

# Hoonah Indian Association

Emissions Estimates  
Wood Chip Boiler

# WISEWOOD ENERGY

3/31/22

## 1x VIESSMANN-KOB Pyrotec 390

Nameplate Capacity (kW) 390

Wood Chip Boiler Heat Load Coverage:	<b>6.6%</b>
Expected Boiler Output [MMBtu/yr]:	<b>584</b>
Max Boiler Output [MMBtu/yr]:	<b>10,912</b>

### Wood Chip Boiler - Air Emissions Factors

Annual Estimated Emissions Discharge	Carbon Monoxide (mg/MJ)	Nitrogen Oxides (mg/MJ)	VOC (mg/MJ)	Total Emissions (mg/MJ)
Full Load	112.0	49	2	31.0
Partial Load	163.0	47	5	32.0
Low Load				

  

	Carbon Monoxide (lb/mmBtu)	Nitrogen Oxides (lb/mmBtu)	VOC (lb/mmBtu)	Total Emissions (lb/mmBtu)
Full Load	0.261	0.114	0.005	0.072
Partial Load	0.379	0.109	0.012	0.074
Low Load				

### Wood Chip Boiler - Annual Estimated Emissions Discharge (expected demand, partial load)

Heat Demand (mmBtu/year)	Carbon Monoxide (lb/year)	Nitrogen Oxides (lb/year)	VOC (lb/year)	Total Particles (lb/year)	Total Emissions (lb/year)
<b>584</b>	<b>221.42</b>	<b>63.84</b>	<b>6.79</b>	<b>43.47</b>	<b>335.52</b>

  

Heat Demand (mmBtu/year)	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	VOC (ton/year)	Total Particles (ton/year)	Total Emissions (ton/year)
<b>584</b>	<b>0.111</b>	<b>0.032</b>	<b>0.003</b>	<b>0.022</b>	<b>0.168</b>

### Wood Chip Boiler - Annual Estimated Emissions Discharge (max boiler capacity, 8200 hrs/yr, full load)

Heat Demand (mmBtu/year)	Carbon Monoxide (lb/year)	Nitrogen Oxides (lb/year)	VOC (lb/year)	Total Particles (lb/year)	Total Emissions (lb/year)
<b>10,912</b>	<b>2842.60</b>	<b>1243.64</b>	<b>50.76</b>	<b>786.79</b>	<b>4923.78</b>

  

Heat Demand (mmBtu/year)	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	VOC (ton/year)	Total Particles (ton/year)	Total Emissions (ton/year)
<b>10,912</b>	<b>1.421</b>	<b>0.622</b>	<b>0.025</b>	<b>0.393</b>	<b>2.462</b>

# Hoonah Indian Association

Emissions Estimates  
Gasifiers

# WISEWOOD ENERGY

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## 2x 125kW Bioenergie Gasifiers

Total Capacity (kW) 250 kW-el, 436 kW-th

Gasifier Heat Load Coverage: **91.5%**  
MMBtu/yr: **8,096**

### Gasifier - Air Emissions Factors

Hourly Emissions Discharge	Exhaust Gas Production (Nm3/hr)	Carbon Monoxide (mg/m3)	Nitrogen Oxides (mg/m3)	VOC (mg/m3)	PM (mg/m3)
	852	25	278	1.6	20

### Gasifier - Annual Estimated Emissions Discharge (expected demand)

Hrs/Year	Exhaust Gas Production (Nm3/yr)	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	VOC (ton/year)	PM (ton/year)	Total Emissions (ton/year)
7500	6,390,000	0.18	1.96	0.01	0.14	2.29

### Gasifier - Annual Estimated Emissions Discharge (max op. hours, 8200 hrs/yr)

Hrs/Year	Exhaust Gas Production (Nm3/yr)	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	VOC (ton/year)	PM (ton/year)	Total Emissions (ton/year)
8200	6,986,400	0.19	2.14	0.01	0.15	2.50

# Hoonah Indian Association

Emissions Estimates  
Diesel Gensets

# WISEWOOD ENERGY

3/31/22

## 250kW CAT C9.3 Diesel Generator Sets

Total Capacity: 750 kW-el Standby, 675 kW-el Prime  
Emissions: EPA Marine Commercial Tier 3

### Nominal Emissions per Generator @ 100% Load

Emissions Discharge	Carbon Monoxide (Lbs/Hr)	Nitrogen Oxides (Lbs/Hr)	Hydrocarbons (Lbs/Hr)	PM (Lbs/Hr)
	0.33	3.23	0.05	0.03

### Diesel Gensets - Total Air Emissions per Hour

Number of Generators	Carbon Monoxide (Lbs/Hr)	Nitrogen Oxides (Lbs/Hr)	Hydrocarbons (Lbs/Hr)	PM (Lbs/Hr)
1	0.33	3.23	0.05	0.03

### Diesel Gensets - Annual Estimated Emissions Discharge (expected demand)

Hrs/Year	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	Hydrocarbons (ton/year)	PM (ton/year)	Total Emissions (ton/year)
2000	0.3	3.2	0.1	0.0	3.64

### Diesel Gensets - Annual Estimated Emissions Discharge (max op. hours, 8200 hrs/yr)

Hrs/Year	Carbon Monoxide (ton/year)	Nitrogen Oxides (ton/year)	Hydrocarbons (ton/year)	PM (ton/year)	Total Emissions (ton/year)
8200	1.4	13.2	0.2	0.1	14.92

# Hoonah Indian Association

Emissions Estimates

Dryer

# WISEWOOD ENERGY

3/31/22

## Bioenergie Wood Chips Dryer

Total Wood Chips Demand: 1573.06 tons per year @ 10% MC

BDT equivalent: 1,415.75

### Particulate Matter Factors

Device	Exhaust Gas Flow (Nm3/hr)	PM (mg/Nm3)
Exhaust Fan	8,495	20

### Particulate Matter Estimate

Device	Exhaust Gas Flow (CFM)	PM (lb/hr)	PM (lb/year)	PM (ton/year)
Exhaust Fan	5,000	0.375	3,071	1.54

### Toxic Air Contaminants - Maximum Emission Factors

Bone-Dry Tons per Hour (BDT)	Methanol (lb/BDT)	Formaldehyde (lb/BDT)	Acetaldehyde (lb/BDT)	Propionaldehyde (lb/BDT)	Acrolein (lb/BDT)
0.173	0.048	0.0037	0.013	0.00107	0.0015

### Toxic Air Contaminants - Annual Emissions (lb/year)

Hours / Year	Methanol (lb/year)	Formaldehyde (lb/year)	Acetaldehyde (lb/year)	Propionaldehyde (lb/year)	Acrolein (lb/year)	Total (lb/year)
8200	68.0	5.2	18.4	1.5	2.1	95.24

### Toxic Air Contaminants - Annual Emissions (ton/year)

Hours / Year	Methanol (ton/year)	Formaldehyde (ton/year)	Acetaldehyde (ton/year)	Propionaldehyde (ton/year)	Acrolein (ton/year)	Total (ton/year)
8200	0.034	0.003	0.009	0.001	0.001	0.048