Honua Power 0638-02-C
Facility Emissions Summary

Pollutant	Emissions (TPY)			
	Gasifier	Blackstart DEG	Baghouses	Total
PM10	16.58	0.03	8.54	25.14
PM25	9.44	0.02	1.28	10.75
SO2	39.65	1.29	no data	40.94
NOx	74.37	4.69	no data	79.06
CO	42.10	0.84	no data	42.94
TOC	1.70	0.01	no data	1.71
HAPs				
As	0.46	no data	no data	0.46
Pb	2.06	no data	no data	2.06
Cd	0.01	no data	no data	0.01
Hg	2.61E-03	no data	no data	2.61E-03
HCl	8.49	no data	no data	8.49
Dioxin	2.12E-06	no data	no data	2.12E-06
BENZENE	no data	1.96E-03	no data	1.96E-03
TOLUENE	no data	7.08E-04	no data	7.08E-04
XYLENES	no data	4.86E-04	no data	4.86E-04
PROPYLENE	no data	7.03E-03	no data	7.03E-03
FORMALDEHYDE	no data	1.99E-04	no data	1.99E-04
ACETALDEHYDE	no data	6.35E-05	no data	6.35E-05
ACROLEIN	no data	1.99E-05	no data	1.99E-05
			Total HAPs	11.04

Honua Power 0638-02-C
Baghouse Emission Calculations

Receiving Area

Air Flow	53000	acfm
Emission Spec	0.015	gr/ft3
Emission Rate	0.114	lb/min
Truck dumping	5	minutes @ 100% airflow
Conveyors clear pit	10	minutes @ 100% airflow
Hold for next truck	10	minutes @ 50% airflow
total emissions	2.2714286	lb per truck
number of trucks	22	trucks per day
	49.97	lb per day
	6.00	day/week
	299.83	lb/week
	50.00	weeks/year
	14991	lb/year
	2000	lb/ton
	7.50	tons/year

Char Removal Area

Air Flow	53000	acfm
Emission Spec	0.015	gr/ft3
Emission Rate	0.114	lb/min
Truck loading	60	min. @ 100% airflow (char on last 2 trucks of the day)
total emissions	6.8142857	lb per day
	6.00	day/week
	40.89	lb/week
	50.00	weeks/year
	2044	lb/year
	2000	lb/ton
	1.02	tons/year

C & D Feedstock Silos

Feedstock delivery	295	tons/day
Average density	10.9	lb/ft3
Feedstock displacement	54,128	ft3/day
Emission spec	0.015	gr/dscf
total emissions	0.1159895	lb per day
	300.00	days/year
	34.80	lb/yr
	2000.00	lb/ton
	1.74E-02	tons/year

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Baghouse Emission Calculations

Tire Feedstock Silo

Daily Delivery	20.53	tons/day
Average density	19.2	lb/ft3
Air displacement by tires	2,139	ft3/day
Emission spec	0.015	gr/dscf
total emissions	0.00458	lb per day
	300.00	days/year
	1.37	lb/yr
	2000.00	lb/ton
	6.87E-04	tons/year

Char Silo

Daily Delivery	34.37	tons/day
Average density	15.7	lb/ft3
Air displacement by tires	4,378	ft3/day
Emission spec	0.015	gr/dscf
total emissions	0.00938	lb per day
	300.00	days/year
	2.81	lb/yr
	2000.00	lb/ton
	1.41E-03	tons/year

Baghouse Emissions Summary

	Emissions (tpy)	
	PM10	PM25
Receiving area	7.50	1.12
Char removal	1.02	0.15
C & D Feedstock	1.74E-02	2.61E-03
Tire Feedstock	6.87E-04	1.03E-04
Char Silo	1.41E-03	2.11E-04
Total	8.54	1.28

Honua Power 0638-02-C
Boiler-Gasifier Emissions

Process Rate 230 tons/day
9.58 tons/hour
83,950 tons/year

82,365 lb/hr steam
98.838 MMBtu/hr (@ 0.0012 lb steam per MMBtu)

