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Prepared for:

Hū Honua BIOENERGY LLC

Application to Add Greenhouse Gas Emission Provisions

Hū Honua Bioenergy, LLC (Facility)
Pepeekeo, Hawaii

January 2017

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Hū Honua Bioenergy, LLC

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Hū Honua Bioenergy, LLC (The Facility)
Pepeekeo, Hawaii

January 2017

Project No. 0269470

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LIST OF ACRONYMS

$\mu g/m^3$	Micrograms per cubic meter
BACT	Best available control technology
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
COMS	Continuous Opacity Monitoring System
CSP	Covered Source Permit
DEP	Department of Environmental Protection
ERM	ERM-West, Inc.
ESP	Electrostatic Precipitator
GHG	Greenhouse gas
GWP	Global warming potential
HAAQS	Hawaii Ambient Air Quality Standards
HAP	Hazardous air pollutant
HAR	Hawaii Administrative Rules
HCl	Hydrogen chloride
HCPC	Hilo Coast Processing Company
HDOH	Hawaii Department of Health
kW	Kilowatt
lb	Pound
MACT	Maximum Achievable Control Technology
MMBtu	Million British thermal units
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
N_2O	Nitrous oxide
NSPS	New Source Performance Standard
O_3	Ozone
PM_{10}	Particulate matter less than 10 microns in diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
ppm	Parts per million
PSD	Prevention of Significant Deterioration
PTE	Potential to emit

ROFA	Rotating Opposed Fire Air
ROTAMIX	Rotating Mix
SAAQS	State Ambient Air Quality Standards
SO_2	Sulfur dioxide
SOx	Sulfur oxide
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compounds

1.0 INTRODUCTION

HDOH requested the Facility submit this application package to incorporate permit conditions based on the GHG Reduction Plan the Facility updated on September 9, 2016. The revised permit conditions will not increase the Facility's potential to emit (PTE). This application is organized as follows:

- Section 2 presents the requested changes to the existing permit;
- Section 3 presents the facility overview;
- Section 4 describes estimated emissions;
- Section 5 summarizes applicable rules;
- Section 6 summarizes air quality impact analysis;
- Section 7 lists the fees for this application; and
- The HDOH-required application forms (Forms S-1, S-6, C-1, and C-2) and emission calculations are included as appendices (Appendix A, B, and C)

2.0 REQUESTED CHANGES TO PERMIT

As HDOH CAB requested in the letter dated November 23, 2016 from Catherine Lopez, The Facility is submitting revisions to the existing permit to reflect the following:

1. A facility-wide limit on carbon dioxide equivalent (CO_2e) emissions of 3,473 metric-tons (3,828 tons) per calendar year. This CO_2e limit excludes biogenic CO_2 emissions from wood and biodiesel, and only accounts for methane (CH_4) and nitrous oxide emissions (N_2O);

2. A January 1, 2020 compliance date for the CO_2e emission cap;

3. GHG emissions monitoring, recordkeeping, and reporting measures from the applicable sections of Title 40 Code of Federal Regulation, Part 98, Mandatory GHG Reporting, and HAR Title 11, Chapter 60.1, Air Pollution Control; and

4. The GHG emission reduction plan is to become a part of the CSP application process for renewal and any required modifications. With each subsequent GHG emission reduction plan submittal, the owner or operator of the affected source shall report:

    - The GHG emission reduction status;
    - Factors contributing to the emission changes;
    - Any control measure updates; and
    - Any new developments or changes that would affect the basis of the facility-wide CO_2e emissions cap.

To address the above items, the Facility is submitting the changes specified in Appendix D. These changes will not change the allowed type and quantity of fuel combusted, will not require adding or modifying new equipment, and will not result in an increase in the PTE for the Facility. In addition, the current permit already includes many of the monitoring and recordkeeping requirements that will be used to determine compliance with the CO_2e emission cap. For example, the method to calculate CO_2e is based on fuel consumption, and the permit already includes provisions to monitor and record fuel consumption. Therefore, these revisions focus on identifying the following:

- an emission cap based on currently allowed fuel consumption,
- emission calculation methods using data already required to be collected, and
- additional reporting requirements.

3.0 FACILITY OVERVIEW

3.1 Facility Location

The Facility is located in Pepeekeo, Hawaii, on a 25.57-acre site at latitude 19°50'36" N and longitude 155°5'8" W on the Big Island of Hawaii. The property is bounded by the ocean on the east and Sugar Mill Road on the north. The elevation at the Facility is approximately 80 feet above sea level. A map showing the Facility location is presented as Figure 3-1.

3.2 Process Description

The Facility consists of a Babcock & Wilcox water tube steam boiler ("Boiler"), a steam turbine generator, and an 836 kW emergency engine. The Facility is designed to only combust non-fossil fuels: wood or 100 percent S15 biodiesel. The Boiler primarily burns wood except on certain occasions such as startup when S15 biodiesel (contains no more than 15 parts per million (ppm) of sulfur) may be used. The primary type of wood fired intended to be used in the Boiler is eucalyptus, but other clean woods can also be used. These woods, as burned, typically have a moisture content within the 40 to 50 percent range.

During the initial stages of startups, the permit requires that only biodiesel be burned in the Boiler. During the later stages of startup, the permit allows for wood to gradually be introduced. The total annual usage of S15 biodiesel in the Boiler during startup periods will not exceed 11,880 gallons per year. Biodiesel may also be used as a supplemental fuel during low load operation of the Boiler when necessary to achieve flame stabilization or during upset conditions (e.g. conveyor malfunction or quick response to load demand). Annual consumption of biomass and biodiesel for the Boiler is limited to 2,800,000 MMBtu (including startup).

The 836 kilowatt (kW) electrical engine is only permitted to combust 100 percent S15 biodiesel. The engine operates only during emergency situations and required maintenance and testing of the engine.

The wood and S15 biodiesel fuels will be stored on site. The wood will be brought on site as logs or chips. If brought on as logs, they will be chipped by an electric chipper within an enclosed chipper building with dust control, and then conveyed to an on-site chip storage facility. Wood transported to the site as chips will be conveyed to the on-site ship storage facility. Ash, a byproduct of burning wood, will be shipped off site for landfill, beneficial use/soil amendment or returned to the forest to enhance the soil.

In addition to the above processes, four wells provide cooling water for the condenser in a once-through system, after which the water is then reinjected into separate wells.

3.3 Equipment Listing

Existing equipment includes:

- Babcock & Wilcox Boiler to be equipped with:
  - Multi-clone
  - Electrostatic Precipitator (ESP);

  - Baghouse;
  - Controls equivalent to the Nalco Rotating Opposed Fire Air (ROFA) System;
  - Controls equivalent to the Nalco Rotating Mix (ROTAMIX) Urea Injection System; and
  - Controls equivalent to trona or lime injection as necessary.
- Steam Powered Turbine Generator.

Equipment defined by the HDOH regulations as insignificant sources include:

- 836 kW S15 biodiesel emergency engine (standby generator under HDOH Section 11-60.1-82(f)(5)); and
- Electric chipper operating within an enclosed chipper building with building dust collector. Contract will require wood to be received within a certain moisture range, thereby further limiting PM_{10} emissions (under emission thresholds under HDOH Section 11-60.1-82(f)(7)).

Equipment specifications for the Boiler and S15 biodiesel emergency engine are summarized in Tables 3-1 and 3-2.

The Boiler will be equipped with a combustion air system equivalent to a Nalco ROFA for combustion control. In addition, the Boiler will utilize NOx emission reduction systems such as a selective non-catalytic reduction (SNCR) (e.g. Nalco's ROTAMIX), or an equivalent system that will be used as needed to achieve necessary NOx emission reductions. The combustion air system is designed to reduce nitrogen oxides (NOx) and carbon monoxide (CO) and increases thermal efficiency. It is able to achieve the reduced emissions by injecting air into various points of the Boiler to control localized air fuel ratios and mixing. Such combustion air control systems by themselves have seen reductions of NOx between 45 and 65 percent. Adding specific NOx emission reduction systems can achieve an additional NOx reduction of up to 65 percent (above that already achieved by the combustion air control system). In addition, exhaust gases will be treated by an ESP and baghouse system that will reduce particulate emissions (including most metals) by at least 95 percent. Having a baghouse together with an ESP will enable the Facility to reduce particulate emissions even further compared to just having an ESP.

The Facility will also employ, as needed, a dry sorbent injection system to control hydrogen chloride (HCl) and sulfur oxide (SOx) emissions. The dry sorbent will be trona (sodium sesquicarbonate), lime, or equivalent. The sorbent will be injected downstream of the ESP where the HCl and SOx will react with the sorbent and be subsequently captured in the baghouse. HCl is also expected to be absorbed to some extent by the ash, thereby reducing HCl emissions even without injection of the dry sorbent into the atmosphere. The dry sorbent injection system will be used as needed to further control HCl emissions to 0.004 pounds per million British thermal units (lb/MMBtu) or less.

Table 3-1 Equipment Specifications and Performance Data: Boiler

Manufacturer	Babcock & Wilcox
Model Number	B W 23623
Primary Fuels	Biomass (Primarily Eucalyptus but will burn other clean woods)
Backup Fuels	S15 Biodiesel
Site Ambient Temperature	80°F
Air Inlet Temperature	80°F

Exhaust Outlet Temperature	345°F (at full load)	
Average Hours of Operation	8,040 hours per year	
	Eucalyptus Wood	***S15 biodiesel***
No. of Burners	N/A	3-4
Burner Manufacturer	N/A	Zeeco
Burner Type	N/A	Y-Jet steam atomized
Fuel Consumption at Rated Output	407 MMBtu/hr	367 gallons/hr (***forecast rate during startup***)[a]

a. S15 biodiesel would also be burned with wood at certain non-peak loads.

Table 3-2 Equipment Specifications: S15 Biodiesel Engine

Manufacturer	Detroit Diesel
Model	12V-2000 G60
Cylinders and Configuration	V-12
Aspiration	Turbocharged and Aftercooled
Exhaust Temperature (100% load)	700°F
Displacement	23.9 liters
Fuel	S15 biodiesel
Fuel Usage	715 MMBtu/yr
Heat Input Rating	7.15 MMBtu/hr
Engine Output Rating	1,120 bhp 836 kW
Exhaust Flow Rate	3,000 scfm

3.4 Fuel Profile

The Boiler may burn both wood and 100 percent S15 biodiesel, while the emergency engine must burn only 100 percent S15 biodiesel. Typical fuel profiles for the primary biomass (Eucalyptus) and S15 biodiesel are summarized in Tables 3-3 and 3-4.

Table 3-3 *Fuel Profile: Eucalyptus*

Property	Average Value
Nitrogen, Wt. %	0.12
Sulfur, Wt. %	0.01
Moisture, Wt. %	45
Ash, Wt. %	1.1
Heat Content, Btu/lb HHV (As burned, 45% moisture) (Dry)	 4,474 8,134

Note: Basis for these average values is included in Appendix C

Table 3-4 *Fuel Profile: S15 Biodiesel*

Property	Typical Value
Nitrogen, Wt. %	12.30
Sulfur, Wt. ppm	15
Heat Content (HHV), Btu/lb Btu/gal	19,020 128,000

Source: Minnesota Air Pollution Biofuels Report (nitrogen and Btu/lb heat content as burned)[1] and sulfur content of S15 Biodiesel. Btu/gal heat content from EPA's 40 CFR 98 subpart C Table 1 (0.128 MMBtu/gal) Biodiesel.

[1] Minnesota Pollution Control Agency. *Emission Factors for Priority Biofuels in Minnesota.* 30 June 2007.

4.0 EMISSIONS

This section describes the emission quantification methodology, and summarizes the estimated emissions from the Boiler and S15 biodiesel engine. PTE emissions of criteria pollutants and their precursors presented include carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and volatile organic compounds (VOCs). PTE emissions for greenhouse gases (GHGs) and hazardous air pollutants (HAPs) have also been calculated. GHG's emitted from biomass include carbon dioxide (CO_2), methane CH_4, and nitrous oxide N_2O. However, since this facility only burns biomass, only CH4 and N2O is considered a part of the CO_2e emission cap. The revisions will not increase the PTE of the Facility.

4.1 Operating Assumptions

The criteria pollutant and HAP emissions calculations are based on the operating assumptions listed in Appendix B, "Summary of Hourly and Annual Criteria Pollutant." The operation assumptions for the GHG emissions are listed in Appendix B, "GHG Emissions." The primary fuel for the Boiler operations will be clean wood, with some use of S15 biodiesel at non-peak loads as necessary. In addition, 100 percent S15 biodiesel will be used for startup of the Boilers. Annual consumption of wood and biodiesel for the Boiler will be limited to 2,800,000 MMBtu (including startup) with annual consumption of biodiesel during startup periods limited to 11,880 gallons. The 836 kilowatt (kW) emergency engine, an "insignificant activity" per § 11-60.1-82(f)), will only combust S15 biodiesel. For biodiesel, a high heat content factor from 40 CFR 98 subpart C (0.128 MMBtu/gal) was used for these calculations.

