

PROPOSED

COVERED SOURCE PERMIT APPLICATION REVIEW 0243-01-C

Renewal Application No. 0243-03

Minor Modification Application No. 0243-04

APPLICANT: Hamakua Energy Partners, L.P.
Hamakua Energy Plant
Covered Source Permit (CSP) No. 0243-01-C

LOCATION: 45-300 Lehua Street
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SIC CODE: 4911 (Electrical Power Generation)

PROPOSED PROJECT:

This review encompasses the following applications:

1. Application No. 243-03 is for the renewal of covered source permit (CSP) number 0243-01-C. The renewal application was submitted on May 31, 2002. No changes to existing permit conditions were proposed with the renewal application.
2. Application No. 0243-04, submitted on May 22, 2003, is for a minor modification to the CSP. The applicant seeks to modify the monitoring and recordkeeping requirements for NO_x concentration monitoring.

The facility produces electrical power and process steam. The nominal 65 MW of electricity produced is sold to the Hawaii Electric Light Company, Inc. (HELCO) to supplement the electrical demands for the island of Hawaii. Except some downtime for maintenance, the Plant is fully dispatchable and operates year-round.

Equipment at the facility consists of two (2) 24.3 (gross capacity) MW General Electric (GE) Model LM2500 combustion turbine generators (CTG), two waste heat recovery steam generators (HRSG), and one nominal 19 MW steam turbine generator (STG). The facility was initially operated in simple cycle mode and currently operates in combined cycle mode. In combined cycle mode, the high temperature exhaust from the CTG's is directed to the HRSG's for extraction of energy to produce steam which then drives the STG's to produce 19 MW of

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additional power. From the HRSG's, the exhaust point of each stack to the atmosphere is approximately 36.6 meters (120 feet) above ground.

The CTG's are fired primarily on naphtha, with low sulfur fuel oil no. 2 or gasoline allowed as alternate fuels. The sulfur content of these fuels is limited to 0.05 percent by weight. The CTG's use water injection to reduce nitrogen oxide (NO_x) emissions. Additional NO_x reduction is provided by two selective catalytic reduction (SCR) units, each installed as part of the two HRSG's.

Proposed Modification:

Application No. 0243-04 seeks to revise the monitoring and recordkeeping requirements for the NO_x concentration at the entrance to the HRSG.

The procedure currently used to determine the ammonia injection rate into the SCR unit uses a NO_x analyzer (shared with the exhaust stack) to monitor NO_x concentrations from the combustion turbine prior to the SCR control device. A digital control system uses the concentration data to proportionately adjust the ammonia injection rate. The modification will allow the ammonia injection rate to be determined using operating load rather than inlet concentration data. The facility claims that the current procedure is unreliable in certain modes of operation due to the response time of the sampling system and issues related to instrument time-sharing. A clause will be added to the permit to allow the Department to revise the monitoring requirements if it is determined that additional monitoring is required.

Additional Permit Modifications:

Other permit modifications in the permit renewal are as follows:

1. Due to the fact that the NO_x emission limit of 15 ppm is not enforced during startup or shutdown, a condition has been added to the permit which classifies missions that exceed the 92.5 ppm limit calculated pursuant to 40 CFR 60.332 as excess emissions, including startup and shutdown.

The limit was determined using the following equation

$$std = 0.0075 \left(\frac{14.4}{Y} \right)$$

where Y=11.6789 kJ/watthour

std = 0.0092% by volume (92 ppm)

2. The monitoring requirements for the cooling tower have been revised so that cooling tower emissions are based upon the total dissolved solids in the cooling tower rather than the total dissolved solids in the groundwater. In addition the total concentration of dissolved solids allowable in the cooling tower has been increased from 1,300 mg/l to 2,100 mg/l due to the fact that only 66 percent of the particulate emissions has an equivalent aerodynamic diameter less than 10 microns.

