

**COVERED SOURCE PERMIT RENEWAL APPLICATION REVIEW**

Application Number 0214-06

**APPLICANT:** Kalaeloa Partners, L.P.  
Kalaeloa Cogeneration Facility  
Covered Source Permit (CSP) Number 0214-01-C

**LOCATION/  
MAILING ADDRESS:** 99-111 Kalaeloa Boulevard  
Kapolei, HI 96707

**RESPONSIBLE  
OFFICIAL/POC:** Mr. Hans R. Tobler (Ruedi)  
General Manager  
808-682-5288

**SIC CODE:** 4911 (Electrical Power Generation)

**PROPOSED PROJECT:**

The application seeks renewal of an existing Title V permit. The facility is a 223.5 megawatt combined cycle electrical generating facility consisting of two combustion turbines (CT), two heat recovery steam generators, a single steam turbine generator, fuel tanks, piping components and a cooling tower. Fuel combusted in the turbines causes a shaft to spin and generates electricity. Steam is generated using the hot exhaust gas from each turbine in the associated heat recovery turbine. After passing through the heat recovery turbine exhaust gases are released to the atmosphere. Steam from the heat recovery steam generators is expanded in the steam turbine to generate additional electricity. Steam from the steam turbine generator is either condensed and reused in the facility or sold to the neighboring Tesoro Refinery. Optionally, the steam turbine may be bypassed by routing the steam directly to the Tesoro refinery.

Electrical power generated by the combustion turbines and steam generator are sold to the Hawaiian Electric Company (HECO). The Kalaeloa facility is operated under the HECO Energy Management System. This system automatically adjusts the operating load for each CT as necessary to meet electrical demands.

The facility has a steam system and a cooling system. Make-up water for the steam system is supplied by a feedwater storage tank from a treatment plant which demineralizes all the water used in the steam cycle. Heat is absorbed from the steam using a steam condenser. This heat is absorbed into the cooling water and routed back to the cooling tower. Periodically a portion of the cooling water having a high solids content is purged and injected into an onsite well. Trace amounts (10 ppm or less) of treatment chemicals is added to the cooling water.

The fuel storage and handling system consists of four tanks, two for the storage of low sulfur fuel oil (LSFO), one diesel tank and a fuel additive tank. Associated pumps, valves and flanges are used in the fuel piping components. Fuel is supplied by the Tesoro Refinery using a dedicated pipeline, with a backup capability to receive diesel by truck. A low temperature and high temperature fuel preheater is located near each LSFO fuel tank, heat is supplied by the steam system.

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The plant operates 24 hours per day, 365 days per year. The maximum potential annual plant production is 8,184 hours per year, factoring in downtime for maintenance. Plant operation can vary considerably depending on the control exercised by HECO's Management System. Either one or both CT's may operate at a range of 45 to 75 MW. As a minimum, one unit is always in continuous operation unless there is a shutdown due to malfunction or maintenance. The cogeneration plant is designed for base-loaded operation and does not provide peak loading of the combustion turbines.

The CT's are the primary source of emissions. Residual LSFO which has less than 0.5 percent sulfur is typically fired in the CT's. Diesel fuel is used for short periods during start-up and shutdown of the CT's and serves as a back-up fuel source. Low pressure steam from the steam system is injected into the CT's to control NO<sub>x</sub> emissions.

### EQUIPMENT:

Stack No.	Equipment Description	Fuel Used
1	CT1, Combustion Turbine, maximum production rated at 74.6 MW, Manufactured by ABB, type GT11N	LSFO normal fuel, diesel for start-up
1	Heat Recovery Steam Generator, Manufactured by Deltak	No fuel, uses exhaust heat from CT1
2	CT2, Combustion Turbine, maximum production rated at 74.6 MW, Manufactured by ABB, type GT11N	LSFO normal fuel, diesel for start-up
2	Heat Recovery Steam Generator, Manufactured by Deltak	No fuel, uses exhaust heat from CT2
N/A	Steam Turbine Generator, 51.5 MW, Manufactured by ABB	No fuel, uses steam from heat recovery steam generators
N/A	Cooling Tower, 4-cell, mechanical forced draft, maximum design cooling capacity 383 million BTUs per hour. Maximum water flow per cell is 523,530 gallons per hour.	

