

**COVERED SOURCE PERMIT REVIEW -PERMIT NO. 0238-01-C**  
**RENEWAL APPLICATION NO. 0238-02**

**Facility:** Honolulu Generating Station  
Located at: Honolulu, HI, UTM: Zone 4, 617.55 km east, 2,356.6 km north

**Applicant:** Hawaiian Electric Company (HECO)

**Responsible Official:** **Thomas C. Simmons** **Point of Contact:** **Ms. Sherri-Ann Loo**  
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**Company's Mailing Address:** Hawaiian Electric Company  
Honolulu Generating Station  
P.O. Box 2750  
Honolulu, HI 96840-0001

**Proposed Project:**

This facility operates two (2) 'Babcock and Wilcox' boilers: one (1) 56 MW and one (1) 57 MW that burns no. 6, no. 2, and specification (spec) used oil for the production of electricity for sale. The facility stores no. 6 Low Sulfur Fuel Oil (LSFO) in two (2) 14,000 barrel tanks, no. 2 diesel fuel oil in a 1,041 barrel tank, and spec used oil in a 147 gal tank (see HECO letter dated 1/25/02). Fuel storage is considered an insignificant activity because of the fuel's low vapor pressure. SICC is 4911 for this facility since it generates electricity for sale.

The Honolulu Generating Station was considered a grandfathered facility based on the dates of equipment construction. Although this is a major source, NSPS, NESHAPS, and PSD do not apply since the boilers were constructed prior to the applicable dates. Any future modification or increase in emissions need to be reviewed for possible applicability to standards.

The boilers are currently permitted to operate 24 hours per day, seven days per week with periodic down periods for repair and maintenance. Sulfur emissions are limited by the combustion of low sulfur fuel oil (LSFO). The facility is expected to burn no more than 5,000 gallons per year of spec used oil collected from the HECO facilities. Aggregate fuel consumption of the boilers is monitored by keeping records of fuel deliveries to the storage tanks and monitoring the fuel level in the tanks. A fuel meter is not required to monitor fuel consumption since there are no fuel limitations.

This facility is located in downtown Honolulu, on the Island of Oahu and has a base elevation of approximately 0.6 meters above sea level. The terrain is flat in the surrounding area of the facility with complex terrain located further to the north.

This facility is a major stationary source based on the annual emissions of criteria pollutants (specifically nitrogen oxides [NO<sub>x</sub>], sulfur dioxide [SO<sub>2</sub>], particulate matter [PM] and carbon monoxide [CO]) exceeding 100 tons per year each. Cumulative Hazardous Air Pollutant (HAP) emissions are less than 25 tons per year and no single HAP exceeds 10 tons per year.

This permit review is based on the application dated 3/27/02 and its revisions dated 8/18/03. A check of \$3,000.00 for a renewal of a major source has been processed.

**Equipment:**

HECO

Unit No.                      Description

- |   |   |
|---|---|
| 8 | 56 MW Babcock and Wilcox Boiler ( 589.0 MMBtu/hr, fired on fuel oil nos. 6 and 2, and spec used oil, constructed 12/54)   |
| 9 | 57 MW Babcock and Wilcox Boiler (631.5 MMBtu/hr, fired on fuel oil nos. 6 and 2, and spec used oil, constructed on 12/57) |

**Air Pollution Controls:**

None of the equipment at this facility use air pollution control devices.

**Applicable Requirements:**

Hawaii Administrative Rules (HAR)

- Chapter 11-59, Ambient Air Quality Standards
- Chapter 11-60.1 Air Pollution Control
  - Subchapter 1, General Requirements
  - Subchapter 2, General Prohibitions
    - 11-60.1-5 Permit Conditions
    - 11-60.1-11 Sampling, Testing, and Reporting Methods
    - 11-60.1-16 Prompt Reporting of Deviations
    - 11-60.1-31 Applicability
    - 11-60.1-32 Visible Emissions
    - 11-60.1-38 Sulfur Oxides from Fuel Combustion
    - 11-60.1-39 Storage of Volatile Organic Compounds
  - Subchapter 5, Covered Sources
  - Subchapter 6, Fees for Covered Sources, Noncovered sources, and Agricultural Burning
    - 11-60.1-111 Definitions
    - 11-60.1-112 General Fee Provisions for Covered Sources
    - 11-60.1-113 Application Fees for Covered Sources
    - 11-60.1-114 Annual Fees for Covered Sources
    - 11-60.1-116 Application Fee Credit for Covered Sources

Consolidated Emissions Reporting Rule (CERR) reporting since each point source (boiler stack) potential emissions are  $\geq 100$  tpy per criteria pollutant except volatile organic compounds (VOC), pursuant to Table 1 of 40 CFR Part 51, Subpart A.

