## RESPONSE TO EPA'S COMMENTS ON THE PROPOSED AIR PERMIT AMENDMENT FOR HU HONUA BIOENERGY, LLC BIOENERGY FACILITY LOCATED AT: 28-283 SUGAR MILL ROAD, PEPEEKEO, HAWAII

## 1. <u>Comment</u>:

Special Conditions F.6.a.vi and F.6.a.vii should reference the emission limits in C.6 and C.7 for CO, NO<sub>x</sub>, and HAPs.

## Response:

The Department is revising the following permit conditions:

Attachment II, Special Condition No. F.6.a.vi

vi. The CO and NO<sub>x</sub> 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;

## Attachment II, Special Condition No. F.6.a.vii

- 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
- 2. <u>Comment</u>:

The equations provided in Special Conditions E.14 and E.15 refer to fuel consumption in annual units (lbs of wood per year or gallons per year) and engine hour meter readings in hours per year. Because compliance with the facility-wide emission limits in Special Conditions C.6 and C.7 are verified monthly on a rolling 12-month basis, conditions containing monitoring, calculation methods, or record keeping related to these limits should refer explicitly to monthly and rolling 12-month periods, not years.

#### Comment:

Special Conditions C.7, E.15, and F.6.a.vii require the permittee to include emissions during startup, shutdown, and malfunctions to calculate monthly HAP emissions from the facility. The permit should include a protocol to account for emissions during these operating scenarios, such as restricting biomass consumption during startup and shutdown and using good engineering practices for estimating HAP emissions (other than HCI) during malfunctions. The permit should also apply appropriate conditions to define and limit startup, shutdowns, and malfunctions

## Comment:

Special Conditions E.14.a and E.15.a require the permittee to use data from the boiler's CO, NO<sub>x</sub>, and HCI CEMS or "data from the boiler's source performance tests" for CO, NO<sub>x</sub> and HCI "when missing CEMS data" to calculate emissions. Rather than using source test data to fill CEMS data gaps, EPA recommends that the permit reference EPA-approved methods for CEMS data substitution, such as those at 40 CFR Part 75.

## Comment:

Special Condition E.15.a allows the permittee to calculate HAP emissions for which performance test and CEMS data is not available on the basis of several sources of emission factors. It appears that Appendix C of Hu Honua's December 2010 application relied on each of these sources on a pollutant-specific basis. EPA recommends that the permit adopt a similar approach, perhaps by cross-reference to Appendix C. The permit might also allow the permittee to use a different emission factor upon HDOH's prior, written approval.

## Comment:

Special Condition E.14.b and E.15.d appear to allow the permittee to use multiple sources to obtain the higher heating value (HHV) of biodiesel. The permittee should use HHV data from the fuel vendor specific to the fuel used at the facility, or another source upon HDOH's prior written approval.

#### Response:

The Department is revising the following permit conditions:

## Attachment II, Special Condition No. E.14

- 14. The permittee shall calculate and record the CO and NO<sub>x</sub> emissions from the facility, including during periods of boiler startups, shutdowns, and malfunction or upset conditions, on a monthly and rolling twelve-month (12-month) basis to demonstrate compliance with Attachment II, Special Condition No. C.6. CO and NO<sub>x</sub> emissions from the 836 kW emergency biodiesel engine generator shall also be included in the CO and NO<sub>x</sub> emissions from the facility.
  - a. The permittee shall use data from the boiler's CO and NO<sub>x</sub> CEMS required by Attachment II, Special Conditions Nos. E.8 and E.9, using the following procedures:
    - i. The permittee shall use the data conversion procedures for SO<sub>2</sub> in 40 CFR Part 75, Appendix F, modified to account for the difference in molecular weight between CO and SO<sub>2</sub>, and the missing data substitution procedures for SO<sub>2</sub> in 40 CFR Part 75, Subpart D, modified to account for the difference in molecular weight between CO and SO<sub>2</sub>, to determine the hourly mass emission rate of CO from the boiler during all boiler operating hours.

