PROPOSED

Covered Source Permit Review Summary (Initial)

Application File No.: 0686-01

Permit No.: 0686-01-C

Applicant: Hawaiian Electric Company, Inc. (HECO)

Facility: Honolulu International Airport Dispatch Standby Generators
Rogers Blvd., Honolulu, Hawaii 96819
UTM Coordinates: Zone 4, 612,067 m E, 2,359,750 m N, (NAD-83)

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Application Date: May 8, 2008

Proposed Project:

SICC 4911 (Electrical Services)

HECO is applying for an Initial Covered Source Permit to construct and operate four (4) 2.5 MW diesel engine generators at the Honolulu International Airport. This is a joint project between the Department of Transportation Airports Division (DOT Airports) and HECO. DOT Airports will build and own the 10 MW Emergency Power Facility (four 2.5 MW units peak), feeding Honolulu Airport via HECO's system. HECO will operate the four generating units for utility system needs and will dispatch these units at the continuous rating of 8 MW total (i.e., 2 MW per unit). HECO and DOT are negotiating a Dispatchable Standby Generation (DSG) agreement, subject to PUC approval, to govern HECO's operation of the units and DOT's use of HECO's substation and electric lines. This project is critical to bolster the Airport's emergency power needs. The service date is July 2010. An application fee of $4000.00 was submitted and processed for this initial covered source permit.

Equipment Description:

1. Four (4) 2.5 MW diesel engine generators each consisting of a Caterpillar Model 3516C-HD TA diesel engine generator with ACERT Technology
   Maximum fuel consumption rate @ 2 MW load = 142 gal/hr
   Maximum fuel consumption rate @ 2.5 MW load = 172 gal/hr

Air Pollution Controls:

1. The diesel engine generators burn no. 2 diesel fuel with a maximum sulfur content of 0.05% by weight (from 10/1/07) and 0.0015% by weight (from 10/1/10) for controlling SO_2 emissions.

2. The diesel engine generators are equipped with Caterpillar's ACERT Technology to meet EPA's Tier 2 emission standards for NO_x, CO, HC, and PM. ACERT Technology reduces emissions at the point of combustion using air and fuel management and electronic controls.

Applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 59 Ambient Air Quality Standards
Title 11, Chapter 60.1 Air Pollution Control
- Subchapter 1 General Requirements
- Subchapter 2 General Prohibitions
  - HAR 11-60.1-31 Applicability
  - HAR 11-60.1-32 Visible Emissions
  - HAR 11-60.1-38 Sulfur Oxides from Fuel Combustion
- Subchapter 5 Covered Sources
- Subchapter 6 Fees for Covered Sources, Noncovered Sources, and Agricultural Burning
  - HAR 11-60.1-111 Definitions
  - HAR 11-60.1-112 General Fee Provisions for Covered Sources
  - HAR 11-60.1-113 Application Fees for Covered Sources
  - HAR 11-60.1-114 Annual Fees for Covered Sources
- Subchapter 8 Standards of Performance for Stationary Sources
- Subchapter 9 Hazardous Air Pollution Sources

Federal Requirements

40 CFR Part 60 - Standards of Performance for New Stationary Sources (NSPS)
40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. NSPS Subpart IIII applies to diesel engines manufactured after April 1, 2006.

40 CFR Part 63 - National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards)
40 CFR Part 63, Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. (RICE NESHAP). This MACT standard applies to stationary reciprocating internal combustion engines located at major and area sources of HAPs. New stationary RICE located at an area

source must meet the requirements of this part by meeting the requirements of 40 CFR Part 60, Subpart IIII for compression ignition (i.e., diesel) engines. No further requirements apply for such engines under this part.

Non-applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 60.1 Air Pollution Control
Subchapter 7 Prevention of Significant Deterioration

Federal Requirements

40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants (NESHAP)

Prevention of Significant Deterioration (PSD):

This source is not a major stationary source nor are there modifications proposed that by itself constitute a major stationary source that is subject to PSD review. Therefore, PSD is not applicable.

