

## ADMINISTRATIVE RECORD

HAWAIIAN ELECTRIC LIGHT COMPANY, INC.  
Puna Generating Station

Application for Significant Modification No. 0235-04

Located At: Puna Mill Road, Keaau, Hawaii

**CSP No. 0235-01-C**

### TABLE OF CONTENTS

1. Public Notice
2. Draft Permit
3. Draft Review Summary
4. Application and Supporting Information

# **PUBLIC NOTICE**

**REQUEST FOR PUBLIC COMMENTS  
ON DRAFT AIR PERMITS  
REGULATING THE EMISSIONS OF AIR POLLUTANTS**

**(Docket No. 20-CA-PA-06)**

Pursuant to Hawaii Revised Statutes (HRS), Chapter 342B-13, and Hawaii Administrative Rules (HAR), Chapter 11-60.1, the Department of Health, State of Hawaii (DOH), is requesting public comments on **DRAFT PERMITS** presently under review for the following affected facilities subject to greenhouse gas (GHG) emission reductions:

A. Independent Power Producers (IPPs)

**(1) Amendment of Covered Source Permit (CSP) No. 0087-02-C**

Application for Significant Modification No. 0087-09  
AES Hawaii, LLC (AES)  
203 MW Coal-Fired Cogeneration Plant  
Located At: 91-086 Kaomi Loop, Kapolei, Oahu

**(2) Amendment of Covered Source Permit (CSP) No. 0243-01-C**

Application for Significant Modification No. 0243-07  
Hamakua Energy, LLC (Hamakua Energy)  
Hamakua Energy Plant (HEP)  
65 MW Cogeneration Facility  
Located At: 45-300 Lehua Street, Honokaa, Hawaii

**(3) Amendment of Covered Source Permit (CSP) No. 0214-01-C**

Application for Significant Modification No. 0214-10  
Kalaeloa Partners, L.P. (KPLP)  
Kalaeloa Cogeneration Plant (KCP)  
223.5 MW Kalaeloa Cogeneration Plant  
Located At: 91-111 Kalaeloa Boulevard, Kapolei, Oahu

B. Hawaiian Electric Companies

**(1) Amendment of Covered Source Permit (CSP) No. 0548-01-C**

Application for Significant Modification No. 0548-09  
Hawaiian Electric Company, Inc. (HECO)  
Campbell Industrial Park (CIP) Generating Station  
Located At: 91-196 Hanua Street, Kapolei, Oahu

**(2) Amendment of Covered Source Permit (CSP) No. 0240-01-C**

Application for Significant Modification No. 0240-08  
Hawaiian Electric Company, Inc. (HECO)  
Kahe Generating Station  
Located At: 92-200 Farrington Highway, Waianae, Oahu

- (3) Amendment of Covered Source Permit (CSP) No. 0238-01-C**  
Application for Significant Modification No. 0238-05  
Hawaiian Electric Company, Inc. (HECO)  
Honolulu Generating Station  
Located At: 170 Ala Moana Boulevard, Honolulu, Oahu
- (4) Amendment of Covered Source Permit (CSP) No. 0239-01-C**  
Application for Significant Modification No. 0239-06  
Hawaiian Electric Company, Inc. (HECO)  
Waiau Generating Station  
Located At: 475 Kamehameha Highway, Pearl City, Oahu
- (5) Amendment of Covered Source Permit (CSP) No. 0234-01-C**  
Application for Significant Modification No. 0234-05  
Hawaii Electric Light Company, Inc. (HELCO)  
Kanoiehua-Hill Generating Station  
Located At: 54 Halekauila Street, Hilo, Hawaii
- (6) Amendment of Covered Source Permit (CSP) No. 0007-01-C**  
Application for Significant Modification No. 0007-07 (0007-01-C)  
Application for Significant Modification No. 0070-04 (0070-01-C)  
Hawaii Electric Light Company, Inc. (HELCO)  
Keahole Generating Station  
Located At: 73-4249 Pukiawe Street, Kailua Kona, Hawaii
- (7) Amendment of Covered Source Permit (CSP) No. 0235-01-C**  
Application for Significant Modification No. 0235-04  
Hawaii Electric Light Company, Inc. (HELCO)  
Puna Generating Station  
Located At: Puna Mill Road, Keaau, Hawaii
- (8) Amendment of Covered Source Permit (CSP) No. 0232-01-C**  
Application for Significant Modification No. 0232-06  
Maui Electric Company, Ltd. (MECO)  
Kahului Generating Station  
Located At: 200 Hobron Avenue, Kahului, Maui
- (9) Amendment of Covered Source Permit (CSP) No. 0067-01-C**  
Application for Significant Modification No. 0067-14 (0067-01-C)  
Application for Significant Modification No. 0067-15 (0067-02-C)  
Maui Electric Company, Ltd. (MECO)  
Maalaea Generating Station  
Located At: Maalaea Generating Station, Maalaea, Maui
- (10) Amendment of Covered Source Permit (CSP) No. 0031-04-C**  
Application for Significant Modification No. 0031-08  
Maui Electric Company, Ltd. (MECO)  
Palaau Generating Station  
Located At: 32 Ulili Street, Kaunakakai, Molokai

