PROPOSED

Minor Modification to a Covered Source
Review Summary

Application No.: 0239-04 (minor modification application)

Permit No.: 0239-01-C

Applicant: Hawaiian Electric Company, Inc. (HECO)

Facility: Waiau Generating Station
Located at: Pearl City, Oahu
475 Kamehameha Highway, Pearl City, Oahu
UTM: Zone 4, 607,337m E; 2,365,837m N (Old Hawaiian)

Mailing Address: Hawaiian Electric Company, Inc.
Waiau Generating Station
P.O. Box 2750
Honolulu, HI 96840-0001

Responsible Official: Anthony G. Taparra
Manager, Generation Operations
Hawaiian Electric Company, Inc.
(808) 543-4321

Point of Contact: Karin Kimura
Environmental Department
Hawaiian Electric Company, Inc.
(808) 543-4522

Application Date: May 6, 2015

Proposed Project:

The Standard Industrial Classification Code (SICC) for this facility is 4911 - *Electric Services.*

This facility operates six (6) boilers and two (2) CTs for the production of electricity for sale. Although all of the boilers and CTs normally operate intermittently, they will be assumed to operate simultaneously for 8,760 hr/yr at maximum capacity. None of the combustion units have any air pollution controls. Boiler unit nos. 3, 4, 5 and 6 are cycling units, whereas boiler unit nos. 7 and 8 are baseload units. For the combustion turbines, unit nos. 9 and 10 are peaking units used for quick starts.

In this minor modification application, the applicant proposes to allow the operation of the combustion turbine generators, unit nos. 9 and 10, below minimum load to address system disturbances and frequency issues.

Proposed change to Attachment IIB, Special Condition No. B.3: Startup and Shutdown

a. The startup sequence for any combustion turbine generator shall ~~not exceed~~ be at thirty (30) minute~~s~~. ~~A startup sequence shall be~~ period from the time the combustion turbine generator start button is pressed ~~until the time the combustion turbine generator is initially brought up to ten (10) percent of normal load~~. Upon completion of the thirty (30) minute startup sequence, the combustion turbine generator shall be at ten (10) percent of nominal load or more.

b. The shutdown sequence for any combustion turbine generator shall not exceed thirty (30) minutes. A shutdown sequence shall be from the time the combustion turbine generator is below ten (10) percent of nominal load following the initiation of the combustion turbine generator stop signal, until fuel use at the combustion turbine generator ceases.

Justification

The requested changes are needed to: 1) clarify the description of the startup sequence to allow for stabilization of the combustion turbine generator during startup; and 2) clarify that the shutdown sequence is dependent on the initiation of the combustion turbine generator stop signal.

Proposed change to Attachment IIB, Special Condition No. B.4: Minimum Operating Load

The combustion turbine generators combined time of operation ~~shall not operate~~ below ten (10) percent of nominal load shall not exceed 225 hours in any rolling twelve (12) month period, excluding ~~except during~~ equipment startup, shutdown, maintenance, and testing.

Justification

The requested change will allow the operation of the combustion turbine generators below ten (10) percent of nominal load (5 MW) to address system frequency issues and other system stability issues.

Units W9 and W10 are GE MS7000 simple cycle combustion turbines (CTs). In 2005, the CSP was revised to set the CT's minimum load at 10% of nominal load (5 MW). Due to the increase in non-firm renewable energy (wind and solar), there may be times when the W9 and W10 load drops below 5 MW to maintain system frequency and stability. In 2005, 5 MW (10% nominal load) emission rates were determined using performance data for the current version of the CT (CT-MS7001EA, CT plus generator package –PG7121). This same approach is used to determine emissions down to loads as low as 1 MW. This analysis determined that load reduction has the following impacts on the CT emission factors:

- The SO_2 emission factor is directly proportional to fuel sulfur content. Thus, the SO_2 emission factor remains constant.
- The lead, fluorides, and H_2SO_4 emission factors are dependent on fuel type. Thus, these emission factors remain constant.
- The NO_x emission factor decreases with decreasing load.
- The CO, VOC, PM, PM_{10}, and $PM_{2.5}$ emission factors increase with decreasing load.

Since SO_2, NO_x, lead, fluorides, and H_2SO_4 emissions decrease with decreasing load, low load emission rates are not needed. Worst-case project emissions will occur when the CTs are operating at 5 MW. Thus, project SO_2, NO_x, lead, fluorides, and H_2SO_4 emissions are based on the CTs operating at 5 MW.

For the low load NO_x, CO, VOC, PM, PM_{10}, and $PM_{2.5}$ emission factors, the PG7121 performance data were used to determine the relationship between load and emission factor. Performance data for a PG7121 without water injection were obtained from GE's Gas Turbine Performance Simulation software. The ratio of the base load to the low load emission factors for CO, VOC, and PM were calculated to account for the increased PG7121 package output and the derived ratios are applied to the AP-42 base load emission factors to determine the CO, VOC, PM, PM_{10}, and $PM_{2.5}$ low load emission factors.