Compliance Data System (CDS) inspection because this is a 'Type A Source' (major source).

**Non-Applicable Requirements:**

Code of Federal Regulations (CFR)

40 CFR 52.21 - Prevention of Significant Deterioration of Air Quality (PSD) since the boilers were installed prior to promulgation of PSD and there are no new major sources and no new modifications.

40 CFR Part 63 - National Emission Standard for Hazardous Air Pollutants (NESHAPS) and Maximum Achievable Control Technology since there is no specific source category for boilers and the facility is not a major source of HAP emissions.

40 CFR Part 60 - New Source Performance Standard (NSPS), specifically D-Dc and Kb since the boilers were installed prior to promulgation of NSPS and all of the petroleum storage tanks store fuel with true vapor pressures less than 3.5 kPa.

Compliance Assurance Monitoring (CAM) is to provide a reasonable assurance that compliance is being achieved with large emissions units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 CFR, Part 64, for CAM to be applicable, the emissions unit must: (1) be located at a major source; (2) be subject to an emissions limit or standard; (3) use a control device to achieve compliance; (4) have potential precontrol emissions that are greater than the major source level [ $>100$  tpy]; and (5) not otherwise be exempt from CAM. CAM is not applicable to the boilers since items 2 and 5 do not apply.

**BACT Requirements:**

A best available control technology (BACT) analysis was not required since this is an existing source and there is no new construction or major modification.

**Insignificant Activities/Exemptions:**

Insignificant activities based on size, emission level, or production rate, are as follows (from the CSP application):

<u>Basis for Exemption</u>	<u>Description</u>
HAR §11-60.1-82(f)(1)	The Honolulu Generating Station contains VOC storage tanks with a capacity less than 40,000 gallons that are not subject to Section 111 or 112 of the CAA. The facility also has two (2) tanks over 40,000 gallons which are exempt due to the low vapor pressure of the fuel they store.

- HAR §11-60.1-82(f)(2)      There occasionally may be fuel burning equipment with a heat input capacity less than one MMBtu/hr.
- HAR §11-60.1-82(f)(5)      Two (2) propane-fired backup generators, a 30-kW Westinghouse DC generator and a 75 kW emergency generator, are used as auxiliary starters. They are used for approximately 30 minutes per week on an annual average operating basis.
- HAR §11-60.1-82(f)(7)      The Honolulu Generating Station has fugitive equipment leaks from valves, flanges, pump seals and oil/water separators. Solvents are used for maintenance purposes. Acid or vertan may be used for periodic boiler cleaning; infrequent boiler cleaning activities generate small quantities of ammonia emissions. These activities are controlled to ensure there are no off-site impacts.

Insignificant activities in addition to those listed in subsection (f) are:

<u>Basis for Exemption</u>	<u>Description</u>
HAR §11-60.1-82(g)(2)	There occasionally may be industrial equipment less than two hundred (200) horsepower on-site and several types of hand held equipment for maintenance and testing purposes. Sandblasting equipment is likely to generate particulate emissions. Reasonable precautions are taken to prevent particulate matter from becoming airborne.
HAR §11-60.1-82(g)(3)	The Honolulu Generating Station uses laboratory equipment for chemical and physical analyses.

**Project Emissions:**

The project emissions have not changed from the previous permit review. Emission rates for NO<sub>x</sub>, SO<sub>2</sub>, CO, PM/PM<sub>10</sub> and VOC are based on an evaluation of AP-42 calculations for fuel oil no. 6 (more conservative than fuel oil no. 2 and specification used oil) & stack test data. The compliance factors based on previous stack test data was greater than the corresponding AP-42 emission factor for fuel oil no. 6. Sulfur emissions were calculated based on mass balance using sulfur content and heating value of the fuel. Some of the HAPs emission rates were determined by using EPRI PISCES Air Toxic Database, while some were determined using 1994 Waiiau 7 test data. HAPs emissions were not calculated for spec used oil since 5,000 gallons was negligible and the assumed emissions factors used is more conservative. A summary of the individual unit criteria pollutant emissions is given in **TABLES 1** through **6**. The values are slightly different from HECO's application due to rounding.