The **DRAFT PERMITS** are described as follows:

The permit amendments incorporate GHG emission caps in accordance with HAR Chapter 11-60.1, Subchapter 11, to limit GHG emissions from affected facilities. Affected facilities are permitted covered sources with potential carbon dioxide equivalent (CO<sub>2</sub>e) emissions (biogenic plus nonbiogenic) equal to or greater than 100,000 short tons per year.

Pursuant to HAR Chapter 11-60.1, Subchapter 11, the amendments incorporate provisions for partnering between thirteen (13) electric plants to combine emissions for flexibility in achieving the GHG reductions. Three (3) affected facilities are independent power producers (IPPs) owned and operated by AES, Hamakua Energy, and KPLP. The remaining ten (10) affected facilities are from the Hawaiian Electric Companies that include HECO, HELCO, and MECO.

The partnering facilities propose a total combined GHG emission baseline for establishing the facility-wide GHG emissions cap of 7,584,991 metric tons (8,361,022 short tons) per year. Partnering facilities used 2010 as the baseline year, except for the KCP cogeneration plant which used 2009 for its baseline year because 2010 was deemed unrepresentative due to an overhaul of its steam turbine generator. Emissions from HECO's Shipman Generating Station which closed at the end of 2015 were included in the baseline emissions. The total combined GHG emissions cap proposed for the partnering facilities for calendar year 2020 and beyond is 6,371,392 metric tons (7,023,257 short tons) of CO<sub>2</sub>e emissions per calendar year which is a 16% reduction from the proposed total combined GHG emission baseline level.

For calendar year 2019, cap adjustments are necessary to compensate for the continuing unavailability of renewable energy from Puna Geothermal Venture (PGV) and delays to new renewable energy projects for reasons outside of the control of the partnering facilities. The cap adjustments will temporarily increase the total combined GHG emissions cap proposed for the partnering facilities to 6,539,587 metric tons (7,208,661 short tons) for a 13.78% reduction from the proposed total combined GHG emission baseline level. Alternate operating scenarios are added to the permits for continuing with the cap adjustments by adding one twelfth (1/12) of the 2019 annual adjustments for every month that PGV generation is delayed into and beyond calendar year 2020. The 2019 annual CO<sub>2</sub>e adjustments for each individual facility on the island of Hawaii only are 97,524 short tons for Hamakua Energy, LLC, 17,132 short tons for Kanoelehua-Hill Generating Station, 31,213 short tons for Keahole Generating Station, and 39,535 short tons for Puna Generating Station. The total combined CO<sub>2</sub>e adjustment for these facilities is 185,404 short tons. For delays in PGV generation into and beyond calendar year 2020, monthly adjustments for each individual facility on the island of Hawaii are 8,127 short tons for Hamakua Energy, LLC, 1,428 short tons for Kanoelehua-Hill Generating Station, 2,601 short tons for Keahole Generating Station, and 3,295 short tons for Puna Generating Station for a total monthly CO<sub>2</sub>e adjustment of 15,450 short tons. These alternate operating scenarios apply to each individual cap for partnering facilities on the island of Hawaii and the total combined emissions cap for all partnering facilities until PGV restores net generation of electricity to levels that preceded its shutdown due to the volcanic activity that was determined to be 26,883 MWh. Once net generation of 26,883 MWh per month from the PGV facility is reached, the alternate operating scenarios no longer applies and no further adjustments will be made to the CO<sub>2</sub>e emissions caps, thereafter.