This modification is considered a minor modification since it:

(1) Does not increase the emissions of any air pollutant above the permitted emission limits;
(2) Does not result in or increase the emissions of any air pollutant not limited by permit to levels equal to or above:

    (A) 500 pounds per year of a hazardous air pollutant, except lead;
    (B) 300 pounds per year of lead;
    (C) twenty-five (25) percent of significant amounts of emission as defined in section 11-60.1-1, paragraph (1) in the definition of "significant"; or
    (D) two (2) tons per year of each regulated air pollutant not already identified above;

(3) Does not violate any applicable requirement;
(4) Does not involve significant changes to existing monitoring requirements or any relaxation or significant change to existing reporting or recordkeeping requirements in the permit. Any change to the existing monitoring, reporting, or recordkeeping requirements that reduces the enforceability of the permit is considered a significant change;
(5) Does not require or change a case-by-case determination of an emission limitation or other standard, a source-specific determination for temporary sources of ambient impacts, or a visibility or increment analysis;
(6) Does not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement, and that the source has assumed to avoid an applicable requirement to which the source would otherwise be subject. Such terms and conditions include:

    (A) A federally enforceable emissions cap assumed to avoid classification as a modification pursuant to any provision of Title I of the Act or subchapter 7; and
    (B) An alternative emissions limit approved pursuant to regulations promulgated pursuant to Section 112(i)(5) of the Act or subchapter 9; and

(7) Is not a modification pursuant to any provision of Title I of the Act.

The minor modification application fee of $200.00 (major, toxic covered source) was submitted by the applicant and processed.

Equipment:

Unit No.	Description (power outputs are nominal and the units are situated from west to east)
10	50 MW General Electric MS7000 Combustion Turbine (682 MMBtu/hr, serial no. 217725, built in 1973)
9	52 MW General Electric MS7000 Combustion Turbine (691 MMBtu/hr, serial no. 217724, built in 1973)

Air Pollution Controls:

None of the equipment at this facility use "add-on" air pollution control devices.

Applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 11-59 Ambient Air Quality Standards
Title 11, Chapter 11-60.1 Air Pollution Control
- Subchapter 1 General Requirements
- Subchapter 2 General Prohibitions
  - 11-60.1-31 Applicability
  - 11-60.1-32 Opacity Requirements
  - 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

Non-Applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 11-60.1 Air Pollution Control
- Subchapter 7 Prevention of Significant Deterioration
- Subchapter 8 Standards of Performance for New Stationary Sources (NSPS)
- Subchapter 9 Hazardous Air Pollutants

Federal Requirements

40 CFR Part 52.21 - Prevention of Significant Deterioration (PSD) of Air Quality review is not applicable since there is no proposed modification or reconstruction for this existing facility that would increase emissions.

40 CFR Part 60, Subpart KKKK – Standards of Performance for Stationary Combustion Turbines, is not applicable for this proposed modification since operation at loads less than five (5) MW will not increase the SO_2 and NO_x emission rates. Both SO_2 and NO_x emission rates decrease with decreasing load. Operation of the combustion turbine generators below

five (5) MW will not require any capital expenditure. The combustion turbine generators are already capable of operating below ten (10) percent nominal load, i.e., components of the combustion turbine generators will not require replacement as part of this proposed modification. Thus, this proposed modification will not be considered reconstruction as provided in 40 CFR §60.15.

40 CFR Part 63 - Maximum Achievable Control Technology (MACT), Subpart YYYY - NESHAPS for Stationary Combustion Turbines, is not applicable. Pursuant to 40 CFR §63.6090(b)(4), the existing CTs do not have to meet the requirements of the subpart.

Alternate Operating Scenarios:

No change from the previous renewal application.

Insignificant Activities:

No change from the previous renewal application.

Prevention of Significant Deterioration (PSD):

PSD is not applicable because this facility is not a *new* major stationary source nor does this application propose any *major modifications* to a major stationary source as defined in 40 CFR 52.21. A *major modification* is defined as a project at an existing major source that will result in a significant and a significant net emissions increase above specified emission thresholds for pollutants subject to regulation.

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is applicable only to new covered sources and significant modifications to covered sources that have the potential to emit or increase emissions above significant levels as defined in HAR §11-60.1-1. A BACT analysis is not applicable since this is a minor modification to a covered source.

Compliance Assurance Monitoring (CAM):

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 pre-control emissions that are greater than the major source level [>100 tpy]; and (5) not otherwise be exempt from CAM. CAM is not applicable since item 3 does not apply.

