-02**	**1.39E-01**	**1.61E-03**	**4.84E-03**	**4.74E-03**	**2.40E+02**	**2.28E-01**	**2.32E-02**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

Vehicle	Use	Segment	Days/Year	Annual Emissions (lb/year)[a]								
				CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractor	Compost Export	MRF-Compost	311	3.03	0.92	1.14	0.02	0.07	0.07	2,803.69	4.86	0.43
Freightliner Tractor	Compost Export	MRF-Entrance	311	7.50	2.26	2.81	0.04	0.18	0.18	6,931.52	12.02	1.07
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	311	33.76	10.16	12.66	0.19	0.80	0.80	31,191.85	54.11	4.82
Tractor/Trailer	CSSR Import	MRF-Entrance	311	13.13	5.39	20.49	0.17	0.39	0.36	27,284.63	0.01	0.59
Ford F350 XL	Utility truck and trailer	MRF-Compost	311	0.63	0.10	1.74	0.03	0.02	0.02	1,829.51	0.00	0.09
Ford F350 XL	Utility truck and trailer	MRF-Entrance	311	1.57	0.24	4.30	0.06	0.04	0.04	4,523.06	0.01	0.22
Total				**59.62**	**19.09**	**43.15**	**0.50**	**1.50**	**1.47**	**74,564.26**	**71.02**	**7.22**

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Table 15 **Off-Site Motor Vehicle Exhaust Emissions without CSSR**

Vehicle	Use	Fuel	One-Way Trips/Day	Mileage (mpg)[d]	One-Way Trip Dist. (mi)	Miles/ Day
Freightliner Tractors	Compost to North County[a]	CNG	8	6	57	456
Freightliner Tractors	Recycleables to POLA[b]	CNG	26	6	131	3,406
Pick-up Trucks (Ford 250 XL)	Miscellaneous[c]	Diesel	8	19	25	200
Worker Commuting	From the North[e]	Gasoline	45	22	37	1,665
Worker Commuting	From the South[e]	Gasoline	5	22	15	75

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8

[b] Round trips/day = 90,000 tons/yr / 311 op. days/yr / 22 tons/trip = 13.2 one-way trips/day x 2 = 26.4 one-way trips/day rounded to 26

[c] Round trips/day are Mustang estimates

[d] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[e] Trips/day are from Project Traffic Study

Vehicle	Use	EMFAC Vehicle Class	Emission Factors (g/mi)								
			CO[a,b]	ROC[a,c]	NOx[a,c]	SOx[a,d]	PM10[a,c]	PM2.5[a,c]	CO_2[a,e]	CH_4[a,f]	N_2O[f,g]
Freightliner Tractors	Compost to North County	N/A	1.17E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Freightliner Tractors	Recycleables to POLA	N/A	1.17E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Pick-up Trucks (Ford 250 XL)	Miscellaneous	LHD1	1.22E+00	2.23E-01	3.57E+00	5.02E-03	1.38E-01	8.12E-02	4.99E+02	1.22E-02	1.73E-02
Worker Commuting	From the North	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02
Worker Commuting	From the South	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02

Diesel Fuel HV =	128,450	Btu/gal	
Natural Gas HV =	1,020	Btu/scf	
Natural Gas S =	0.5	grains/100 scf	
Diesel Fuel Density =	6.943	lb/gal	
Diesel Fuel Sulfur =	15	ppmw	
Natural Gas CO_2 EF =	0.054	Kg/scf	from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO_2/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas CO_2 EF (Kg/scf) x 1,000 (g/Kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

Table 15 Off-Site Motor Vehicle Exhaust Emissions without CSSR

Vehicle	Use	Daily Emissions (lb/day)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Compost to North County	1.17	0.37	0.46	0.01	0.03	0.03	1,139.38	1.98	0.18
Freightliner Tractors	Recycleables to POLA	8.76	2.78	3.45	0.05	0.22	0.22	8,510.36	14.76	1.31
Pick-up Trucks (Ford 250 XL)	Miscellaneous	0.54	0.10	1.57	0.00	0.06	0.04	220.21	0.01	0.01
Worker Commuting	From the North	12.72	1.12	1.32	0.01	0.18	0.08	1,142.67	0.09	0.05
Worker Commuting	From the South	0.57	0.05	0.06	0.00	0.01	0.00	51.47	0.00	0.00
Total		**23.76**	**4.42**	**6.87**	**0.07**	**0.49**	**0.36**	**11,064.08**	**16.84**	**1.55**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

Vehicle	Use	Op. Days/yr	Annual Emissions (lb/year)[a]								
			CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Compost to North County	311	364.69	115.68	143.82	2.13	9.07	9.07	354,346.90	614.66	54.71
Freightliner Tractors	Recycleables to POLA	311	2,723.97	864.04	1,074.21	15.88	67.72	67.72	2,646,722.64	4,591.09	408.67
Pick-up Trucks (Ford 250 XL)	Miscellaneous	311	167.22	30.62	489.43	0.69	18.90	11.14	68,483.80	1.67	2.37
Worker Commuting	From the North	311	3,955.46	349.49	409.44	4.35	55.17	23.98	355,369.04	28.77	17.03
Worker Commuting	From the South	311	176.17	15.74	18.44	0.20	2.49	1.08	16,007.61	1.30	0.77
Total			**7,389.51**	**1,375.57**	**2,135.35**	**23.24**	**153.34**	**112.98**	**3,440,929.99**	**5,237.48**	**483.55**

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Off-Site Motor Vehicle Fugitive PM Emissions

Emission Factors for Vehicles on Off-Site Paved Roads

Parameter	Value	Comments
Road silt loading (g/m^2)	0.1	CalEEMod default
Onroad vehicles average weight (tons)	2.4	CalEEMod Default for Santa Barbara County
PM10 emission factor (lb/mile)	6.61E-04	0.0022 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)
PM2.5 emission factor (lb/mile)	1.62E-04	0.00054 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)

Vehicle	Use	Miles/ Day	Op. Days/yr	Daily Emissions (lb/day)[a]		Annual Emissions (lb/year)[b]	
				PM10	PM2.5	PM10	PM2.5
Freightliner Tractors	Compost to North County	456	311	0.30	0.07	93.75	23.01
Freightliner Tractors	Recycleables to POLA	3,406	311	2.25	0.55	700.23	171.88
Pick-up Trucks (Ford 250 XL)	Miscellaneous	200	311	0.13	0.03	41.12	10.09
Worker Commuting	From the North	1,665	311	1.10	0.27	342.30	84.02
Worker Commuting	From the South	75	311	0.05	0.01	15.42	3.78
Total				**3.84**	**0.94**	**1,192.82**	**292.78**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Table 16 **Off-Site Motor Vehicle Exhaust Emissions with CSSR**

Vehicle	Use	Fuel	One-Way Trips/Day	Mileage (mpg)[d]	One-Way Trip Dist. (mi)	Miles/ Day
Freightliner Tractors	Compost to North County[a]	CNG	8	6	57	456
Freightliner Tractors	Recycleables to POLA[b]	CNG	36	6	131	4,716
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast[e]	Diesel	14	6	-17	-238
Pick-up Trucks (Ford 250 XL)	Miscellaneous[c]	Diesel	8	19	25	200
Worker Commuting	From the North[f]	Gasoline	59	22	37	2,183
Worker Commuting	From the South[f]	Gasoline	7	22	15	105

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8

[b] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 one-way trips/day x 2 = 36.8 one-way trips/day rounded to 36

[c] Round trips/day are Mustang estimates

[d] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[e] Trips/day are from Project Traffic Study. Mileage is difference between SCRTS to Tajiguas (22 mi.) and SCRTS to Gold Coast (39 mi.)

[f] Trips/day are from Project Traffic Study

Vehicle	Use	EMFAC Vehicle Class	Emission Factors (g/mi)								
			CO[a,b]	ROC[a,c]	NOx[a,c]	SOx[a,d]	PM10[a,c]	PM2.5[a,c]	CO_2[a,e]	CH_4[a,f]	N_2O[f,g]
Freightliner Tractors	Compost to North County	N/A	1.17E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Freightliner Tractors	Recycleables to POLA	N/A	1.17E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	T7 tractor	1.16E+00	2.53E-01	6.95E+00	1.69E-02	1.80E-01	1.11E-01	1.68E+03	1.38E-02	5.81E-02
Pick-up Trucks (Ford F250 XL)	Miscellaneous	LHD1	1.22E+00	2.23E-01	3.57E+00	5.02E-03	1.38E-01	8.12E-02	4.99E+02	1.22E-02	1.73E-02
Worker Commuting	From the North	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02
Worker Commuting	From the South	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02

Diesel Fuel HV =	128,450	Btu/gal
Natural Gas HV =	1,020	Btu/scf
Natural Gas S =	0.5	grains/100 scf
Diesel Fuel Density =	6.943	lb/gal
Diesel Fuel Sulfur =	15	ppmw
Natural Gas CO_2 EF =	0.054	Kg/scf

from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO_2/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas CO_2 EF (kg/scf) x 1,000 (g/kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

Table 16 **Off-Site Motor Vehicle Exhaust Emissions with CSSR**

Vehicle	Use	Daily Emissions (lb/day)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Compost to North County	1.17	0.37	0.46	0.01	0.03	0.03	1,139.38	1.98	0.18
Freightliner Tractors	Recycleables to POLA	12.13	3.85	4.78	0.07	0.30	0.30	11,783.58	20.44	1.82
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	-0.61	-0.13	-3.65	-0.01	-0.09	-0.06	-880.47	-0.01	-0.03
Pick-up Trucks (Ford 250 XL)	Miscellaneous	0.54	0.10	1.57	0.00	0.06	0.04	220.21	0.01	0.01
Worker Commuting	From the North	16.68	1.47	1.73	0.02	0.23	0.10	1,498.16	0.12	0.07
Worker Commuting	From the South	0.80	0.07	0.08	0.00	0.01	0.00	72.06	0.01	0.00
Total		**30.71**	**5.73**	**4.98**	**0.09**	**0.54**	**0.41**	**13,832.92**	**22.54**	**2.05**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

Vehicle	Use	Op. Days/yr	Annual Emissions (lb/year)[a]								
			CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Compost to North County	311	364.69	115.68	143.82	2.13	9.07	9.07	354,346.90	614.66	54.71
Freightliner Tractors	Recycleables to POLA	311	3,771.65	1,196.36	1,487.37	21.99	93.77	93.77	3,664,692.89	6,356.89	565.85
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	311	-189.68	-41.25	-1,134.46	-2.75	-29.39	-18.15	-273,825.41	-2.25	-9.48
Pick-up Trucks (Ford 250 XL)	Miscellaneous	311	167.22	30.62	489.43	0.69	18.90	11.14	68,483.80	1.67	2.37
Worker Commuting	From the North	311	5,186.04	458.22	536.82	5.70	72.33	31.44	465,928.30	37.72	22.33
Worker Commuting	From the South	311	249.44	22.04	25.82	0.27	3.48	1.51	22,410.66	1.81	1.07
Total			**9,549.37**	**1,781.67**	**1,548.80**	**28.03**	**168.16**	**128.77**	**4,302,037.13**	**7,010.50**	**636.86**

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Off-Site Motor Vehicle Fugitive PM Emissions

Emission Factors for Vehicles on Off-Site Paved Roads

Parameter	Value	Comments
Road silt loading (g/m^2)	0.1	CalEEMod default
Onroad vehicles average weight (tons)	2.4	CalEEMod Default for Santa Barbara County
PM10 emission factor (lb/mile)	6.61E-04	0.0022 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)
PM2.5 emission factor (lb/mile)	1.62E-04	0.00054 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)

Vehicle	Use	Miles/ Day	Op. Days/yr	Daily Emissions (lb/day)[a]		Annual Emissions (lb/year)[b]	
				PM10	PM2.5	PM10	PM2.5
Freightliner Tractors	Compost to North County	456	311	0.30	0.07	93.75	23.01
Freightliner Tractors	Recycleables to POLA	4,716	311	3.12	0.77	969.55	237.98
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	-238	311	-0.16	-0.04	-48.93	-12.01
Pick-up Trucks (Ford 250 XL)	Miscellaneous	200	311	0.13	0.03	41.12	10.09
Worker Commuting	From the North	2,183	311	1.44	0.35	448.80	110.16
Worker Commuting	From the South	105	311	0.07	0.02	21.59	5.30
Total				**4.91**	**1.20**	**1,525.88**	**374.53**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Table 17 On-Site Fugitive PM Emissions without CSSR

On-Site Motor Vehicle Fugitive PM Emissions without CSSR

Vehicle	Use	Route	Weight (tons)[a]	Miles/Day	Annual Op. (Days/year)	Emission Factors (lb/mi)[b]		Control Efficiency (%)[c]	Emissions (lb/day)[d]		Emissions (lb/year)[e]	
						PM10	PM2.5		PM10	PM2.5	PM10	PM2.5
Freightliner Tractor	Compost Export	MRF-Compost	13.75	3.61	311	0.19	0.05	86	0.10	0.02	30.10	7.60
Freightliner Tractor	Compost Export	MRF-Entrance	13.75	8.92	311	0.19	0.05	86	0.24	0.06	74.42	18.78
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	13.75	28.99	311	0.19	0.05	86	0.78	0.20	241.86	61.04
Ford F350 XL	Utility truck and trailer	MRF-Compost	7	5.41	311	0.10	0.02	86	0.07	0.02	22.68	5.72
Ford F350 XL	Utility truck and trailer	MRF-Entrance	7	13.38	311	0.10	0.02	86	0.18	0.05	56.07	14.15

[a] Freightliner tractor + trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = [k x (silt loading [g/m^2])$^{0.91}$ (weight [tons])$^{1.02}$](1 - P/4N)
from AP-42, Section 13.2.1 (Paved Roads), Equation 2 (1/11)

k = 0.0022 for PM10 P= 40 days
0.00054 for PM2.5

silt loading = 7.4 g/m^2 from AP-42, Section 13.2.1 (Paved Roads), Table 13.2.1-3 (1/11)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

Material Transfers without CSSR

Material	Transfer	Moisture (%)[a]	Daily Amount (tons)[b]	Annual Op. (Days/year)	Emission Factors (lb/ton)[c]		Emissions (lb/day)[d, f]		Emissions (lb/year)[e]	
					PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Digestate	Into Truck	4.8	288	208	3.70E-04	5.60E-05	1.07E-04	1.61E-05	0.02	0.00
Digestate	Onto Windrow	4.8	288	208	3.70E-04	5.60E-05	1.07E-01	1.61E-02	22.17	3.36
Windrow	Windrow turning	4.8	15,363	52	3.70E-04	5.60E-05	5.68E+00	8.60E-01	295.21	44.70
Compost	Into Screen	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Out of Screen	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Onto Storage Pile	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Into Export Truck	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
MSW	Into MRF Facility	4.8	800	311	3.70E-04	5.60E-05	2.96E-04	4.48E-05	0.09	0.01
MSW	Into AD Facility	4.8	240	311	3.70E-04	5.60E-05	8.87E-05	1.34E-05	0.03	0.00

[a] Maximum moisture content of materials used to develop emission factor equation.

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2)$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

Table 17 On-Site Fugitive PM Emissions without CSSR

Screening

Material	Daily Amount (tons)[a]	Annual Op. (Days/year)	Emission Factors (lb/ton)[b]		Emissions (lb/day)[c]		Emissions (lb/year)[d]	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Compost	83	311	0.00074	0.00005	6.13E-02	4.14E-03	1.91E+01	1.29E+00

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr

[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04), Table 11.19.2-2 for controlled screening

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

Chipper/Grinder

Material	Hourly Amount (tph)	Operating Time (hr/day)	Annual Op. (Days/year)	Emission Factors (lb/ton)[a]		Emissions (lb/hr)[b]		Emissions (lb/day)[c]		Emissions (lb/year)[d]	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Wood	45.5	1.5	311	0.0144	0.0144	0.66	0.66	0.98	0.98	305.65	305.65

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3, http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.