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is required for new covered sources and significant modifications to covered sources that have the potential to emit or a net emissions increase above significant levels as defined in HAR §11-60.1. The potential to emit for NO_x is greater than the significant level of 40 tons/yr. See the table below. Thus, a BACT analysis is required.

NSPS Subpart IIII applies to diesel engines manufactured after April 1, 2006. Compliance with NSPS Subpart IIII will be achieved through the purchase of a certified engine. The proposed CHP unit is powered by a Caterpillar 3516C-HD TA diesel engine equipped with Caterpillar's ACERT Technology to meet the EPA Tier-2 emission standards. ACERT Technology reduces emissions at the point of combustion using air and fuel management and electronic controls. NSPS Subpart IIII contains tiered emission limits. Compliance with the EPA Tier-2 standards represents the state of the art in emission controls, therefore is considered to be BACT.

Pollutant	Potential to Emit (PTE) (tpy)	Significant Level (tpy)	Significant ?
NO_x	118.2	40	yes
SO_2	2.97	40	
CO	14.40	100	
PM	0.98	25	
PM_{10}	0.98	15	
VOC	2.88	40	

Consolidated Emissions Reporting Rule (CERR):

40 CFR Part 51, Subpart A - Emission Inventory Reporting Requirements, determines CER based on the emissions of criteria air pollutants from Type B point sources (as defined in 40 CFR Part 51, Subpart A), that emit at the CER triggering levels as show in the table below.

Pollutant	Type B CER Triggering Levels [1] (tpy)	Pollutant	In-house Total Facility Triggering Levels [2] (tpy)	Total Facility Emissions [2] (tpy)
NO_x	≥ 100	NO_x	≥ 25	118.2
SO_x	≥ 100	SO_X	≥ 25	2.97
CO	≥ 1000	CO	≥ 250	14.40
$PM_{10}/PM_{2.5}$	≥ 100/100	PM/PM_{10}	≥ 25/25	$PM/PM_{10}/PM_{2.5}$ = 0.98
VOC	≥ 100	VOC	≥ 25	2.88
		HAPS	≥ 5	1.53 E-01

[1] Based on actual emissions
[2] Based on potential emissions

This facility emits at the CER triggering level for NO_x. Therefore, CER requirements are applicable.

The Clean Air Branch also requests annual emissions reporting for all covered sources and from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels. Annual emissions reporting is required for this facility for in-house recordkeeping purposes because it is a covered source and facility-wide emissions of NO_x exceed 25 tons per year.

Compliance Assurance Monitoring (CAM):

40 CFR Part 64

Applicability of the CAM Rule is determined on a pollutant specific basis for each affected emission unit. Each determination is based upon a series of evaluation criteria. In order for a source to be subject to CAM, each source must:

- Be located at a major source per Title V of the Clean Air Act Amendments of 1990;
- Be subject to federally enforceable applicable requirements;
- Have pre-control device potential emissions that exceed applicable major source thresholds;
- Be fitted with an “active” air pollution control device; and
- Not be subject to certain regulations that specifically exempt it from CAM.

Emission units are any part or activity of a stationary source that emits or has the potential to emit any air pollutant.

CAM is not applicable since this facility does not have equipment with an “active” air pollution control device.

Synthetic Minor Source:

This facility is not a synthetic minor source, it is a major source.

Insignificant Activities:

1. Three (3) diesel storage tanks < 40,000 gallons
2. Plant maintenance and upkeep activities

Alternate Operating Scenarios:

The following alternate operating scenarios are proposed:

1. The first alternate operating scenario is the use of a replacement unit in the event of a failure or major overhaul of an installed unit. In the event that the projected down-time of the installed unit increases the likelihood of an interruption in electrical service, the installed unit would be replaced with an equivalent unit. Emissions from the replacement unit shall be equal or less than the original unit's emissions.