**TABLE 1**  
**NO<sub>x</sub> EMISSIONS**

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
8	0.449	0.673	589.0	396	1734
9	0.449	0.673	631.5	425	1862

Assumed EF was provided by the applicant; AP-42 may underestimate the emission rate.

**TABLE 2**  
**SO<sub>2</sub> EMISSIONS**

Unit No.	Assumed EF* (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
8	0.53	589.0	312	1367
9	0.53	631.5	335	1467

\* Sulfur Balance

**TABLE 3**  
**CO EMISSIONS**

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
8	0.034	0.067	589.0	39	170
9	0.034	0.067	631.5	42	184

Assumed EF was provided by the applicant; AP-42 may underestimate the emission rate.

**TABLE 4**  
**PM/PM<sub>10</sub> EMISSIONS**

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
8	0.052	0.110	589.0	65	285
9	0.052	0.174	631.5	110	482

Assumed EF was provided by the applicant; AP-42 may underestimate the emission rate.

**TABLE 5  
 VOC EMISSIONS**

Unit No.	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)
8	0.005	0.0102	589.0	6.0	26
9	0.005	0.0102	631.5	6.4	28

Assumed EF was provided by the applicant; AP-42 may underestimate the emission rate.

**TABLE 6  
 HAPs EMISSIONS**

POLLUTANT	UNIT 8 (TPY)	UNIT 9 (TPY)	TOTAL (TPY)
Acetaldehyde	5.62e-03	6.02e-03	1.16e-02
Benzene	7.89e-03	8.46e-03	1.64e-02
Formaldehyde	1.06e-02	1.14e-02	2.20e-02
Phosphorus	6.86e-03	7.35e-03	1.42e-02
Toluene	1.58e-02	1.69e-02	3.27e-02
Antimony	1.22e-02	1.31e-02	2.53e-02
Arsenic	8.71e-03	9.34e-03	1.81e-02
Beryllium	3.27e-04	3.51e-04	6.78e-04
Cadmium	5.83e-03	6.25e-03	1.21e-02
Chromium	1.05e-03	1.12e-03	2.17e-03
Cobalt	5.57e-02	5.97e-02	1.15e-01
Lead	1.36e-02	1.46e-02	2.82e-02
Manganese	6.03e-02	6.47e-02	1.25e-01
Mercury	1.28e-02	1.37e-02	2.65e-02
Nickel	3.35e+00	3.59e+00	6.94e+00
POM	9.28e-02	9.95e-02	1.92e-01
Selenium	4.64e-03	4.97e-03	9.61e-03
<b>TOTALS (TPY)</b>	<b>3.66e+00</b>	<b>3.93e+00</b>	<b>7.59e+00</b>

As shown in the tables above, the facility is a major source for NO<sub>x</sub>, SO<sub>2</sub>, CO, and PM<sub>10</sub> since they are greater than 100 tpy.

**Ambient Air Quality Assessment:**

A new ambient air quality analysis (AAQA) was not required since there were no change in emissions. The following information was taken from the previous permit review. For details, please refer to Covered Source Permit Review dated 12/1/97.

**TABLE 7** presents the potential to emit/allowable emission rates and stack parameters of the boilers used in the AAQA. The derivation of SO<sub>2</sub>, NO<sub>x</sub>, CO, PM<sub>10</sub>, and lead (Pb) emission rates were previously discussed in the **Project Emissions** subsection. Hydrogen sulfide (H<sub>2</sub>S) emissions are not expected from these sources.

The predicted concentrations presented in **TABLE 8** assumes maximum annual operations of 8760 hr/yr. Short-term concentrations (except for PM<sub>10</sub> which was the maximum) are the second highest high. Ozone Limiting Method was used to calculate NO<sub>2</sub> concentrations. Based on these assumptions, the facility should comply with State and Federal AAQS for SO<sub>2</sub>, NO<sub>2</sub>, CO, and PM<sub>10</sub>. No results were provided for Pb because it was found to be insignificant.