[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]

[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

Table 18 On-Site Fugitive PM Emissions with CSSR

On-Site Motor Vehicle Fugitive PM Emissions with CSSR

Vehicle	Use	Route	Weight (tons)[a]	Miles/Day	Annual Op. (Days/year)	Emission Factors (lb/mi)[b]		Control Efficiency (%)[c]	Emissions (lb/day)[d]		Emissions (lb/year)[e]	
						PM10	PM2.5		PM10	PM2.5	PM10	PM2.5
Freightliner Tractor	Compost Export	MRF-Compost	13.75	3.61	311	0.19	0.05	86	0.10	0.02	30.10	7.39
Freightliner Tractor	Compost Export	MRF-Entrance	13.75	8.92	311	0.19	0.05	86	0.24	0.06	74.42	18.78
Freightliner Tractor	Recycleables to POLA	MRF-Entrance	13.75	40.14	311	0.19	0.05	86	1.08	0.27	334.88	84.51
Tractor/Trailer	CSSR Import	MRF-Entrance	13.75	15.61	311	0.19	0.05	86	0.42	0.11	130.23	32.87
Ford F350 XL	Utility truck and trailer	MRF-Compost	7	5.41	311	0.10	0.02	86	0.07	0.02	22.68	5.72
Ford F350 XL	Utility truck and trailer	MRF-Entrance	7	13.38	311	0.10	0.02	86	0.18	0.05	56.07	14.15

[a] Freightliner tractor + trailer and tractor/trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = [k x (silt loading [g/m^2])$^{0.91}$ (weight [tons])$^{1.02}$](1 - P/4N)
from AP-42, Section 13.2.1 (Paved Roads), Equation 2 (1/11)

k = 0.0022 for PM10; 0.00054 for PM2.5 P= 40 days

silt loading = 7.4 g/m^2 from AP-42, Section 13.2.1 (Paved Roads), Table 13.2.1-3 (1/11)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

Material Transfers with CSSR

Material	Transfer	Moisture (%)[a]	Daily Amount (tons)[b]	Annual Op. (Days/year)	Emission Factors (lb/ton)[c]		Emissions (lb/day)[d,f]		Emissions (lb/year)[e]	
					PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Digestate	Into Truck	4.8	288	278	3.70E-04	5.60E-05	1.07E-04	1.61E-05	0.03	0.00
Digestate	Onto Windrow	4.8	288	278	3.70E-04	5.60E-05	1.07E-01	1.61E-02	29.63	4.49
Windrow	Windrow turning	4.8	15,363	52	3.70E-04	5.60E-05	5.68E+00	8.60E-01	295.21	44.70
Compost	Into Screen	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Out of Screen	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Onto Storage Pile	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
Compost	Into Export Truck	4.8	83	311	3.70E-04	5.60E-05	3.06E-02	4.63E-03	9.52	1.44
MSW	Into MRF Facility	4.8	800	311	3.70E-04	5.60E-05	2.96E-04	4.48E-05	0.09	0.01
MSW	Into AD Facility	4.8	240	311	3.70E-04	5.60E-05	8.87E-05	1.34E-05	0.03	0.00

[a] Maximum moisture content of materials used to develop emission factor equation.

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2)$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10; 0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

Table 18 On-Site Fugitive PM Emissions with CSSR

Screening

Material	Daily Amount (tons)[a]	Annual Op. (Days/year)	Emission Factors (lb/ton)[b]		Emissions (lb/day)[c]		Emissions (lb/year)[d]	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Compost	83	311	0.00074	0.00005	6.13E-02	4.14E-03	1.91E+01	1.29E+00

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr

[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04), Table 11.19.2-2 for controlled screening

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

Chipper/Grinder

Material	Hourly Amount (tph)	Operating Time (hr/day)	Annual Op. (Days/year)	Emission Factors (lb/ton)[a]		Emissions (lb/hr)[b]		Emissions (lb/day)[c]		Emissions (lb/year)[d]	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Wood	45.5	1.5	311	0.0144	0.0144	0.66	0.66	0.98	0.98	305.65	305.65

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3, http://hank.baaqmd.gov/prnt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.

[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]

[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

Table 19 **Windrow ROC Emissions**

Item	Value	Comment
Digestate production (ton/yr)	73,590	AD design capacity
Digestate production (ton/day)	201.62	Annual / 365 days/year
Fraction food waste	**0.481**	Mustang estimate
Fraction green waste	**0.519**	Mustang estimate
Digestate from food waste (ton/day)	96.98	
Digestate from green waste (ton/day)	104.64	
Food waste EF (lb VOC/ton)	37.1	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Green waste EF (lb VOC/ton)	5.71	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
VOC from food waste (lb/day)	3,597.87	
VOC from green waste (lb/day)	597.49	
Total VOC (lb/day)	4,195	
Reduction from digestion process	0.97	See note b
VOC after reduction from digestion (lb/day)	125.86	
Reduction from Best Available Control Technologies	0.90	See note c
VOC after BMP reductions (lb/day)	12.59	
VOC after BMP reductions (lb/hour)	0.52	Daily / 24 hours/day
VOC after BMP reductions (lb/yr)	4,594	

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at: http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 20% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting prepared from SJVAPCD 2009: http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
Greenwaste Compost Air Emissions Review (Modesto Compost Facility) prepared fror CIWMB June 2008: http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pdf
Greenwaste Compost Site Emissions Reductions Prepared for San Joaquin Valley Technology Advancement Program May 2013: http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pdf

Table 20 **Biofilter ROC Emissions**

Item	Value	Comment
Digestate production (ton/yr)	73,590	AD design capacity
Digestate production (ton/day)	201.62	Annual / 365 days/year
Fraction food waste	**0.481**	Mustang estimate
Fraction green waste	**0.519**	Mustang estimate
Digestate from food waste (ton/day)	96.98	
Digestate from green waste (ton/day)	104.64	
Food waste EF (lb VOC/ton-composting cycle)	37.1	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Green waste EF (lb VOC/ton-composting cycle)	5.71	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Food waste EF (lb VOC/ton-day)	0.618	For one day of 60-day composting cycle
Green waste EF (lb VOC/ton-day)	0.095	For one day of 60-day composting cycle
VOC from food waste (lb/day)	59.96	
VOC from green waste (lb/day)	9.96	
Total VOC (lb/day)	70	
Reduction from biofilter	0.95	
VOC after biofilter (lb/day)	3.50	
VOC after biofilter (lb/hour)	0.15	Daily / 24 hours/day
VOC after biofilter (lb/yr)	1,276	

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at: http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

Biofilter	m^3/ min	Fract.	Emiss. (lb/day)	Emiss. (g/s)
Tipping Area	1,461	0.329128	0.04794	0.0060409
ADF	1,428	0.321694	0.04686	0.00590445
Recycling Area	1,550	0.349178	0.05087	0.00640889
Total	**4,439**	1	**0.14567**	

Table 21a AD Flare Toxic Air Contaminant Emissions from Biogas Combustion

Compound	CAS Number	Emission Factor (lb/MMscf)	Emission Factor Source[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]	
Indeno(1,2,3-cd)pyrene	193-39-5	5.60E-02	CATEF	9.52E-04	2.50E-01	ADFLARE
Manganese	7439-96-5	2.92E-03	Source Test	4.96E-05	1.30E-02	
Naphthalene	91-20-3	1.75E-04	Source Test	2.97E-06	7.80E-04	
Nickel	7440-02-0	1.43E-03	Source Test	2.43E-05	6.37E-03	
Perylene	198-55-0	7.48E-05	CATEF	1.27E-06	3.34E-04	
Phenanthrene	85-01-8	9.85E-04	Source Test	1.67E-05	4.39E-03	
Pyrene	129-00-0	3.04E-05	Source Test	5.18E-07	1.36E-04	
Toluene	108-88-3	1.09E+02	CATEF	1.85E+00	4.86E+02	
Trichloroethene	79-01-6	1.13E+00	CATEF	1.92E-02	5.04E+00	
Vinyl Chloride	75-01-4	7.64E-02	CATEF	1.30E-03	3.41E-01	
Xylene (m,p)	1330-20-7	4.61E-01	CATEF	7.84E-03	2.06E+00	
Xylene (o)	95-47-6	3.35E-01	CATEF	5.70E-03	1.49E+00	
Zinc	7440-66-6	4.28E+00	CATEF	7.28E-02	1.91E+01	
1,1,1-Trichloroethane	71-55-6	3.37E-01	CATEF	5.73E-03	1.50E+00	
1,1-Dichloroethane	75-34-3	4.37E-01	CATEF	7.43E-03	1.95E+00	
1,2-Dichloroethane	107-06-2	1.35E+00	CATEF	2.30E-02	6.02E+00	
1,4-Dioxane	123-91-1	4.55E-03	Source Test	7.74E-05	2.03E-02	
2-Methylnaphthalene	91-57-6	9.56E-05	Source Test	1.62E-06	4.26E-04	
Acenaphthene	83-32-9	7.04E-06	Source Test	1.20E-07	3.14E-05	
Acenaphthylene	208-96-8	1.09E-04	Source Test	1.85E-06	4.86E-04	
Acetaldehyde	75-07-0	6.53E-01	CATEF	1.11E-02	2.91E+00	
Acetonitrile	75-05-8	7.96E+00	CATEF	1.35E-01	3.55E+01	
Acrolein	107-02-8	9.33E-02	CATEF	1.59E-03	4.16E-01	
Acrylonitrile	107-13-1	4.50E-03	Source Test	7.65E-05	2.01E-02	
Anthracene	120-12-7	1.10E-05	Source Test	1.88E-07	4.92E-05	
Arsenic	7440-38-2	5.91E-02	Source Test	1.00E-03	2.63E-01	
Benzene	71-43-2	8.59E-01	CATEF	1.46E-02	3.83E+00	
Benzo(a)anthracene	56-55-6	5.60E-02	CATEF	9.52E-04	2.50E-01	
Benzo(a)pyrene	50-32-8	5.60E-02	CATEF	9.52E-04	2.50E-01	
Benzo(b)fluoranthene	205-99-2	5.60E-02	CATEF	9.52E-04	2.50E-01	
Benzo(e)pyrene	192-97-2	7.48E-05	CATEF	1.27E-06	3.34E-04	
Benzo(g,h,i)perylene	191-24-2	5.60E-02	CATEF	9.52E-04	2.50E-01	
Benzo(k)fluoranthene	207-08-9	5.60E-02	CATEF	9.52E-04	2.50E-01	
Cadmium	7440-43-9	1.43E-03	Source Test	2.43E-05	6.37E-03	
Carbon Tetrachloride	56-23-5	3.76E-02	CATEF	6.39E-04	1.68E-01	
Chlorobenzene	108-90-7	8.69E-01	CATEF	1.48E-02	3.88E+00	
Chloroform	67-66-3	5.60E-02	CATEF	9.52E-04	2.50E-01	
Chromium (Hex)	18540-29-9	1.21E-05	Source Test	2.07E-07	5.42E-05	
Chromium (Total)	7440-47-3	4.64E-03	Source Test	7.90E-05	2.07E-02	
Chrysene	218-01-9	6.51E-06	Source Test	1.11E-07	2.90E-05	
Copper	7440-50-8	4.86E+00	CATEF	8.26E-02	2.17E+01	
Dibenz(a,h)anthracene	53-70-3	5.60E-02	CATEF	9.52E-04	2.50E-01	
Dichloromethane	75-09-2	4.29E-01	CATEF	7.29E-03	1.91E+00	
Fluoranthene	206-44-0	1.40E-05	Source Test	2.38E-07	6.24E-05	
Fluorene	86-73-7	2.84E-04	Source Test	4.82E-06	1.27E-03	
Formaldehyde	50-00-0	1.77E-01	Source Test	3.01E-03	7.89E-01	
HCl	7647-01-0	1.61E-03	Source Test	2.75E-05	7.20E-03	
HF	7664-39-3	2.15E-01	Source Test	3.65E-03	9.58E-01	

Hourly Biogas flow rate =	17,002 scfh	Assumed to be biogas flow to one AD CHP engine
Annual biogas flow rate A	36,926	Assumed to be 1/16 of biogas flow to two engines x annual
Annual biogas flow rate w	4,422,382	Assumed to be biogas flow to one engine x hours/year engi
Total Annual biogas flow	4,459,308	

[a] CATEF = Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsin\ for flare fired on landfill gas based on assumption that biogas composition is similar to landfill gas
Source Test = September 9-11 2010 source tests on Santa Maria Landfill flare combusting LFG. Non-detects set t

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Biogas flow rate [scfh] / 10^6 [scf/MMscf]

[b] Annual emission rate [lb/yr] = Emission factor [lb/MMscf] x Annual biogas flow rate [scf/yr] / 10^6 [scf/MMscf]

Table 21b Flare Toxic Air Contaminant Emissions from Biogas Combustion

Compound	CAS Number	Emission Factor (lb/MMscf)	Emission Factor Source[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]
Indeno(1,2,3-cd)pyrene	193-39-5	5.60E-02	CATEF	1.27E-03	1.11E+00
Manganese	7439-96-5	2.92E-03	Source Test	6.60E-05	5.78E-02
Naphthalene	91-20-3	1.75E-04	Source Test	3.95E-06	3.46E-03
Nickel	7440-02-0	1.43E-03	Source Test	3.23E-05	2.83E-02
Perylene	198-55-0	7.48E-05	CATEF	1.69E-06	1.48E-03
Phenanthrene	85-01-8	9.85E-04	Source Test	2.23E-05	1.95E-02
Pyrene	129-00-0	3.04E-05	Source Test	6.88E-07	6.03E-04
Toluene	108-88-3	1.09E+02	CATEF	2.46E+00	2.16E+03
Trichloroethene	79-01-6	1.13E+00	CATEF	2.55E-02	2.24E+01
Vinyl Chloride	75-01-4	7.64E-02	CATEF	1.73E-03	1.51E+00
Xylene (m,p)	1330-20-7	4.61E-01	CATEF	1.04E-02	9.13E+00
Xylene (o)	95-47-6	3.35E-01	CATEF	7.57E-03	6.63E+00
Zinc	7440-66-6	4.28E+00	CATEF	9.67E-02	8.47E+01
1,1,1-Trichloroethane	71-55-6	3.37E-01	CATEF	7.62E-03	6.67E+00
1,1-Dichloroethane	75-34-3	4.37E-01	CATEF	9.88E-03	8.65E+00
1,2-Dichloroethane	107-06-2	1.35E+00	CATEF	3.05E-02	2.67E+01
1,4-Dioxane	123-91-1	4.55E-03	Source Test	1.03E-04	9.01E-02
2-Methylnaphthalene	91-57-6	9.56E-05	Source Test	2.16E-06	1.89E-03
Acenaphthene	83-32-9	7.04E-06	Source Test	1.59E-07	1.39E-04
Acenaphthylene	208-96-8	1.09E-04	Source Test	2.46E-06	2.16E-03
Acetaldehyde	75-07-0	6.53E-01	CATEF	1.48E-02	1.29E+01
Acetonitrile	75-05-8	7.96E+00	CATEF	1.80E-01	1.58E+02
Acrolein	107-02-8	9.33E-02	CATEF	2.11E-03	1.85E+00
Acrylonitrile	107-13-1	4.50E-03	Source Test	1.02E-04	8.91E-02
Anthracene	120-12-7	1.10E-05	Source Test	2.49E-07	2.19E-04
Arsenic	7440-38-2	5.91E-02	Source Test	1.34E-03	1.17E+00
Benzene	71-43-2	8.59E-01	CATEF	1.94E-02	1.70E+01
Benzo(a)anthracene	56-55-6	5.60E-02	CATEF	1.27E-03	1.11E+00
Benzo(a)pyrene	50-32-8	5.60E-02	CATEF	1.27E-03	1.11E+00
Benzo(b)fluoranthene	205-99-2	5.60E-02	CATEF	1.27E-03	1.11E+00
Benzo(e)pyrene	192-97-2	7.48E-05	CATEF	1.69E-06	1.48E-03
Benzo(g,h,i)perylene	191-24-2	5.60E-02	CATEF	1.27E-03	1.11E+00
Benzo(k)fluoranthene	207-08-9	5.60E-02	CATEF	1.27E-03	1.11E+00
Cadmium	7440-43-9	1.43E-03	Source Test	3.23E-05	2.83E-02
Carbon Tetrachloride	56-23-5	3.76E-02	CATEF	8.50E-04	7.44E-01
Chlorobenzene	108-90-7	8.69E-01	CATEF	1.96E-02	1.72E+01
Chloroform	67-66-3	5.60E-02	CATEF	1.27E-03	1.11E+00
Chromium (Hex)	18540-29-9	1.21E-05	Source Test	2.75E-07	2.41E-04
Chromium (Total)	7440-47-3	4.64E-03	Source Test	1.05E-04	9.20E-02
Chrysene	218-01-9	6.51E-06	Source Test	1.47E-07	1.29E-04
Copper	7440-50-8	4.86E+00	CATEF	1.10E-01	9.62E+01
Dibenz(a,h)anthracene	53-70-3	5.60E-02	CATEF	1.27E-03	1.11E+00
Dichloromethane	75-09-2	4.29E-01	CATEF	9.70E-03	8.49E+00
Fluoranthene	206-44-0	1.40E-05	Source Test	3.16E-07	2.77E-04
Fluorene	86-73-7	2.84E-04	Source Test	6.41E-06	5.62E-03
Formaldehyde	50-00-0	1.77E-01	Source Test	4.00E-03	3.51E+00
HCl	7647-01-0	1.61E-03	Source Test	3.65E-05	3.20E-02
HF	7664-39-3	2.15E-01	Source Test	4.86E-03	4.25E+00