4.2 Criteria Pollutant and Hazardous Air Pollutant Emissions

The PTE criteria pollutant and HAP emissions will not change as a result of the submitted revisions to the permit conditions. Detailed calculations for these pollutants are presented in Appendix B and are identical to those presented in the Renewal Application submitted to HDOH on August 26, 2015.[2]

[2] Hū Honua Bioenergy, Renewal Application for New Covered Source Permit, August 2016.

4.3 Greenhouse Gas Emissions

Greenhouse gas emissions are estimated based on annual operation of the Boiler being restricted to 2,800,000 MMBtu, including 11,880 gallons per year of biodiesel used during startup. It is also assumed that during normal operations (after startup), 1 percent of the annual heat input will be from the combustion of biodiesel and the remaining will be from the combustion of wood. For the emergency engine, emissions are based on assuming biodiesel combustion for 100 hours and a 7.15 MMBtu per hr design capacity, totaling 715 MMBtu. Default emission factors from EPA Mandatory Reporting Rule, Table C-1 and C-2 (dated November 29, 2013) are used. CO_2e equivalent emissions are calculated based on global warming potentials from EPA Mandatory Reporting Rule, Table A-1 (dated November 29, 2013). The emission factors used and resulting GHG emissions are presented in Table 4-4.

Table 4-1 Potential to Emit for Greenhouse Gases

	Annual Use (MMBtu)	Emission Factors (kg/MMBtu)[1]			Annual GHG Emissions (short tons/yr)				Annual CO2e Emissions (short tons CO2e/yr)[2]				
		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	Total	CO_2	CH_4	N_2O	Total	$CH_4 + N_2O$
Boiler - Normal Operations[3]													
Wood (99%)	2,770,495	93.8	0.0072	0.0036	286,460	21.99	10.99	286,493	286,460	549.7	3,276	290,286	*3,826*
Biodiesel (1%)	27,985	73.84	0.0011	0.00011	2,278	0.034	0.0034	2,278	2,278	0.85	1.01	2,280	*1.86*
Boiler - Startup													
Biodiesel (11,880 gal/yr, 0.128 MMBtu/gal)	1,521	73.84	0.0011	0.00011	123.8	0.0018	0.00018	123.8	123.8	0.046	0.055	123.9	*0.101*
Emergency Engine													
Biodiesel (100 hr, 7.15 MMBtu/hr)	715	73.84	0.0011	0.00011	58.2	0.00087	0.00009	58.2	58.2	0.022	0.026	58.2	*0.048*
				Total	**288,920**	**22.03**	**11.0**	**288,953**	**288,920**	**550.6**	**3,277**	**292,748**	*3,828*

1. Default emission factors from EPA Mandatory Reporting Rule, Table C-1 and C-2 (dated November 29, 2013).
2. Based on global warming potentials from EPA Mandatory Reporting Rule, Table A-1 (dated November 29, 2013).
3. Normal operations for the Boiler are any operations aside from startup. The annual Boiler limit is 2,800,000 MMBtu/yr. With 1,521 MMBtu/yr used for startup, normal operations are restricted to the remaining 2,798,479 MMBtu/yr.

5.0 APPLICABLE RULES

5.1 Applicable Hawaii Administrative Rules

The following is a list of applicable Hawaii Administrative Rules (HAR) under Title 11, Chapter 60.1 (Air Pollution Control), followed by the applicant's response.

CHAPTER 11-59 AMBIENT AIR QUALITY STANDARDS (09/28/01)

§11-59-4 and -5 Ambient Air Quality Standards and Prohibition

The Facility's PTE will not change. As discussed in Section 6, the Facility operations will not result in an exceedance of ambient air quality standards summarized in Table 6-1

CHAPTER 11-60.1 AIR POLLUTION CONTROL (6/19.14)

§11-60.1-1 Definitions

The Facility is considered a "major source" since it has the potential to emit more than 100 tons/year of a single air pollutant (in this case NOx and CO). As such, the Facility is deemed a "covered source."

The Boiler will be classified a "biomass fuel burning Boiler" given that the annual heat input from biomass fuel will exceed the annual heat input from S15 biodiesel.

§11-60.1-2 Prohibition of Air Pollution

This application is being submitted to modify the permit conditions to incorporate a GHG emissions limit for the Facility per HDOH requirements.

§11-60.1-3 General Conditions for Considering Applications

All applicable requirements per HAR §11-60, National Ambient Air Quality Standards (NAAQS), New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and Prevention of Significant Deterioration (PSD) review are listed in this application along with a statement of compliance with these requirements.

§11-60.1-4 Certification

All required application forms are signed by the responsible official stating the veracity of the listed information.

§11-60.1-5 Permit Conditions

The Facility will comply with any and all conditions imposed on the Facility within the current and modified covered source permit.

§11-60.1-6 Holding of Permit

A copy of the permit will be kept on site near each stationary source and will be replaced whenever the permit is renewed and/or modified.

§11-60.1-7 Transfer of Permit

The permit will not be transferred either from source to source or location to location and the applicant will obtain approval of a permit transfer to another person or entity, if the need arises.

§11-60.1-8 Reporting Discontinuance

The applicant will give written notification within 30 days of permanent discontinuance of the operation of any source at the Facility.

§11-60.1-9 Cancellation of a Noncovered or Covered Source Permit

Construction shall commence within 18 months of the issuance of the covered source permit.

§11-60.1-10 Permit Termination, Suspension, Reopening, and Amendment

The Facility will comply with any action taken by the director of the HDOH.

§11-60.1-11 Sampling, Testing, and Reporting Methods

All necessary sampling and testing shall be done in accordance with USEPA reference methods.

§11-60.1-12 Air Quality Models

The applicant will use methodologies outlined in 40 CFR Part 51, Appendix W (Guideline on Air Quality Models) as the basis for air model estimates of ambient concentrations. Details of the method used for the ambient air quality modeling are presented in Section 5.

§11-60.1-14 Public Access to Information

The applicant is aware that any information submitted to the HDOH will be considered a government record with the exception of documents designated as confidential.

§11-60.1-15 Reporting of Equipment Shutdown

Twenty-four hour notice shall be given whenever air pollution control equipment will be shutdown for necessary scheduled maintenance.

§11-60.1-16 Prompt Reporting of Deviations

The Facility will comply with the stated notification requirements whenever a malfunction or breakdown of an emission unit or air pollution control equipment will cause a violation of an air quality standard.

§11-60.1-17 Prevention of Air Pollution Emergency Episodes

The Facility will comply with any directives issued by the director of the HDOH to curtail source activities.

§11-60.1-18 Variances

Any variances and variance requests will comply with Hawaii Revised Statute 342B-14 and will not prevent or interfere with the attainment or maintenance of NAAQS.

§11-60.1-19 Penalties and Remedies

The applicant will pay any penalties imposed as a result of a violation of any permit condition or HAR requirement.

§11-60.1-32 Visible Emissions

The visible emission limitation of §11-60.1-32(b) applies to stationary sources that commenced construction after 20 March 1972.

As new sources, the Boiler and emergency engine will be subject to the visible emissions limitation of 20 percent opacity except during startup, shutdown, and breakdown for 6 minutes in any 60 minutes for visible emissions that do not exceed 60 percent opacity. The Boiler and emergency engine will be in compliance at all times with the visible emissions limitation. As will be discussed below, the Facility is in compliance with the opacity limits specified in 40 CFR 63 Subpart JJJJJJ.

§11-60.1-33 Fugitive Dust

The Facility will take "reasonable precautions," with examples cited in the regulation, to prevent visible fugitive dust from becoming airborne.

§11-60.1-34 Motor Vehicles

All motor vehicles involved in the construction, maintenance, or operation of the covered source shall comply with the visible smoke and idling limitations of this section.

§11-60.1-36 Biomass Fuel Burning Boilers

The Boiler shall comply with the particulate matter limitation of 0.40 lb particulate matter per 100 lb of biomass burned.

Using the particulate matter emission factor for the Boiler burning biomass at peak load as shown in Table 3-1, the amount of particulate matter that will potentially be emitted per 100 lb of biomass burned can be calculated as follows:

$$\text{Feed Rate}_{\text{Biomass}} = \text{Firing Rate}_{\text{Biomass}} / \text{HHV}_{\text{Biomass}}$$
$$= 407 \text{ MMBtu/hr} \times 1{,}000{,}000 \text{ Btu/1 MMBtu} \times 1 \text{ lb/4,474 Btu}$$
$$= 90{,}970 \text{ lb/hr}$$

$$\text{PM/100 lb}_{\text{biomass}} = \text{PM lb/MMBtu} \times \text{Firing Rate MMBtu/hr} \times 1/\text{Feed Rate} \times 100$$
$$= 0.024 \text{ lb/MMBtu} \times 407 \text{ MMBtu/hr} \times 1 \text{ hr/90,970 lb} \times 100$$
$$= 0.01 \text{ lb/100 lbs}_{\text{biomass}}$$

The calculated particulate matter emission rate per 100 lb of biomass burned is below the limitation of 0.40 lb particulate matter per 100 lb of biomass burned.

§11-60.1-38 Sulfur Oxides from Fuel Combustion

In general, a source cannot burn fuel with a sulfur content greater than 2 percent by weight. Wood analysis conducted on representative eucalyptus show sulfur contents to be 0.02 percent or less by weight for this type of wood. Also, the S15 biodiesel will have a sulfur content of 0.0015 percent.

§11-60.1 Subchapter 5 Covered Sources

The Boiler is not exempt per any of the exemptions listed in HAR § 11-60.1-82(d), nor is operation of the Boiler at the plant considered an "insignificant activity" per § 11-60.1-82(e) through § 11-60.1-82(g). Therefore, the Boiler is subject to the requirements for covered sources per § 11-60.1-82. The emergency engine is considered an "insignificant activity" per § 11-60.1-82(f). The covered source will comply with the requirement of § 11-60.1-85 for submitting a compliance plan by listing all applicable requirements and the compliance status of each requirement. The compliance certification required by § 11-60.1-86 is submitted with this application.

New or modified covered sources that have the potential to emit or increase emission above significant amounts must apply BACT to control pollutants covered under the NAAQS or State Ambient Air Quality Standards (SAAQS). The regulation defines significant as the following:

- CO = 100 tons per year;
- NO_x= 40 tons per year;
- SO_2 = 40 tons per year;
- PM = 25 tons per year;
- PM_{10} = 15 tons per year;
- VOC = 40 tons per year; and
- Lead = 0.6 tons per year.

As shown in Section 4, annual emissions from the Boiler are forecast to exceed these significance thresholds for CO, NO_x, and particulate matter and so BACT is required for these pollutants. A detailed top-down BACT analysis was conducted in the initial permit application to determine the appropriate emission levels for these pollutants. Details on the BACT analysis were included in the report titled "Top-Down BACT Analysis for Biomass-Fueled Boiler."[3]

The emission factors presented in Appendix B and Table 5-1 are the BACT levels for these pollutants as determined in the initial permit application. NOx emission reduction systems will be employed along with combustion air systems to control NOx levels as discussed in more detail in Section 3.3. CO will be minimized using good combustion practices and combustion air mixing design. Particulate matter will be controlled using an ESP and baghouse to BACT levels for filterable PM_{10} emissions.

[3] ERM, *Top-Down BACT Analysis for Biomass-Fueled Boiler*, December 2010.

Table 5-1 BACT Levels from Initial Permit Application

Pollutant	lb/MMBtu	Equivalent Control Technology
NO_x	0.15	Equivalent to Nalco ROFA and ROTAMIX
CO	0.176	Good combustion practices, Nalco ROFA equivalent air mixing
FPM_{10}(filterable)	0.012	ESP and baghouse

§11-60.1 Subchapter 7 Prevention of Significant Deterioration Review

As shown in HAR § 11-60.1-132, the requirements for a Prevention of Significant Deterioration (PSD) review are applicable to any "major stationary source" or "major modification" as defined in HAR § 11-60.1-131. The major stationary source threshold for a non-fossil-fuel-fired Boiler is 250 tons per year of any regulated new source review pollutant (not including GHG). As shown in Appendix B, controlled emissions of regulated air pollutants will remain under 250 tons per year and so the Facility will not be a major stationary source subject to PSD.