Pollutant	Run No.	Pilot Test (lb/hr)	Process Rate (lb/hr)	Process Rate (T/hr)	Emission Rate used (lb/ton)	Safety factor	Adjusted Emission Rate (lb/T)	Uncontrolled Emissions (T/yr)	Control Efficiency (%)	Controlled Emissions (T/yr)	Controlled Emissions (lb/hr)	Controlled Emissions (lbMMBtu)	Controlled Emissions (g/s)
PM10 (day 1)	1	9.6	1962	0.981	9.79								
	2	9.7	1979	0.9895	9.80								
(day 2)	3	12.9	2030	1.015	12.71								
	4	10.7	1848	0.924	11.58								
Mean					10.97	1.2	13.16	552.54	97.00%	16.58	3.78	3.83E-02	0.477
PM25					6.25	1.2	7.50	314.74	97.00%	9.44	2.16	2.18E-02	0.272
SO2 (day 1)	1	5.9	1956	0.978	6.03								
	2	6.3	1996	0.998	6.31								
	3	4.4	1945	0.9725	4.52								
Mean					5.62	1.2	6.75	283.24	86.00%	39.65	9.05	9.16E-02	1.14
NOx (day 1)	1	6.1	1956	0.978	6.24								
	2	7.8	1996	0.998	7.82								
	3	1.3	1945	0.9725	1.34								
(day 2)	4	4.7	2052	1.026	4.58								
	5	1.7	1846	0.923	1.84								
Mean					4.36								
pre-lnb [3]					6.71	1.2	8.05	338.06	78.00%	74.37	16.98	1.72E-01	2.14
As (day 1)	1	1.40E-01	1962	0.981	1.43E-01								
	2	1.10E-01	1979	0.9895	1.11E-01								
(day 2)	3	4.03E-02	2030	1.015	3.97E-02								
	4	6.67E-02	1848	0.924	7.22E-02								
Mean					9.14E-02	1.2	0.11	4.61	90.00%	0.46	0.11	1.06E-03	0.013
Pb (day 1)	1	6.75E-01	1962	0.981	6.88E-01								
	2	5.68E-01	1979	0.9895	5.74E-01								
(day 2)	3	4.26E-01	2030	1.015	4.20E-01								
	4	4.93E-01	1848	0.924	5.34E-01								
Mean					5.54E-01	1.2	0.66	27.90	92.60%	2.06	0.47	4.77E-03	0.059
Cd (day 1)	1	1.43E-03	1962	0.981	1.46E-03								
	2	1.38E-03	1979	0.9895	1.39E-03								
(day 2)	3	2.04E-03	2030	1.015	2.01E-03								
	4	1.34E-03	1848	0.924	1.45E-03								
Mean					1.58E-03	1.2	0.0019	0.08	90.00%	7.95E-03	1.81E-03	1.84E-05	2.29E-04
Cr (day 1)	1	5.30E-02	1962	0.981	5.40E-02								
	2	4.83E-02	1979	0.9895	4.88E-02								
(day 2)	3	1.64E-02	2030	1.015	1.62E-02								
	4	1.90E-02	1848	0.924	2.06E-02								
Mean					3.49E-02	1.2	0.0419	1.76	99.88%	2.11E-03	4.81E-04	4.87E-06	6.07E-05
Hg (day 1)	1	5.17E-04	1962	0.981	5.27E-04								
	2	8.12E-04	1979	0.9895	8.21E-04								
(day 2)	3	3.56E-04	2030	1.015	3.51E-04								
	4	3.47E-04	1848	0.924	3.76E-04								
Mean					5.18E-04	1.2	6.22E-04	0.03	90.00%	2.61E-03	5.96E-04	6.03E-06	7.51E-05
HCl (day 1)	1	2.63	1996	0.998	2.64								
(day 2)	2	2.38	1864	0.932	2.55								
Mean					2.59	1.2	3.11	130.68	93.50%	8.49	1.94	1.96E-02	0.24
Total dioxins (day 1)	1	3.66E-06	1956	0.978	3.74E-06								
(day 2)	2	1.91E-06	2052	1.026	1.86E-06								
Mean					2.80E-06	1.2	3.36E-06	1.41E-04	98.50%	2.12E-06	4.83E-07	4.89E-09	6.09E-08
Dioxin TEQ (day 1)	1	6.82E-08	1956	0.978	6.97E-08								
(day 2)	2	3.79E-08	2052	1.026	3.69E-08								
Mean					5.33E-08	1.2	6.40E-08	2.69E-06	98.60%	3.76E-08	8.59E-09	8.69E-11	1.08E-09
PCB (day 1)	1	2.69E-06	1956	0.978	2.75E-06								
(day 2)	2	1.47E-06	2052	1.026	1.43E-06								
Mean					2.09E-06	1.2	2.51E-06	1.05E-04	75.00%	2.63E-05	6.01E-06	6.08E-08	7.58E-07
CO		N/A	N/A	N/A	N/A	N/A	N/A	4.21E+01	0.00%	4.21E+01	9.61E+00	9.72E-02	1.21E+00
VOC		N/A	N/A	N/A	3.38E-02	1.2	4.06E-02	1.70E+00	0.00%	1.70E+00	3.89E-01	3.93E-03	4.90E-02

Notes:
1. Pilot test data obtained from "2009 Pilot Plant Emission Test", May 13 and 14, 2009.
2. Obtained from AP-42, Appendix B-2.
3. Corrected for LNB (5.52/(1-0.35) = 8.49 lb/hr) due to fact that boiler tested configured with low NOx burners.
4. PM25 emissions obtained from AP-42, Appendix B-2, Table B.2.2. PM10 multiplied by ratio of (45/79) to obtain PM25 emissions.
5. CO emissions based on vendor guarantee of 100 ppm. Refer to application for conversion to lb/hr.
6. Emission factor for VOC obtained from AP-42, table 1.4-1. Assumed 1020 BTU/scf heat capacity and 60 MMBtu/hr burner capacity.