MRFFLAR

Hourly LFG flow rate = 22,602 scfh Assumed to be LFG flow to one CHP engine

Annual biogas flow rate w 19,799,207 Assumed to be LFG flow to one engine x hours/year engines

Total Annual biogas flow 19,799,207

[a] CATEF = Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv for flare fired on landfill gas

Source Test = September 9-11 2010 source tests on Santa Maria Landfill flare combusting LFG. Non-detects set tc

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x LFG flow rate [scfh] / 10^6 [scf/MMscf]

[b] Annual emission rate [lb/yr] = Emission factor [lb/MMscf] x Annual LFG flow rate [scf/yr] / 10^6 [scf/MMscf]

Table 22 CHP Engine Toxic Air Contaminant Emissions from Biogas/LFG Combustion

			ADCHP1, ADCHP2		MRFCHP1-2		PAPERDRY	
Compound	CAS Number	Emission Factor (lb/MMscf)[a]	Hourly Emission Rate per Engine (lb/hr)[b]	Annual Emission Rate per Engine (lb/yr)[c]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]
Benzene	71-43-2	9.48E-03	1.61E-04	1.34E+00	2.14E-04	1.82E+00	4.29E-04	3.65E+00
Benzo(a)anthracene	56-55-6	1.60E-06	2.72E-08	2.26E-04	3.62E-08	3.08E-04	7.23E-08	6.16E-04
Benzo(a)pyrene	50-32-8	2.70E-07	4.59E-09	3.82E-05	6.10E-09	5.19E-05	1.22E-08	1.04E-04
Benzo(b)fluoranthene	205-99-2	4.88E-07	8.30E-09	6.90E-05	1.10E-08	9.39E-05	2.21E-08	1.88E-04
Benzo(k)fluoranthene	207-08-9	2.70E-07	4.59E-09	3.82E-05	6.10E-09	5.19E-05	1.22E-08	1.04E-04
Carbon Tetrachloride	56-23-5	1.14E-04	1.94E-06	1.61E-02	2.58E-06	2.19E-02	5.15E-06	4.39E-02
Chloroform	67-66-3	1.13E-04	1.92E-06	1.60E-02	2.55E-06	2.17E-02	5.11E-06	4.35E-02
Chrysene	218-01-9	5.87E-06	9.98E-08	8.31E-04	1.33E-07	1.13E-03	2.65E-07	2.26E-03
Dibenz(a,h)anthracene	53-70-3	2.70E-07	4.59E-09	3.82E-05	6.10E-09	5.19E-05	1.22E-08	1.04E-04
Ethylene Dibromide	106-93-4	1.12E-04	1.90E-06	1.58E-02	2.53E-06	2.15E-02	5.06E-06	4.31E-02
Ethylene Dichloride	106-93-4	5.08E-03	8.64E-05	7.19E-01	1.15E-04	9.77E-01	2.30E-04	1.95E+00
Formaldehyde	50-00-0	1.49E+00	2.53E-02	2.11E+02	3.37E-02	2.87E+02	6.74E-02	5.73E+02
Hydrochloric Acid	7647-01-0	2.07E+00	3.52E-02	2.93E+02	4.68E-02	3.98E+02	9.36E-02	7.97E+02
Indeno(1,2,3-cd)pyrene	193-39-5	2.70E-07	4.59E-09	3.82E-05	6.10E-09	5.19E-05	1.22E-08	1.04E-04
Methyl Chloroform	71-55-6	1.11E-04	1.89E-06	1.57E-02	2.51E-06	2.14E-02	5.02E-06	4.27E-02
Methylene Chloride	75-09-2	1.30E-04	2.21E-06	1.84E-02	2.94E-06	2.50E-02	5.88E-06	5.00E-02
Napthtalene	91-20-3	7.38E-04	1.25E-05	1.04E-01	1.67E-05	1.42E-01	3.34E-05	2.84E-01
Perchloroethylene	127-18-4	5.84E-04	9.93E-06	8.26E-02	1.32E-05	1.12E-01	2.64E-05	2.25E-01
Trichloroethylene	79-01-6	1.49E-03	2.53E-05	2.11E-01	3.37E-05	2.87E-01	6.74E-05	5.73E-01
Vinyl Chloride	75-01-4	1.63E-04	2.77E-06	2.31E-02	3.68E-06	3.14E-02	7.37E-06	6.27E-02
Fuel flow rate =		17,002 scfh	Engine specificiation at 100% load				22,602 scfh	Engine specificiation at 100% load
		141,488,324 scf/year	Hourly biogas [scfh] x Annual op. hours [hr/year]				192,395,044 scf/year	Hourly LFG [scfh] x Annual op. hours [h

[a] Santa Barbara County Air Pollution Control District approved emission factors for landfill gas-fired IC engines with oxidation catalyst

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x biogas/LFG flow rate [scfh] / 10^6 [scf/MMsc] Molar volume [scf/lb-mole] x (1 - Engine destruction efficiency [%] / 100) x (1 - Oxidation catalyst efficiency [%] / 100)

[c] Annual emission rate [lb/yr] = Emission factor [lb/MMscf] x annual biogas/LFG flow rate [scf/year] / 10^6 [scf/MMsc]

CHP Engine Ammonia Emissions from SCR Ammonia Slip, Each Engine

Item	AD Value	Comments	MRF Value
Ammonia concentration	5	ppm @ 15% oxygen	5
Ammonia molecular weight	17	lb/lb-mole	17
Fd	11,370	scf/MMBtu, SCR system vendor estimate	11,370
Molar volume	385.5	scf/lb-mole	385.5
Engine heat input	9.88	MMBtu/hr, manufacturer's specification	12.32
Ammonia hourly emissions	8.77E-02	lb/hr = Ammonia concentration [ppm] x Molecular weight [lb/lb-mole] x	1.09E-01
		10^{-6} / Molar volume [scf/lb-mole] x [20.9 / (20.9 - percent oxygen)] x	
		Fd [scf/MMBtu] x Heat input [MMBtu/hr]	
Ammonia annual emissions	7.30E+02	lb/yr = Hourly emissions [lb/hr] x Annual biogas production [scf/year] /	9.31E+02
		Hourly biogas flow rate [scfh]	

hr/year]

Table 23 Diesel Exhaust Particulate Matter Emissions

Table 23-A
MRF Facility Biofilter for Tipping Area (7:00 a.m. - 11:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
Caterpillar M322D Material Handler	311	16	2.07E-06	1.03E-02	
CAT 966 M Loader	311	16	7.44E-06	3.70E-02	
CAT 938 K Loader	311	16	2.02E-06	1.01E-02	
Tennant 800 Sweeper	311	16	6.53E-07	3.25E-03	
Total			**1.22E-05**	**6.06E-02**	BF_TIP

Table 23-B
MRF Facility Biofilter for Tipping Area (11:00 p.m. - 7:00 a.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)		Hourly Night Factor	Annual Night Factor
Tennant 800 Sweeper	311	8	6.53E-07	1.62E-03			
Total			**6.53E-07**	**1.62E-03**	BF_TIP	0.05	0.03

Table 23-C
MRF Facility Biofilter for Recycling Area (7:00 a.m. - 11:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
CAT 2P-6000 Forklift	311	16	1.62E-06	8.07E-03	
Tennant 800 Sweeper	311	16	6.53E-07	3.25E-03	
Total			**2.27E-06**	**1.13E-02**	BFRECYC

Table 23-D
MRF Facility Biofilter for Recycling Area (11:00 p.m. - 7:00 a.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
Tennant 800 Sweeper	311	8	6.53E-07	1.62E-03	
Total			**6.53E-07**	**1.62E-03**	BFRECYC

Table 23-E
AD Facility Biofilter (8:00 a.m. - 4:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
CAT 938 M Loader	208	8	4.04E-06	6.73E-03	BF_ADF
Total			**4.04E-06**	**6.73E-03**	

Table 23-F
Outside MRF Facility Building (11:00 a.m. - 5:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	MRFSWP1 & 2
Tennant M30 Scrubber-Sweeper	311	6	8.24E-04	1.54E+00	7.684E-01
Total			**8.24E-04**	**1.54E+00**	

Table 23-G
Outside AD Facility Building (11:00 a.m. - 5:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	ADSWEEP
Tennant M30 Scrubber-Sweeper	311	6	8.24E-04	1.54E+00	
Total	0	0	8.24E-04	1.54E+00	

Table 23-H
Composting Area (8:00 a.m. - 4:00 p.m.)

Equipment	Operating Days per Year	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
CAT 938 K Loader	311	8	2.02E-06	5.03E-03	COMPMAT
Backhus A55 Windrow Turner	52	8	3.07E-03	1.28E+00	WINDROW

Table 23-I
Motor Vehicles (8:00 a.m. - 2:00 p.m.)

Segment	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
MRF-Compost	6	4.82E-05	8.99E-02	MRFCOMP
MRF-Entrance	6	7.58E-04	1.41E+00	MRFENTRY

Table 23-J
Emergency Generator

Segment	Operating Hours per Day	Hourly Emissions (lb/hr)	Annual Emissions (lb/yr)	
150 kW Generator	6	1.1E-02	5.3E-01	EMGEN

Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

Table 24-A
MRF Facility Biofilter (7:00 a.m. - 11:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	BF_TIP
Benzene	71-43-2	0.1863	2.53E-03	
Formaldehyde	50-00-0	1.7261	2.35E-02	
Acetaldehyde	75-07-0	0.7833	1.07E-02	
Acrolein	107-02-8	0.0339	4.61E-04	
1,3-Butadiene	106-99-0	0.2174	2.96E-03	
Toluene	108-88-3	0.1054	1.43E-03	
Xylenes	1330-20-7	0.0424	5.77E-04	
Hydrogen chloride	7647-01-0	0.1863	2.53E-03	
Arsenic	7440-38-2	0.0016	2.18E-05	
Copper	7440-50-8	0.0041	5.58E-05	
Mercury	7439-97-6	0.0020	2.72E-05	
Nickel	7440-02-0	0.0039	5.30E-05	

Hourly fuel use = 13.6 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24-B
MRF Recyling Area Biofilter (7:00 a.m. - 11:00 p.m.) - BFRECYC

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)
Benzene	71-43-2	0.1863	1.21E-03
Formaldehyde	50-00-0	1.7261	1.12E-02
Acetaldehyde	75-07-0	0.7833	5.09E-03
Acrolein	107-02-8	0.0339	2.20E-04
1,3-Butadiene	106-99-0	0.2174	1.41E-03
Toluene	108-88-3	0.1054	6.85E-04
Xylenes	1330-20-7	0.0424	2.76E-04
Hydrogen chloride	7647-01-0	0.1863	1.21E-03
Arsenic	7440-38-2	0.0016	1.04E-05
Copper	7440-50-8	0.0041	2.67E-05
Mercury	7439-97-6	0.0020	1.30E-05
Nickel	7440-02-0	0.0039	2.54E-05

Hourly fuel use = 6.5 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

Table 24-C
AD Facility Biofilter (8:00 a.m. - 4:00 p.m.) -BFADF

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	BFADF
Benzene	71-43-2	0.1863	1.21E-03	
Formaldehyde	50-00-0	1.7261	1.12E-02	
Acetaldehyde	75-07-0	0.7833	5.09E-03	
Acrolein	107-02-8	0.0339	2.20E-04	
1,3-Butadiene	106-99-0	0.2174	1.41E-03	
Toluene	108-88-3	0.1054	6.85E-04	
Xylenes	1330-20-7	0.0424	2.76E-04	
Hydrogen chloride	7647-01-0	0.1863	1.21E-03	
Arsenic	7440-38-2	0.0016	1.04E-05	
Copper	7440-50-8	0.0041	2.67E-05	
Mercury	7439-97-6	0.0020	1.30E-05	
Nickel	7440-02-0	0.0039	2.54E-05	

Hourly fuel use = 7 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24-D
Outside MRF and AD Facility Building (11:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	ADSWEEP Emissions (lb/hour)	MRFSWP1	MRFSWP2
Benzene	71-43-2	0.1863	1.21E-03	6.055E-04	6.055E-04
Formaldehyde	50-00-0	1.7261	1.12E-02	5.610E-03	5.610E-03
Acetaldehyde	75-07-0	0.7833	5.09E-03	2.546E-03	2.546E-03
Acrolein	107-02-8	0.0339	2.20E-04	1.102E-04	1.102E-04
1,3-Butadiene	106-99-0	0.2174	1.41E-03	7.066E-04	7.066E-04
Toluene	108-88-3	0.1054	6.85E-04	3.426E-04	3.426E-04
Xylenes	1330-20-7	0.0424	2.76E-04	1.378E-04	1.378E-04
Hydrogen chloride	7647-01-0	0.1863	1.21E-03	6.055E-04	6.055E-04
Arsenic	7440-38-2	0.0016	1.04E-05	5.200E-06	5.200E-06
Copper	7440-50-8	0.0041	2.67E-05	1.333E-05	1.333E-05
Mercury	7439-97-6	0.0020	1.30E-05	6.500E-06	6.500E-06
Nickel	7440-02-0	0.0039	2.54E-05	1.268E-05	1.268E-05

Hourly fuel use = 4 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

Table 24-E
Composting Area (8:00 a.m. - 4:00 p.m.)
Cat 938 K Loader

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)
Benzene	71-43-2	0.1863	5.03E-04
Formaldehyde	50-00-0	1.7261	4.66E-03
Acetaldehyde	75-07-0	0.7833	2.11E-03
Acrolein	107-02-8	0.0339	9.15E-05
1,3-Butadiene	106-99-0	0.2174	5.87E-04
Toluene	108-88-3	0.1054	2.85E-04
Xylenes	1330-20-7	0.0424	1.14E-04
Hydrogen chloride	7647-01-0	0.1863	5.03E-04
Arsenic	7440-38-2	0.0016	4.32E-06
Copper	7440-50-8	0.0041	1.11E-05
Mercury	7439-97-6	0.0020	5.40E-06
Nickel	7440-02-0	0.0039	1.05E-05

COMPMAT

Hourly fuel use = 2.7 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24-F
Composting Area (8:00 a.m. - 4:00 p.m.)
Vermeer CT1010 TX Windrow Turner

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)
Benzene	71-43-2	0.1863	2.24E-03
Formaldehyde	50-00-0	1.7261	2.07E-02
Acetaldehyde	75-07-0	0.7833	9.40E-03
Acrolein	107-02-8	0.0339	4.07E-04
1,3-Butadiene	106-99-0	0.2174	2.61E-03
Toluene	108-88-3	0.1054	1.26E-03
Xylenes	1330-20-7	0.0424	5.09E-04
Hydrogen chloride	7647-01-0	0.1863	2.24E-03
Arsenic	7440-38-2	0.0016	1.92E-05
Copper	7440-50-8	0.0041	4.92E-05
Mercury	7439-97-6	0.0020	2.40E-05
Nickel	7440-02-0	0.0039	4.68E-05

WINDROW

Compounds from WINDROW Organic TAC tab	Hourly Emission Rate (lb/hr)
Isopropyl alcohol	2.22E-01
Methyl alcohol	6.71E-02
Naphthalene	2.62E-03
Acetaldehyde	7.34E-04
NH3	1,779.46