In addition, PSD can be triggered when GHG emissions were equal to or greater than 100,000 tons per year of CO2e. However, on June 23, 2014, the U.S. Supreme Court concluded that GHG emissions alone cannot trigger PSD. Thus, PSD would not be triggered since non-GHG emissions are less than 250 tons per year. In addition, this permit application is for changes in the permit conditions that will not result in increases of any air pollutant.

§11-60.1-174 Maximum Achievable Control Technology (MACT) emission standards

As shown in Section 3.4, HAPs emissions at the Facility will be controlled to be less than 10 tons per single HAP and 25 tons per combined and is therefore not a major source of HAPs. The Facility is installing a baghouse and sorbent injection system that will control emissions of HCl to below 5.5 tons per year. USEPA has finalized the rule for non-major Area Sources of HAP from Industrial, Commercial, and Industrial Boilers (40 CFR Part 63 Subpart JJJJJJ). While the Facility is not subject to the case-by-case MACT provision for major sources (40 CFR 63.50-56), for the Facility's initial permit application, the Facility voluntarily complied with the following provisions in the draft Area Source Boiler MACT, which have since been included in the final rule:

- PM Limit of 0.03 lb/MMBtu;
- Opacity of 10 percent (daily block average);
- Installation of a Continuous Opacity Monitoring System (COMS); and

The rule specifies that these limits do not apply during startup and shutdown. The Facility will comply with the final rule.

The S15 biodiesel emergency engine will be located at an area source of HAPs and is subject to the requirements of 40 CFR 63 Subpart ZZZZ "National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines." Under 40 CFR Part 63, Subpart ZZZZ [40 CFR 63.6590(c)(1)], new or reconstructed engines need to meet the requirements of 40 CFR Part 60 Subpart IIII. However, as described in Section 4.2 of this application, 40 CFR Part 60 Subpart IIII is not applicable because the engine was manufactured prior to 1 April 2006 [per 40 CFR 60.4200(a)].

§11-60.1 Subchapter 11 Greenhouse Gas Emissions

The Facility is a permitted covered source with the potential to emit GHG emissions (all biogenic) equal to or above 100,000 tons per year CO_2e (when considering biogenic CO_2 emissions in addition to CH_4 and N_2O). Pursuant to HAR 11-60.1 subchapter 11, the Facility submitted GHG gas emission reduction plan with a proposed facility-wide emissions cap for CH_4 and N_2O, and HDOH has approved the plan. The Facility will comply with its facility-wide cap for GHG gases by January 1, 2020 and maintain that cap thereafter in accordance with §11-60.1-204(c). This permit application is being submitted to revise the permit conditions to be consistent with the state GHG rule.

5.2 Applicable New Source Performance Standards

The following is a list of applicable New Source Performance Standards (NSPS) and the applicant's response.

NSPS - 40 CFR 60 Subpart Db (02/27/2014)
(Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units)

NSPS Subpart Db applies to Boilers that generates steam and are constructed, modified, or reconstructed after 19 June 1984, and that have a heat input capacity greater than 100 MMBtu per hour. The following requirements apply to non-fossil fuel-fired Boilers:

Emission Limits:

- PM ≤ 0.030 lb/MMBtu; and
- Opacity ≤ 20 percent, 6-minute average, except for one 6-minute period per hour not to exceed 27 percent.

Initial Testing:

- Conduct performance tests in accordance with the following procedures listed in 40 CFR 60, Appendix A:
  - PM - Methods: 1; 3A or 3B; 5, 5B, or 17; and
  - Opacity - Method 9.

Monitoring:

- Install a continuous opacity monitoring system (COMS) for measuring opacity.

Reporting:

- Submit initial notifications per 40 CFR 60 Subpart A:
  - Initial startup notification;
  - Performance test results; and
  - COMS performance evaluation results.
- Submit semiannual reports including:
  - Excess emission reports.

Recordkeeping:

- Maintain the following records:
  - Fuel usage and calculate annual capacity factor for each fuel;
  - Opacity records; and

- Performance test results.

- Maintain records for 2 years following the date of the record.

The Facility will comply with all of the above.

NSPS - 40 CFR 60 Subpart IIII (06/28/11)
(Standards of Performance for Stationary Compression Ignition Internal Combustion Engines)

The requirements of this NSPS are not applicable to the S15 biodiesel emergency engine, since the unit was manufactured prior to the 1 April 2006 or model year 2007 applicability dates as listed in section 40 CFR 60.4200(a) of the NSPS.

6.0 AMBIENT AIR QUALITY STANDARDS

The federal government has set standards, specifically the National Ambient Air Quality Standards (NAAQS), for ambient concentrations of six "criteria" pollutants to protect human health. These health-based standards represent a threshold below which health impacts are not expected. The pollutants include ozone (O_3), nitrogen dioxide (NO_2), SO_2, CO, lead (Pb), PM_{10}, and $PM_{2.5}$. An area with ambient air concentrations below the NAAQS levels is said to be "in attainment." The number of exceedances allowed depends on the pollutant considered and the averaging time, but is typically only once per year. The state of Hawaii has been designated "in attainment" of the NAAQS for all criteria pollutants where sufficient data were available.

The HDOH has established its own, generally stricter, standards for the criteria pollutants, known as the SAAQS. Like the NAAQS, the SAAQS specify concentration standards for a given averaging time for a given pollutant. Table 6-1 summarizes both the NAAQS and SAAQS. The pollutants with short-term standards are those with short-term health effects, and those with long-term averaging times reflect those with long-term health effects. It is not uncommon for the same pollutant to have multiple averaging times.

In the initial permit application, dispersion modeling was performed using the AERMOD modeling system and an air quality impact assessment was performed to estimate maximum off-site concentrations of CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. The analysis was performed to demonstrate that the operations of the Facility will not cause or add to an exceedance of an NAAQS or SAAQS. The impact analysis was performed for multiple operating scenarios to illustrate that the maximum potential concentrations have been identified. The operating scenarios vary depending on the pollutant and averaging times and represent the Boiler at maximum firing load, minimum firing load, and during startup conditions. To demonstrate compliance with the NAAQS and SAAQS, maximum modeled concentrations of CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 were added to representative monitored background concentrations. Modeling indicated no exceedances of the NAAQS or SAAQS. Emission rates will not increase and source parameters will not change as a result of this new permit application. Therefore, the Facility is still in compliance with NAAQS and SAAQS.

Table 6-1 Federal and State Ambient Air Quality Standards

Air Pollutant	Hawaii Standard	Federal Primary Standard	Federal Secondary Standard
Carbon Monoxide			
1-hour average	9 ppm (10,000 µg/m^3)	35 ppm (40,000 µg/m^3)	None
8-hour average	4.4 ppm (5,000 µg/m^3)	9 ppm (10,000 µg/m^3)	None
Lead			
Quarterly average	1.5 µg/m3 (calendar quarter)	0.15 µg/m^3 (running 3-month)	Same as Primary
Nitrogen Dioxide			
1-hour average [a]	None	0.1 ppm (188 µg/m^3)	None
Annual average	0.04 ppm (70 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
Particulate Matter (PM_{10})			
24-hour average	150 µg/m3	150 µg/m^3	Same as Primary
Annual average	50 µg/m3	Revoked 12/17/06	Revoked 12/17/06
Particulate Matter ($PM_{2.5}$)			
24-hour average [b]	None	35 µg/m^3	Same as Primary
Annual average	None	12 µg/m^3	15 µg/m^3
Ozone			
8-hour average	0.08 ppm (157 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
Sulfur Dioxide			
1-hour average [c]	None	0.075 ppm (196 µg/m^3)	None
3-hour average	0.5 ppm (1,300 µg/m^3)	None	0.5 ppm (1,300 µg/m^3)
24-hour average	0.14 ppm (365 µg/m^3)	None	None
Annual average	0.03 ppm (80 µg/m^3)	None	None
Hydrogen Sulfide			
1-hour average	0.025 ppm (35 µg/m^3)	None	None

[a] The 1-hour NAAQS for NO_2 is attained when the 3-year average of the 98th percentile of 1-hour daily maximum concentrations is below 188 µg/m^3.

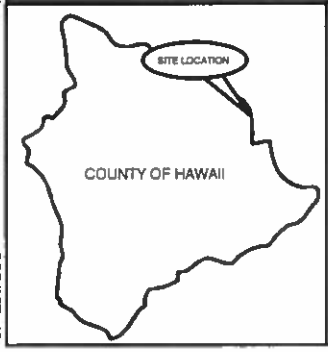
[b] The 24-hour NAAQS for $PM_{2.5}$ is attained when the 98th percentile of the daily concentrations, averaged over 3 years is equal to or less than 35 µg/m^3.

[c] The 1-hour NAAQS for SO_2 is attained when the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations is less than 196 µg/m^3.

7.0 FEES

According to HDOH HAR 60.1-113, the application renewal fee for a major toxic source, with no increase in emissions, shall be $1,000. A check for this amount was made out to "Clean Air Special Fund-COV," as stipulated in the HDOH application instructions. The check is being delivered to HDOH separately.

Figure



1" = 2000'

0 1000' 2000' 4000' 6000'

Figure 3-1
Site Location Map
Hu Honua Bioenergy
Pepeekeo, Hawaii

Environmental Resources Management
www.erm.com

ERM

Image Source: Google Earth Pro, Version 5.0.11337.1968

J. Estrada 1/11/2017. 0269470.00 G:\DWGS\0269470 Hu Honua Bioenergy\0269470000-01.dwg

Appendix A
Covered Source Application Forms

File/Application No.: _____

S-1: Standard Air Pollution Control Permit Application Form

(Covered Source Permit and Noncovered Source Permit)

State of Hawaii
Department of Health
Environmental Management Division
Clean Air Branch
P.O. Box 3378 • Honolulu, HI 96801-3378 • Phone: (808) 586-4200

1. Company Name: Hu Honua Bioenergy, LLC

2. Facility Name (if different from the Company): Hu Honua Bioenergy Facility

3. Mailing Address: One Embarcadero Center Suite 1320

   City: San Francisco State: CA Zip Code: 94111

   Phone Number: (415) 230-4844

4. Name of Owner/Owner's Agent: John G. Sylvia

   Title: President Phone: (415) 230-4844

   Mailing Address: Administration Office. One Embarcadero Center, Suite 1320

   City: San Francisco State: CA Zip Code: 94111

5. Plant Site Manager/Other Contact: Kevin Owen

   Title: General Manager Phone: (808) 964-1110

   Mailing Address: P.O. Box 8

   City: Pepeekeo State: HI Zip Code: 96813

6. Permit Application Basis: (Check all applicable categories.)

   ☐ Initial Permit for a New Source ☐ Initial Permit for an Existing Source

   ☐ Renewal of Existing Permit ☐ General Permit

   ☐ Temporary Source ☐ Transfer of Permit

   ☒ Modification to a Covered Source: → Is Modification? ☒ Significant ☐ Minor ☐ Uncertain

   ☐ Modification to a Noncovered Source

7. If renewal or modification, include existing permit number: **CSP 0724-01-C**

8. Does the Proposed Source require a County Special Management Area Permit? ☐ Yes ☒ No

9. Type of Source (Check One): ☒ Covered Source ☐ Covered and PSD Source

   ☐ Noncovered Source ☐ Uncertain

10. Standard Industrial Classification Code (SICC), if known: 4911

11. Proposed Equipment/Plant Location (e.g. street address): 28-283 Sugar Mill Road

City: Pepeekeo State: HI Zip Code: 96783

UTM Coordinates (meters): East: 281250 North: 2195900

UTM Zone: ___ UTM Horizontal Datum: ☐ Old Hawaiian ☒ NAD-27 ☐ NAD-83

12. General Nature of Business: Electric Power Generation

13. Date of Planned Commencement of Construction or Modification: TBD

14. Is *any* of the equipment to be leased to another individual or entity? ☐ Yes ☒ No

15. Type of Organization: ☒ Corporation ☐ Individual Owner ☐ Partnership

☐ Government Agency (Government Facility Code: _____)

☐ Other: _____

Any applicant for a permit who fails to submit any relevant facts or who has submitted incorrect information in any permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. In addition, an applicant shall provide additional information as necessary to address any requirements that become applicable to the source after the date it filed a complete application, but prior to the issuance of the noncovered source permit or release of a draft covered source permit. (HAR §11-60.1-64 & 11-60.1-84)

RESPONSIBLE OFFICIAL (as defined in HAR §11-60.1-1)

Name (Last): Sylvia (First): John (MI): G.