2. The second alternate operating scenario is the ability to burn biodiesel. Should cheaper fuel become available, or the supply of diesel no. 2 become limited, HECO proposes an alternative scenario that would allow the burning of biodiesel provided that all conditions of the Covered Source permit are complied with.

3. The third alternate operating scenario would occur in the event that the demand for electricity requires increased operation of the units. The scenario entails extending the exhaust stacks by five (5) feet to a total length of 82.5 feet, and increasing the total combined fuel use by all four diesel engine generators to 1,781,000 gallons per year. All emission limits shall be complied with including compliance with the NAAQS/SAAQS.

Project Emissions:

The primary operating scenario is for the DSG project with 77.5 foot stack heights on all four (4) diesel engine generators with an annual fuel use of 845,400 gallons. The alternate operating scenario is for the DSG project with 82.5 foot stacks on all four (4) diesel engine generators with an annual fuel use of 1,781,000 gallons.

Emissions for One (1) 2.5 MW Diesel Engine Generator

Pollutant	Emission Factor (lb/MMBtu)	Heat Input [3] (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate [4] (Primary Scenario) (tpy)	Emission Rate [5] (Alternate Operating Scenario) (tpy)
NO_x	1.996	24.1	48.1 [1]	118.2	249.04
SO_2	0.05	24.1	1.21 [6]	2.97	6.26
CO	0.243	24.1	5.86 [1]	14.40	30.34
PM	0.017	24.1	0.4 [1]	0.98	2.07
PM_{10}	0.017	24.1	0.4 [1]	0.98	2.07
$PM_{2.5}$	0.017	24.1	0.4 [1]	0.98	2.07
VOC	0.0485	24.1	1.17 [1]	2.88	6.06
H_2SO_4 Mist		24.1	0.17 [7]	0.42	0.88
Fluorides		24.1	2.43 E-04 [8]	6.00 E-04	1.26 E-03
Acetaldehyde	2.52 E-05 [2]	24.1	6.07 E-04	1.49 E-03	3.14 E-03
Acrolein	7.88 E-06 [2]	24.1	1.90 E-04	4.67 E-04	9.84 E-04
Benzene	7.76 E-04 [2]	24.1	1.87 E-02	4.60 E-02	9.68 E-02
Formaldehyde	7.89 E-05 [2]	24.1	1.90 E-03	4.67 E-03	9.84 E-03
Toluene	2.81 E-04 [2]	24.1	6.77 E-03	1.66 E-02	3.51 E-02
Xylene	1.93 E-04 [2]	24.1	4.65 E-03	1.14 E-02	2.41 E-02
1,3 Butadiene	1.60 E-05 [2]	24.1	3.86 E-04	9.48 E-04	2.00 E-03
Naphthalene	1.30 E-04 [2]	24.1	3.13 E-03	7.70 E-03	1.62 E-02
Arsenic	1.10 E-05 [2]	24.1	2.65 E-04	6.51 E-04	1.37 E-03
Beryllium	3.10 E-07 [2]	24.1	7.47 E-06	1.84 E-05	3.87 E-05
Cadmium	4.80 E-06 [2]	24.1	1.16 E-04	2.84 E-04	6.01 E-04
Chromium	1.10 E-05 [2]	24.1	2.65 E-04	6.51 E-04	1.37 E-03
Lead	1.40 E-05 [2]	24.1	3.37 E-04	8.29 E-04	1.74 E-03
Manganese	7.90 E-04 [2]	24.1	1.90 E-02	4.68 E-02	9.84 E-02
Mercury	1.20 E-06 [2]	24.1	2.89 E-05	7.11 E-05	1.50 E-04
Nickel	4.60 E-06 [2]	24.1	1.11 E-04	2.72 E-04	5.75 E-04
POM	2.12 E-04 [2]	24.1	5.11 E-03	1.26 E-02	2.65 E-02
Selenium	2.50 E-05 [2]	24.1	6.03 E-04	1.48 E-03	3.12 E-03
Total HAPS			6.22 E-02	1.53 E-01	3.22 E-01

[1] Based on manufacturer's emission rates at 100% load. This engine meets EPA Tier 2 standards.