For calendar year 2020 and beyond, AES further reduced its individual GHG emissions cap by 16% below its individual GHG emission baseline level. Emissions from the AES cap adjustments were distributed evenly among partnering facilities on the island of Oahu, excluding the AES plant and the HECO Honolulu Generating Station.

The three (3) IPP permits and CSP No. 0548-01-C for HECO's CIP Generating Station will specify individual and total combined GHG emission caps established for the partnering facilities. Any GHG emission cap revision will require each of these facilities (AES, Hamakua Energy, KPLP, and HECO's CIP Generating Station) to submit a significant permit modification for the change.

The permits for the remaining partnering facilities operated by HECO, HELCO, and MECO will not specify individual and total combined GHG emission caps, but instead reference GHG emission caps included in CSP No. 0548-01-C for HECO's CIP Generating Station. Designating CSP No. 0548-01-C as the main permit will reduce the burden of modifying all Hawaiian Electric Companies' permits should an emissions cap be revised. Only CSP No. 0548-01-C would require modification as the emission caps will not be incorporated separately into each facility's permit.

Individual and total combined GHG emission caps were established in each facility's GHG emission reduction plan. Each facility may exceed its individual cap as long as the total combined GHG emissions cap is met. Biogenic carbon dioxide emissions are excluded in determining compliance with the CO<sub>2</sub>e emissions caps.

A. Independent Power Producers (IPPs)

- (1) The significant modification of **CSP No. 0087-02-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 1,534,598 metric tons (1,691,605 short tons) for calendar year 2019 and 1,281,442 metric tons (1,412,548 short tons) for calendar year 2020 and beyond that applies specifically to the AES cogeneration plant. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emissions cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (2) The significant modification of **CSP No. 0243-01-C** will grant conditional approval to temporarily increase individual CO<sub>2</sub>e emissions cap to 227,906 metric tons (251,223 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emission cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. For 2020 and beyond, an individual CO<sub>2</sub>e emissions cap of 139,433 metric tons (153,699 short tons) is specified for the Hamakua Energy cogeneration plant. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e

emission cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emissions cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.

- (3) The significant modification of **CSP No. 0214-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 993,198 metric tons (1,094,813 short tons) for calendar year 2019 and 1,056,486 metric tons (1,164,577 short tons) for calendar year 2020 and beyond that applies specifically to the KPLP cogeneration plant. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.

B. Hawaiian Electric Companies

- (1) The significant modification of **CSP No. 0548-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 48,752 metric tons (53,740 short tons) for calendar year 2019 and 112,041 metric tons (123,504 short tons) for calendar year 2020 and beyond that applies specifically to the HECO CIP Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (2) The significant modification of **CSP No. 0238-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap 0 metric tons (0 short tons) per calendar year that applies specifically to the HECO Honolulu Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for

every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.