Title: President Phone: (415) 230-4844

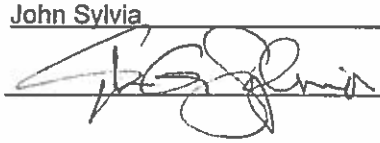
Mailing Address: Administration Office, One Embarcadero Center, Suite 1320

City: San Francisco State: CA Zip Code: 94111

Certification by Responsible Official (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

NAME (Print/Type): John Sylvia

(Signature):  Date: 1/22/17

FOR AGENCY USE ONLY:

File/Application No.: _____

Island: _____

Date Received: _____

Submit the following documents as part of your application:

A. The ***Emissions Units Table***, filled in as completely as possible. Use separate sheets of paper as needed. General instructions include the following:

1. Identify each **emission point** with a unique number for this plant site, consistent with emission point identification used on the location drawing and previous permits; if known, provide the SICC number. Emission points shall be identified and described in sufficient detail to establish the basis for **fees** and applicability of requirement of HAR, Chapter 11-60.1. Examples of emission point names are: heater, vent, boiler, tank, baghouse, fugitive, etc. Abbreviations may be used.
   a. For each emission point use as many lines as necessary to list regulated and hazardous air pollutant data. For hazardous air pollutants, also list the Chemical Abstracts Service number (CAS#).
   b. Indicate the emission points that discharge together for any length of time.
   c. The **Equipment Date** is the date of equipment construction, reconstruction, or modification. Provide supporting documentation.

2. State the **maximum emission rates** in terms sufficient to establish compliance with the applicable requirements and standard reference test methods. Provide all supporting emission calculations and assumptions:
   a. Include all regulated and hazardous air pollutants and air pollutants for which the source is major, as defined in HAR §11-60.1-1. Examples of regulated pollutant names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), and particulate less than 10 microns (PM_{10}). Abbreviations may be used.
   b. Include fugitive emissions.
   c. **Pounds per hour (#/HR)** is the maximum potential emission rate expected by applicant.
   d. **Tons per year** is the annual maximum potential emissions expected by the applicant, taking into account the typical operating schedule.

3. Describe ***Stack Source Parameters***:
   a. **Stack Height** is the height above the ground.
   b. **Direction** refers to the exit direction of stack emissions: up, down or horizontal.
   c. **Flow Rate** is the actual, not the calculated, flow rate.

4. Provide any additional information, if applicable, as follows:
   a. If combinations of different fuels are used that cause any of the stack source parameters to differ, complete one row for each possible set of stack parameters and identify each fuel in the **Equipment Description**.
   b. For a rectangular stack, indicate the length and width.
   c. Provide any information on stack parameters or any stack height limitations developed pursuant to Section 123 of the Clean Air Act.

B. A **process flow diagram** identifying all equipment used in the process, including the following:
1. Identify and describe each emission point.
2. Identify the locations of safety valves, bypasses, and other such devices which when activated may release air pollutants to the atmosphere.

C. A **facility location map**, drawn to a reasonable scale and showing the following:
1. The property involved and all structures on it. Identify property/fence lines plainly.
2. Layout of the facility.
3. Location and identification of the proposed emissions unit on the property.
4. Location of the property and equipment with respect to streets and all adjacent property. Show the location of all structures within 100 meters of the applicant's emissions unit. Provide the building dimensions (height, length, and width) of all structures that have heights greater than 40% of the stack height of the emissions unit.

D. Provide a description of any proposed modifications or permit revisions. Include any justification or supporting information for the proposed modifications or permit revisions.

Company Name: Hu Honua Bioenergy, LLC

File No.: _____

Location: Pepeekeo, HI

(Make as many copies of this page as necessary)

EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA: EMISSION POINTS				AIR POLLUTANT	AIR POLLUTANT EMISSION RATE		UTM Zone: 5 Horizontal Datum [a]: NAD 83		STACK SOURCE PARAMETERS						
Stack No.	Unit No.	Equipment Name/ Description & SICC number	Equipment Date [c]	Regulated/ Hazardous Air Pollutant Name & CAS#	#/ HR	Tons/ YR	Coordinates (mtrs)		Stack Height (mtrs)	Direction (u/d/h) [b]	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m^3/s)	Temp. (° K)	Capped (Y/N)
1	1	Babcock & Wilcox Steam Tube Boiler (Peak Load for Hourly)	TBD	NO_x	61.1	210	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	SO_2	11.4	39.2	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	CO	71.6	246.3	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	VOC	11.4	39.2	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	$PM_{2.5}$	9.8	33.6	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	PM_{10}	9.8	33.6	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	CO2e (in the form of CH4 and N2O)	65.289	3,828	East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							
			TBD	HAP (See Appendix of Permit Application)			East	281524.07941179	42.31	u	2.51	18.93	93.68	438.7	N
							North	2195505.320959							

[a] Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27

[b] Specify the direction of the stack exhaust as u = upward, d = downward, or h = horizontal

[c] Date provided is expected start date of commercial operations.

File No.: _____

C-1: Compliance Plan

The Responsible Official shall submit a Compliance Plan as indicated in the Instructions for Applying for an Air Pollution Control Permit and at such other times as requested by the Director of Health (hereafter, Director).

Use separate sheets of paper if necessary.

1. Compliance status with respect to all Applicable Requirements:

   Will your facility be in compliance, or is your facility in compliance, with all applicable requirements in effect at the time of your permit application submittal?

   [X] YES {If YES, complete items a and c below}

   [ ] NO {If NO, complete items a, b, and c below}

   a. Identify all applicable requirement(s) for which compliance is achieved.

   HAR 11-59 Ambient Air Quality Standards
   HAR 11-60.1-2 Prohibition of Air Pollution
   HAR 11-60.1-5 Permit Conditions
   HAR 11-60.1-6 Holding of Permit
   HAR 11-60.1-7 Transfer of Permit
   HAR 11-60.1-8 Reporting of Discontinuance
   HAR 11-60.1-9 Covered Source Permit Cancellation
   HAR 11-60.1-11 Sampling, Testing, Reporting Methods
   HAR 11-60.1-12 Air Quality Models
   HAR 11-60.1-15 Reporting of Equipment Shutdown
   HAR 11-60.1-16 Deviation Reporting
   HAR 11-60.1-32 Visible Emissions
   HAR 11-60.1-33 Fugitive Dust
   HAR 11-60.1-34 Motor Vehicles
   HAR 11-60.1-36 Biomass Fuel Burning Boilers
   HAR 11-60.1-38 SOx from Fuel Combustion
   HAR 11-60.1 Subchapter 5 Covered Sources
   (also see Section 4.0 of permit application)
   HAR 11-60.1 Subchapter 11 Greenhouse Gas Emissions

   Provide a statement that the source is in compliance and will continue to comply with all such requirements.

   The source is in compliance with the above applicable requirements and will continue to remain in compliance with all applicable requirements.

   b. Identify all applicable requirement(s) for which compliance is NOT achieved.

Provide a detailed Schedule of Compliance Schedule and a description of how the source will achieve compliance with all such applicable requirements.

Description of Remedial Action	Expected Date of Completion

c. Identify any other applicable requirement(s) with a future compliance date that your source is subject to. These applicable requirements may take effect AFTER permit issuance:

Applicable Requirement	Effective Date	Currently in Compliance?
A facility-wide GHG emission cap, will have a future compliance date §11-60.1-204(c).	January 1, 2020	NA

If the source is not currently in compliance, provide a Schedule of Compliance and a description of how the source will achieve compliance with all such applicable requirements:

Description of Proposed Action/Steps to Achieve Compliance	Expected Date of Achieving Compliance

Provide a statement that the source on a timely basis will meet all these applicable requirements:
The source will meet any applicable requirements that have a future compliance date.

If the expected date of achieving compliance will NOT meet the applicable requirement's effective date, provide a more detailed description of each remedial action and the expected date of completion:

Description of Remedial Action and Explanation	Expected Date of Completion

2. Compliance Progress Reports:

a. If a compliance plan is being submitted to remedy a violation, complete the following information:

Frequency of Submittal: N/A (less than or equal to 6 months) Beginning Date: N/A

b. Date(s) that the Action described in (1)(b) was achieved:

Remedial Action	Date Achieved
N/A	

c. Narrative description of why any date(s) in (1)(b) was not met, and any preventive or corrective measures taken in the interim:

N/A

RESPONSIBLE OFFICIAL (as defined in HAR §11-60.1-1)

Name (Last): Sylvia (First): John (MI): G.

Title: President Phone: (415) 230-4844

Mailing Address: Administration Office. One Embarcadero Center, Suite 1320

City: San Francisco State: CA Zip Code: 94111

Certification by Responsible Official (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

Name (Print/Type): John G. Sylvia

(Signature): John G. Sylvia Date: 1/22/17

Facility Name: Hu Honua Bioenergy, LLC

Location: Pepeekeo, HI

Permit Number: 0724-01-C

FOR AGENCY USE ONLY

File/Application No.:

File No.: _____

C-2: Compliance Certification

The Responsible Official shall submit a Compliance Certification as indicated in the Instructions for Applying for an Air Pollution Control Permit and at such other times as requested by the Director of Health (hereafter, Director).

Complete as many copies of this form as needed. Use separate sheets of paper if necessary.

RESPONSIBLE OFFICIAL (as defined in HAR §11-60.1-1)

Name (Last): Sylvia (First): John (MI): G.

Title: President Phone: (415) 230-4844

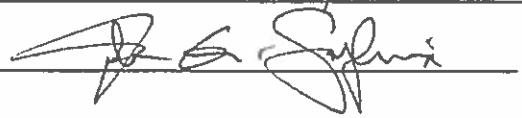
Mailing Address: Administration Office. One Embarcadero Center, Suite 1320

City: San Francisco State: CA Zip Code: 94111

Certification by Responsible Official (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

Name (Print/Type): John G. Sylvia

(Signature):  Date: 1/22/17

Facility Name: Hu Honua Bioenergy, LLC

Location: Pepeekeo, HI

Permit Number: 0724-01-C

FOR AGENCY USE ONLY

File/Application No.:

Island:

Complete the following information for ***each*** applicable requirement that applies to ***each*** emissions unit at the source. Also include any additional information as required by the Director. The compliance certification may reference information contained in a previous compliance certification submittal to the Director, provided such referenced information is certified as being current and still applicable.

1. Schedule for submission of Compliance Certifications during the term of the permit:

   Frequency of Submittal: Annually Beginning Date: 2018

2. Emissions Unit No./Description: Babcock & Wilcox Biomass and Biodiesel-fired Boiler

3. Identify the applicable requirement(s) that is/are the basis of this certification:

HAR 11-59 Ambient Air Quality Standards	HAR 11-60.1-33 Fugitive Dust
HAR 11-60.1-2 Prohibition of Air Pollution	HAR 11-60.1-34 Motor Vehicles
HAR 11-60.1-5 Permit Conditions	HAR 11-60.1-36 Biomass Fuel Burning Boilers
HAR 11-60.1-6 Holding of Permit	HAR 11-60.1-38 SOx from Fuel Combustion
HAR 11-60.1-7 Transfer of Permit	HAR 11-60.1 Subchapter 5 Covered Sources
HAR 11-60.1-8 Reporting of Discontinuance	(also see Section 4.0 of permit application)
HAR 11-60.1-9 Covered Source Permit Cancellation	HAR 11-60.1 Subchapter 11 Greenhouse Gas
HAR 11-60.1-11 Sampling, Testing, Reporting Methods	Emissions
HAR 11-60.1-12 Air Quality Models	
HAR 11-60.1-15 Reporting of Equipment Shutdown	
HAR 11-60.1-16 Deviation Reporting	
HAR 11-60.1-32 Visible Emissions	

4. Compliance status:

   a. Will the emissions unit be in compliance with the identified applicable requirement(s)?

      [X] YES [ ] NO

   b. If YES, will compliance be continuous or intermittent?

      [X] Continuous [ ] Intermittent

   c. If NO, explain:

5. Describe the methods to be used in determining compliance of the emissions unit with the applicable requirement(s), including any monitoring, recordkeeping, reporting requirements, and/or test methods:

Monitoring, recordkeeping, reporting, and conducting permit required tests according to permit stated test methodologies.

Provide a detailed description of the methods used to determine compliance (e.g. monitoring device type and location, test method description, or parameter being recorded, frequency of recordkeeping, etc.):

Monitoring – The following monitors will be used to determine compliance:

Visible emissions monitoring [Compliance with HAR 11-60.32; SIP 11-60-24]

Recordkeeping – The following records will be kept:

Biodiesel purchase order receipts with sulfur content listed [Compliance with HAR 11-60.1-38]

Monthly & annual logs of hours of operation & fuel consumption [Compliance with HAR 11-59;11-60.1-36],

Permit required monitoring data [Compliance with HAR 11-60.1-5]

Reporting – The following reports will be submitted when required:

Discontinuance report [Compliance with HAR 60.1-8]

Equipment shutdown notifications [Compliance with HAR 60.1-15]

Deviation reports [Compliance with HAR 60.1-16]

Annual emissions report [Compliance with HAR 60.1-5, 60.1 Subchapter 5], 60.1 Subchapter 6]

Bi-annual compliance certification report [Compliance with HAR 60.1-86(b)]

Testing – Any permit required testing will comply with permit stated methodologies.