[2] Emission factors based on AP-42 (10/96) Table 3.4-3. Speciated Organic Compound Emission Factors for Large Uncontrolled Stationary Diesel Engines and Table 3.4-4. PAH Emission Factors for Large Uncontrolled Stationary Diesel Engines and AP-42 (4/00) Table 3.1-4. Emission Factors for Hazardous Air Pollutants from Distillate Oil-Fired Stationary Gas Turbines and Table 3.1-5. Emission Factors for Metallic Hazardous Air Pollutants from Distillate Oil-Fired Stationary Gas Turbines

[3] Based on a maximum hourly fuel flow rate of 172 gal/hr and using a heating value of 140,000 Btu/gal for no. 2 diesel fuel = 24.1 MMBtu/hr

[4] Based on (845,400 gallons/yr) / (172 gallons/hr) = 4,915 hrs/yr

[5] Based on (1,781,000 gallons/yr) / (172 gallons/hr) = 10,355 hrs/yr (total combined rate for the four DEGs)

[6] SO_2 emissions are based on a mass balance method and 0.05% maximum sulfur content for fuel
172 gal/hr x 7.05 lb/gal x 0.0005 = 0.606 lb/hr sulfur
$S + O_2 = SO_2$
32.06 g/mol + 32 g/mol = 64.06 g/mol
SO_2 = 32.06 / 64.06 = 0.6/x
x = 1.21 lb/hr

[7] H_2SO_4 emission rate based on 13.83% of the SO_2 emission rate (0.73 lb/hr / 5.28 lb/hr). This ratio is derived from the August 19, 1994 SCEC report of Maalaea M13 source tests.

[8] Emission rate for Fluorides based on fuel test results of 0.2 ppm dated 04/11/85.

Air Quality Assessment:

The applicant submitted an air quality assessment for this project. EPA's recommended dispersion model, AERMOD (version 07026), was used for this modeling analysis. AERMOD is a steady-state plume model capable of modeling simple, intermediate, and complex terrain receptors. In the stable boundary layer (nighttime), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the convective boundary layer (daytime), the probability density function describing the horizontal distribution is assumed to be Gaussian, while the vertical distribution is assumed to be bi-Gaussian. AERMOD also contains the PRIME algorithm which incorporates the two fundamental features associated with building downwash: (1) enhanced plume dispersion coefficients due to the turbulent wake, and (2) reduced plume rise caused by a combination of the descending streamlines in the lee of the building and the increased entrainment in the wake (EPA 2004b).

Stack Parameters and Emission Rates

Shown in the table below are the stack parameters and emission rates for each 2.5 MW diesel engine generator. The primary operating scenario is for the DSG project with 77.5 foot stack heights on all four units with an annual fuel use of 845,400 gallons. The alternate operating scenario is for the DSG project with 82.5 foot stacks on all four units with an annual fuel use of 1,781,000 gallons.

Stack Parameters and Emission Rates for the Four (4) 2.5 MW Diesel Engine Generators

Unit	Stack Height (m)	Stack Temp. (K)	Stack Velocity (m/s)	Stack Diameter (m)	SO_2 (g/s)	NO_x (g/s)	CO (g/s)	PM_{10} (g/s)
1, 2, 3 or 4 (Primary Operating Scenario)	23.62	767.2	44.4	0.508	0.152	3.40	0.738	0.05
1, 2, 3 or 4 (Alternate Operating Scenario)	25.15	767.2	44.4	0.508	0.152	7.16	0.738	0.05

Note
1. SO_2, CO, and PM_{10} emission rates are based on the maximum short-term emission rates.
2. Modeled NO_x emission rates are based on each unit individually operating at the annual emission limit, i.e., maximum short-term emission rate x 4915/8760 or 10355/8760.