Hourly fuel use = 12 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

Table 24-G
On-Site Motor Vehicles (8:00 a.m. - 2:00 p.m.)
Entrance to/from MRF

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	MRFENTRY
Benzene	71-43-2	0.1863	1.10E-04	
Formaldehyde	50-00-0	1.7261	1.02E-03	
Acetaldehyde	75-07-0	0.7833	4.64E-04	
Acrolein	107-02-8	0.0339	2.01E-05	
1,3-Butadiene	106-99-0	0.2174	1.29E-04	
Toluene	108-88-3	0.1054	6.25E-05	
Xylenes	1330-20-7	0.0424	2.51E-05	
Hydrogen chloride	7647-01-0	0.1863	1.10E-04	
Arsenic	7440-38-2	0.0016	9.49E-07	
Copper	7440-50-8	0.0041	2.43E-06	
Mercury	7439-97-6	0.0020	1.19E-06	
Nickel	7440-02-0	0.0039	2.31E-06	

Hourly fuel use = 0.59 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24-H
On-Site Motor Vehicles (8:00 a.m. - 2:00 p.m.)
MRF to/from Compost

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	MRFCOMP
Benzene	71-43-2	0.1863	1.20E-05	
Formaldehyde	50-00-0	1.7261	1.11E-04	
Acetaldehyde	75-07-0	0.7833	5.05E-05	
Acrolein	107-02-8	0.0339	2.18E-06	
1,3-Butadiene	106-99-0	0.2174	1.40E-05	
Toluene	108-88-3	0.1054	6.79E-06	
Xylenes	1330-20-7	0.0424	2.73E-06	
Hydrogen chloride	7647-01-0	0.1863	1.20E-05	
Arsenic	7440-38-2	0.0016	1.03E-07	
Copper	7440-50-8	0.0041	2.64E-07	
Mercury	7439-97-6	0.0020	1.29E-07	
Nickel	7440-02-0	0.0039	2.51E-07	

Hourly fuel use = 0.06 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

Table 24-I
Emergency Generator (0.5 hours/day, 26 hrs/year)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	EMGEN
Benzene	71-43-2	0.1863	1.05E-03	
Formaldehyde	50-00-0	1.7261	9.75E-03	
Acetaldehyde	75-07-0	0.7833	4.43E-03	
Acrolein	107-02-8	0.0339	1.92E-04	
1,3-Butadiene	106-99-0	0.2174	1.23E-03	
Toluene	108-88-3	0.1054	5.96E-04	
Xylenes	1330-20-7	0.0424	2.40E-04	
Hydrogen chloride	7647-01-0	0.1863	1.05E-03	
Arsenic	7440-38-2	0.0016	9.04E-06	
Copper	7440-50-8	0.0041	2.32E-05	
Mercury	7439-97-6	0.0020	1.13E-05	
Nickel	7440-02-0	0.0039	2.20E-05	

Hourly fuel use = 11.30 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 25 **AD NH3 Emissions**

Item	Value	Comment
Digestate production (ton/yr)	73,590	AD design capacity
Digestate production (ton/day)	201.62	Annual / 365 days/year
Fraction food waste	**0.481**	Mustang estimate
Fraction green waste	**0.519**	Mustang estimate
Digestate from food waste (ton/day)	96.98	
Digestate from green waste (ton/day)	104.64	
Food waste EF (lb NH3/ton)	14.20	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Green waste EF (lb NH3/ton)	2.37	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Food waste EF (lb VOC/ton-day)	0.237	For one day of 60-day composting cycle
Green waste EF (lb VOC/ton-day)	0.040	For one day of 60-day composting cycle
NH3 from food waste (lb/day)	22.95	
NH3 from green waste (lb/day)	4.13	
Total NH3 (lb/day)	27	
Reduction from biofilter	0.95	
NH3 after biofilter (lb/day)	1.35	
VOC after biofilter (lb/hour)	0.06	Daily / 24 hours/day
VOC after biofilter (lb/yr)	494	

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at: http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

Table 26 **TOTAL AD Biofilter Organic Toxic Air Contaminant Emissions**

Compound	CAS Number	ROC Mass Fraction[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]	BF_TIP Hourly Emission Rate (lb/hr)[b]	BF_TIP Annual Emission Rate (lb/yr)[c]	BF_ADF Hourly Emission Rate (lb/hr)[b]	BF_ADF Annual Emission Rate (lb/yr)[c]	BF_RECYC Hourly Emission Rate (lb/hr)[b]	BF_RECYC Annual Emission Rate (lb/yr)[c]
Isopropyl alcohol	67-63-0	0.423	6.16E-02	5.40E+02	2.03E-02	1.78E+02	9.91E-03	8.68E+01	2.15E-02	1.89E+02
Methyl alcohol	67-56-1	0.128	1.86E-02	1.63E+02	6.13E-03	5.37E+01	3.00E-03	2.63E+01	6.51E-03	5.70E+01
Naphthalene	91-20-3	0.005	7.28E-04	6.38E+00	2.40E-04	2.10E+00	1.17E-04	1.03E+00	2.54E-04	2.23E+00
Acetaldehyde	75-07-0	0.001	2.04E-04	1.79E+00	6.71E-05	5.88E-01	3.28E-05	2.87E-01	7.12E-05	6.24E-01
H2S	7783064	0.300	4.37E-02	3.83E+02	1.44E-02	1.26E+02	7.03E-03	6.16E+01	1.53E-02	1.34E+02
Ammonia	NH3		5.64E-02	4.94E+02	1.86E-02	1.63E+02	9.08E-03	7.95E+01	1.97E-02	1.73E+02

Hourly ROC Emissions = 0.15 lb/hr

Annual ROC Emissions = 1,276.09 lb/yr

[a] From Anuj Kumer, et. al, Volatile organic compound emissions from green waste composting: Characterization and ozone formation, Atmos. Environ., 45 (2011) 1841-1848.

[b] Hourly emission rate [lb/hr] = Hourly ROC emission rate [lb/hr] x Mass Fraction

[c] Annual emission rate [lb/yr] = Annual ROC emission rate [lb/yr] x Mass Fraction

Biofilter	m^3/ min	Fract.
Tipping Area	1,461	0.329
ADF	1,428	0.322
Scrub	1,550	0.349
Total	**4,439**	**1.000**

Table 27
Windrow NH3 Emissions

Item	Value	Comment
Digestate production (ton/yr)	73,590	AD design capacity
Digestate production (ton/day)	201.62	Annual / 365 days/year
Fraction food waste	**0.481**	Mustang estimate
Fraction green waste	**0.519**	Mustang estimate
Digestate from food waste (ton/day)	96.98	
Digestate from green waste (ton/day)	104.64	
Food waste EF (lb NH3/ton)	14.20	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
Green waste EF (lb NH3/ton)	2.37	From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a]
NH3 from food waste (lb/day)	1,377.08	
NH3 from green waste (lb/day)	247.99	
Total NH3 (lb/day)	1,625	
Reduction from digestion process	0.97	See note b
NH3 after reduction from digestion (lb/day)	48.75	
Reduction from Best Available Control Technologies	0.90	See note c
NH3 after BMP reductions (lb/day)	4.88	
NH3 after BMP reductions (lb/hour)	0.20	Daily / 24 hours/day
NH3 after BMP reductions (lb/yr)	1,779	

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at: http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 20% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting prepared from SJVAPCD 2009: http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
Greenwaste Compost Air Emissions Review (Modesto Compost Facility) prepared fror CIWMB June 2008: http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pdf
Greenwaste Compost Site Emissions Reductions Prepared for San Joaquin Valley Technology Advancement Program May 2013: http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pdf

Table 28
Composting Windrow Fugitive Organic Toxic Air Contaminant Emissions

Compound	CAS Number	ROC Mass Fraction[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]
Isopropyl alcohol	67-63-0	0.423	2.22E-01	1.94E+03
Methyl alcohol	67-56-1	0.128	6.71E-02	5.88E+02
Naphthalene	91-20-3	0.005	2.62E-03	2.30E+01
Acetaldehyde	75-07-0	0.001	7.34E-04	6.43E+00
Hourly ROC Emissions =	0.52 lb/hr			
Annual ROC Emissions =	4,593.91 lb/yr			

[a] From Anuj Kumer, et. al, Volatile organic compound emissions from green waste composting: Characterization and ozone formation, Atmos. Environ., 45 (2011) 1841-1848.

[b] Hourly emission rate [lb/hr] = Hourly ROC emission rate [lb/hr] x Mass Fraction

[c] Annual emission rate [lb/yr] = Annual ROC emission rate [lb/yr] x Mass Fraction

Table 29-A MRF Criteria Pollutant Daily Emissions Summary with CSSR

Source	Emissions (lb/day)					
	CO	ROC	NOx	SOx	PM10	PM2.5
Onsite						
MRF Facility Equipment	48.18	2.22	13.21	0.07	0.00	0.00
Diesel Fuel Storage Tank		0.02				
Material Handling Fugitive PM					0.00	0.00
Onsite Total	**48.18**	**2.24**	**13.21**	**0.07**	**0.00**	**0.00**
Offsite						
Motor Vehicle Exhaust	28.03	5.17	2.84	0.08	0.44	0.34
Motor Vehicle Fugitive PM					4.39	1.08
Offsite Total	**28.03**	**5.17**	**2.84**	**0.08**	**4.83**	**1.42**
Total	**76.21**	**7.42**	**16.06**	**0.15**	**4.83**	**1.42**

Table 29-B MRF Criteria Pollutant Annual Emissions Summary with CSSR

Source	Emissions (ton/year)					
	CO	ROC	NOx	SOx	PM10	PM2.5
Onsite						
MRF Facility Equipment	7.49	0.35	2.05	0.01	0.00	0.00
Diesel Fuel Storage Tank		0.01				
Material Handling Fugitive PM					0.00	0.00
Onsite Total[a]	**7.49**	**0.35**	**2.05**	**0.01**	**0.00**	**0.00**
Offsite						
Motor Vehicle Exhaust	4.36	0.80	0.44	0.01	0.07	0.05
Motor Vehicle Fugitive PM					0.68	0.17
Offsite Total	**4.36**	**0.80**	**0.44**	**0.01**	**0.75**	**0.22**
Total	**11.85**	**1.16**	**2.50**	**0.02**	**0.75**	**0.22**

Table 30
MRF Greenhouse Gas Annual Emissions Summary with CSSR

Source	Emissions (MT/year)[a]			
	CO_2	CH_4	N_2O	CO_2e[b]
Onsite				
MRF Facility Equipment	1,122.79	0.06	0.03	1,132.90
Onsite Total	**1,122.79**	**0.06**	**0.03**	**1,132.90**
Offsite				
Motor Vehicle Exhaust	1,747.41	2.90	0.26	1,898.09
Offsite Total	**1,747.41**	**2.90**	**0.26**	**1,898.09**
Total	**2,870.20**	**2.96**	**0.29**	**3,030.99**

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[b] CO_2e = CO2-equivalent = CO_2 + 25 x CH_4 + 298 x N_2O

Table 31 MRF Equipment Exhaust Emissions

Equipment	Horsepower	Number	Hours/Day	Fuel Use (gal/hr)	Emission Stds.	Emission Factors (g/bhp-hr)[a]					Emission Factor (g/gal)		
						CO	ROC[b]	NOx[b]	PM10[c]	PM2.5[c]	CO_2[d]	CH_4[e]	N_2O[e]
Materials Recovery Facility Building													
Caterpillar M322D Material Handler	173	1	16	2.7	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 966 M Loader	311	2	16	3.1	Tier 4	2.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 938 K Loader	169	1	16	2.7	Tier 4	3.7	0.14	0.3	0.015	0.015	10,210	0.58	0.26
CAT 2P-6000 Forklift	61	3	16	1.5	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26
Tennant 800 Sweeper	65	1	24	4	Tier 4	3.7	0.18	3.33	0.02	0.02	10,210	0.58	0.26

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] CH_4 and N_2O from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

Equipment	Load Factor[c]	Emission Rates Each Unit (lb/hr)								
		CO[a]	ROC[a]	NOx[a]	SOx[b]	PM10[a,d]	PM2.5[a,d]	CO_2[e]	CH_4[e]	N_2O[e]
Materials Recovery Facility Building										
Caterpillar M322D Material Handler	0.3618	0.511	0.019	0.041	0.00056	2.07E-06	2.07E-06	60.77	3.45E-03	1.55E-03
CAT 966 M Loader	0.3618	0.670	0.035	0.074	0.00065	3.72E-06	3.72E-06	69.78	3.96E-03	1.78E-03
CAT 938 K Loader	0.3618	0.499	0.019	0.040	0.00056	2.02E-06	2.02E-06	60.77	3.45E-03	1.55E-03
CAT 2P-6000 Forklift	0.201	0.100	0.005	0.090	0.00031	5.41E-07	5.41E-07	33.76	1.92E-03	8.60E-04
Tennant 800 Sweeper	0.4556	0.242	0.011	0.217	0.00083	1.31E-06	1.31E-06	90.04	5.11E-03	2.29E-03

Diesel Fuel Density = 6.943 lb/gal

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x 10^{-6} x 2 [lb SO_2/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

Table 31 MRF Equipment Exhaust Emissions

Equipment	Daily Emissions (lb/day)[a]								
	CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Materials Recovery Facility Building									
Caterpillar M322D Material Handler	8.17	0.31	0.66	0.01	3.31E-05	3.31E-05	972.38	0.06	0.02
CAT 966 M Loader	21.43	1.11	2.38	0.02	1.19E-04	1.19E-04	2,232.87	0.13	0.06
CAT 938 K Loader	7.98	0.30	0.65	0.01	3.24E-05	3.24E-05	972.38	0.06	0.02
CAT 2P-6000 Forklift	4.80	0.23	4.31	0.01	2.59E-05	2.59E-05	1,620.63	0.09	0.04
Tennant 800 Sweeper	5.80	0.27	5.21	0.02	3.13E-05	3.13E-05	2,160.85	0.12	0.06
Total	**48.18**	**2.22**	**13.21**	**0.07**	**0.00**	**0.00**	**7,959.12**	**0.45**	**0.20**

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

Equipment	Days/Year	Annual Emissions (lb/year)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Materials Recovery Facility Building										
Caterpillar M322D Material Handler	311	2,540.53	96.13	205.99	2.80	0.01	0.01	3.02E+05	17.18	7.70
CAT 966 M Loader	311	6,665.46	345.62	740.61	6.43	0.04	0.04	6.94E+05	39.45	17.68
CAT 938 K Loader	311	2,481.79	93.91	201.23	2.80	0.01	0.01	3.02E+05	17.18	7.70
CAT 2P-6000 Forklift	311	1,492.99	70.61	1,341.67	4.66	0.01	0.01	5.04E+05	28.63	12.83
Tennant 800 Sweeper	311	1,803.01	85.28	1,620.27	6.22	0.01	0.01	6.72E+05	38.18	17.11
Total		**14,983.77**	**691.54**	**4,109.76**	**22.91**	**0.08**	**0.08**	**2.48E+06**	**140.61**	**63.03**

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

Table 32 **MRF Off-Site Motor Vehicle Exhaust Emissions with CSSR**

Vehicle	Use	Fuel	One-Way Trips/Day	Mileage (mpg)[b]	One-Way Trip Dist. (mi)	Miles/ Day
Freightliner Tractors	Recycleables to POLA[a]	CNG	36	6	131	4,716
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast[c]	Diesel	14	6	-17	-238
Worker Commuting	From the North[d]	Gasoline	56	22	37	2,072
Worker Commuting	From the South[d]	Gasoline	6	22	15	90

[a] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 one-way trips/day x 2 = 36.8 one-way trips/day rounded to 36

[b] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[c] Round trips are from Project Traffic Study. Mileage is difference between SCRTS to Tajiguas (22 mi.) and SCRTS to Gold Coast (39 mi.)