Honua Power 0638-02-C
Blackstart DEG Emission Calculations

Blackstart Diesel Engine Generator

Engine Horsepower:	1,474	Type of Fuel:	diesel
Maximum Design Fuel Feed Rate (gal/hr):	72	Sulfur Content by Weight (%):	0.50%
Maximum Heat Input (MMBTU/hr):	10.08	Fuel Heating Value (BTU/gal):	140,000
Operating Hours (hr/yr):	500		

Max Fuel Consumption (8,760 hr/yr):	88,301	gal
Fuel Consumption, Limited Hours:	36,000	gal

Manufacturer's data:

Pollutant	Rate (lb/hr)	Rate (lb/MMBtu)
NOx	18.76	1.86
CO	3.37	0.33
PM	0.1	0.0099
TOC	0.04	3.97E-03

Emissions (lb/hr)= Max Heat Input x Emission Factor

Pollutant	Emission Factor (lb/MMBtu)	EMISSIONS			
		(lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
SOx	0.5100	5.14	0.6477	22.52	1.29
NOx	1.8611	18.76	2.3637	82.17	4.69
CO	0.3343	3.37	0.4246	14.76	0.84
TOC	0.0040	0.04	0.0050	0.18	0.01
PM_{10}	0.0099	0.1	0.0126	0.44	0.03
PM_{25}	0.0089	0.09	0.0113	0.39	0.02

HAP	Emission Factor (lb/MMBtu)	EMISSIONS			
		(lb/hr)	(g/s)	Max (TPY)	Limited (TPY)
BENZENE	7.76E-04	7.82E-03	9.86E-04	3.43E-02	1.96E-03
TOLUENE	2.81E-04	2.83E-03	3.57E-04	1.24E-02	7.08E-04
XYLENES	1.93E-04	1.95E-03	2.45E-04	8.52E-03	4.86E-04
PROPYLENE	2.79E-03	2.81E-02	3.54E-03	1.23E-01	7.03E-03
FORMALDEHYDE	7.89E-05	7.95E-04	1.00E-04	3.48E-03	1.99E-04
ACETALDEHYDE	2.52E-05	2.54E-04	3.20E-05	1.11E-03	6.35E-05
ACROLEIN	7.88E-06	7.94E-05	1.00E-05	3.48E-04	1.99E-05
			TOTAL	**0.18**	**0.01**

Notes:
1. Emission rates for NOx, CO, SO2 and TOC obtained from manufacturer.
2. Maximum fuel feed rate obtained from manufacturer.
3. All PM emissions assumed to be PM10 for conservatism.
4. PM25 emissions assumed to be 90% of PM10 emissions (AP-42, appendix B).

Honua Power 0638-02-C
HAP Compliance

Modeled 8-hr conc.	1.72266	$\mu g/m^3$
Modeled Annual conc.	0.17815	$\mu g/m^3$
Modeled emission rate	1	lb/hr

Non-Carcinogenic HAPs

HAP	Emission Rate (lb/hr)	TLV (ug/m^3)	TLV/100 (ug/m^3)	TLV/420 (ug/m^3)	Adjusted 8-hr Conc. (ug/m^3)	Adjusted Annual Conc. (ug/m^3)	Pass/Fail
HCl	1.94	7000	70	16.7	3.3	0.35	PASS
As (organic)	0.11	500	5	1.2	0.2	0.02	PASS
Hg	5.96E-04	100	1	0.2	1.03E-03	1.06E-04	PASS
Cd	1.81E-03	2.5	0.025	5.95E-03	3.13E-03	3.23E-04	PASS

Carcinogenic HAPS

HAP	Emission Rate (lb/hr)	Screening Level (SL)[1]	Adjusted Annual Concentration (ug/m^3)	Annual/SL	Annual/SL x 10 e6	
Dioxin TEQ	8.59E-09	6.40E-08	1.53E-09	2.39E-02	2.39E-08	
PCB	6.01E-06	4.30E-03	1.07E-06	2.49E-04	2.49E-10	
Cr	4.81E-04	1.10E-05	8.58E-05	7.80E+00	7.80E-06	
					7.82E-06	PASS

Notes:
1. Value obtained from EPA Region 9 Regional Screening Levals (RSL), May 2010.
2. Passes if Annual/SL x 10 E6 less than ten per million (1/100,000).

Honua Power 0638-02-C
Boiler Firing Propane

Fuel rate	546.4	gallons per hour
Hours of Operation	8760	hours per year
Sulfur Content	15	grains per hundred cubic feet (assumed)

Pollutant	Emission Factor (lb/kgal)	Emission Rate (lb/hr)	Emission Rate (g/s)	Emissions (TPY)
NOx	13	7.10	0.90	31.11
SO2	1.5	0.82	0.10	3.59
CO	7.5	4.10	0.52	17.95
PM Filterable	0.2	0.11	0.01	0.48
PM Condensible	0.5	0.27	0.03	1.20
PM Total	0.7	0.38	0.05	1.68
TOC	1	0.55	0.07	2.39

Emission Rate Comparison

Polluant	Syngas Emission Rate (g/s)	Propane Emission Rate (g/s)	Emission Rate Used In Model (g/s)
SO2	1.14	0.10	1.14
NOx	2.14	0.90	2.14
CO	1.21	0.52	1.21
PM10	0.48	0.05	0.48
PM25	0.27	0.05	0.27
Pb	0.06	0	0.06