- ii. The permittee shall use the data conversion procedures in 40 CFR Part 75, Appendix F and the missing data substitution procedures for NO<sub>x</sub> in 40 CFR Part 75, Subpart D, to determine the hourly mass emission rate of NO<sub>x</sub> from the boiler during all boiler operating hours;
- b. The 836 kW emergency biodiesel engine generator's CO and NO<sub>x</sub> emissions shall be calculated using the following equation:

Emission factor (lb/MMBtu) x Higher Heating Value (MMBtu/gallon) x Fuel Consumption (gallons/rolling 12-month period)

The CO and NO<sub>x</sub> emission factors shall be based on data from the manufacturer, AP-42, or other data with prior written approval by the Department of Health. The biodiesel HHV shall be from the facility's biodiesel vendor, or other data with prior written approval by the Department of Health. The fuel consumption of biodiesel (gallons/rolling 12-month period) shall be based on the hour meter reading (hours/rolling 12-month period) and fuel consumption rate (gallons/hour) at the maximum load as specified by the manufacturer.

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

## Attachment II, Special Condition No. E.15

- 15. The permittee shall calculate and record the total of all HAPs emissions and all individual HAP emissions as identified in AP-42 from the facility, including during periods of boiler startups, shutdowns, and malfunction or upset conditions, on a monthly and rolling twelve-month (12-month) basis to demonstrate compliance with Attachment II, Special Condition No. C.7. HAPs emissions from the 836 kW emergency biodiesel engine generator shall also be included in the HAPs emissions from the facility.
  - a. The permittee shall use data from the boiler's HCI CEMS required by Attachment II, Special Conditions No. E.7. The permittee shall use the data conversion procedures for SO<sub>2</sub> in 40 CFR Part 75, Appendix F, modified to account for the difference in molecular weight between HCI and SO<sub>2</sub>, and the missing data substitution procedures for SO<sub>2</sub> in 40 CFR Part 75, Subpart D, modified to account for the difference in molecular weight between HCI and SO<sub>2</sub>, to determine the hourly mass emission rate of HCI from the boiler during all boiler operating hours.
  - b. The permittee shall use data from the boiler's source performance test for chlorine, acetaldehyde, acrolein, benzene, dichloromethane, formaldehyde, manganese, naphthalene, styrene, and toluene to calculate HAPs emissions. All other HAPs emissions as identified in AP-42 for the boiler shall be calculated using data from the sources listed in Appendix C of Hu Honua's December 2010 application or other data with prior written approval by the Department of Health.

- c. The boiler's HAPs emissions (not including HCL) shall be calculated based on the following:
  - When using source performance test results, Section 4.3 of US EPA's Emission Inventory Improvement Program (EIIP), Volume 2, Chapter 2, "Preferred and Alternative Methods for Estimating Air Emissions from Boilers" (January 2001).
  - ii. When using source performance test results, the F factor (Fd) required in Section 4.1 and 4.3 for burning wood shall be derived using Equation 2.4-3 of the EIIP document. The high heating value (HHV) and hydrogen, carbon, sulfur, nitrogen, and oxygen content for the wood needed for this equation shall be derived from the wood sampling conducted per Attachment II, Special Condition No. E.2.c.iii.
  - iii. HAP emission estimates not from CEMS or source performance test results shall follow the approach contained in Section 5 of US EPA's Emission Inventory Improvement Program (EIIP), Volume 2, Chapter 2, "Preferred and Alternative Methods for Estimating Air Emissions from Boilers" (January 2001). The emission factors shall be based on data sources listed in Appendix C on Hu Honua's December 2010 application or other data with prior written approval by the Department of Health. The wood HHV shall be derived from the wood sampling conducted per Attachment II, Special Condition No. E.2.c.iii. The biodiesel HHV shall be from the facility's biodiesel vendor, or other data with prior written approval by the Department of Health.
  - iv. Good engineering practices shall be used to estimate HAPs emissions during malfunctions, or other methods with prior written approval by the Department of Health.
- d. The following equation shall be used to calculate the boiler's HAPs emissions where CEMS or source performance test data is not available:

Emission factor (lb/MMBtu) x Higher Heating Value (MMBtu/lbs of wood or MMBtu/gallons of biodiesel) x Fuel Consumption (lbs of wood/rolling 12-month period or gallons of biodiesel/rolling 12-month period)

The wood HHV shall be from the wood sampling and analysis conducted per Attachment II, Special Condition No. E.2.c.iii for wood fuel. The biodiesel HHV shall be from the facility's biodiesel vendor, or other data with prior written approval by the Department of Health.

e. The following equation shall be used to calculate the 836 kW biodiesel emergency generator's HAPs emissions:

Emission factor (lb/MMBtu) x Higher Heating Value (MMBtu/gallon) x Fuel Consumption (gallons/rolling 12-month period)

Emission factors for HAPs shall be from one or more of the following sources:

i. AP-42 data; and

ii. Other data with prior written approval by the Department of Health.