(see Section 4.0 of permit application for more information)

6. Statement of Compliance with Enhanced Monitoring and Compliance Certification Requirements.

a. Will the emissions unit identified in this application be in compliance with applicable enhanced monitoring and compliance certification requirements?

☐ YES ☐ NO

b. If YES, identify the requirements and the provisions being taken to achieve compliance:

No enhanced monitoring requirements are currently applicable.

c. If NO, describe below which requirements will not be met:

File No.: _____

S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)
Permits Office, Air Division
U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, CA 94105

I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:

A. Equipment Specifications:
   1. Maximum design capacity.
   2. Fuel type.
   3. Fuel use.
   4. Production capacity.
   5. Production rates.
   6. Raw materials.
   7. Provide any manufacturer's literature.

B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.
   1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.
   2. List all ***new insignificant*** activities in accordance with HAR §11-60.1-82.

C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
   1. Total hours per day, per week, and/or per month.
   2. Total hours per year.
   3. If operation is seasonal or irregular, describe.

D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
   1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement.
   2. Explanation of all proposed exemptions from any applicable requirements.

E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.

F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable.

G. Provide detailed information to define permit terms and conditions for any proposed ***emissions trading*** within the facility in accordance with HAR §11-60.1-96.

H. For ***significant*** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards.

I. For ***new*** covered sources or ***significant*** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7.

J. Provide the following for compliance purposes:
   1. A Compliance Plan, Form C-1.
   2. A Compliance Certification, Form C-2.

II. Submit an application fee according to the Application Fee Schedule in the Instructions for Applying for an Air Pollution Control Permit.

III. Provide other information as follows:

A. As required by any applicable requirement or as requested and deemed necessary by the Director of Health (hereafter, Director) to make a decision on the application.

B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.

IV. The Director reserves the right to request the following information:

A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.

B. Results of source emissions testing, ambient air quality monitoring, or both.

C. Information on other available control technologies.

V. An application shall be determined to be complete only when all of the following have been complied with:

A. All information required or requested in numbers **I, III, and IV** has been submitted.

B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.

C. All applicable fees have been submitted.

D. The Director has certified that the application is complete.

VI. The Director shall not continue to act upon or consider an incomplete application.

A. The applicant shall be notified in writing whether the application is complete:
   1. For the requirements of subchapter 7, thirty days after receipt of the application.
   2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
   3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to **VI.A.2** above, the application shall be deemed complete for the requirements of subchapter 5.

B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.

VII. After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.

A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.

B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.

VIII. The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.

IX. The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.

X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**

XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

Appendix B
Criteria Pollutant, Greenhouse Gas, and Hazardous Air Pollutant Emissions Calculations

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler

Revised:	1/6/17

Summary of Hourly and Annual Criteria Pollutant

I. Variables

BOILER

Biomass Boiler Heat Input at Peak Load*	407 MMBtu/hr	Sulfur Content of Biodiesel	15 PPM
Biodiesel Boiler Heat Input at Min Load*	41 MMBtu/hr	Max. Days of Boiler Operations	335 Days/Year
Annual Boiler Heat Input During Normal Operations	2,798,479 MMBtu/yr	Start-Up Fuel Usage	11880 gallons/year
Biodiesel HHV	0.019 MMBtu/lb	Start-Up Fuel Usage	1520.64 MMBtu/year
Biodiesel Heat Conter	128,000 Btu/gal	Start-Up Firing Rate**:	47 MMBtu/hr

* Peak load would only burn biomass. Minimum load would burn a combination of biomass and biodiese

** Hourly fuel use during startup is conservatively based on a three hour duration and 1,100 gallon fuel need

II. Hourly Emissions

A. Boiler Normal Operations

Pollutant	Boiler Wood Firing (lbs/hr)
Criteria Pollutants	
$TPM_{2.5}$*	9.8
TPM_{10}	9.8
NOx	61.1
CO	71.6
VOC	11.4
SO_2	11.4

B. Boiler Start-Up

Pollutant	Boiler Start-Up (lbs/hr)
Criteria Pollutants	
$TPM_{2.5}$*	0.1
TPM_{10}	0.1
NOx	5.1
CO	2.6
VOC	0.4
SO_2	0.1

C. Emergency Engine

Pollutant	Emergency Engine (lbs/hr)
Criteria Pollutants	
$TPM_{2.5}$*	0.40
TPM_{10}	0.41
NOx	22.9
CO	6.1
VOC	0.59
SO_2	0.011

* In lieu of particle size distribution information, currently assumes all estimated PM_{10} emissions from the project is $PM_{2.5}$ (a conservative assumption)

III. Annual Emissions

Pollutant	Boiler		Emergency Engine (tons/yr)	Total Emissions (tons/yr)
	Operation (tons/yr)	Start-Up (tons/yr)		
Criteria Pollutants				
PM2.5*	33.6	0.0015	0.020	33.6
PM10	33.6	0.0015	0.020	33.6
NOx	209.9	0.083	1.1	211
CO	246.3	0.042	0.30	247
VOC	39.2	0.0062	0.029	39.2
SO2	39.2	0.0012	0.00056	39.2

* In lieu of particle size distribution information, currently assumes all estimated PM_{10} emissions from the project is $PM_{2.5}$ (a conservative assumption)

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler

Revised: 1/6/17

Emission Factors Used In Calculating Criteria Pollutant

I.A. Boiler - Biomass Firing

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
TPM_{10}	0.024	lb/MMBtu	BACT
NOx	0.15	lb/MMBtu	BACT
CO	0.176	lb/MMBtu	Adjusted to PSD Threshold < 250 TPY at 2,800,000 MMBtu/yr
VOC	0.028	lb/MMBtu	Adjusted to BACT Threshold < 40 TPY at 2,800,000 MMBtu/yr
SO_2	0.028	lb/MMBtu	Adjusted to BACT Threshold < 40 TPY at 2,800,000 MMBtu/yr

I.B. Boiler - Biodiesel Firing**

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
PM_{10}	0.002	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
NOx	0.109	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
CO	0.055	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
VOC	0.008	lb/MMBtu	EPA AP-42 Chapter 1.3 - Diesel
SO_2*	0.002	lb/MMBtu	Mass Balance Calculation

** Used only for start-up of boiler when emission controls assumed not working. Biodiesel emission factors during normal operations conservatively assumed to be equivalent to the higher biomass emission factors.

II. Emergency Engine - 100% Biodiesel

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
PM2.5	0.0556	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel (CPM + FPM3)
PM10	0.0573	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
NOx	3.20	lbs/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
CO	0.85	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
VOC	0.082	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel (NMTOC)
SO2*	0.0016	lb/MMBtu	Mass Balance Calculation

* Mass Balance Calculation:		
MW_{SO2}	64	g/mol
MW_{Sulfur}	32	g/mol
MW_{SO2}/ MW_{Sulfur} =	2	

SO2 Emission Factor = MW_{SO2}/ MW_{Sulfur} * Sulfur Content * Heating Value of Fuel

SO2 EF = 2 * (15/1,000,000)*1 lb/0.019020 MMBtu)

SO2 EF = 0.002 lb/MMBtu

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler
Start-up

Revised: 1/6/17

I. Variables

Heat Input at Rated Output	47	MMBtu/hr
Annual Heat Input	1,521	MMBtu/yr

II. Emission Factors

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
PM10	0.002	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
NOx	0.11	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
CO	0.055	lb/MMBtu	Minnesota Air Pollution Agency Biofuels Report, Table 4-6
VOC	0.008	lb/MMBtu	EPA AP-42 Chapter 1.3 - Diesel
SO2	0.002	lb/MMBtu	Mass Balance Calculation

Startup calculations represent the biodiesel portion of startup. Wood will gradually be introduced during the later stages of startup. The combined maximum fuel usage for wood and biodiesel for normal operations and startup is set at 2,800,000 MMBtu/hr .

III. Emissions Assessment

	Biomass Firing	
Pollutant	Max Hour (lb/hr)	Max Annual (tons/year)
Criteria Pollutants		
PM2.5	0.0939	0.0015
PM10	0.0939	0.0015
NOx	5.1157	0.083
CO	2.5813	0.042
VOC	0.3813	0.006
SO2	0.0740	0.001

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler
Normal Operations

Revised: 1/6/17

I. Variables

Heat Input at Rated Output	407	MMBtu/hr
Annual Heat Input	2,798,479	MMBtu/yr

Used for max hourly.

II. Emission Factors

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
PM10	0.024	lb/MMBtu	BACT
NOx	0.15	lb/MMBtu	BACT
CO	0.176	lb/MMBtu	Adjusted to PSD Threshold < 250 TPY at 2,800,000 MMBtu
VOC	0.028	lb/MMBtu	Adjusted to BACT Threshold < 40 TPY at 2,800,000 MMBtu
SO2	0.028	lb/MMBtu	Adjusted to BACT Threshold < 40 TPY at 2,800,000 MMBtu

III. Emissions Assessment

	Biomass Firing	
Pollutant	Max Hour (lb/hr)	Max Annual (tons/year)
Criteria Pollutants		
PM2.5	9.8	33.6
PM10	9.8	33.6
NOx	61.1	209.9
CO	71.6	246.3
VOC	11.4	39.2
SO2	11.4	39.2

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Emergency Engine Emissions

Revised: 1/6/17

I. Variables

100% Biodiesel (B100) HHV	0.128	MMBtu/gal	
Heat Input at Rated Output	7.15	MMBtu/hr	***Used for max hourly.***
Operating Hours	100	hr/year	
Annual Heat Input	715	MMBtu/yr	***Used for annual emissions.***

II. Equipment Specifications: Biodiesel Emergency Engine

Manufacturer:	Detroit Diesel		
Model:	12V-2000 G60		
Configuration:	V-12		
Aspiration:	Turbocharged and Aftercooled		
Primary Fuel:	100% Biodiesel (B100)		
Exhaust Temperature:	915	°F	(@ 100% load)
Displacement	23.9	Liters	
Heat Input Rating:	7.15	MMBTU/hr	
Engine Output Rating:	1,200	bhp	
	836	kW	
Exhaust Flow Rate:	6,370	acfm	

III. Emission Factors

Pollutant	Emission Rate	Units	Source
Criteria Pollutants			
PM2.5	0.0556	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel (CPM + FPM3)
PM10	0.0573	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
NOx	3.20	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
CO	0.85	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel
VOC	0.08	lb/MMBtu	EPA AP-42 Chapter 3.4 - Diesel (NMTOC)
SO2	0.002	lb/MMBtu	Mass Balance Calculation

IV. Emissions Assessment

	Biodiesel Firing	
Pollutant	Max Hour (lb/hr)	Max Annual (tons/year)
Criteria Pollutants		
PM2.5	0.4	0.02
PM10	0.4	0.02
NOx	22.9	1.1
CO	6.1	0.3
VOC	0.6	0.029
SO2	0.011	0.001

Appendix B
Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler

Revised:	7/15/15

HAP EMISSION ESTIMATES FOR BOILER DURING NORMAL OPERATIONS (HOURLY PEAK LOAD, HOURLY MINIMUM LOAD, ANNUAL) BIOMASS AND BIODIESEL COMBUST

Operating Parameters

Biomass Boiler Heat Input at Peak Load*	407 MMBtu/hr
Biomass Boiler Heat Input at Min Load*	163 MMBtu/hr
Annual Boiler Heat Input During Normal Operations	2,798,479 MMbtu/yr
(from Biomass (99%)	2,770,495 MMbtu/yr)
(from Biodiesel (1%)	27,985 MMbtu/yr)
Wood HHV	0.0045 MMBtu/lb