[d] Trips/day are from Project Traffic Study

Vehicle	Use	EMFAC Vehicle Class	Emission Factors (g/mi)								
			CO[a,b]	ROC[a,c]	NOx[a,c]	SOx[a,d]	PM10[a,c]	PM2.5[a,c]	CO_2[a,e]	CH_4[a,f]	N_2O[f,g]
Freightliner Tractors	Recycleables to POLA	N/A	1.17E+00	3.70E-01	4.60E-01	6.80E-03	2.90E-02	2.90E-02	1.13E+03	1.97E+00	1.75E-01
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	T7 tractor	1.16E+00	2.53E-01	6.95E+00	1.69E-02	1.80E-01	1.11E-01	1.68E+03	1.38E-02	5.81E-02
Worker Commuting	From the North	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02
Worker Commuting	From the South	LDT1	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	2.52E-02	1.49E-02

Diesel Fuel HV =	128,450	Btu/gal
Natural Gas HV =	1,020	Btu/scf
Natural Gas S =	0.5	grains/100 scf
Diesel Fuel Density =	6.943	lb/gal
Diesel Fuel Sulfur =	15	ppmw
Natural Gas CO_2 EF =	0.054	Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO_2/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas CO_2 EF (kg/scf) x 1,000 (g/kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

Table 32 MRF Off-Site Motor Vehicle Exhaust Emissions with CSSR

Vehicle	Use	Daily Emissions (lb/day)[a]								
		CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Recycleables to POLA	12.13	3.85	4.78	0.07	0.30	0.30	11,783.58	20.44	1.82
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	-0.61	-0.13	-3.65	-0.01	-0.09	-0.06	-880.47	-0.01	-0.03
Worker Commuting	From the North	15.83	1.40	1.64	0.02	0.22	0.10	1,421.98	0.12	0.07
Worker Commuting	From the South	0.69	0.06	0.07	0.00	0.01	0.00	61.77	0.01	0.00
Total		**28.03**	**5.17**	**2.84**	**0.08**	**0.44**	**0.34**	**12,386.86**	**20.55**	**1.86**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

Vehicle	Use	Op. Days/yr	Annual Emissions (lb/year)[a]								
			CO	ROC	NOx	SOx	PM10	PM2.5	CO_2	CH_4	N_2O
Freightliner Tractors	Recycleables to POLA	311	3,771.65	1,196.36	1,487.37	21.99	93.77	93.77	3,664,692.89	6,356.89	565.85
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	311	-189.68	-41.25	-1,134.46	-2.75	-29.39	-18.15	-273,825.41	-2.25	-9.48
Worker Commuting	From the North	311	4,922.35	434.92	509.53	5.41	68.65	29.84	442,237.03	35.80	21.20
Worker Commuting	From the South	311	213.81	18.89	22.13	0.24	2.98	1.30	19,209.14	1.56	0.92
Total			**8,718.13**	**1,608.92**	**884.57**	**24.89**	**136.02**	**106.75**	**3,852,313.65**	**6,391.99**	**578.48**

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Off-Site Motor Vehicle Fugitive PM Emissions

Emission Factors for Vehicles on Off-Site Paved Roads

Parameter	Value	Comments
Road silt loading (g/m^2)	0.1	CalEEMod default
Onroad vehicles average weight (tons)	2.4	CalEEMod Default for Santa Barbara County
PM10 emission factor (lb/mile)	6.61E-04	0.0022 x (silt loading [g/m^2])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)
PM2.5 emission factor (lb/mile)	1.62E-04	0.00054 x (silt loading [g/m^2])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11)

Vehicle	Use	Miles/ Day	Op. Days/yr	Daily Emissions (lb/day)[a]		Annual Emissions (lb/year)[b]	
				PM10	PM2.5	PM10	PM2.5
Freightliner Tractors	Recycleables to POLA	4.716	311	3.12	0.77	969.55	237.98
Tractor/Trailer	CSSR from SCRTS to Tajiguas instead of Gold Coast	-238	311	-0.16	-0.04	-48.93	-12.01
Worker Commuting	From the North	2.072	311	1.37	0.34	425.98	104.56
Worker Commuting	From the South	90	311	0.06	0.01	18.50	4.54
Total				**4.39**	**1.08**	**1,365.11**	**335.07**

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

Table 33 **MRF On-Site Fugitive PM Emissions with CSSR**

Material Transfers with CSSR

Material	Transfer	Moisture (%)[a]	Daily Amount (tons)	Annual Op. (Days/year)	Emission Factors (lb/ton)[b]		Emissions (lb/day)[c,e]		Emissions (lb/year)[d]	
					PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
MSW	Into MRF Facility	28	930	311	3.84E-04	5.82E-05	3.57E-04	5.41E-05	0.11	0.02

[a] From Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2)$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

Table 34 Motor Vehicle Emission Factors in Santa Barbara County for 2017

Vehicle Class	Fuel		Emission Factors (g/mi)[a]										
			CO	ROG	NOx	SOx	PM10	PM2.5	CO_2	TOG	CH_4	N_2O	Mileage (mpg)
LDA	GAS	LDAGAS	1.48E+00	1.31E-01	1.48E-01	3.26E-03	4.68E-02	1.97E-02	2.51E+02	1.45E-01	1.31E-02	6.14E-03	26.09
LDA	DSL	LDADSL	1.55E-01	2.65E-02	4.71E-01	3.31E-03	6.34E-02	3.49E-02	2.71E+02	3.01E-02	1.45E-03	1.14E-02	29.10
LDT1	GAS	LDT1GAS	3.46E+00	3.06E-01	3.59E-01	3.81E-03	4.83E-02	2.10E-02	3.11E+02	3.33E-01	2.52E-02	1.49E-02	22.32
LDT1	DSL	LDT1DSL	2.53E-01	5.47E-02	6.14E-01	3.38E-03	8.97E-02	5.91E-02	2.78E+02	6.23E-02	2.99E-03	1.16E-02	28.49
LDT2	GAS	LDT2GAS	2.46E+00	2.27E-01	3.47E-01	4.46E-03	4.73E-02	2.01E-02	3.69E+02	2.49E-01	2.11E-02	1.44E-02	19.08
LDT2	DSL	LDT2DSL	1.81E-01	3.17E-02	5.51E-01	3.32E-03	6.82E-02	3.94E-02	2.82E+02	3.60E-02	1.73E-03	1.14E-02	28.99
LHD1	GAS	LHD1GAS	5.86E+00	7.03E-01	1.13E+00	1.00E-02	4.85E-02	2.12E-02	9.44E+02	7.56E-01	4.55E-02	4.70E-02	8.48
LHD1	DSL	LHD1DSL	1.22E+00	2.23E-01	3.57E+00	5.02E-03	1.38E-01	8.12E-02	4.99E+02	2.54E-01	1.22E-02	1.73E-02	19.17
LHD2	GAS	LHD2GAS	3.94E+00	5.03E-01	9.78E-01	9.99E-03	4.73E-02	2.01E-02	9.44E+02	5.43E-01	4.03E-02	4.07E-02	8.51
LHD2	DSL	LHD2DSL	1.16E+00	2.07E-01	3.36E+00	5.02E-03	1.47E-01	8.38E-02	4.99E+02	2.36E-01	1.13E-02	1.73E-02	19.19
MCY	GAS	MCYGAS	2.85E+01	3.62E+00	1.35E+00	2.17E-03	4.55E-02	1.84E-02	1.55E+02	3.90E+00	2.41E-01	5.61E-02	39.15
MDV	GAS	MDVGAS	3.37E+00	2.87E-01	5.08E-01	5.66E-03	4.73E-02	2.01E-02	4.85E+02	3.20E-01	3.14E-02	2.11E-02	15.03
MDV	DSL	MDVDSL	1.47E-01	2.63E-02	4.04E-01	3.32E-03	6.53E-02	3.66E-02	2.94E+02	2.99E-02	1.43E-03	1.14E-02	29.00
MH	GAS	MHGAS	5.38E+00	2.11E-01	8.76E-01	6.86E-03	4.71E-02	1.99E-02	6.44E+02	2.48E-01	2.33E-02	3.64E-02	12.41
MH	DSL	MHDSL	7.31E-01	2.32E-01	7.05E+00	1.15E-02	3.36E-01	2.37E-01	1.14E+03	2.64E-01	1.27E-02	3.95E-02	8.40
Motor Coach	DSL	Motor CoachDSL	1.31E+00	2.74E-01	6.55E+00	1.74E-02	2.16E-01	1.27E-01	1.73E+03	3.12E-01	1.50E-02	6.00E-02	5.52
OBUS	GAS	OBUSGAS	1.62E+01	1.21E+00	2.87E+00	7.40E-03	4.65E-02	1.93E-02	6.77E+02	1.29E+00	8.25E-02	1.19E-01	11.49
PTO	DSL	PTODSL	7.94E-01	2.26E-01	9.79E+00	2.05E-02	6.43E-02	5.92E-02	2.05E+03	2.58E-01	1.24E-02	7.08E-02	4.68
SBUS	GAS	SBUSGAS	7.34E+00	6.16E-01	1.05E+00	7.64E-03	4.68E-02	1.96E-02	7.14E+02	6.70E-01	1.01E-01	4.37E-02	11.14
SBUS	DSL	SBUSDSL	8.65E-01	2.48E-01	1.18E+01	1.34E-02	8.77E-01	4.33E-01	1.33E+03	2.82E-01	1.35E-02	4.61E-02	7.20
T6 Ag	DSL	T6 AgDSL	1.07E+00	3.24E-01	4.79E+00	1.15E-02	3.11E-01	2.14E-01	1.15E+03	3.69E-01	1.77E-02	3.97E-02	8.36
T6 Public	DSL	T6 PublicDSL	3.34E-01	8.46E-02	6.51E+00	1.18E-02	1.81E-01	9.45E-02	1.18E+03	9.63E-02	4.62E-03	4.07E-02	8.15
T6 CAIRP heavy	DSL	T6 CAIRP heavyDSL	4.46E-01	1.22E-01	3.30E+00	1.14E-02	1.85E-01	9.85E-02	1.13E+03	1.39E-01	6.69E-03	3.92E-02	8.45
T6 CAIRP small	DSL	T6 CAIRP smallDSL	5.60E-01	1.54E-01	1.93E+00	1.13E-02	2.10E-01	1.22E-01	1.13E+03	1.76E-01	8.43E-03	3.90E-02	8.51
T6 OOS heavy	DSL	T6 OOS heavyDSL	4.46E-01	1.22E-01	3.30E+00	1.14E-02	1.85E-01	9.85E-02	1.13E+03	1.39E-01	6.69E-03	3.92E-02	8.45
T6 OOS small	DSL	T6 OOS smallDSL	5.60E-01	1.54E-01	1.93E+00	1.13E-02	2.10E-01	1.22E-01	1.13E+03	1.76E-01	8.43E-03	3.90E-02	8.51
T6 instate construction heavy	DSL	T6 instate construction heavyDSL	4.61E-01	1.31E-01	6.42E+00	1.15E-02	1.96E-01	1.09E-01	1.15E+03	1.49E-01	7.17E-03	3.97E-02	8.35
T6 instate construction small	DSL	T6 instate construction smallDSL	8.12E-01	2.31E-01	3.47E+00	1.14E-02	2.70E-01	1.76E-01	1.13E+03	2.63E-01	1.26E-02	3.92E-02	8.47
T6 instate heavy	DSL	T6 instate heavyDSL	4.62E-01	1.30E-01	5.77E+00	1.15E-02	1.95E-01	1.07E-01	1.14E+03	1.48E-01	7.12E-03	3.96E-02	8.37
T6 instate small	DSL	T6 instate smallDSL	7.62E-01	2.16E-01	3.16E+00	1.13E-02	2.59E-01	1.66E-01	1.13E+03	2.46E-01	1.18E-02	3.91E-02	8.48
T6 utility	DSL	T6 utilityDSL	3.86E-01	9.17E-02	3.53E+00	1.17E-02	1.74E-01	8.79E-02	1.16E+03	1.04E-01	5.01E-03	4.03E-02	8.24
T6TS	GAS	T6TSGAS	1.29E+01	1.02E+00	1.95E+00	7.24E-03	4.70E-02	1.98E-02	6.67E+02	1.09E+00	5.04E-02	8.10E-02	11.76
T7 Ag	DSL	T7 AgDSL	1.86E+00	4.07E-01	8.81E+00	1.71E-02	2.86E-01	2.08E-01	1.71E+03	4.63E-01	2.22E-02	5.91E-02	5.61
T7 CAIRP	DSL	T7 CAIRPDSL	1.74E+00	3.60E-01	4.50E+00	1.76E-02	1.81E-01	1.12E-01	1.75E+03	4.10E-01	1.97E-02	6.06E-02	5.47
T7 CAIRP construction	DSL	T7 CAIRP constructionDSL	1.74E+00	3.60E-01	4.65E+00	1.76E-02	1.81E-01	1.12E-01	1.75E+03	4.10E-01	1.97E-02	6.06E-02	5.47
T7 NNOOS	DSL	T7 NNOOSDSL	1.68E+00	3.39E-01	2.95E+00	1.77E-02	1.63E-01	9.53E-02	1.76E+03	3.86E-01	1.85E-02	6.10E-02	5.44
T7 NOOS	DSL	T7 NOOSDSL	1.89E+00	3.87E-01	4.66E+00	1.78E-02	1.82E-01	1.13E-01	1.78E+03	4.41E-01	2.12E-02	6.15E-02	5.39
T7 other port	DSL	T7 other portDSL	2.45E+00	5.29E-01	7.87E+00	1.73E-02	2.09E-01	1.38E-01	1.72E+03	6.02E-01	2.89E-02	5.96E-02	5.56
T7 POLA	DSL	T7 POLADSL	2.62E+00	5.58E-01	7.87E+00	1.76E-02	2.09E-01	1.38E-01	1.75E+03	6.36E-01	3.05E-02	6.07E-02	5.46
T7 Public	DSL	T7 PublicDSL	1.38E+00	2.76E-01	1.54E+01	2.01E-02	1.67E-01	9.92E-02	2.00E+03	3.14E-01	1.51E-02	6.93E-02	4.79
T7 Single	DSL	T7 SingleDSL	8.53E-01	1.83E-01	8.92E+00	1.71E-02	1.59E-01	9.17E-02	1.70E+03	2.08E-01	1.00E-02	5.90E-02	5.62
T7 single construction	DSL	T7 single constructionDSL	8.46E-01	1.82E-01	9.18E+00	1.71E-02	1.59E-01	9.21E-02	1.70E+03	2.07E-01	9.93E-03	5.90E-02	5.62
T7 SWCV	DSL	T7 SWCVDSL	1.05E+00	2.13E-01	1.23E+01	1.84E-02	1.61E-01	9.40E-02	1.83E+03	2.43E-01	1.17E-02	6.33E-02	5.24
T7 tractor	DSL	T7 tractorDSL	1.16E+00	2.53E-01	6.95E+00	1.69E-02	1.80E-01	1.11E-01	1.68E+03	2.88E-01	1.38E-02	5.81E-02	5.71
T7 tractor construction	DSL	T7 tractor constructionDSL	1.25E+00	2.69E-01	7.90E+00	1.71E-02	1.81E-01	1.12E-01	1.70E+03	3.06E-01	1.47E-02	5.90E-02	5.62
T7 utility	DSL	T7 utilityDSL	1.90E+00	3.60E-01	9.58E+00	1.99E-02	1.48E-01	8.14E-02	1.98E+03	4.10E-01	1.97E-02	6.86E-02	4.83
T7IS	GAS	T7ISGAS	4.33E+01	1.28E+00	5.91E+00	6.63E-03	4.58E-02	1.87E-02	5.63E+02	1.45E+00	1.01E-01	2.46E-01	12.82
UBUS	GAS	UBUSGAS	1.85E+01	3.27E+00	4.52E+00	7.86E-03	4.83E-02	2.11E-02	7.11E+02	3.48E+00	1.30E-01	1.88E-01	10.83
UBUS	DSL	UBUSDSL	2.17E+00	4.67E-01	1.26E+01	2.36E-02	1.08E+00	5.78E-01	2.35E+03	5.32E-01	2.55E-02	8.14E-02	4.07
All Other Buses	DSL	All Other BusesDSL	5.08E-01	1.42E-01	5.35E+00	1.15E-02	1.98E-01	1.10E-01	1.14E+03	1.62E-01	7.78E-03	3.95E-02	8.39

[a] CO, ROC NOx, SO_2, PM10, PM2.5, TOG and CO_2 calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). CH_4 for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). CH_4 for diesel-fueled vehicles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). N_2O for gasoline-fueled vehicles calculated as 0.046 x NOx, and N_2O for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

Appendix B
Existing Landfill Sources Emissions Calculations

Table 1
Gasoline Dispensing Emissions
http://www.sbcapcd.org/eng/dl/appforms/apcd-25T.pdf

SBCAPCD Approved Emission Factors

Phase	lb/1000 gal	lb/yr	lb/hr
Loading	0.15	0.557	6.354E-05
Breathing	0.25	0.928	1.059E-04
Refueling	0.42	1.559	1.779E-04
Spillage	0.42	1.559	1.779E-04
Total	1.24	4.602	5.253E-04