The biodiesel HHV shall be from the facility's biodiesel vendor, or other data with prior written approval by the Department of Health. The fuel consumption of biodiesel (gallons/rolling 12-month period) shall be based on the hour meter reading (hours/rolling 12-month period) and fuel consumption rate (gallons/hour) at the maximum load as specified by the manufacturer.

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

## Attachment II, Special Condition No. D.1.c.i

i. Biodiesel (S15) usage during startup shall not exceed a maximum of 11,880 gallons per any rolling twelve-month (12-month) period.

#### Attachment II, Special Condition No. D.1.d.

- d. Boiler Startup and Shutdown
  - i. The definition of startup shall be as defined in 40 CFR Part 63, Subpart JJJJJJ.
  - ii. During startup, only biodiesel (S15) shall be used prior to the operating temperature of the superheater reaching 750 °F. When the superheater reaches 750 °F, operation of the air pollution control equipment shall commence. Wood can only be burned during startup after all the air pollution control equipment is operating according to the manufacturer's specifications.
  - iii. The period when only wood is burned during startup shall not exceed three (3) hours.
  - iv. The permittee shall minimize startup and shutdown periods per the manufacturer's recommended procedures.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90, 40 CFR §63.11214)<sup>1</sup>

In addition, the Department will be adding the following table to the permit review summary (permit record) to show a potential reduction of annual emissions assuming the boiler burns up to the new biodiesel fuel limit during startup in Attachment II, Special Condition No. D.1.c.i.

Pollutant	Boiler Peak Load (Biomass Only) (tons/yr)	Boiler Startup (100% Biodiesel) (tons/yr)	Total Annual Emissions (tons/yr)
NOx	209.9	0.09	209.9660
CO	246.3	0.046	246.2997
SO <sub>2</sub>	39.2	0.00131	39.1781
PM	33.6	0.001659	33.5818
PM10	33.6	0.001659	33.5818
PM <sub>2.5</sub>	33.6	0.001659	33.5818
VOC	39.2	0.006	39.1826

#### **Revised Potential Emissions – Criteria Pollutants**

Above calculations are based on the following:

Annual Boiler Heat Input During Normal Operations = 2,798,341 MMBtu/yr

Biodiesel HHV = 0.019 MMBtu/lb

Biodiesel Density = 7.34 lb/gallon

Sulfur Content of Biodiesel = 15 ppm

Startup Fuel Usage (Biodiesel) = 11,880 gallons/yr

Startup Firing Rate = 11,880 gallons/yr x 0.019 MMBtu/lb x 7.34 lb/gallon = 1,659 MMBtu/yr

# 3. <u>Comment</u>:

Special Condition C.2 states that emission limits for  $NO_x$ , CO,  $SO_2$ , VOC, and HCI apply at all times except during startup and shutdown. HDOH's revised Review Summary explains that "air pollution control equipment are not fully optimized during startup and shutdown conditions" and that the exclusion of startup and shutdown periods in the permit is similar to an exclusion in EPA' regulation under 40 CFR Part 63. EPA recommends that HDOH consider including additional explanation of the applicability or non-applicability of BACT during startup and shutdown. In addition, EPA recommends that permitting authorities include emission limits and/or work practice standards to regulate startup and shutdown operations.

# <u>Response</u>:

The Department is revising the permit review summary (permit record) as follows regarding Attachment II, Special Condition No. C.2.

C.2. Boiler CO, NO<sub>x</sub>, SO<sub>2</sub>, VOC and HCI Emissions

The NO<sub>x</sub>, SO<sub>2</sub>, VOC and HCI emission limits shall be complied with at all times, except during boiler startup and shutdown. The CO emission limit shall be based on a thirty-day (30-day) rolling average when monitored by the CO continuous emissions monitoring system required in Attachment II, Special Condition No. E.8 and shall be complied with at all times, except during boiler startup and shutdown. The CO emission limit shall be based on a 3-hour average when conducting the performance test required in Attachment II, Special Condition No. G.1.a.