*** Peak load would only burn biomass. Minimum load would burn a combination of biomass and biodiesel**

HAP Emissions

Pollutant	Percent Control	Wood			Biodiesel (Using Diesel Emission Factors)			Emissions	
		Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Hourly[e]	Annual[e]
		lb/MMBtu	lb/MMBtu	(see note)	lb/MMBtu	lb/MMBtu	(see note)	(lb/hr)	tons/year
Acetaldehyde	0%	8.3E-04	8.3E-04	—[d]	2.51E-06	2.51E-06	—[c]	3.38E-01	1.15E+00
Acetophenone	0%	3.2E-09	3.2E-09	—[d]	NA	NA	NA	1.30E-06	4.43E-06
Acrolein	0%	8.2E-05	8.2E-05	f, g	2.51E-06	2.51E-06	—[c]	3.35E-02	1.14E-01
Benzene	0%	4.2E-03	4.2E-03	—[d]	3.15E-08	3.15E-08	—[c]	1.71E+00	5.82E+00
bis(2-Ethylhexyl)phthalate (Dioctyl phthalate)	0%	4.7E-08	4.7E-08	—[d]	NA	NA	NA	1.91E-05	6.51E-05
Bromomethane (Methyl bromide)	0%	1.5E-05	1.5E-05	—[d]	NA	NA	NA	6.11E-03	2.08E-02
1,3-Butadiene	0%	NA	NA	NA	1.06E-07	1.06E-07	—[c]	NA	1.48E-06
Carbon tetrachloride	0%	4.5E-05	4.5E-05	—[d]	NA	NA	NA	1.83E-02	6.23E-02
Chlorine	0%	0.0E+00	0.0E+00	d, h	NA	NA	NA	0.00E+00	0.00E+00
Chlorobenzene	0%	3.3E-05	3.3E-05	—[d]	1.43E-09	1.43E-09	—[c]	1.34E-02	4.57E-02
Chloroform	0%	2.8E-05	2.8E-05	—[d]	NA	NA	NA	1.14E-02	3.88E-02
Chloromethane (Methyl chloride)	0%	2.3E-05	2.3E-05	—[d]	NA	NA	NA	9.36E-03	3.19E-02
2-Chloronaphthalene	0%	2.4E-09	2.4E-09	—[d]	1.44E-07	1.44E-07	—[i]	9.77E-07	5.34E-06
Dichloromethane (Methylene chloride)	0%	2.9E-04	2.9E-04	—[d]	NA	NA	NA	1.18E-01	4.02E-01
1,2-Dichloropropane (Propylene dichloride)	0%	3.3E-05	3.3E-05	—[d]	NA	NA	NA	1.34E-02	4.57E-02
2,4-Dinitrophenol	0%	1.8E-07	1.8E-07	—[d]	NA	NA	NA	7.33E-05	2.49E-04
Ethylbenzene	0%	3.1E-05	3.1E-05	—[d]	1.16E-05	1.16E-05	—[i]	1.26E-02	4.31E-02
Ethylene dichloride (1,2-dichloroethane)	0%	2.9E-05	2.9E-05	—[d]	NA	NA	—[i]	1.18E-02	4.02E-02
Formaldehyde	0%	4.4E-03	4.4E-03	—[d]	2.73E-03	2.73E-03	—[i]	1.79E+00	6.13E+00
Hexane	0%	NA	NA	NA	2.51E-08	2.51E-08	—[c]	NA	3.51E-07
Hydrogen chloride	94%	6.9E-02	4.0E-03	h	NA	NA	NA	1.63E+00	5.54E+00
4-Nitrophenol	0%	1.1E-07	1.1E-07	—[d]	NA	NA	NA	—[j]	1.52E-04
Pentachlorophenol (PCP)	0%	5.1E-08	5.1E-08	—[d]	NA	NA	NA	2.08E-05	7.06E-05
Phenol	0%	5.1E-05	5.1E-05	—[d]	NA	NA	NA	2.08E-02	7.06E-02
Propionaldehyde	0%	6.1E-05	6.1E-05	—[d]	NA	NA	NA	2.48E-02	8.45E-02
Styrene	0%	1.9E-03	1.9E-03	—[d]	NA	NA	NA	7.73E-01	2.63E+00
Tetrachloroethene (Perchloroethylene)	0%	3.8E-05	3.8E-05	—[d]	NA	NA	NA	1.55E-02	5.26E-02
Toluene	0%	9.2E-04	9.2E-04	—[d]	3.15E-08	3.15E-08	—[c]	3.74E-01	1.27E+00
Trichloroethylene	0%	3.0E-05	3.0E-05	—[d]	NA	NA	NA	1.22E-02	4.16E-02
2,4,6-Trichlorophenol	0%	2.2E-08	2.2E-08	—[d]	NA	NA	NA	8.95E-06	3.05E-05
Vinyl chloride	0%	1.8E-05	1.8E-05	—[d]	NA	NA	NA	7.33E-03	2.49E-02
o-Xylene	0%	2.5E-05	2.5E-05	—[d]	NA	NA	NA	1.02E-02	3.46E-02
Xylene (Total)	0%	NA	NA	NA	1.16E-05	1.16E-05	—[i]	NA	1.63E-04

HAP Emissions

Pollutant	Percent Control	Wood			Biodiesel (Using Diesel Emission Factors)			Emissions	
		Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Hourly[a]	Annual[c]
		lb/MMBtu	lb/MMBtu	(see note)	lb/MMBtu	lb/MMBtu	(see note)	(lb/hr)	tons/year
Metals:									
Antimony	95%	7.9E-06	4.0E-07	—[d]	NA	NA	NA	1.61E-04	5.47E-04
Arsenic	95%	2.2E-05	1.1E-06	—[d]	4.00E-06	2.00E-07	—[j]	4.48E-04	1.53E-03
Beryllium	95%	1.1E-06	5.5E-08	—[d]	3.00E-06	1.50E-07	—[j]	2.24E-05	7.83E-05
Cadmium	95%	4.1E-06	2.1E-07	—[d]	3.00E-06	1.50E-07	—[j]	8.34E-05	2.86E-04
Chromium	95%	2.1E-05	1.1E-06	—[d]	3.00E-06	1.50E-07	—[j]	4.27E-04	1.46E-03
Chromium (VI)	95%	3.5E-06	1.8E-07	—[d]	NA	NA	NA	7.12E-05	2.42E-04
Lead	95%	4.8E-05	2.4E-06	—[d]	9.00E-06	4.50E-07	—[j]	9.77E-04	3.33E-03
Manganese	95%	1.6E-03	8.0E-05	—[d]	6.00E-06	3.00E-07	—[j]	3.26E-02	1.11E-01
Mercury	0%	3.5E-06	3.5E-06	—[d]	3.00E-06	3.00E-06	—[j]	1.42E-03	4.89E-03
Nickel	95%	3.3E-05	1.7E-06	—[d]	3.00E-06	1.50E-07	—[j]	6.72E-04	2.29E-03
Phosphorus	95%	2.7E-05	1.4E-06	—[d]	NA	NA	NA	5.49E-04	1.87E-03
Selenium	95%	2.80E-06	1.40E-07	—[d]	1.50E-05	7.50E-07	—[j]	5.70E-05	2.04E-04
Polycyclic Aromatic Hydrocarbons (PAHs):									
Acenaphthene	0%	9.1E-07	9.1E-07	—[d]	1.65E-06	1.65E-06	—[i]	3.70E-04	1.28E-03
Acenaphthylene	0%	5.0E-06	5.0E-06	—[d]	5.08E-07	5.08E-07	—[i]	2.04E-03	6.93E-03
Anthracene	0%	3.0E-06	3.0E-06	—[d]	1.87E-07	1.87E-07	—[i]	1.22E-03	4.16E-03
Benzo(a)anthracene	0%	6.5E-08	6.5E-08	—[d]	1.05E-07	1.05E-07	—[i]	2.65E-05	9.15E-05
Benzo(a)pyrene	0%	2.6E-06	2.6E-06	—[d]	5.90E-08	5.90E-08	—[i]	1.06E-03	3.60E-03
Benzo(b)fluoranthene	0%	1.0E-07	1.0E-07	—[d]	5.21E-08	5.21E-08	—[i]	4.07E-05	1.39E-04
Benzo(e)pyrene	0%	2.6E-09	2.6E-09	—[d]	1.09E-07	1.09E-07	—[i]	1.06E-06	5.13E-06
Benzo(g,h,i)perylene	0%	9.3E-08	9.3E-08	—[d]	6.64E-08	6.64E-08	—[i]	3.79E-05	1.30E-04
Benzo(j,k)fluoranthene	0%	1.6E-07	1.6E-07	—[d]	NA	NA	NA	6.51E-05	2.22E-04
Benzo(k)fluoranthene	0%	3.6E-08	3.6E-08	—[d]	6.49E-07	6.49E-07	—[i]	1.47E-05	5.90E-05
Chrysene	0%	3.8E-08	3.8E-08	—[d]	1.00E-07	1.00E-07	—[i]	1.55E-05	5.40E-05
Dibenzo(a,h)anthracene	0%	9.1E-09	9.1E-09	—[d]	5.07E-08	5.07E-08	—[i]	3.70E-06	1.33E-05
Fluoranthene	0%	1.6E-06	1.6E-06	—[d]	2.59E-07	2.59E-07	—[i]	6.51E-04	2.22E-03
Fluorene	0%	3.4E-06	3.4E-06	—[d]	9.14E-07	9.14E-07	—[i]	1.38E-03	4.72E-03
Indeno(1,2,3-cd)pyrene	0%	8.7E-08	8.7E-08	—[d]	5.19E-08	5.19E-08	—[i]	3.54E-05	1.21E-04
2-Methylnaphthalene	0%	1.6E-07	1.6E-07	—[d]	1.09E-06	1.09E-06	—[i]	6.51E-05	2.37E-04
Naphthalene	0%	9.7E-05	9.7E-05	—[d]	2.87E-03	2.87E-03	—[i]	3.95E-02	1.74E-01
Perylene	0%	5.2E-10	5.2E-10	—[d]	2.12E-07	2.12E-07	—[i]	2.12E-07	3.68E-06
Phenanthrene	0%	7.0E-06	7.0E-06	—[d]	2.91E-06	2.91E-06	—[i]	2.85E-03	9.74E-03
Pyrene	0%	3.7E-06	3.7E-06	—[d]	3.19E-07	3.19E-07	—[i]	1.51E-03	5.13E-03

HAP Emissions

Pollutant	Percent Control	Wood			Biodiesel (Using Diesel Emission Factors)			Emissions	
		Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Uncontrolled Emission Factor	Controlled Emission Factor	Emission Factor Source	Hourly[a]	Annual[c]
		lb/MMBtu	lb/MMBtu	(see note)	lb/MMBtu	lb/MMBtu	(see note)	(lb/hr)	tons/year
Dioxins/Furans:									
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	0%	1.0E-11	1.0E-11	—[k]	NA	NA	NA	4.16E-09	1.42E-08
Tetrachorodibenzo-p-dioxins	0%	2.2E-10	2.2E-10	—[k]	NA	NA	NA	8.77E-08	2.99E-07
Pentachlorodibenzo-p-dioxins	0%	3.4E-10	3.4E-10	—[k]	NA	NA	NA	1.39E-07	4.72E-07
Hexachlorodibenzo-p-dioxin, mixture (1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD)	0%	1.1E-10	1.1E-10	—[k]	NA	NA	NA	4.39E-08	1.49E-07
Heptachlorodibenzo-p-dioxins	0%	4.1E-10	4.1E-10	—[k]	NA	NA	NA	1.65E-07	5.61E-07
Octachlorodibenzo-p-dioxins	0%	7.3E-11	7.3E-11	—[k]	NA	NA	NA	2.98E-08	1.01E-07
2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)	0%	1.5E-10	1.5E-10	—[k]	NA	NA	NA	6.24E-08	2.12E-07
Tetrachorodibenzo-p-furans	0%	9.7E-10	9.7E-10	—[k]	NA	NA	NA	3.95E-07	1.34E-06
Pentachlorodibenzo-p-furans	0%	1.1E-09	1.1E-09	—[k]	NA	NA	NA	4.46E-07	1.52E-06
Hexachlorodibenzo-p-furans	0%	7.4E-10	7.4E-10	—[k]	NA	NA	NA	3.00E-07	1.02E-06
Heptachlorodibenzo-p-furans	0%	3.7E-10	3.7E-10	—[k]	NA	NA	NA	1.51E-07	5.15E-07
Octachlorodibenzo-p-furans	0%	1.5E-10	1.5E-10	—[k]	NA	NA	NA	6.16E-08	2.10E-07
Polychlorinated Biphenyls (PCBs):									
Monochlorobiphenyl	0%	2.2E-10	2.2E-10	—[d]	NA	NA	NA	8.95E-08	3.05E-07
Dichlorobiphenyl	0%	7.4E-10	7.4E-10	—[d]	NA	NA	NA	3.01E-07	1.03E-06
Trichlorobiphenyl	0%	2.6E-09	2.6E-09	—[d]	NA	NA	NA	1.06E-06	3.60E-06
Tetrachlorobiphenyls, total	0%	2.5E-09	2.5E-09	—[d]	NA	NA	NA	1.02E-06	3.46E-06
Pentachlorobiphenyls, total	0%	1.2E-09	1.2E-09	—[d]	NA	NA	NA	4.88E-07	1.66E-06
Hexachlorobiphenyls, total	0%	5.5E-10	5.5E-10	—[d]	NA	NA	NA	2.24E-07	7.62E-07
Heptachlorobiphenyls, total	0%	6.6E-11	6.6E-11	—[d]	NA	NA	NA	2.69E-08	9.14E-08
Decachlorobiphenyl	0%	2.7E-10	2.7E-10	—[d]	NA	NA	NA	1.10E-07	3.74E-07