Annual Throughput: 3711 gal/yr

% Benzene 0.3 0.1
0.003 0.01

Benzene Emissions for Modeling

Phase	lb/yr	lb/hr
Loading	1.670E-03	1.906E-07
Breathing	2.783E-03	3.177E-07
Refueling	4.676E-03	5.338E-07
Spillage	1.559E-02	1.779E-06

Modeling Parameters

Process	Release Height (ft)	Stack Temp (deg F)	Stack Vel (ft/min)	Stack Dia (ft)	σZint (ft)	σYint (ft)
Loading	12	65	0.000463	0.167	--	--
Breathing	12	60	0.000771	0.167	--	--
Refueling	3.28	--	--	--	6.1	9.16
Spillage	0	--	--	--	6.1	9.16

Modeling Parameters

Process	Release Height (m)	Stack Temp (deg K)	Stack Vel (m/s)	Stack Dia (m)	σZint (m)	σYint (m)	Source ID
Loading	3.658	291.483	2.350E-06	0.051	--	--	GASLOAD
Breathing	3.658	288.706	3.917E-06	0.051	--	--	GASBREAT
Refueling	1.000	--	--	--	1.859	2.792	GASREFU
Spillage	0.000	--	--	--	1.859	2.792	GASSPILL

Table 2
LFG Fugitive Emissions

Item	Units	Value	Comments
CH_4 Production	MT/yr	8,565	From GHG Analysis[a]
CH_4 Production	cu. ft./yr	4.55E+08	cu. ft. = MT x 10^6 g/MT / 453.6 g/lb / 16 lb/lb-mole x 385.5 cf/lb-mole
LFG Production	cu. ft./yr	909,889,632.94	Default 50% CH_4 from LandGEM Model
NMOC Concentration	ppmv as hexane	4,000	Default from LandGEM Model
NMOC Production	cu. ft./yr	3,639,558.53	cu. ft NMOC = cu. ft. LFG x ppmv NMOC x 10^{-6}
NMOC Production	lb/yr	811,937.83	lb/yr = ppmv x 10-6 x 86 lb/lb-mole / 385.5 cu. ft./lb-mole
LFG Collection Efficiency	unitless	0.68	From GHG Analysis[b]
LFG Fugitive Emissions	cu. ft./yr	291,164,683	LFG fugitive emissions = LFG production x (1 - Collection efficiency)
LFG Fugitive NMOC Emissions	lb/yr	2.60E+05	Controlled = Uncontrolled x (1 - Collection efficiency)
LFG Fugitive NMOC Emissions	cu. ft./yr	1,164,658.73	Controlled = Uncontrolled x (1 - Collection efficiency)

[a] Modeled using Equation HH-1 from 40 CFR 98, Subpart HH

[a] Calculated using Equation HH-3 from 40 CFR 98, Subpart HH

103,869	SCFHr	Estimated total LFG Production
86,236	SCFHr	Estimated Max LFG Flow rate to the engine & flare
83.0%		Potential landfill gas collection efficiency

Table 3
Landfill Gas TAC Concentrations

Compound	CAS Number	Molecular Weight	LFG Concentration (ppm)[a]					
			AP-42, Table 2.4-1	2009 Tajiguas Sample	2011 Tajiguas Sample	2012 Tajiguas Sample	2013 Tajiguas Sample	Selected Value[b]
1,1,1-Trichloroethane	71556	133.4	2.43E-01	2.00E-02	2.00E-02	4.00E-02	4.00E-02	4.00E-02
1,1,2,2-Tetrachloroethane	79345	167.86	5.35E-01	3.00E-02	3.00E-02	6.00E-02	6.00E-02	6.00E-02
1,1,2-Trichloroethane	79005	133.4	1.58E-01			6.00E-02	6.00E-02	6.00E-02
1,1-Dichloroethane	75343	98.96	2.08E+00	3.40E-02	3.00E-02	6.00E-02	6.00E-02	6.00E-02
1,1-Dichloroethene (1,1-Dichloroethylene)	75354	97	1.60E-01	4.00E-02	4.00E-02	6.00E-02	6.00E-02	6.00E-02
1,2-Dibromoethane (Ethylene dibromide)	106934	187.88	4.80E-03					4.80E-03
1,2-Dichloroethane (Ethylene dichloride)	107062	98.96	1.59E-01	3.00E-02	3.00E-02	6.00E-02	6.00E-02	6.00E-02
1,3-Butadiene (Vinyl ethylene)	106990	54.1	1.66E-01					1.66E-01
1,4-Dioxane (1,4-Diethylene dioxide)	123911	88.12	8.29E-03					8.29E-03
2-Butanone (Methyl ethyl ketone)	78933	72.11	4.01E+00	4.39E+00	4.72E+00	5.44E+00	3.86E+00	5.44E+00
2-Propanol (Isopropyl alcohol)	67630	60.1	1.80E+00	4.40E+00	1.00E+00	2.00E-01	2.00E-01	4.40E+00
Acetaldehyde	75070	44.06	7.74E-02					7.74E-02
Acrylonitrile	107131	53.06		1.50E-01	2.00E-01	3.00E-01	3.00E-01	3.00E-01
Benzene	71432	78.12	2.40E+00			5.09E-01	4.60E-01	5.09E-01
Benzyl chloride	100447	126.58	1.81E-02					1.81E-02
Bromomethane (Methyl bromide)	74839	94.95	2.10E-02					2.10E-02
Carbon disulfide	75150	76.13	1.47E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01
Carbon tetrachloride	56235	153.81	7.98E-03	3.00E-02	3.00E-02	4.00E-02	4.00E-02	4.00E-02
Chlorobenzene	108907	112.56	4.84E-01	3.20E-02	4.40E-02	6.00E-02	7.20E-02	7.20E-02
Chloroethane (Ethyl chloride)	75003	64.52	3.95E+00	9.10E-02	4.00E-02	4.30E-02	6.00E-02	9.10E-02
Chloroform	67663	119.38		2.00E-02	2.00E-02	4.00E-02	4.00E-02	4.00E-02
Dichlorobenzene	106467	147.01	9.40E-01	1.68E-01	4.38E-01	5.00E-01	6.47E-01	6.47E-01
Dichloromethane (Methylene chloride)	75092	84.94	6.15E+00	5.70E-02	4.20E-02	6.00E-02	6.00E-02	6.00E-02
Ethylbenzene	100414	106.17	4.86E+00	3.26E+00	4.88E+00	5.28E+00	5.26E+00	5.28E+00
Formaldehyde	50000	30.03	1.17E-02					1.17E-02
Hydrogen sulfide	7783064	34.08	2.00E+01	7.39E+01	6.72E+01	9.40E+01	8.80E+01	9.40E+01
Methyl tert-butyl ether (MTBE)	1634044	88.15	1.18E-01					1.18E-01
Naphthalene	91203	128.18	1.07E-01					1.07E-01
Styrene (Vinylbenzene)	100425	104.16	4.11E-01					4.11E-01
Tetrachloroethylene (Perchloroethylene)	127184	165.82	2.03E+00	1.57E-01	1.14E-01	1.16E-01	1.02E-01	1.57E-01
Toluene (Methyl benzene)	108883	92.13	2.95E+01			3.80E+00	3.90E+00	3.90E+00
Trichloroethylene (Trichloroethene)	79016	131.38	8.28E-01	8.50E-02	5.50E-02	4.00E-02	6.10E-02	8.50E-02
Trichloromethane (Chloroform)	67663	119.37	7.08E-02	2.00E-02	2.00E-02	4.00E-02	4.00E-02	4.00E-02
Vinyl acetate	108054	86.09	2.48E-01					2.48E-01
Vinyl chloride (Chloroethene)	75014	62.5	1.42E+00	1.27E-01	7.50E-02	1.33E-01	8.60E-02	1.33E-01
Xylenes (o-, m-, p-, mixtures)	1330207	106.16	9.23E+00	8.52E+00	1.30E+01	1.40E+01	1.47E+01	1.47E+01

[a] Values for Tajiguas samples are results from analysis of Tajiguas LI 92.35 131.63

[b] Selected value is maximum value measured in Tajiguas samples or value from AP-42 if compound was not measured in Tajiguas samples.

Table 4
Landfill Gas Fugitive TAC Emissions

Compound	CAS Number	Molecular Weight	LFG Concentration (ppm)[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]	
1,1,1-Trichloroethane	71556	133.40	4.00E-02	4.60E-04	4.03E+00	LFGFUG
1,1,2,2-Tetrachloroethane	79345	167.86	6.00E-02	8.68E-04	7.61E+00	
1,1,2-Trichloroethane	79005	133.40	6.00E-02	6.90E-04	6.05E+00	
1,1-Dichloroethane	75343	98.96	6.00E-02	5.12E-04	4.48E+00	
1,1-Dichloroethene (1,1-Dichloroethylene)	75354	97.00	6.00E-02	5.02E-04	4.40E+00	
1,2-Dibromoethane (Ethylene dibromide)	106934	187.88	4.80E-03	7.78E-05	6.81E-01	
1,2-Dichloroethane (Ethylene dichloride)	107062	98.96	6.00E-02	5.12E-04	4.48E+00	
1,3-Butadiene (Vinyl ethylene)	106990	54.10	1.66E-01	7.74E-04	6.78E+00	
1,4-Dioxane (1,4-Diethylene dioxide)	123911	88.12	8.29E-03	6.30E-05	5.52E-01	
2-Butanone (Methyl ethyl ketone)	78933	72.11	5.44E+00	3.38E-02	2.96E+02	
2-Propanol (Isopropyl alcohol)	67630	60.10	4.40E+00	2.28E-02	2.00E+02	
Acetaldehyde	75070	44.06	7.74E-02	2.94E-04	2.58E+00	
Acrylonitrile	107131	53.06	3.00E-01	1.37E-03	1.20E+01	
Benzene	71432	78.12	5.09E-01	3.43E-03	3.00E+01	
Benzyl chloride	100447	126.58	1.81E-02	1.98E-04	1.73E+00	
Bromomethane (Methyl bromide)	74839	94.95	2.10E-02	1.72E-04	1.51E+00	
Carbon disulfide	75150	76.13	2.00E-01	1.31E-03	1.15E+01	
Carbon tetrachloride	56235	153.81	4.00E-02	5.30E-04	4.65E+00	
Chlorobenzene	108907	112.56	7.20E-02	6.99E-04	6.12E+00	
Chloroethane (Ethyl chloride)	75003	64.52	9.10E-02	5.06E-04	4.43E+00	
Chloroform	67663	119.38	4.00E-02	4.12E-04	3.61E+00	
Dichlorobenzene	106467	147.01	6.47E-01	8.20E-03	7.18E+01	
Dichloromethane (Methylene chloride)	75092	84.94	6.00E-02	4.39E-04	3.85E+00	
Ethylbenzene	100414	106.17	5.28E+00	4.83E-02	4.23E+02	
Formaldehyde	50000	30.03	1.17E-02	3.03E-05	2.65E-01	
Hydrogen sulfide	7783064	34.08	9.40E+01	2.76E-01	2.42E+03	
Methyl tert-butyl ether (MTBE)	1634044	88.15	1.18E-01	8.97E-04	7.86E+00	
Naphthalene	91203	128.18	1.07E-01	1.18E-03	1.04E+01	
Styrene (Vinylbenzene)	100425	104.16	4.11E-01	3.69E-03	3.23E+01	
Tetrachloroethylene (Perchloroethylene)	127184	165.82	1.57E-01	2.24E-03	1.97E+01	
Toluene (Methyl benzene)	108883	92.13	3.90E+00	3.10E-02	2.71E+02	
Trichloroethylene (Trichloroethene)	79016	131.38	8.50E-02	9.63E-04	8.43E+00	
Trichloromethane (Chloroform)	67663	119.37	4.00E-02	4.12E-04	3.61E+00	
Vinyl acetate	108054	86.09	2.48E-01	1.84E-03	1.61E+01	
Vinyl chloride (Chloroethene)	75014	62.50	1.33E-01	7.17E-04	6.28E+00	
Xylenes (o-, m-, p-, mixtures)	1330207	106.16	1.47E+01	1.35E-01	1.18E+03	

LFG fugitive emission rate = 291,164,682.54 cu. ft./year
Molar volume = 385.5 scf/lb-mole

[a] See Table 2

[b] Hourly emission rate [lb/hr] = Concentration [ppm] x 10^{-6} x Molecular weight [lb/lb-mole] x Fugitive LFG emission rate [scf/yr] / Molar volume [scf/lb-mole] / 8,760 [hr/year]

[b] Annual emission rate [lb/yr] = Concentration [ppm] x 10^{-6} x Molecular weight [lb/lb-mole] x Fugitive LFG emission rate [scf/yr] / Molar volume [scf/lb-mole]

Table 5

Taljguas Landfill Operation's Equipment Fuel+Hours & Vehicle Mileage For average working day in 2013 and assumed average working day post preferred TRRP project