EXISTING EQUIPMENT

The existing permitted equipment at the facility consists of the following:

1. Two (2) 23 MW (nominal) General Electric LM2500 combustion turbine generators;

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2. Two (2) unfired heat recovery steam generators (HRSG), with two (2) selective catalytic reduction (SCR) units;
3. Two (2) 120-foot high exhaust stacks for the combustion turbines;
4. One (1) 19 MW (nominal) steam turbine generator;
5. One (1) 1,250 kW Black Start diesel engine generator;
6. One (1) emergency fire pump;
7. Two (2) external floating roof petroleum storage tanks storing naphtha, gasoline or low sulfur fuel oil no. 2 (hereinafter, "LSFO"):
 - a. Tank 1: 70-foot diameter, 55.6-foot high (34,350 bbl.); and
 - b. Tank 3: 70-foot diameter, 55.6-foot high (34,350 bbl.).
8. One (1) multi-cell cooling tower.

AIR POLLUTION CONTROL DEVICES:

NO_x emissions from the combustion turbines are controlled through the use of water injection and selective catalytic reduction (SCR). NO_x emissions are limited to 15 ppmvd @ 15% O₂.

Hamakua Power uses a continuous emissions monitoring system (CEMS) to measure NO_x and CO emissions. A transmissometer is used to measure visible emission levels.

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):

1. 40 CFR Part 60 Subpart A, *General Requirements*
2. 40 CFR Part 60 Subpart GG, *Standards of Performance for Stationary Gas Turbines*

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3. 40 CFR Part 60 Subpart Subpart Kb, *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*

CONSOLIDATED EMISSIONS REPORTING RULE (CERR):

The facility is subject to CERR, and is classified as a type B source. Pursuant to rule, reporting is required every 3rd year. Refer to the following table for a comparison of emission levels to CERR reporting levels.

Pollutant	Total Emissions (TPY)	CERR Reporting Levels (TPY)	
		Type A (Annual)	Type B (every 3 rd year)
CO	245.5	≥ 2,500	≥ 100
NO _x	104.5	≥ 2,500	≥ 100
PM ₁₀	41.3	≥ 250	≥ 100
SO _x	131.4	≥ 2,500	≥ 100
VOC	25.1	≥ 250	≥ 100
Pb	0.11	--	≥ 5

PREVENTION OF SIGNIFICANT DETERIORATION (PSD):

The facility is already classified as a PSD source. A PSD review is not required for the permit renewal because the facility is not proposing any modifications that will increase emissions above current levels.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT):

The facility is not subject to a BACT review for the permit renewal because no modifications that will increase emissions have been proposed in conjunction with this renewal.

CHEMICAL ACCIDENT PREVENTION PROVISIONS

The storage and use of ammonia at the facility is subject to the provisions of 40 CFR 68, Chemical Accident Prevention Provisions. Pursuant to section 112(r) of the [Clean Air Act](#), the [Chemical Accident Prevention Provisions](#) require facilities that produce, handle, process, distribute, or store certain chemicals to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA. Covered facilities were initially required to comply with the rule in 1999, and the rule has been amended on several occasions since then, most recently in 2004.

INSIGNIFICANT ACTIVITIES

Insignificant activities at the facility consists of a 8,950 barrel (375,900 gallon) fuel storage tank used to store diesel fuel.

EMISSION CALCULATIONS

Project emissions remain unchanged for the permit renewal. Air emissions are generated from the combustion turbine generators, black start diesel engine, fuel storage tanks, and the cooling tower.

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Project Emissions Summary

Air Pollutant	Estimated Emissions ^{a,b}	
	(lbs/hr)	(tons/yr)
Nitrogen Oxides	96.4	104.5
Sulfur Dioxide	31.5	131.4
Carbon Monoxide	64.0	245.4
Volatile Organic Compounds	8.7	25.1
Particulate Matter ^c	10.3	41.3
Lead	0.05	0.11

^a Contribution from each type of emission unit are presented in the tables below.