Maximum Federal HAP (Formaldehyde) (tons/year):	6.13
Total Federal HAPs (tons/year):	24.0

[a] Maximum hourly based on peak load of 407 MMBtu/hr.
[c] Annual based 97.6% of annual heat input burning on biomass and 2.4% of annual heat input burning biodiesel.
[d] USEPA AP-42 Section 1.6, Tables 1.6-3, 1.6-4
[e] 2003 Permit Renewal Application for Covered Source Permit #0229-02-C, which was based on Ventura County APCD Emission Factors.
[f] Maine Department of Environmental Protection, Bureau of Air Quality
[g] Acrolein emission factor for wood calculated using an emission factor of 7.4 E-04 lbs/ton$_{wood}$ and a HHV of 4500 Btu/lb$_{wood}$
[h] Based on wood analysis where average Cl content was 0.03 % wt. Assume all chlorine is emitted as HCl
[i] California Toxic Emission Factors (CATEF), Boiler, Diesel
[j] USEPA AP-42 Section 1.3, Tables 1.3-10 assuming biodeisel emission factors same as distillate fuel oil.
[k] USEPA, Table 4-14, "An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States for the Years 1987, 1995, and 2000". November 2006

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler

Revised:	7/15/15

HAP EMISSION ESTIMATES FOR BIODIESEL-FIRED BOILER DURING STARTUP

(Assuming Biodiesel Emission Factors Same as Diesel)

Operating Parameters*

Start-Up Fuel Usage	11880	gallons/year
Start-Up Fuel Usage	1521	MMBtu/year
Start-Up Firing Rate**:	47	MMBtu/hr
Heat Content	128,000	Btu/gal

*Startup calculations represent the biodiesel portion of startup. Wood will gradually be introduced during the later stages of startup. The combined maximum fuel usage for wood and biodiesel for normal operations and startup is set at 2,800,000 MMBtu/hr .

** Hourly fuel use during startup is conservatively based on a three hour duration and 1,100 gallon fuel need.

HAP Emissions

Pollutant	Emission Factor Source	Emission Factor		Maximum Hourly	Annual	
		lb/Mgal	lb/MMBtu	Boiler lb/hr	Boiler lb/yr	Boiler ton/yr
Acenaphthene	2	2.11E-04	1.64844E-06	7.74E-05	2.51E-03	1.3E-06
Acenaphthylene	2	6.50E-05	5.07813E-07	2.38E-05	7.72E-04	3.9E-07
Acetaldehyde	3	3.51E-01	2.73906E-06	1.29E-04	4.17E-03	2.1E-06
Acrolein	3	3.51E-01	2.74E-06	1.29E-04	4.17E-03	2.1E-06
Anthracene	2	2.39E-05	1.87E-07	8.76E-06	2.84E-04	1.4E-07
Benzene	3	4.40E-03	3.4375E-08	1.61E-06	5.23E-05	2.6E-08
Benzo(a)anthracene	2	1.35E-05	1.05469E-07	4.95E-06	1.60E-04	8.0E-08
Benzo(a)pyrene	2	7.55E-06	5.89844E-08	2.77E-06	8.97E-05	4.5E-08
Benzo(b)fluoranthene	2	6.67E-06	5.21094E-08	2.45E-06	7.92E-05	4.0E-08
Benzo(e)pyrene	2	1.40E-05	1.09E-07	5.13E-06	1.66E-04	8.3E-08
Benzo(g,h,i)perylene	2	8.50E-06	6.64063E-08	3.12E-06	1.01E-04	5.0E-08
Benzo(k)fluoranthene	2	8.31E-05	6.49219E-07	3.05E-05	9.87E-04	4.9E-07
1,3-Butadiene	3	1.48E-02	1.15625E-07	5.43E-06	1.76E-04	8.8E-08
Chlorobenzene	3	2.00E-04	1.5625E-09	7.33E-08	2.38E-06	1.2E-09
2-Chloronaphthalene	2	1.84E-05	1.4375E-07	6.75E-06	2.19E-04	1.1E-07
Chrysene	2	1.28E-05	0.0000001	4.69E-06	1.52E-04	7.6E-08
Dibenzo(a,h)anthracene	2	6.49E-06	5.07031E-08	2.38E-06	7.71E-05	3.9E-08
Ethylbenzene	2	1.49E-03	1.16406E-05	5.46E-04	1.77E-02	8.9E-06
Fluoranthene	2	3.32E-05	2.59375E-07	1.22E-05	3.94E-04	2.0E-07
Fluorene	2	1.17E-04	9.14063E-07	4.29E-05	1.39E-03	6.9E-07
Formaldehyde	2	3.49E-01	0.002726563	1.28E-01	4.15E+00	2.1E-03
Hexane	3	3.50E-03	2.73438E-08	1.28E-06	4.16E-05	2.1E-08
Indeno(1,2,3-cd)pyrene	2	6.64E-06	5.1875E-08	2.43E-06	7.89E-05	3.9E-08
2-Methylnaphthalene	2	1.40E-04	1.09375E-06	5.13E-05	1.66E-03	8.3E-07
Naphthalene	2	3.67E-01	0.002867188	1.35E-01	4.36E+00	2.2E-03
Perylene	2	2.71E-05	2.11719E-07	9.94E-06	3.22E-04	1.6E-07
Phenanthrene	2	3.72E-04	2.90625E-06	1.36E-04	4.42E-03	2.2E-06
Pyrene	2	4.08E-05	3.1875E-07	1.50E-05	4.85E-04	2.4E-07
Toluene	3	4.40E-03	3.4375E-08	1.61E-06	5.23E-05	2.6E-08
Xylene (Total)	2	1.49E-03	1.16406E-05	5.46E-04	1.77E-02	8.9E-06
Metals:						
Arsenic	1	NA	4.00E-06	1.88E-04	6.08E-03	3.0E-06
Beryllium	1	NA	3.00E-06	1.41E-04	4.56E-03	2.3E-06
Cadmium	1	NA	3.00E-06	1.41E-04	4.56E-03	2.3E-06
Chromium	1	NA	3.00E-06	1.41E-04	4.56E-03	2.3E-06
Lead	1	NA	9.00E-06	4.22E-04	1.37E-02	6.8E-06
Manganese	1	NA	6.00E-06	2.82E-04	9.12E-03	4.6E-06
Mercury	1	NA	3.00E-06	1.41E-04	4.56E-03	2.3E-06
Nickel	1	NA	3.00E-06	1.41E-04	4.56E-03	2.3E-06
Selenium	1	NA	1.50E-05	7.04E-04	2.28E-02	1.1E-05

Maximum Federal HAP (Naphthalene) (tons/year):	2.18E-03
Total Federal HAPs (tons/year):	4.32E-03

[1] USEPA AP-42 Section 1.3, Tables 1.3-10 assuming biodeisel emission factors same as distillate fuel oil.

[2] California Toxic Emission Factors (CATEF), Boiler, Diesel

[3] 2003 Permit Renewal Application for Covered Source Permit #0229-02-C, which was based on Ventura County APCD Emission Factors.

Appendix B

Hu Honua Bioenergy, LLC
Pepeekeo, HI
Biomass Boiler

Revised: 8/2/2015

HAP EMISSION ESTIMATES FOR BIODIESEL-FIRED EMERGENCY ENGINE

(Assuming Biodiesel Emission Factors Same as Diesel)

I. Basis

Organic TACs based on AP-42, Section 3.4, dated 10/96
Metals based on factors presented in AP-42, Section 1.3, dated 9/98
(Although Section 1.3 is for boilers fired on fuel oil, these factors in lb/1012 Btu (input) are converted to bhp-hr output for the engines. Metal emissions are due to metals in the fuel, so it is assumed that boilers and engines behave similarly with respect to metal emissions.)

Operating Hours	100 hr/year
Engine Output Rating:	1200 bhp

II. HAP Emission Factors and Estimated Emission Rates

	AP-42 Emission Factor		Emission Rate		
Pollutant	**lb/MMBtu**	**lb/(bhp-hr)**	**lb/hr**	**lb/yr**	**ton/yr**
Benzene	7.76E-04	5.4320E-06	0.00652	0.65184	0.00033
Toluene	2.81E-04	1.9670E-06	0.00236	0.23604	0.00012
Xylenes	1.93E-04	1.3510E-06	0.00162	0.16212	0.00008
Propylene	2.79E-03	1.9530E-05	0.02344	2.34360	0.00117
Formaldehyde	7.89E-03	5.5230E-05	0.06628	6.62760	0.00331
Acetaldehyde	2.52E-04	1.7640E-06	0.00212	0.21168	0.00011
Acrolein	7.88E-05	5.5160E-07	0.00066	0.06619	0.00003
Total PAHs	2.12E-04	1.4840E-06	0.00178	0.17808	0.00009

III. Emission Factors for Trace Elements From Distillate Fuel Oil Combustion Sources

			Emission Rate		
	(lb/10^{12}Btu)	**(lb/bhp-hr)(a)**	**lb/hr**	**lb/yr**	**ton/yr**
Arsenic	4	2.8000E-08	0.00003	0.00336	0.0000017
Beryllium	3	2.1000E-08	0.00003	0.00252	0.0000013
Cadmium	3	2.1000E-08	0.00003	0.00252	0.0000013
Chromium	3	2.1000E-08	0.00003	0.00252	0.0000013
Lead	9	6.3000E-08	0.00008	0.00756	0.0000038
Mercury	3	2.1000E-08	0.00003	0.00252	0.0000013
Manganese	6	4.2000E-08	0.00005	0.00504	0.0000025
Nickel	3	2.1000E-08	0.00003	0.00252	0.0000013
Selenium	15	1.0500E-07	0.00013	0.01260	0.0000063

Note:
(a) Assume 7000 Btu/bhp-hr (i.e., a 36% engine efficiency), as assumed in AP-42.

Total Federal HAPs (tons/year): 0.00526

Appendix B
GHG Emissions

	Annual Use (MMBtu)	Emission Factors (kg/MMBtu)[1]			Annual GHG Emissions (short tons/yr)				Annual CO2e Emissions (short tons CO2e/yr)[2]				Annual CO2e Emissions (short tons CO2e/yr)
		CO2	CH4	N2O	CO2	CH4	N2O	Tot	CO2	CH4	N2O	Tot	CH4 + N2O
Boiler - Normal Operations[3]													
Wood (99%)	2,770,495	93.8	0.0072	0.0036	286,460	21.99	10.99	286,493	286,460	549.7	3,276	290,286	3,826
Biodiesel (1%)	27,985	73.84	0.0011	0.00011	2,278	3.39E-02	3.39E-03	2,278	2,278	0.848	1.011	2,280	1.860
Boiler - Startup													
Biodiesel (11,880 gal/yr, 0.128 MMBtu/gal)	1,521	73.84	0.0011	0.00011	123.8	1.84E-03	1.84E-04	123.8	123.8	4.61E-02	5.49E-02	123.9	0.1010
Emergency Generator													
Biodiesel (100 hr, 7.15 MMBtu/hr)	715	73.84	0.0011	0.00011	58.20	8.67E-04	8.67E-05	58.20	58.20	2.17E-02	2.58E-02	58.24	0.04751
Total					**288,920**	**22.03**	**11.0**	**288,953**	**288,920**	**550.6**	**3,277**	**292,748**	**3,828**

1 Default emission factors from EPA Mandatory Reporting Rule, Table C-1 and C-2 (dated November 29, 2013)

2 Based on global warming potentials from EPA Mandatory Reporting Rule, Table A-1 (dated November 29, 2013)

3 Normal operations for the boiler are any operations aside from startup. The annual boiler limit is 2800,000 MMBtu/yr. With 1,521 MMBtu/yr used for startup, normal operations are restricted to the remaining 2,798,479 MMI

Appendix C
Eucalyptus Analysis Results

1. AVERAGED EUCALYPTUS CHIP ANALYSES USED FOR PERMITTING/DESIGN

	Dry	At 45% moisture		
Water	0.00%	45.00%	heat content dry	8134 Btu/lbm
C	51.58%	28.37%	heat content moist	4474 Btu/lbm
H	5.64%	3.10%		
N	0.22%	0.12%		
S	0.02%	0.01%		
Cl	0.05%	0.03%		
O2	40.51%	22.28%		
Ash	2.00%	1.10%		
	100%	100%		