The short term NO<sub>x</sub>, CO, and PM<sub>10</sub> (filterable) numerical limits are based on the Hawaii's BACT requirements since these emissions were above the BACT significant levels. The emissions of SO<sub>2</sub> and VOC were less than Hawaii's BACT significant levels and are such not subject to BACT. The numerical BACT limits are applicable only during the equipment's normal operating conditions since the air pollution control equipment are not fully optimized during startup and shutdown conditions. The exclusion of startup and shutdown periods for numerical emission limits follows the requirements in 40 CFR Part 63, Subpart JJJJJJ, Table 1. The permit also requires the permittee to follow work practice standards to minimize the boiler's startup and shutdown emissions per the manufacturer's recommended procedures in accordance with 40 CFR Part 63, Subpart JJJJJJJ, Table 2. In addition, it would be difficult to verify any numerical startup and shutdown emission limits using a source performance test.

Consistent with the Clean Air Act, emission limits are required during separate startup periods. These limits can be in any of the following three forms:

- (1) numerical limit
- (2) technological limit
- (3) work practice standard

The applicant, Hu Honua Bioenergy, LLC, is proposing limits during startup periods based on a combination of work practice standards and technological limits. Development of normative numerical limits for a biomass boiler located on an isolated electric grid, such as is the case in the island of Hawaii, is not considered practically feasible for the reasons described below.

Unlike electric grids on the mainland, electrical grids on islands such as Hawaii are isolated and not interconnected with any other electricity network. Therefore, the island of Hawaii cannot rely on the flexibility of interconnection with other electrical distribution networks to maintain operating equilibrium between electricity demand and supply (i.e. export or import electricity) to avoid voltage or frequency variations that can lead to electrical system interruptions. Moreover, the electrical grid on the island of Hawaii also has a disproportionately large volume of electricity supply from intermittent renewable sources which are by definition and operation unpredictable, but which still have a high priority on the grid. The variability in the supply from intermittent renewable sources adds to the challenge of maintaining electrical system demand/supply equilibrium and providing reliable and stable electricity service to customers. Electric generating facilities such as Hu Honua Bioenergy must be prepared to respond and react quickly to changes in electrical system conditions to compensate for the electrical grid's limited flexibility and the unpredictable intermittent renewable electricity supply, including during startup.

This plant utilizes a steam boiler, and a steam boiler requires up to 8 hours for startup. Thus, the boiler's startup profile can vary from one session to another due to the plant's need to respond and react during startup to the electrical system's independent operations while it is adjusting to maintain reliable and stable service to customers. The unpredictable startup profile means Hu Honua Bioenergy will not necessarily know in advance the startup parameters, including how quickly it will need to ramp up. This is particularly challenging for an electric generation facility that uses a boiler, which generally cannot react as quickly as other types of energy generating systems (e.g. combustion turbine). In contrast, larger and more diverse interconnected electrical distribution systems, such as on the mainland, have the ability to create normative, repeatable startup profiles for their sources of electricity supply.

Therefore, instead of a numerical emission limits during startup, the applicant has proposed a robust work practice standard that also incorporates technological limits. In particular, the following additional limits are proposed for startup:

- Until the air pollution control equipment are operating per manufacturer's specs, the boiler will only burn B-100 biodiesel, which is expected to generate fewer CO and NO<sub>x</sub> emissions compared to burning wood.
- When the boiler superheater reaches 750°F, biomass wood can be introduced and burned in the boiler.
- The period that only biomass wood is burned in the boiler can last not more than 3 hours during startup.

This work practice standard will minimize emissions during startup by using a cleaner burning fuel (biodiesel) until the air pollution control equipment is operating per manufacturer's specifications. Only after the air pollution control equipment is operating per manufacturer's specifications can biomass wood be introduced to the boiler, and the permit conditions would limit the time where only wood can be burned during start up (see Attachment II, Special Condition No. D.1.d. for the specific permit language). Per Hawaii Administrative Rules §11-60.1-5, the Department is imposing more restrictive conditions in this covered source permit to further limit the air pollutants and operation of the source.