^b Annual estimated emissions are based on two CTG's and cooling tower operating 8,760 hour per year, and on the black start diesel engine generator operating 52 hours per year.

^c Either TSP or PM₁₀.

Total Emissions from CTG's

Air Pollutant	Emissions	
	lb/hr	tons/yr
Nitrogen Oxides	23.4	102.6
Sulfur Dioxide	30.0	131.4
Carbon Monoxide	58	245.2
Volatile Organic Compounds	4	17.6
Particulate Matter ^c	9.4	41.2
Lead	0.05	0.11

Emissions from Blackstart DEG

Air Pollutant	Emissions	
	lb/hr	tons/yr
Nitrogen Oxides	29.85	0.776
Sulfur Dioxide	0.15	0.004
Carbon Monoxide	2.66	0.069
Volatile Organic Compounds	0.49	0.013
Particulate Matter ^c	0.2	0.005
Lead	--	--

Fuel Storage Tank Emissions

Air Pollutant	Emissions	
	lb/hr	tons/yr
Volatile Organic Compounds	1.7	7.4

Cooling Tower Emissions

Air Pollutant	Emissions	
	lb/hr	tons/yr
Particulate Matter	0.01	0.04

Hamakua Power HAP Emissions¹

Pollutant	Emissions	
	(lbs/hr)	(tons/yr)
Nitrogen Oxides	96.4	104.5
Sulfur Dioxide	31.5	131.4
Carbon Monoxide	64.0	245.4
Volatile Organic Compounds	8.7	25.1
Particulate Matter	10.3	41.3
Lead	0.05	0.11
HAPs	(lbs/hr)	(tons/yr)
Antimony Compounds	0.001	0.044
Arsenic	0.0022	0.0096
Beryllium Compounds	0.00015	0.00066
Cadmium	0.0019	0.0083
Chromium	0.022	0.096
Cobalt Compounds	0.0042	0.018
Manganese	0.16	0.7
Mercury	0.00042	0.0018
Nickel	0.56	2.5
Polyaromatic Hydrocarbons	0.078	0.34
Selenium Compounds	0.0024	0.011

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Pollutant	Emissions	
	(lbs/hr)	(tons/yr)
Acetaldehyde	0.36	1.6
Acrolein	0.042	0.18
Benzene	0.46	2.0
Formaldehyde	0.54	2.4
Phosphorus	0.14	0.61
Toluene	0.19	0.83
Xylene (mixed isomers)	0.13	0.57
Flourides	0.0038	0.017
Sulfuric Acid	0.48	2.1
Total HAPs		14.04

HAP emissions from CTG's only; blackstart DEG emissions negligible.

AIR QUALITY ASSESSMENT:

An ambient air quality assessment was not required for the permit renewal since short term (g/s) and long term (tpy) emission rates are unchanged from previously modeled levels. The result of the previous air quality assessment, done in accordance with the initial Title V permit application is exhibited in the following table. Refer to the initial title V permit application review for additional information.

AMBIENT AIR QUALITY IMPACT (COMBINED CYCLE)						
Pollutant	Averaging Period	CONCENTRATION ($\mu\text{g}/\text{m}^3$)				% of std.
		Conc.	Background ^b	Total	Std ²	
NO _x	Annual	23.4	2.0	25.4	70	36.3
SO ₂	3-Hour	177.0	585.0	762.0	1,300	58.6
	24-Hour	87.7	117.0	204.7	365	56.1
	Annual	39.3	5.0	44.3	80	55.4
PM ₁₀ ^a	24-Hour	56.6	28.0	84.6	150	56.4
	Annual	12.3	14.0	26.3	50	52.6

^a assumes all particulate is PM₁₀

^b Background levels obtained from Puna monitoring station.

CONCLUSION:

The operation of the facility does not violate State or Federal Ambient Air Quality Standards. Recommend approval of renewal and minor modification subject to 30 day public comment period and EPA 45-day review.

Kevin Kihara
December 8, 2008