2. EUCALYPTUS DATA

	1 EUCALYPTUS Hazen Res. 3/17/2009	[1] 2 EUCALYPTUS Hazen Res. 4/12/05	[2] 3 EUCALYPTUS Hazen Res. 6/4/09	[3] 4 EUCALYPTUS Rose Gum Bole w/o Bark	[4] AVERAGE	At 2% ASH	At 45% MOISTURE
Water	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	45.00%
C	51.10%	51.26%	55.59%	51.12%	52.27%	51.58%	28.37%
H	5.72%	5.76%	5.65%	5.72%	5.71%	5.64%	3.10%
N	0.16%	0.30%	0.11%	0.33%	0.23%	0.22%	0.12%
S	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.01%
Cl	0.044% [10]	0.042%	0.103%	0.010%	0.050%	0.049%	0.027%
O2	42.48%	41.94%	37.39%	42.38%	41.05%	40.51%	22.28%
Ash	0.53%	0.72%	1.14%	0.42%	0.70%	2.00%	1.10%
	100.04%	100.04%	100.00%	100.00%	100.02%	100.02%	100.01%

3. REFERENCES (see attached)

1. Hazen Research, Inc., 3/17/2009. Sample provided by HRSG.
2. From the Hamakua air permit application.
3. Hazen Research, Inc., 6/4/09. Sample provided by Hu Honua.
4. Physicochemical Analysis of Selected Biomass Materials in Hawaii, University of Hawaii - Hawaii Natural Energy Institute, August 2005, Table 2-A. Also Hazen 6/24/05.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date May 27 2009
HRI Project 002-AEO
HRI Series No. C79/09-1
Date Rec'd. 03/17/09
Cust. P.O.#

HRSG International, Inc.
Tim Formaz
PO Box 591
Sharon Center, OH 44274-0591

Sample Identification:
Eucalyptus Wood

Elemental Analysis of Ash (%)

SIO2	28.08
AL2O3	6.32
TIO2	0.90
FE2O3	4.70
CAO	23.65
MGO	6.31
NA2O	9.85
K2O	5.20
P2O5	8.99
SO3	1.89
CL	0.69
CO2	3.49
Total	100.07

Ash Fusion Temperatures (Deg F)

	Oxidizing Atmosphere	Reducing Atmosphere
Initial Softening		
Hemispherical		
Fluid		

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

Note: The ash was calcined @ 1110 deg F (600 C) prior to analysis

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

DATE May 12, 2009
PROJ. # 002-AEO
CTRL # C79/09
REC'D 03/17/09

HRSG International, Inc.
Tim Formaz
PO Box 591
Sharon Center, OH 44274-0591

Control Number	Sample Identification	As Received Moisture, %	As Received Chlorine, %	Dry Basis Chlorine, %
C79/09-1	Eucalyptus Wood	50.78	0.022	0.044

By:

Gerard H. Cunningham
Fuel Laboratory Manager

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date August 12 2005
HRI Project 009-444
HRI Series No. F233/05-2
Date Rec'd. 06/24/05
Cust. P.O.#

Hawaii Natural Energy Institute
Scott Q. Turn
2540 Dole Street, Holmes Hall 246
Honolulu, Hawaii 96822

Sample Identification
E. Gardis (All) Forest
Solutions 06/08/05

Reporting Basis >	As Rec'd	Dry	As-Fired	Air Dry
Proximate (%)				
Moisture	5.32	0.00	35.00	3.66
Ash	0.68	0.72	0.47	0.69
Volatile	80.30	84.81	55.13	81.71
Fixed C	13.70	14.47	9.40	13.94
Total	100.00	100.00	100.00	100.00
Sulfur	0.02	0.02	0.013	0.02
Btu/lb (HHV)	7848	8289	5,388	7986
MMF Btu/lb	7906	8353		
MAF Btu/lb		8349		
Air Dry Loss (%)	1.72			
Ultimate (%)				
Moisture	5.32	0.00	35.000	3.66
Carbon	48.53	51.26	33.319	49.38
Hydrogen	5.45	5.76	3.744	5.55
Nitrogen	0.29	0.30	0.195	0.29
Sulfur	0.02	0.02	0.013	0.02
Ash	0.68	0.72	0.468	0.69
Oxygen*	39.71	41.94	27.261	40.41
Total	100.00	100.00	100.000	100.00
Chlorine**	0.039	0.042	.0273	0.040

Forms of Sulfur (as S,%)

Sulfate		
Pyritic		
Organic		
Total	0.02	0.02

Water Soluble Alkalies (%)

Na2O	
K2O	

Lb. Alkali/MM Btu= 0.14
Lb. Ash/MM Btu= 0.86
Lb. SO2/MM Btu= 0.05
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 9,670

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date June 19 2009
HRI Project 002-AMC
HRI Series No. F13/09-3
Date Rec'd. 06/04/09
Cust. P.O.#

Big Island Landscaping
Dan Kenknight
59-480 ALA KAHUA DR.
Kamuela, HI 96743

Sample Identification
Eucalyptus

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	45.44	0.00	2.61
Ash	0.62	1.14	1.11
Volatile	42.92	78.67	76.62
Fixed C	11.02	20.19	19.66
Total	100.00	100.00	100.00
Sulfur	0.011	0.021	0.020
Btu/lb (HHV)	4659	8539	8317
MMF Btu/lb	4690	8646	
MAF Btu/lb		8638	
Air Dry Loss (%)	43.98		
Ultimate (%)			
Moisture	45.44	0.00	2.61
Carbon	30.33	55.59	54.14
Hydrogen	3.08	5.65	5.50
Nitrogen	0.06	0.11	0.11
Sulfur	0.01	0.02	0.02
Ash	0.62	1.14	1.11
Oxygen*	20.46	37.49	36.51
Total	100.00	100.00	100.00
Chlorine**	0.056	0.103	0.100

Forms of Sulfur (as S,%)

Sulfate		
Pyritic		
Organic		
Total	0.01	0.02

Water Soluble Alkalies (%)

Na2O	
K2O	

Lb. Alkali/MM Btu=
Lb. Ash/MM Btu= 1.33
Lb. SO2/MM Btu= 0.05
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 10,350

Report Prepared By:

Vickie Buster Cor

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Appendix D
Revised Permit Conditions

APPENDIX D Proposed Permit Conditions

The following are proposed permit conditions to incorporate the GHG requirements. Except for the last paragraph regarding "reporting forms," additions are shown underlined and deletions are shown strikeout.

RENEWAL PROCESS

Attachment I: Standard Conditions

25. Each permit renewal application shall be submitted to the Department of Health and the U.S. EPA Region 9, no less than twelve (12) months and no more than eighteen (18) months prior to the permit expiration date. The director may allow a permit renewal application to be submitted no less than six (6) months prior to the permit expiration date, if the director determines that there is reasonable justification. The renewal application shall include any updates to the GHG emission reduction plan. The permittee shall report the following with each plan submittal:

a. The GHG emission reduction status.
b. Factors contributing to the emission changes.
c. Any control measure updates.
d. Any new developments or changes that would affect the basis of the facility wide GHG emission cap.

(Auth: HAR §11-60.1-101, §11-60.1-204(g), 40 CFR §70.5(a)(1)(iii))

EMISSION CAP

Attachment II: Special Conditions, Section C. Emission Limits

9. Starting with calendar year 2019, carbon dioxide equivalent (CO_2e) emissions from the facility, excluding biogenic CO_2, and considering only the contribution from methane (CH_4) and nitrous oxide (N_2O), shall not exceed 3,473 metric-tons (3,828 short tons) per calendar year, including periods of boiler startups, shutdowns, and malfunction or upset conditions. CH_4 and N_2O emissions from the 836 kW emergency biodiesel engine generator shall also be included in the CO_2e emissions from the facility.

(Auth: HAR §11-60.1-204)

CALCULATION METHOD

Attachment II: Special Conditions, Section E. Monitoring and Recordkeeping Requirements

16. The permittee shall calculate and record the CO_2e emissions from the facility, excluding biogenic CO_2, and considering only the contribution from CH_4 and N_2O, on a calendar year basis to demonstrate

compliance with Attachment II, Special Condition No. C.9. The calculations shall include periods of Boiler startups, shutdowns, and malfunction or upset conditions. CH4 and N2O emissions from the 836 kW emergency biodiesel engine generator shall also be included in the CO2e emissions from the facility.

a. The Boiler's CO2e emissions, excluding biogenic CO2, and considering only the contribution from CH4 and N2O, shall be calculated based on the following

i. CH4 emissions (metric tons) x Global Warming Potential of 25 + N2O emissions (metric tons) x Global Warming Potential of 298

ii. CH4 and N2O emissions shall be based on the following

Emission factor (kg/MMbtu) x 0.001 x Higher Heating Value (MMBtu/lb of wood or MMBtu/gallons of biodiesel) x Fuel Consumption (lbs of wood or gallons of biodiesel).

For wood, the emission factor for CH4 and N2O shall be 0.0072 kg/MMBtu and 0.0036 kg/MMBtu respectively. For biodiesel, the emission factor for CH4 and N2O shall be 0.0011 kg/MMBtu and 0.00011 kg/MMBtu respectively. The higher heating value and fuel consumption shall be the same as derived in Attachment II, Special Conditions No. E.15.

b. The 836 kW biodiesel emergency generator's CO2e emissions, excluding biogenic CO2, and considering only the contribution from CH4 and N2O, shall be calculated based on the following

i. CH4 emissions (metric tons) x Global Warming Potential of 25 + N2O emissions (metric tons) x Global Warming Potential of 298

ii. CH4 and N2O emissions shall be based on the following

Emission factor (kg/MMbtu) x 0.001 x Higher Heating Value (MMBtu/gallons of biodiesel) x Fuel Consumption (gallons of biodiesel).

For wood, the emission factor for CH4 and N2O shall be 0.0072 kg/MMBtu and For biodiesel, the emission factor for CH4 and N2O shall be 0.0011 kg/MMBtu and 0.00011 kg/MMBtu respectively. The higher heating value and fuel consumption shall be the same as derived in Attachment II, Special Conditions No. E.15.

(Auth: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90)

ADDITIONAL REPORTING

Attachment II: Special Conditions, Section F. Notification and Reporting Requirements

APPENDIX D Proposed Permit Conditions

6. Monitoring Report Forms

The permittee shall submit **semi-annually** the following reports to the Department of Health. The reports shall be submitted within **sixty (60) days** after the end of each semi-annual calendar period (January 1 - June 30 and July 1 - December 31).

a. For the **Monitoring Report: Boiler Fuel, ESP and Baghouse, Emission Caps**, report on:

i. The total gallons of biodiesel (S15) fired in the Boiler during startup on a monthly and rolling twelve-month (12-month) basis;

ii. Any instances where treated wood (e.g., painted or chemically treated wood) was fired in the Boiler. If no such instances occurred, state so on the report;

iii. Any instances where ESP operating voltage was below the normal range. If there were no such incidents, state so on the report;

iv. Any instances where the pressure drop across the baghouse was above the normal range. If there were no such incidents, state so on the report;

v. The total heat input of biodiesel (S15) and wood on a monthly and rolling twelve-month (12-month) basis;

vi. The CO and NO_x emissions from the facility on a monthly and rolling twelve-month (12-month) basis to demonstrate compliance with Attachment II, Special Condition No. C.6. Facility emissions shall include emissions during periods of Boiler startups, shutdowns, and malfunction or upset conditions; and emissions from the 836 kW emergency biodiesel engine generator;

vii. The total of all HAPs emissions and the largest individual HAP emissions from the facility on a monthly and rolling twelve-month (12-month) basis to demonstrate compliance with Attachment II, Special Condition No. C.7. Facility emissions shall include emissions during periods of Boiler startups, shutdowns, and malfunction or upset conditions; and emissions from the 836 kW emergency biodiesel engine generator; ~~and~~

viii. The CO2e emissions, excluding biogenic CO2, and considering only the contribution from CH4 and N2O,on a calendar year basis to demonstrate compliance with Attachment II, Special Condition No. C.9. Facility emissions shall include emissions during periods of Boiler startups, shutdowns, and malfunction or upset conditions; and emissions from the 836 kW emergency biodiesel engine generator; and

ix~~viii~~. Supporting documents (i.e., source of emission factors and copies of the source documents) and calculations showing the basis of the emissions for Attachment II, Special Condition Nos. F.6.a.vi and F.6.a.vii.

APPENDIX D Proposed Permit Conditions

REPORTING FORMS

Request update "Monitoring Report Form : Boiler Fuel, ESP and Baghouse, Emissions Caps" to include an additional table called "Table 7: CO2e Emissions" to allow reporting of CO2e emissions, excluding biogenic CO2, and considering only the contribution from CH4 and N2, annually.