# 4. <u>Comment</u>:

Format of final issued permit. To ensure that the terms and conditions of the final permit are clear to the owner/operator, HDOH, the EPA and the public, we suggest that HDOH issue a consolidated final title V permit, which addresses all applicable requirements and satisfies all the requirements of title V in one document, to implement the permit revisions in response to EPA's 2014 Order. This consolidated permit would include all the changes that have been made to the permit since the 2014 Order, as well as all the pre-existing information and requirements that remain unchanged.

## Response:

The Department plans to issue both a Significant Modification amendment to the Covered Source Permit and a consolidated Covered Source Permit on the same day.

# 5. <u>Comment</u>:

Classification of permit action. We recommend including additional language in the permit review document to further clarify that this permit amendment has been processed in a manner consistent with the procedures for a significant modification since being published for public notice in March 2014.

## Response:

The Department plans to add additional language in the permit review document as recommended by EPA.

6. <u>Comment</u>:

Compliance demonstration. In order to provide additional clarity for how compliance with NO<sub>x</sub>, CO, and HAP synthetic minor emission limits is demonstrated, we recommend the following:

- a. The inclusion of additional language in Condition C.6 that specifically directs the owner/operator, following the end of each month, to determine compliance with the annual NO<sub>x</sub> and CO limits by summing the total mass of NO<sub>x</sub> and CO from both the boiler and the 836 kW emergency biodiesel engine generator, from the preceding 12 months, using the methodology and data collected pursuant to Condition E.14.
- b. The inclusion of additional language in Condition C.7 that specifically directs the owner/operator, following the end of each month, to determine compliance with annual HAP emission limits by summing the total mass of aggregate HAPs and individual HAPs from both the boiler and the 836 kW emergency biodiesel engine generator, from the preceding 12 months, using the methodology and data collected pursuant to Condition E.15.

# <u>Response</u>:

The Department does not plan to revise the permit language as suggested by EPA since the Department believes the changes are not substantially different from the current permit language. The Department believes Attachment II, Special Conditions C.6 and E.14, and Special Conditions C.7 and E.15, are not ambiguous in demonstrating compliance with the synthetic minor emission limits for NO<sub>x</sub> and CO.

# 7. <u>Comment</u>:

Missing data substitution. In addition, we note that the amended conditions E.14 and E.15 require the use of data conversion and missing data substitution procedures from 40 CFR part 75 with regard to the use of NO<sub>x</sub>, CO, and HCI CEMS. The amended conditions E.14 and E.15 require the use of these Part 75 procedures for all boiler operating hours, including periods of startup and shutdown. We recommend certain refinements to these conditions with regard to the handling of CEMS data during periods of startup and shutdown. These recommendations would involve the use of maximum potential values to determine startup and shutdown emissions when using CEMS.

- a. For HCl, we recommend inserting additional language to Condition E.15 that specifies the use of the missing data substitution procedures of **40 CFR part 75.31(b)(2)** for the purposes of accounting for HCl emissions during startup and shutdown. This would involve using the maximum potential concentration of SO<sub>2</sub> per §75.31(b)(2), modified to account for the difference in molecular weight between HCl and SO<sub>2</sub>, to determine the hourly mass emission rate of HCl from the boiler for periods of startup and shutdown.
- b. For CO, we recommend inserting additional language to Condition E.14 that specifies the use of the missing data substitution procedures of **40 CFR part 75.31(b)(2)** for the purposes of accounting for CO emissions during startup and shutdown. This would involve using the maximum potential concentration of SO<sub>2</sub> per §75.31(b)(2), modified to account for the difference in molecular weight between CO and SO<sub>2</sub>, to determine the hourly mass emission rate of CO from the boiler for periods of startup and shutdown.
- c. For NO<sub>x</sub>, we recommend inserting additional language to Condition E.14 that specifies the use of the missing data substitution procedures of **40 CFR part 75.31(c)(3)** for the purposes of accounting for annual NO<sub>x</sub> emissions during startup and shutdown.

## <u>Response</u>:

The Department does not plan to revise the permit language as suggested by EPA since the Department believes the CO and NO<sub>x</sub> CEMS will be accurately monitoring CO and NO<sub>x</sub> concentrations during startup and shutdown. Since Attachment II, Special Conditions Nos. E.8 and E.9 specify dual range monitors for the CO and NO<sub>x</sub> CEMS, the wide variations in emission concentrations during startup/shutdown conditions and normal operating conditions can be accurately monitored.