**PROPOSED**  
Reviewer: CS  
November 5, 2003

**TABLE 7**  
**SOURCE EMISSION RATES AND STACK PARAMETERS FOR AIR MODELING**

SOURCE		EMISSION RATES					STACK PARAMETERS			
Equipment	Unit/Stack No.	SO <sub>2</sub> (g/s)	NO <sub>x</sub> (g/s)	CO (g/s)	PM <sub>10</sub> (g/s)	Pb (g/s)	Height (m)	Temp. (K)	Velocity (m/s)	Diameter (m)
56 MW Boiler	8	39.32	49.91	4.96	8.11	0.00039	49.23	436	14.76	2.74
57 MW Boiler	9	42.16	53.51	5.32	13.82	0.00041	49.23	436	14.76	2.74

**PROPOSED**  
**Reviewer: CS**  
November 5, 2003

**TABLE 8**  
**PREDICTED AMBIENT AIR QUALITY IMPACTS**

AIR POLLUTANT	AVERAGING TIME	IMPACT ( $\mu\text{g}/\text{m}^3$ )	BACKGROUND <sup>1</sup> ( $\mu\text{g}/\text{m}^3$ )	TOTAL IMPACT ( $\mu\text{g}/\text{m}^3$ )	AIR STANDARD ( $\mu\text{g}/\text{m}^3$ )	PERCENT STANDARD	IMPACT LOCATION (R, $\Theta$ ) <sup>2</sup>
SO <sub>2</sub>	3-Hour <sup>3</sup>	291.86	--	292	1300	22%	331,255
	24-Hour <sup>3</sup>	148.39	--	148	365	41%	302,243
	Annual	55.19	--	55	80	69%	302,243
NO <sub>2</sub>	Annual <sup>4</sup>	38.52	--	39	70	55%	302,243
CO	1-Hour <sup>3</sup>	50.86	--	51	10000	1%	3418,81
	8-Hour <sup>3</sup>	25.56	--	26	5000	1%	331,255
PM <sub>10</sub>	24-Hour <sup>3</sup>	41.58	--	42	150	28%	283,252
	Annual	14.85	--	15	50	30%	302,243
Pb	Calendar Quarter	--	--	--	1.5	--	--
H <sub>2</sub> S	1-Hour	--	--	--	35	--	--

Note:

1. Background concentrations are not required for this facility.
2. (R, $\Theta$ ) = meters, degrees.
3. Short-term concentrations are the highest second high except for PM<sub>10</sub> which is the maximum predicted concentration.
4. Ozone Limiting Method was used to calculate NO<sub>2</sub> concentrations. An annual ozone concentration of 35.4  $\mu\text{g}/\text{m}^3$  recorded at Kahe, 1992-1993 was used.

**Other Issues/Conditions:**

The applicant had proposed six (6) additional alternate operating scenarios (AOS) which were not considered AOS by the Department of Health. Five (5) were considered facility maintenance: 1) “.. unit operation during start-up, shutdown, maintenance and testing..” 2) “.. unpredictable periods of equipment failure, upsets, or emergency conditions..” 3) “.. fuel additives and other products..” 4) “.. boiler soot-blowing..” and 5) “.. replacement of standby generators with permanent emergency standby generators..” The sixth was considered as a normal operation: “.. waste oil ..”

**Existing Permit Conditions:**

1. Fuel types and specifications (there are no fuel limits except for spec used oil).
2. 40% opacity due to the age of the boilers.
3. Alternate operating scenario to switch fuels.
4. Other standard conditions including visible emissions monitoring that have been updated.

**New Permit Conditions:**

1. 5,000 gal/yr of spec used oil as proposed by HECO (previously there were no limit to burn spec used oil).

**Conclusion and Recommendation:**

The applicant has demonstrated compliance with State/Federal requirements. Conservatism has been used in the following ways:

1. Conservative emission factors were used, including assumed emission factors greater than AP-42.
2. The annual emissions assumed that the boilers were operating at maximum capacity for 8760 hours per year.

Therefore, a renewal for a Covered Source Permit for HECO - Honolulu Generating Station is recommended based on the information provided in the air permit application and subject to the following:

1. Above permit conditions;
2. 30-day public review period; and
3. 45-day EPA review period.