Receptor Grids

Receptor densities of 25 meters, 100 meters and 250 meters were used in the modeling. The receptor grids were placed concentrically about each other starting with the 25 meter grid around the site perimeter of the project's proposed property line. Flagpole receptors were also placed along the elevated highway ramp located directly adjacent to the east of the proposed property of the project. This receptor scheme ensured that the maximum predicted concentrations were identified. The *State Air Modeling Guidelines for Prevention of Significant Deterioration and Covered Source Permit Applications* (DOH 1998) recommends a refined grid spacing of 50 meters for simple terrain and 30 meters for complex terrain when the maximum modeling impact is greater than 75% of the standard. Receptor elevations are derived from the USGS 10 meter DEM (Digital Elevation Model) using EPA's AERMAP program (EPA 2004d). The receptor grid density scheme used in the modeling analysis meets DOH's recommendations.

Meteorological Data

One year of National Weather Service (NWS) Automated Surface Observation System (ASOS) surface data from Honolulu International Airport and upper air data from Lihue provides the

meteorological data for the modeling. EPA's AERMET meteorological data processor was used to produce the required meteorological data files. The Honolulu International Airport ASOS station is located approximately 3.1 kilometers to the southwest of the proposed project site and is the nearest available meteorological station. The one-year data collection period was from January 1, 1992 through December 31, 1992. All surface data were collected at a height of 33 feet (10 meters).

Building Downwash

Downwash effects are limited to stacks located within 5L of a structure. The only buildings influencing the downwash calculations are the DSG project building which houses the four DEGs, the electrical substation control building, and the fuel storage tanks. The ratios of the distance from the stacks and the height of the remaining structures within a 325 meter radius of the DSG building are greater than 5. Therefore, those buildings are more than 5L from the stacks and do not impact downwash.

Background Ambient Air Monitoring Data

Background ambient air quality data were obtained from DOH's *2006 Annual Summary Hawaii Air Quality Data.* The maximum monitored island-wide concentrations were selected as conservative values and are shown in the table below.

Background Ambient Monitoring Data

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	DOH Monitoring Station
NO_2	Annual	9	Kapolei
SO_2	3-hr	62	Makaiwa
	24-hr	17	Makaiwa
	Annual	5	Kapolei
PM_{10}	24-hr	59	Kapolei
	Annual	16	Liliha
CO	1-hr	2,850	Honolulu
	8-hr	1,967	University

Shown below are the total project impacts including background concentrations for the four (4) 2.5 MW diesel engine generators for both the primary operating scenario and the alternate operating scenario. There were no exceedances of the State and National Ambient Air Quality Standards for any pollutant in either case.

Project Impacts for the Four (4) 2.5 MW Diesel Engine Generators (Primary Operating Scenario)

Pollutant	Averaging Period	Project Concentration[1,2] (µg/m^3)	Background Concentration[3] (µg/m^3)	Total Concentration (µg/m^3)	SAAQS[6] (µg/m^3)	Percent of SAAQS (%)
NO_2	Annual	57.8 [4,5]	9	66.8	70	95.4
SO_2	3-hr	72	62	134	1300	10.3
	24-hr	29.9	17	46.9	365	12.8
	Annual	9.1	5	14.1	80	17.6
PM_{10}	24-hr	9.8	59	68.8	150	45.9
	Annual	2.99	16	18.99	50	38.0
CO	1-hr	490	2,850	3,340	10,000	33.4
	8-hr	309	1,967	2,276	5,000	45.5

[1] Short-term concentrations are the highest first high modeling impacts for 77.5 ft stacks.
[2] All concentrations except for NO_x are based on the maximum short-term emission rates.
[3] All background concentrations are the maximum concentrations collected during 2006 for each pollutant islandwide.
[4] Modeled NO_2 concentrations is based on a NO_x to NO_2 conversion based on the Ambient Ratio Method (75% NO_x = NO_2).
[5] NO_x concentrations are based on annual fuel use of 845,400 gallons.
[6] Only the SAAQS are shown as they are the same or more restrictive than the NAAQS.