TYPE	MAKE	MODEL	YEAR	MAX HORSEPOWER (HP)	Fuel Type	EQUIPMENT NUMBERS (INTERNAL COUNTY NUMBER)	EQUIPMENT HOUR/MILEAGE TOTAL FOR 2013	FUEL USED TOTAL FOR 2013	EQUIPMENT HOUR/MILLAGE PER WORKING DAY (2013) 5 FUEL DAYS + 1/2 DAY PER WEEK IS 307 WORKING DAYS IN ONE YEAR	EQUIPMENT HOUR/MILLAGE PER WORKING DAY WITH PREFERRED TRRP PROJECT (ASSUME 35% REDUCTION)	HOURS/ MILEAGE	FUEL USED TOTAL FOR 2013 (GAL)	FUEL USED PER WORKING DAY (GAL)	ESTIMATED DAILY FUEL USE WITH TRRP (GAL)	WORKING LOCATION (SEE MAP)	PM Emission Factor (g/bhp-hr or g/mi)[a]	Tier[b]	Load Factor[c]	Hourly PM Emissions (lb/hr)[d]	Annual PM Emissions (lb/yr)[e]	Hourly Fuel Use (gal/hr)[f]
Motor Grader	CAT	163H	1999	220	RED	163H	316	1949	1.03	0.67	HOURS	1,040	3.39	2.20	5	0.4	1	0.41	7.85E-02	1.63E+01	3.29
Motor Grader	CAT	160M	2013	213	RED	160M	463	1532.5	1.51	0.98	HOURS	1,533	4.99	3.24	5	0.015	4i	0.41	2.89E-03	8.69E-01	3.31
Backhoe Loader	CAT	430F	2012	117	RED	430F	91	173	0.30	0.19	HOURS	173	0.56	0.37	5	0.015	4i	0.37	1.43E-03	8.47E-02	1.90
Wheel Tractor Scraper	CAT	637G	2007	515	RED	6371	676	6786	2.20	1.43	HOURS	6,786	22.11	14.37	3	0.15	3	0.48	8.17E-02	3.59E+01	10.04
Wheel Tractor Scraper	CAT	637E	1999	450	RED	6377	60	842	0.20	0.13	HOURS	842	2.74	1.78	3	0.4	1	0.48	1.90E-01	7.43E+00	14.03
Wheel Tractor Scraper	CAT	637G	2004	515	RED	6378	714	8023.5	2.33	1.51	HOURS	8,024	26.14	16.99	3	0.15	2	0.48	8.17E-02	3.79E+01	11.24
Wheel Tractor Scraper	CAT	637G	2005	515	RED	6379	527	5691	1.72	1.12	HOURS	5,691	18.54	12.05	3	0.15	2	0.48	8.17E-02	2.80E+01	10.80
Trash Compactor	CAT	826H	2005	401	RED	8268	295	3534	0.96	0.62	HOURS	3,534	11.51	7.48	2	0.15	2	0.4	5.39E-02	1.02E+01	11.98
Trash Compactor	CAT	836H	2010	555	RED	8361	1512	21878.4	4.93	3.20	HOURS	21,878	71.27	46.32	2	0.15	3	0.4	7.34E-02	7.22E+01	14.47
Bulldozer	CAT	D9T	2005	464	RED	D9T6	534	4711.7	1.74	1.13	HOURS	4,712	15.35	9.98	2	0.15	2	0.43	6.60E-02	2.29E+01	8.82
Bulldozer	CAT	D9T	2012	464	RED	D9T7	1605	10945.7	5.23	3.40	HOURS	10,946	35.65	23.17	2	0.015	4i	0.43	6.60E-03	6.88E+00	6.82
Bulldozer	CAT	D9R	2001	410	RED	D9C3	115	1399.5	0.37	0.24	HOURS	1,391	4.53	2.94	6+7[g]	0.15	2	0.43	5.83E-02	4.36E+00	12.09
Bulldozer	CAT	D9R	2001	410	RED	D9C3	57.5	695.25	0.19	0.12	HOURS	695	2.26	1.47	6	0.15	2	0.43	2.92E-02	1.09E+00	6.05
Bulldozer	CAT	D9R	2001	410	RED	D9C3	57.5	695.25	0.19	0.12	HOURS	695	2.26	1.47	7	0.15	2	0.43	2.92E-02	1.09E+00	6.05
Bulldozer	CAT	D6N	2009	145	RED	D6N1	936	3487.6	3.05	1.98	HOURS	3,488	11.36	7.38	2	0.22	3	0.43	3.62E-02	1.64E+01	3.73
Bulldozer	CAT	D6M	1997	153	RED	D6XL	93	319.7	0.30	0.20	HOURS	320	1.04	0.68	2	0.274	N/A	0.43	3.97E-02	2.40E+00	3.44
Bulldozer	CAT	D5T	2013	228	RED	D5T1	33	103	0.11	0.07	HOURS	103	0.34	0.22	2	0.015	4i	0.43	3.24E-03	6.95E-02	3.12
Bulldozer	CAT	D10T	2008	646	RED	D10T	484	8329	1.58	1.02	HOURS	8,329	27.13	17.63	6+7[g]	0.15	3	0.43	9.19E-02	2.89E+01	17.21
Bulldozer	CAT	D10T	2008	646	RED	D10T	242	4164.5	0.79	0.51	HOURS	4,165	13.57	8.82	6	0.15	2	0.43	4.59E-02	7.22E+00	8.60
Bulldozer	CAT	D10T	2008	646	RED	D10T	242	4164.5	0.79	0.51	HOURS	4,165	13.57	8.82	7	0.15	2	0.43	4.59E-02	7.22E+00	8.60
Hydraulic Excavator	CAT	330D	2006	270	RED	330D	69	520.7	0.22	0.15	HOURS	521	1.70	1.10	5	0.15	3	0.38	3.39E-02	1.52E+00	7.55
Wheel Tractor Mower	CAT	MTS25D	2013	130	RED	MOW1	86	86	0.28	0.18	HOURS	86	0.28	0.18	5	0.015	4i	0.44	1.89E-03	1.06E-01	1.00
Wheel Loader	CAT	966H	2008	286	RED	LD51	207	931	0.67	0.44	HOURS	931	3.03	1.97	5	0.15	3	0.36	3.40E-02	4.58E+00	4.50
Wheel Loader	CAT	IT28F	1995	128	RED	IT28	175	507	0.57	0.37	HOURS	507	1.65	1.07	5	0.274	N/A	0.36	2.78E-02	3.17E+00	2.90
Tarp Machine	Tarpomatic	NA	NA	NA	RED	TOM1	20	0	0.07	0.04	HOURS	0	0.00	0.00	2						
Tarp Machine	Tarpomatic	NA	NA	NA	RED	TOM3	114	0	0.37	0.24	HOURS	0	0.00	0.00	2						
Generator	Ingersoll Rand	G60	2007	72	RED	GEN#6	149	284	0.49	0.32	HOURS	284	0.93	0.60	8	0.3	2	0.74	3.52E-02	3.41E+00	1.91
Small off road	KUBOTA	RTV900	2005	22	CLEAR	KUB1	45	12.8	0.15	0.10	HOURS	13	0.04	0.03	5	0.6	2	0.34	9.89E-03	2.89E-01	0.28
Small off road	JOHN DEERE	GATOR	2011	19	CLEAR	GAT2	59	24.7	0.19	0.12	HOURS	25	0.08	0.05	5	0.3	4	0.34	4.27E-03	1.64E-01	0.42
Water truck	INTERNATIONAL	7400W/S	2011	NA	CLEAR	WT11	170	614.9	0.55	0.36	HOURS	615	2.00	1.30	5	5.36E-02	On-Road	N/A		1.27E-03	1.95E-01	3.62
Water truck	INTERNATIONAL	7400/WS	2012	NA	CLEAR	WT12	529	2370.5	1.72	1.12	HOURS	2,371	7.72	5.02	5	5.11E-02	On-Road	N/A		1.69E-03	5.81E-01	4.48
Fuel Truck	FREIGHTLINER	M2106	2010	NA	CLEAR	TJF2	168	176	0.55	0.36	HOURS	176	0.57	0.37	5	5.59E-02	On-Road	N/A		1.85E-03	2.02E-01	1.05
Green waste Grinder	MORBARK	6600	2008	1125	RED	HOG1	649	20681.3	2.11	1.37	HOURS	20,681	67.37	43.79	4/Portable	0.15	2	0.42	1.56E-01	1.01E+02	31.87
Wheel Loader	CAT	938G	2000	180	RED	LD43	635	2033.9	1.97	1.28	HOURS	2,034	6.63	4.31	4	0.4	1	0.36	5.71E-02	2.25E+01	3.36
Wheel Loader	CAT	938G	1998	189	RED	LD40	280	998.2	0.91	0.59	HOURS	998	3.25	2.11	4	0.4	1	0.36	5.71E-02	1.04E+01	3.57
Wheel Loader	CAT	938H	2008	197	RED	LD52	1306	2921	4.25	2.77	HOURS	2,921	9.51	6.18	4	0.15	3	0.36	2.35E-02	1.99E+01	2.24

[a] Emission factors for off-road equipment are Tier emission limits for engine horsepower. Emission factors for on-road vehicles are model-year specific emission factors for calendar year 2017 at 15 mph from EMFAC2011.

[b] Tier is based on engine model year and horsepower rating.

[c] Default load factors from Table 3.3, Appendix D of California Emissions Estimation Model (CalEEMod)

[d] Hourly Off-road Equipment PM emissions [lb/hr] = Emission factor [g/bph-hr] x Load factor [unitless] x Engine horsepower [bhp] / 453.6 [g/lb]. Hourly On-Road Vehicle PM emissions [lb/hr] = Emission factor [g/mi] x 15 [mph] / 453.6 [g/lb]

[e] Annual PM emissions [lb/year] = Hourly PM emissions [lb/hr] x 2013 Annual operating hours [hours/yr] x 0.65 [Post-project activity / 2013 activity]

[f] Hourly fuel use [gal/hr] = Annual fuel fuse [gal/yr] / Annual operating hours [hours/yr]

[g] Emissions divided equally between Area 6 and Area 7

Table 6
Landfill Mobile Equipment DPM Emissions by Area

Area	Hourly DPM Emissions (lb/hr)	Annual DPM Emissions (lb/yr)	
2	2.72E-01	1.33E+02	TRSHFILL
3	4.36E-01	1.09E+02	SCRAPPER
4	1.38E-01	5.28E+01	GRNWASTE
5	2.01E-01	2.81E+01	LFMAINOP
6	7.51E-02	8.31E+00	
7	7.51E-02	8.31E+00	

1.66E+01 AREA6N7

Table 7
Landfill Green Waste Grinder DPM Emissions
(Area 4)

Hourly Emissions (lb/hr)	1.56E-01
Annual Emissions (lb/yr)	1.01E+02 GWGRIND

Table 8
Diesel Equipment Exhaust Emissions of TACs with Acute Effects

Table 8-A
Area 2 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	
Benzene	71-43-2	0.1863	9.76E-03	TRSHFILL
Formaldehyde	50-00-0	1.7261	9.04E-02	
Acetaldehyde	75-07-0	0.7833	4.10E-02	
Acrolein	107-02-8	0.0339	1.78E-03	
1,3-Butadiene	106-99-0	0.2174	1.14E-02	
Toluene	108-88-3	0.1054	5.52E-03	
Xylenes	1330-20-7	0.0424	2.22E-03	
Hydrogen chloride	7647-01-0	0.1863	9.76E-03	
Arsenic	7440-38-2	0.0016	8.38E-05	
Copper	7440-50-8	0.0041	2.15E-04	
Mercury	7439-97-6	0.0020	1.05E-04	
Nickel	7440-02-0	0.0039	2.04E-04	

Hourly fuel use = 52.38 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-B
Area 3 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	
Benzene	71-43-2	0.1863	8.59E-03	SCRAPPER
Formaldehyde	50-00-0	1.7261	7.96E-02	
Acetaldehyde	75-07-0	0.7833	3.61E-02	
Acrolein	107-02-8	0.0339	1.56E-03	
1,3-Butadiene	106-99-0	0.2174	1.00E-02	
Toluene	108-88-3	0.1054	4.86E-03	
Xylenes	1330-20-7	0.0424	1.96E-03	
Hydrogen chloride	7647-01-0	0.1863	8.59E-03	
Arsenic	7440-38-2	0.0016	7.38E-05	
Copper	7440-50-8	0.0041	1.89E-04	
Mercury	7439-97-6	0.0020	9.22E-05	
Nickel	7440-02-0	0.0039	1.80E-04	

Hourly fuel use = 46.11 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-C
Area 4 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	
Benzene	71-43-2	0.1863	1.71E-03	GRNWASTE
Formaldehyde	50-00-0	1.7261	1.58E-02	
Acetaldehyde	75-07-0	0.7833	7.18E-03	
Acrolein	107-02-8	0.0339	3.11E-04	
1,3-Butadiene	106-99-0	0.2174	1.99E-03	
Toluene	108-88-3	0.1054	9.66E-04	
Xylenes	1330-20-7	0.0424	3.89E-04	
Hydrogen chloride	7647-01-0	0.1863	1.71E-03	
Arsenic	7440-38-2	0.0016	1.47E-05	
Copper	7440-50-8	0.0041	3.76E-05	
Mercury	7439-97-6	0.0020	1.83E-05	
Nickel	7440-02-0	0.0039	3.57E-05	

Hourly fuel use = 9.16 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-D
Area 5 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	
Benzene	71-43-2	0.1863	6.65E-03	LFMAINOP
Formaldehyde	50-00-0	1.7261	6.16E-02	
Acetaldehyde	75-07-0	0.7833	2.79E-02	
Acrolein	107-02-8	0.0339	1.21E-03	
1,3-Butadiene	106-99-0	0.2174	7.76E-03	
Toluene	108-88-3	0.1054	3.76E-03	
Xylenes	1330-20-7	0.0424	1.51E-03	
Hydrogen chloride	7647-01-0	0.1863	6.65E-03	
Arsenic	7440-38-2	0.0016	5.71E-05	
Copper	7440-50-8	0.0041	1.46E-04	
Mercury	7439-97-6	0.0020	7.14E-05	
Nickel	7440-02-0	0.0039	1.39E-04	

Hourly fuel use = 35.68 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-E
Area 6 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	SUM Emissions (lb/hour)	AREA6N7
Benzene	71-43-2	0.1863	2.73E-03	5.46E-03	
Formaldehyde	50-00-0	1.7261	2.53E-02	5.06E-02	
Acetaldehyde	75-07-0	0.7833	1.15E-02	2.30E-02	
Acrolein	107-02-8	0.0339	4.97E-04	9.93E-04	
1,3-Butadiene	106-99-0	0.2174	3.18E-03	6.37E-03	
Toluene	108-88-3	0.1054	1.54E-03	3.09E-03	
Xylenes	1330-20-7	0.0424	6.21E-04	1.24E-03	
Hydrogen chloride	7647-01-0	0.1863	2.73E-03	5.46E-03	
Arsenic	7440-38-2	0.0016	2.34E-05	4.69E-05	
Copper	7440-50-8	0.0041	6.01E-05	1.20E-04	
Mercury	7439-97-6	0.0020	2.93E-05	5.86E-05	
Nickel	7440-02-0	0.0039	5.71E-05	1.14E-04	

Hourly fuel use = 14.65 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-F
Area 7 (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)
Benzene	71-43-2	0.1863	2.73E-03
Formaldehyde	50-00-0	1.7261	2.53E-02
Acetaldehyde	75-07-0	0.7833	1.15E-02
Acrolein	107-02-8	0.0339	4.97E-04
1,3-Butadiene	106-99-0	0.2174	3.18E-03
Toluene	108-88-3	0.1054	1.54E-03
Xylenes	1330-20-7	0.0424	6.21E-04
Hydrogen chloride	7647-01-0	0.1863	2.73E-03
Arsenic	7440-38-2	0.0016	2.34E-05
Copper	7440-50-8	0.0041	6.01E-05
Mercury	7439-97-6	0.0020	2.93E-05
Nickel	7440-02-0	0.0039	5.71E-05

Hourly fuel use = 14.65 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 8-G
Green Waste Grinder (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	GWGRIND
Benzene	71-43-2	0.1863	5.94E-03	
Formaldehyde	50-00-0	1.7261	5.50E-02	
Acetaldehyde	75-07-0	0.7833	2.50E-02	
Acrolein	107-02-8	0.0339	1.08E-03	
1,3-Butadiene	106-99-0	0.2174	6.93E-03	
Toluene	108-88-3	0.1054	3.36E-03	
Xylenes	1330-20-7	0.0424	1.35E-03	
Hydrogen chloride	7647-01-0	0.1863	5.94E-03	
Arsenic	7440-38-2	0.0016	5.10E-05	
Copper	7440-50-8	0.0041	1.31E-04	
Mercury	7439-97-6	0.0020	6.37E-05	
Nickel	7440-02-0	0.0039	1.24E-04	

Hourly fuel use = 31.87 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 9

Table 9-A
On-Site Motor Vehicle DPM Emissions

Vehicle	Use	Operating Hours/Day	Days/ Year	Segment	Mileage (mpg)	Round-Trip Dist. (mi)	Average Round-Trips/Day	Maximum Round Trips/Day[a]	Average Miles/ Day	Maximum Miles/ Day	Maximum Hourly Fuel Use (gal/hr)[b]	PM10 Emission Factor (g/mi)[c]	Hourly DPM Emissions (lb/hr)[d]	Annual DPM Emissions (lb/yr)[e]
Tractor/Trailer	CSSR Import[f]	6	311	MRF-Entrance	6	2.23	7	7	15.61	15.61	0.43	3.68E-02	2.11E-04	3.94E-01
MSW Haul	MSW Haul[g]	9	309	MRF-Entrance	6	2.23	60.3	159.2	134.47	355.00	6.57	3.68E-02	3.20E-03	3.37E+00
MSW Haul	MSW Haul[g]	9	309	MRF-Trash Fill	6	0.90	60.3	159.2	54.39	143.59	2.66	3.68E-02	1.29E-03	1.36E+00
Ford F350 XL	Utility truck and trailer	6	311	MRF-Compost	14	0.90	6	6	5.41	5.41	0.06	4.90E-03	9.75E-06	1.82E-02
Ford F350 XL	Utility truck and trailer	6	311	MRF-Entrance	14	2.23	6	6	13.38	13.38	0.16	4.90E-03	2.41E-05	4.50E-02

[a] Maximum round trips/day for MSW Haul = Average Round Trips/day x 2.64

[b] Maximum hourly fuel use [gal/hr] = Maximum daily mileage [miles/day] / Mileage [mpg] / Operating hours/day

[c] Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[d] Hourly DPM emissions [lb/hr] = Maximum miles/day x PM10 emission factor [g/mi] / 453.6 [g/lb] / Operating hours/day

[e] Annual DPM emissions [lb/yr] = Average miles/day x PM10 emission factor [g/mi] / 453.6 [g/lb] x Days/year

[f] Trips/day are from Project Traffic Study.

[g] Average trips/day are 2013 totals / 309 working days.