Air Emissions Reporting Requirements (AERR):

40 CFR Part 51, Subpart A – Air Emissions Reporting Requirements, is based on the emissions of criteria air pollutants from Type A and B point sources (as defined in 40 CFR Part 51, Subpart A), that emit at the AERR triggering levels as shown in the table below. This facility exceeds the Type A triggering levels. Therefore, AERR are applicable.

Pollutant	Total Facility Emissions [1] (tpy)	AERR Triggering Levels [1] (tpy)		In-House Total Facility Triggering Levels [1] (tpy)
		1-yr Reporting Cycle (Type A Sources)	3-yr Reporting Cycle (Type B Sources)	
VOC	372	≥ 250	≥ 100	≥25
PM/PM_{10}	2,671/2671	n/a	n/a	≥25/25
$PM_{10}/PM_{2.5}$	2,671/2671	≥ 250/250	≥ 100/100	n/a
NO_x	29,741	≥ 2,500	≥ 100	≥25
SO_x	13,041	≥ 2,500	≥ 100	≥25
CO	1,833	≥ 2,500	≥ 1,000	≥250
HAPs (total)	37.4	n/a	n/a	≥5

[1] Based on potential emissions

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 because it is a covered source.

Synthetic Minor:

A synthetic minor is a facility with operational limitations in order to keep potential emissions lower than major source levels (≥100 tpy of criteria pollutants, or ≥10 TPY of individual or 25 TPY of a combination of HAPs). This facility is a major source and therefore is not a synthetic minor.

Project Emissions:

Unit Nos. 9 or 10 - Low Load Project Emissions

Pollutant	(lb/hr per CT)	(tpy total)	Significant Level (tpy)	Significant Modification Required?
CO	58.4	6.57	25	no
NO_x	85.1	9.58	10	no
SO_2	12.0	1.35	10	no
PM	7.87	0.885	6.25	no
PM_{10}	22.0	2.48	3.75	no
$PM_{2.5}$, $PM_{2.5}$	22.0	2.48	2.5	no
$PM_{2.5}$, SO_2	12.0	1.35	10	no
$PM_{2.5}$, NO_x	85.1	9.58	10	no
O_3, NO_x	85.1	9.58	10	no
O_3, VOC	2.05	0.231	10	no
Lead	3.33E-03	3.74E-04	0.15	no
Fluorides	2.39E-03	2.69E-04	2	no
H_2SO_4	1.57	0.177	2	no
CO_2e		4,369	10,000	no

Notes:

1. Project tpy values based on 225 hrs/yr.
2. Minor modification significant levels from HAR §11-60.1-81.
3. $PM_{2.5}$ emissions and PM_{10} emissions shall include gaseous emissions from a source or activity which condenses to form particulate matter at ambient temperatures (40 CFR §52.21(b)(50)(i)(a) and HAR §11-60.1-1).
4. In addition to the 10 tpy significant level for direct $PM_{2.5}$ emissions, the project is significant for $PM_{2.5}$ if SO_2 or NO_x emissions exceed 40 tpy (40 CFR §52.21(b)(23)(i)(a) and HAR §11-60.1-1).
5. The project is significant for O_3 if NO_x or VOC emissions exceed 40 tpy (40 CFR §52.21(b)(23)(i)(a) and HAR §11-60.1-1).

Ambient Air Quality Impact Assessment (AAQIA):

An ambient air quality impact assessment is not required for minor modifications.

Significant Permit Conditions:

- Attachment IIB, Special Condition No. B.3

3. Startup and Shutdown

    a. The startup sequence for any combustion turbine generator shall be a thirty (30) minute period from the time the combustion turbine generator start button is pressed. Upon completion of the thirty (30) minute startup sequence, the combustion turbine generator shall be at ten (10) percent of nominal load or more.
    b. The shutdown sequence for any combustion turbine generator shall not exceed thirty (30) minutes. A shutdown sequence shall be from the time the combustion turbine generator is below ten (10) percent of nominal load following the initiation of the combustion turbine generator stop signal, until fuel use at the combustion turbine generator ceases.

- Attachment IIB, Special Condition No. B.4

4. Minimum Operating Load

    The combustion turbine generators, unit nos. 9 and 10, combined hours of operation below ten (10) percent of nominal load shall not exceed 225 hours in any rolling twelve (12) month period, excluding during equipment startup, shutdown, maintenance, or testing.

- Added monitoring and recordkeeping requirements for the total combined hours of operation of the combustion turbine generators, unit nos. 9 and 10, to show compliance with Attachment IIB, Special Condition No. B.4.

Conclusion and Recommendation:

Recommend issuance of the minor modification to existing Covered Source Permit No. 0239-01-C, subject to the significant permit conditions above. A forty-five day (45-day) EPA review period is also required. This permit shall supersede CSP No. 0239-01-C issued on April 17, 2013, in its entirety.

Reviewer: Darin Lum
Date: 7/2015