Project Impacts for the Four (4) 2.5 MW Diesel Engine Generators (Alternate Operating Scenario)

Pollutant	Averaging Period	Project Concentration[1,2] (µg/m^3)	Background Concentration[3] (µg/m^3)	Total Concentration (µg/m^3)	SAAQS[6] (µg/m^3)	Percent of SAAQS (%)
NO_2	Annual	47.5 [4,5]	9	56.5	70	80.7
SO_2	3-hr	30.3	62	92.3	1300	7.1
	24-hr	13.8	17	30.8	365	8.4
	Annual	3.26	5	8.26	80	10.3
PM_{10}	24-hr	4.53	59	63.53	150	42.4
	Annual	1.07	16	17.06	50	34.1
CO	1-hr	218	2,850	3,068	10,000	30.7
	8-hr	115	1,967	2,082	5,000	41.6

[1] Short-term concentrations are the highest first high modeling impacts for 82.5 ft stacks.
[2] All concentrations except for NO_x are based on the maximum short-term emission rates.
[3] All background concentrations are the maximum concentrations collected during 2006 for each pollutant islandwide.
[4] Modeled NO_2 concentrations is based on a NO_x to NO_2 conversion based on the Ambient Ratio Method (75% NO_x = NO_2).
[5] NO_x concentrations are based on annual fuel use of 1,781,000 gallons.
[6] Only the SAAQS are shown as they are the same or more restrictive than the NAAQS.

Significant Permit Conditions:

Significant permit conditions included the following:

1. The four (4) 2.5 MW diesel engine generators are subject to 40 CFR Part 60, Subpart IIII and 40 CFR Part 63, Supart ZZZZ.

2. Fuel limits for the diesel engine generators consist of the following:
   a. Beginning October 1, 2007 and up through September 30, 2010, the diesel engine generators shall be fired only on diesel no. 2 with:
      i. A maximum sulfur content of 0.05% by weight, and
      ii. A cetane index or aromatic content as follows:
         1) Minimum cetane index of 40; or
         2) Maximum aromatic content of 35 volume percent.
   b. Beginning October 1, 2010, the diesel engine generators shall be fired only on diesel no. 2 with:

i. A maximum sulfur content of 0.0015% by weight; and
ii. A cetane index or aromatic content as follows:
1) Minimum cetane index of 40; or
2) Maximum aromatic content of 35 volume percent.

c. The total combined fuel consumption of diesel no. 2 for the four (4) diesel engine generators shall not exceed 845,400 gallons per any rolling twelve (12) month period.

3. Opacity limit of twenty (20) percent, except during start-up, shutdown, or equipment breakdown.

4. Alternate operating scenarios to replace the diesel engine generators with a temporary replacement unit, to use biodiesel, and to increase the fuel limit to 1,781,000 gallons per any rolling twelve (12) month period provided the stacks are raised by 5 feet to a total length of 82.5 feet. Prior DOH approval is necessary for the temporary replacement of a unit, to use biodiesel and to increase the fuel limit to 1,781,000 gallons per any rolling twelve (12) month period.

5. Monitoring, recordkeeping and reporting of the fuel consumption for the four (4) diesel engine generators for compliance with the fuel consumption limit and annual emissions reporting. Also monitoring, recordkeeping and reporting of the fuel type, maximum sulfur content, minimum cetane index and maximum aromatic content for compliance with the NSPS and MACT standards.

Conclusion and Recommendations:

Recommend issuing Covered Source Permit, CSP No. 0686-01-C, subject to the significant permit conditions shown above, a 30-day public comment period and 45-day EPA review period. The project will be in compliance with all State and National ambient air quality standards.

Reviewer: Darin Lum
Date: 10/08