Table 9-B
On-Site Motor Vehicle DPM Emissions by Segment

Segment	Hourly DPM Emissions (lb/hr)[d]	Annual DPM ER (lb/yr)[e]	Project DPM ER (8a-2p) (lb/yr)	Total DPM Emissions (lb/yr)	
MRF-Entrance	3.44E-03	3.81E+00	1.41E+00	5.23E+00	MRFENTRY
MRF-Trash Fill	1.29E-03	1.36E+00	0	1.36E+00	HAUL
MRF-Compost	9.75E-06	1.82E-02	8.99E-02	1.08E-01	MRFCOMP

Table 10
Diesel Motor Vehicle Exhaust Emissions of TACs with Acute Effects

Table 10-A
Entrance to/from MRF (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Existing Emissions (lb/hour)	Project Emissions (lb/hr)	Total Emissions (lb/hr)	
Benzene	71-43-2	0.1863	1.34E-03	1.10E-04	1.45E-03	MRFENTRY
Formaldehyde	50-00-0	1.7261	1.24E-02	1.02E-03	1.34E-02	
Acetaldehyde	75-07-0	0.7833	5.61E-03	4.64E-04	6.08E-03	
Acrolein	107-02-8	0.0339	2.43E-04	2.01E-05	2.63E-04	
1,3-Butadiene	106-99-0	0.2174	1.56E-03	1.29E-04	1.69E-03	
Toluene	108-88-3	0.1054	7.55E-04	6.25E-05	8.18E-04	
Xylenes	1330-20-7	0.0424	3.04E-04	2.51E-05	3.29E-04	
Hydrogen chloride	7647-01-0	0.1863	1.34E-03	1.10E-04	1.45E-03	
Arsenic	7440-38-2	0.0016	1.15E-05	9.49E-07	1.24E-05	
Copper	7440-50-8	0.0041	2.94E-05	2.43E-06	3.18E-05	
Mercury	7439-97-6	0.0020	1.43E-05	1.19E-06	1.55E-05	
Nickel	7440-02-0	0.0039	2.80E-05	2.31E-06	3.03E-05	

Hourly fuel use = 7.17 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 10-B
MRF to/from Trash Fill (7:00 a.m. - 5:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Emissions (lb/hour)	
Benzene	71-43-2	0.1863	4.95E-04	HAUL
Formaldehyde	50-00-0	1.7261	4.59E-03	
Acetaldehyde	75-07-0	0.7833	2.08E-03	
Acrolein	107-02-8	0.0339	9.01E-05	
1,3-Butadiene	106-99-0	0.2174	5.78E-04	
Toluene	108-88-3	0.1054	2.80E-04	
Xylenes	1330-20-7	0.0424	1.13E-04	
Hydrogen chloride	7647-01-0	0.1863	4.95E-04	
Arsenic	7440-38-2	0.0016	4.25E-06	
Copper	7440-50-8	0.0041	1.09E-05	
Mercury	7439-97-6	0.0020	5.32E-06	
Nickel	7440-02-0	0.0039	1.04E-05	

Hourly fuel use = 2.66 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 10-C
MRF to/from Compost Area (8:00 a.m. - 2:00 p.m.)

Compound	CAS Number	Emission Factor (lb/1,000 gal)[a]	Existing Emissions (lb/hour)	Project Emissions (lb/hr)	Total Emissions (lb/hr)	
Benzene	71-43-2	0.1863	1.20E-05	1.20E-05	2.40E-05	MRFCOMP
Formaldehyde	50-00-0	1.7261	1.11E-04	1.11E-04	2.22E-04	
Acetaldehyde	75-07-0	0.7833	5.05E-05	5.05E-05	1.01E-04	
Acrolein	107-02-8	0.0339	2.18E-06	2.18E-06	4.37E-06	
1,3-Butadiene	106-99-0	0.2174	1.40E-05	1.40E-05	2.80E-05	
Toluene	108-88-3	0.1054	6.79E-06	6.79E-06	1.36E-05	
Xylenes	1330-20-7	0.0424	2.73E-06	2.73E-06	5.46E-06	
Hydrogen chloride	7647-01-0	0.1863	1.20E-05	1.20E-05	2.40E-05	
Arsenic	7440-38-2	0.0016	1.03E-07	1.03E-07	2.06E-07	
Copper	7440-50-8	0.0041	2.64E-07	2.64E-07	5.28E-07	
Mercury	7439-97-6	0.0020	1.29E-07	1.29E-07	2.58E-07	
Nickel	7440-02-0	0.0039	2.51E-07	2.51E-07	5.03E-07	

Hourly fuel use = 0.06 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 11
IC Engine and Flare 2013 Annual LFG Combustion

Quarter	IC Engine LFG Heat Input (MMBtu)[a]	LFG Heat Value (Btu/scf)[a]	IC Engine LFG Input (scf)[b]	Flare LFG Heat Input (MMBtu)[a]	LFG Heat Value (Btu/scf)[a]	Flare LFG Input (scf)[b]
First	68,570.76	569	120,511,002	8,584.20	582	14,749,485
Second	69,161.52	524	131,987,634	335.23	524	639,752
Third	65,180.18	524	124,389,656	5,169.71	524	9,865,859
Fourth	74,705.11	524	142,567,004	516.03	524	984,790
Total	**277,617.57**		**519,455,296**	**14,605.17**		**26,239,885**

[a] From quarterly emissions reports

[b] LFG input [scf] = LFG heat input [MMBtu] x 10^6 [Btu/MMBtu] / LFG heat value [Btu/scf]

Table 12
IC Engine Toxic Air Contaminant Emissions from LFG Combustion

Compound	CAS Number	Emission Factor (lb/MMscf)[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]	
Acenaphthene	83-32-9	3.01E-04	2.07E-05	1.56E-01	EXISTENG
Acenaphthylene	208-96-8	1.23E-03	8.48E-05	6.39E-01	
Anthracene	120-12-7	3.71E-04	2.56E-05	1.93E-01	
Benzene	71-43-2	2.09E-01	1.44E-02	1.09E+02	
Benzo(a)anthracene	56-55-6	2.88E-04	1.98E-05	1.50E-01	
Benzo(a)pyrene	50-32-8	6.77E-04	4.67E-05	3.52E-01	
Benzo(b)fluoranthene	205-99-2	8.00E-04	5.51E-05	4.16E-01	
Benzo(g,h,i)perylene	191-24-2	8.54E-04	5.89E-05	4.44E-01	
Benzo(k)fluoranthene	207-08-9	6.77E-04	4.67E-05	3.52E-01	
Carbon Tetrachloride	56-23-5	7.89E-03	5.44E-04	4.10E+00	
Chloroform	67-66-3	6.11E-03	4.21E-04	3.17E+00	
Chrysene	218-01-9	3.42E-04	2.36E-05	1.78E-01	
Dibenz(a,h)anthracene	53-70-3	2.37E-05	1.63E-06	1.23E-02	
Ethylene Dibromide	106-93-4	9.64E-03	6.64E-04	5.01E+00	
Ethylene Dichloride	106-93-4	5.08E-03	3.50E-04	2.64E+00	
Fluoranthene	206-44-0	2.48E-03	1.71E-04	1.29E+00	
Fluorene	86-73-7	6.99E-04	4.82E-05	3.63E-01	
Formaldehyde	50-00-0	4.47E+00	3.08E-01	2.32E+03	
HCl	7647-01-0	2.07E+00	1.43E-01	1.08E+03	
Indeno(1,2,3-cd)pyrene	193-39-5	3.14E-04	2.16E-05	1.63E-01	
Methyl Chloroform	71-55-6	2.64E-02	1.82E-03	1.37E+01	
Methylene Chloride	75-09-2	4.66E-01	3.21E-02	2.42E+02	
Naphthalene	91-20-3	5.05E-02	3.48E-03	2.62E+01	
Perchloroethylene	127-18-4	1.28E-02	8.82E-04	6.65E+00	
Phenanthrene	85-01-8	5.82E-03	4.01E-04	3.02E+00	
Pyrene	129-00-0	4.66E-03	3.21E-04	2.42E+00	
Trichloroethylene	79-01-6	8.43E-03	5.81E-04	4.38E+00	
Vinyl Chloride	75-01-4	4.01E-03	2.76E-04	2.08E+00	

Hourly LFG flow rate = 68,922 scfh Maximum rated capacity from facility Title V permit
Annual LFG flow rate 519,455,296 scf 2013 reported annual total

[a] Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv/catef_form.html for flare fired on landfill gas

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Hourly LFG flow rate [scfh] / 10^6 [scf/MMscf]

[c] Annual emission rate [lb/hr] = Emission factor [lb/MMscf] x Annual LFG flow rate [scfh] / 10^6 [scf/MMscf]

Table 13
Flare Toxic Air Contaminant Emissions from LFG Combustion

Compound	CAS Number	Emission Factor (lb/MMscf)	Emission Factor Source[a]	Hourly Emission Rate (lb/hr)[b]	Annual Emission Rate (lb/yr)[c]
Indeno(1,2,3-cd)pyrene	193-39-5	5.60E-02	CATEF	4.83E-03	1.47E+00
Manganese	7439-96-5	2.92E-03	Source Test	2.52E-04	7.66E-02
Naphthalene	91-20-3	1.75E-04	Source Test	1.51E-05	4.59E-03
Nickel	7440-02-0	1.43E-03	Source Test	1.23E-04	3.75E-02
Perylene	198-55-0	7.48E-05	CATEF	6.45E-06	1.96E-03
Phenanthrene	85-01-8	9.85E-04	Source Test	8.50E-05	2.59E-02
Pyrene	129-00-0	3.04E-05	Source Test	2.63E-06	7.99E-04
Toluene	108-88-3	1.09E+02	CATEF	9.40E+00	2.86E+03
Trichloroethene	79-01-6	1.13E+00	CATEF	9.74E-02	2.97E+01
Vinyl Chloride	75-01-4	7.64E-02	CATEF	6.59E-03	2.00E+00
Xylene (m,p)	1330-20-7	4.61E-01	CATEF	3.98E-02	1.21E+01
Xylene (o)	95-47-6	3.35E-01	CATEF	2.89E-02	8.79E+00
Zinc	7440-66-6	4.28E+00	CATEF	3.69E-01	1.12E+02
1,1,1-Trichloroethane	71-55-6	3.37E-01	CATEF	2.91E-02	8.84E+00
1,1-Dichloroethane	75-34-3	4.37E-01	CATEF	3.77E-02	1.15E+01
1,2-Dichloroethane	107-06-2	1.35E+00	CATEF	1.16E-01	3.54E+01
1,4-Dioxane	123-91-1	4.55E-03	Source Test	3.93E-04	1.19E-01
2-Methylnaphthalene	91-57-6	9.56E-05	Source Test	8.24E-06	2.51E-03
Acenaphthene	83-32-9	7.04E-06	Source Test	6.07E-07	1.85E-04
Acenaphthylene	208-96-8	1.09E-04	Source Test	9.39E-06	2.86E-03
Acetaldehyde	75-07-0	6.53E-01	CATEF	5.63E-02	1.71E+01
Acetonitrile	75-05-8	7.96E+00	CATEF	6.86E-01	2.09E+02
Acrolein	107-02-8	9.33E-02	CATEF	8.05E-03	2.45E+00
Acrylonitrile	107-13-1	4.50E-03	Source Test	3.88E-04	1.18E-01
Anthracene	120-12-7	1.10E-05	Source Test	9.52E-07	2.90E-04
Arsenic	7440-38-2	5.91E-02	Source Test	5.10E-03	1.55E+00
Benzene	71-43-2	8.59E-01	CATEF	7.41E-02	2.25E+01
Benzo(a)anthracene	56-55-6	5.60E-02	CATEF	4.83E-03	1.47E+00
Benzo(a)pyrene	50-32-8	5.60E-02	CATEF	4.83E-03	1.47E+00
Benzo(b)fluoranthene	205-99-2	5.60E-02	CATEF	4.83E-03	1.47E+00
Benzo(e)pyrene	192-97-2	7.48E-05	CATEF	6.45E-06	1.96E-03
Benzo(g,h,i)perylene	191-24-2	5.60E-02	CATEF	4.83E-03	1.47E+00
Benzo(k)fluoranthene	207-08-9	5.60E-02	CATEF	4.83E-03	1.47E+00
Cadmium	7440-43-9	1.43E-03	Source Test	1.23E-04	3.75E-02
Carbon Tetrachloride	56-23-5	3.76E-02	CATEF	3.24E-03	9.87E-01
Chlorobenzene	108-90-7	8.69E-01	CATEF	7.49E-02	2.28E+01
Chloroform	67-66-3	5.60E-02	CATEF	4.83E-03	1.47E+00
Chromium (Hex)	18540-29-9	1.21E-05	Source Test	1.05E-06	3.19E-04
Chromium (Total)	7440-47-3	4.64E-03	Source Test	4.00E-04	1.22E-01
Chrysene	218-01-9	6.51E-06	Source Test	5.61E-07	1.71E-04
Copper	7440-50-8	4.86E+00	CATEF	4.19E-01	1.28E+02
Dibenz(a,h)anthracene	53-70-3	5.60E-02	CATEF	4.83E-03	1.47E+00
Dichloromethane	75-09-2	4.29E-01	CATEF	3.70E-02	1.13E+01
Fluoranthene	206-44-0	1.40E-05	Source Test	1.21E-06	3.67E-04
Fluorene	86-73-7	2.84E-04	Source Test	2.45E-05	7.44E-03
Formaldehyde	50-00-0	1.77E-01	Source Test	1.53E-02	4.65E+00
HCl	7647-01-0	1.61E-03	Source Test	1.39E-04	4.24E-02
HF	7664-39-3	2.15E-01	Source Test	1.85E-02	5.64E+00

EXISTFLR

Hourly LFG flow rate = 86,236 scfh Maximum one minute flow rate provided by SBCAPCD
Annual LFG flow rate 26,239,885 scf 2013 reported annual total

[a] CATEF = Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv/catef_form.html for flare fired on landfill gas based on assumption that biogas composition is similar to landfill gas
Source Test = September 9-11 2010 source tests on Santa Maria Landfill flare combusting LFG. Non-detects set to detection limit.

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Hourly LFG flow rate [scfh] / 10^6 [scf/MMscf]

[c] Annual emission rate [lb/hr] = Emission factor [lb/MMscf] x Annual LFG flow rate [scfh] / 10^6 [scf/MMscf]

Appendix C
Air Dispersion Modeling Archive Data Files (with Air Emission Quantification Files) (on CD)

AECOM Environment
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Modeling Files for the Tajiguas Resource Recovery Project
Dispersion Modeling Analysis
Santa Barbara County, CA – July, 2017

The archive of modeling files have the following folder and file organization (included as read me text file):

- AERMAP Folder – This folder contains all files associated with the AERMAP processing for this project, including the AERMAP executable (version 11103), the National Elevation Dataset (NED) file, and the AERMAP input and output files. There were three different AERMAP runs used in the analysis, with the resulting output files:
  - TAJIGUAS_2017.ROU: This file contains all of the receptors from the original fenceline.
  - MODFENCE.rou: This file contains the modified portion of the fenceline on the east boundary. These were substituted into the TAJIGUAS_2017.ROU file dated 5/3/17.
- Met Data – This folder contains the meteorological data files used in the analysis. This file, representing one year (2015) of meteorological data from Los Flores Canyon Monitor #4, was provided by Michael Goldman of the SBCAPCD.
- Background Concentrations: This folder contains the worksheets used to determine the ambient background concentrations for the criteria pollutants.
  BPIP: This folder contains the BPIP input, output, and summary files used to generate building downwash input for the AERMOD Model.
- AERMOD: This folder contains all of the modeling files used in the analysis, including input files, output files, plot files, etc, for each pollutant and period. The base folder also contains the AERMOD executable used in the modeling and the full-grid receptor file used in the modeling. There are two subfolders in this folder:
  - Criteria Pollutants: This folder includes all of the criteria pollutant modeling. The short term modeling folder contains two subfolders each for 1-hour SO2 and NO2: One with the emergency generator included for the CAAQS modeling, and a second without the emergency generator for the NAAQS modeling. Also in this folder is a subfolder called HRA containing the ISCST3 run used to support the HARP modeling.
  - Odor modeling: This subfolder contains the modeling files used in the odor analysis. One subfolder contains the modeling runs themselves as described in the modeling report, while a second folder contains a spreadsheet that calculates the odor impacts for both the full receptor grid and the specific sensitive receptors considered in the analysis.
  - HRA modeling: This subfolder contains the modeling files used to generate the chi/q values for input to HARP2. There are folders for the project sources (Acute and Period) as well as the Existing sources for the facility wide analysis.
- HARP2: This folder contains the CSV files used as input to HARP2 for the Project and Facility Wide modeling as well as the two folders containing the HARP2 files.

(CD GOES HERE)

About AECOM

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With more than 87,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and collaborative technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 150 countries and has annual revenue in excess of $17 billion.

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