### AIR POLLUTION CONTROL AND MONITORING DEVICES:

Nitrogen oxide emissions from the combustion turbines are controlled through the use of water injection at a mass steam to fuel ratio of 1.3 to 1.0, on a one hour average. Pursuant to the PSD permit conditions this ratio must be maintained at all times, except for the two hours following start-up and one hour preceding shutdown. The one hour steam to fuel ratio is monitored by a continuous emissions monitoring system (CEMS).

NO<sub>x</sub> and CO emissions are also monitored by a CEM. SO<sub>2</sub> emissions are monitored by using fuel consumption data and the sulfur content of the fuel used. Fuel sulfur content and heat content data are measured and recorded for each new delivery of fuel.

Annual emissions tests are performed to demonstrate compliance with permit limits for NO<sub>x</sub>, VOC, CO, SO<sub>2</sub> and particulate matter at 60%, 80%, and full capacity.

PM<sub>10</sub> emissions from the cooling tower are controlled through the design of the cooling tower which includes a drift eliminator.

**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
      - 11-60.1-31 Applicability
      - 11-60.1-32 Visible Emissions
      - 11-60.1-33 Fugitive Dust
      - 11-60.1-38 Sulfur Oxides from fuel combustion
    - 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
    - Subchapter 7, Prevention of Significant Deterioration Review
    - Subchapter 8, Standards of Performance for Stationary Sources
    - Subchapter 10, Field Citations

**NSPS:**

The facility is subject to the following New Source Performance Standards (NSPS):  
40 CFR Part 60 Subpart A, General Requirements  
40 CFR Part 60 Subpart GG, Standards of Performance for Stationary Gas Turbines

**CONSOLIDATED EMISSIONS REPORTING RULE (CERR):**

The facility will continue to be subject to the consolidated emissions reporting rule.

**PSD:**

The facility is already classified as a PSD source. PSD review is not required for the permit renewal because the facility is not proposing any modification to current operational practices.

**BEST AVAILABLE CONTROL TECHNOLOGY (BACT):**

The facility is not subject to BACT for the permit renewal because no modifications have been proposed in conjunction with this permit renewal.

**INSIGNIFICANT ACTIVITIES/EXCEPTIONS:**

Insignificant activities have not been modified since the issuance of the initial title V permit and include the following:

<b>Stack No.</b>	<b>Equipment Description</b>	<b>Fuel Used</b>
N/A	T4, 13,000 gallon fuel additive tank	
N/A	T5, 500 gallon fire pump diesel fuel tank	
N/A	209 hp Emergency Diesel Engine Generator	Diesel
N/A	121 hp diesel engine for emergency fire pump	Diesel

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## ALTERNATIVE OPERATING SCENARIOS:

None (unchanged from initial application)

## PROJECT EMISSIONS:

This renewal application does not propose and modifications, so facility emissions remain unchanged. Annual emission estimates presented in the initial title V permit application are as follows:

**Pollutant Emissions from Turbine Operations**

Air Pollutant (CAS#)	Air Pollutant Emission Rate		
	Hourly (lb/hr or grams/hr <sup>(1)</sup> )	Annual (tons/yr <sup>(2)</sup> ) Per turbine	Total (tons/yr <sup>(2)</sup> )
NO <sub>x</sub>	488	2,067	4,134
SO <sub>2</sub>	483	2,048	4,096
CO	35	148	296
PM-10	80	339	678
VOC	3.6	15	30
Antimony (173)	15.02	0.28	0.56
Arsenic (177)	3.78	0.035	0.07
Benzene (15)	0.61	0.006	0.01
Beryllium (175)	0.13	0.001	0.002
Cadmium (176)	3.4	0.032	0.064
Chlorine (34)	6.6	0.061	0.122
Chromium (177)	19.20	0.179	0.358
Cobalt (178)	17.22	0.161	0.322
Ethylbenzene	0.18	0.002	0.004
Formaldehyde (87)	94.39	0.881	1.762
Lead (182)	23.7	0.221	0.442
Manganese (183)	138.92	1.296	2.592
Mercury (184)	4.43	0.041	0.082
Napthalene	3.23	0.030	0.060
Toluene	17.73	0.165	0.330
O-xylene	0.31	0.003	0.006
POM (187)	3.72	0.035	0.070
Phosphorous	122.58	1.144	2.288
Selenium (189)	2.17	0.02	0.040
VOC (LSFO storage tank T1)	1.258 <sup>(3)</sup>	0.02	0.02
VOC (LSFO storage tank T2)	1.258 <sup>(3)</sup>	0.02	0.02

**Pollutant Emissions from Turbine Operations**

Air Pollutant (CAS#)	Air Pollutant Emission Rate		
	Hourly (lb/hr or grams/hr <sup>(1)</sup> )	Annual (tons/yr <sup>(2)</sup> ) Per turbine	Total (tons/yr <sup>(2)</sup> )
VOC (Diesel storage tank <sup>(4)</sup> )	27.1 <sup>(3)</sup>	2.01	2.01
VOC (Fuel Additive Tank)	0.8 <sup>(3)</sup>	0.21	0.21
VOC (Fuel Pumps)	0.0190	1.25	1.25
VOC (Valves)	0.0002	0.31	0.31
VOC (Flanges)	0.0002	0.26	0.26
PM <sub>10</sub> (Cooling tower)	0.0009 <sup>(5)</sup>	8.0	8.0

<sup>(1)</sup> Criteria pollutants based on lb/hr full load (74.6 MW) except CO which is based on 60% - 80% of full load. HAP expressed in grams per hour.

<sup>(2)</sup> Based on 8,472 operating hours (8,760-288 for an A and B Inspection).

<sup>(3)</sup> Annual throughput, thousand barrels.

<sup>(4)</sup> Horizontal cylinder tanks (12 feet diameter x 50 feet long).

<sup>(5)</sup> lbs/1000 gal-water.

**AIR QUALITY ASSESSMENT:**

An ambient air quality assessment was not required for the permit renewal because there was no increase in short term (g/s) or long term (tpy) emission rates from previously modeled levels. Results of the air quality assessment done in accordance with the initial Title V permit application are exhibited in the following table. Refer to the initial title V permit application review for detailed calculations.

**Summary of Previous Ambient Air Quality Impacts**

Pollutant	Averaging Period	1988 PSD Application Impact (µg/m <sup>3</sup> )	1994 Title V Application Impact (µg/m <sup>3</sup> )	SAAQs (µg/m <sup>3</sup> )	NAAQS (µg/m <sup>3</sup> )
NO <sub>x</sub> as NO <sub>2</sub>	Annual	2.3	3.6	70	100
SO <sub>2</sub>	3-Hour	159.3	220.3	1300	1300
	24-Hour	27.2	73.2	365	365
	Annual	2.0	3.2	80	80
CO	1- Hour	29.1	18.7	10,000	40,000
	8-Hour	9.7	10	5,000	10,000
TSP	24- Hour	4.5	12.2	---	---
	Annual	0.3	0.5		
PM <sub>10</sub>	24-Hour	4.5	18.7	150	150
	Annual	0.3	10.0	50	50

**OTHER ISSUES:** None

**SIGNIFICANT PERMIT CONDITIONS:** None

**CONCLUSION AND RECOMMENDATION:**

## **PROPOSED**

The facility complies with all State and Federal standards with regards to air pollution.  
Recommend renewal of permit pending 30-day public comment period and EPA 45-day review.

Kevin Kihara  
March 4, 2008