- (3) The significant modification of **CSP No. 0240-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap 1,935,707 metric tons (2,133,752 short tons) for calendar year 2019 and 1,998,996 metric tons (2,203,516 short tons) for calendar year 2020 and beyond that applies specifically to the HECO Kahe Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (4) The significant modification of **CSP No. 0239-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 733,265 metric tons (808,286 short tons) for calendar year 2019 and 796,554 metric tons (878,050 short tons) for calendar year 2020 and beyond that applies specifically to the HECO Waiau Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed beyond into and beyond calendar year 2020 to a total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) in partnering with all other affected facilities. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (5) The significant modification of **CSP No. 0234-01-C** will grant conditional approval to temporarily increase the individual CO<sub>2</sub>e emissions cap to 171,991 metric tons (189,588 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. For calendar year 2020 and beyond, an individual CO<sub>2</sub>e emissions cap of 156,449 metric tons (172,456 short tons) per calendar year is specified for the HELCO Kanoelehua-Hill Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emission cap for every month that PGV's restoration is delayed into and beyond calendar



year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once PGV net generation of 26,883 MWh per month is reached.

- (6) The significant modification of **CSP No. 0007-01-C** will grant conditional approval to temporarily increase the individual CO<sub>2</sub>e emissions cap to 248,043 metric tons (273,421 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. For calendar year 2020 and beyond, an individual CO<sub>2</sub>e emissions cap of 219,727 metric tons (242,208 short tons) per calendar year is specified for the HELCO Keahole Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (7) The significant modification of **CSP No. 0235-01-C** will grant conditional approval to temporarily increase the individual CO<sub>2</sub>e emissions cap to 64,666 metric tons (71,282 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. For calendar year 2020 and beyond an individual CO<sub>2</sub>e emissions cap of 28,800 metric tons (31,747 short tons) per calendar year for the HELCO Puna Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.
- (8) The significant modification of **CSP No. 0232-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 140,281 metric tons (154,633 short tons) per calendar year that applies specifically to the MECO Kahului Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that

adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.

- (9) The significant modification of **CSP No. 0067-01-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 417,182 metric tons (459,864 short tons) per calendar year that applies specifically to the MECO Maalaea Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once PGV net generation of 26,883 MWh per month is reached.
- (10) The significant modification of **CSP No. 0031-04-C** will grant conditional approval to incorporate an individual CO<sub>2</sub>e emissions cap of 23,999 metric tons (26,454 short tons) per calendar year that applies specifically to the MECO Palaau Generating Station. The conditional approval includes temporarily increasing the total combined CO<sub>2</sub>e emissions cap proposed in partnering with the other affected facilities to 6,539,587 metric tons (7,208,661 short tons) for calendar year 2019 and an alternate operating scenario that adds one twelfth (1/12) of the 2019 annual adjustments to the 2020 and beyond GHG emissions cap for every month that PGV's restoration is delayed into and beyond calendar year 2020. A total combined CO<sub>2</sub>e emission cap of 6,371,392 metric tons (7,023,257 short tons) is specified for calendar year 2020 and beyond. The alternate operating scenarios will no longer apply once a net generation of 26,883 MWh per month from PGV is reached.

The **ADMINISTRATIVE RECORDS**, consisting of the **APPLICATIONS, GHG EMISSION REDUCTION PLANS**, and non-confidential supporting material from the applicant, the permit review summary, and the **DRAFT PERMITS**, are available for public inspection during regular office hours, Monday through Friday, 7:45 a.m. to 4:15 p.m., at the following locations:

**Oahu:**

State of Hawaii  
Clean Air Branch  
2827 Waimano Home Road, #130  
Pearl City, HI 96782

**Hawaii:**

Hilo: Hawaii District Health Office, Department of Health  
1582 Kamehameha Avenue, Hilo, Hawaii 96720

Kona: Sanitation Branch, Department of Health  
79-1020 Haukapila Street, Room 115, Kona, Hawaii 96750

**Maui:**

Maui District Health Office, Department of Health  
54 High Street, Wailuku, Maui 96793

**Kauai:**

Kauai District Health Office, Department of Health  
3040 Umi Street, Lihue, Kauai 96766

All comments on the draft permits and any request for a public hearing must be in writing, addressed to the Clean Air Branch at the above address on Oahu and must be postmarked or received by **August 14, 2020**.

Any person may request a public hearing by submitting a written request that explains the party's interest and the reasons why a hearing is warranted. The DOH may hold a public hearing if a hearing would aid in DOH's decision. If a public hearing is warranted, a public notice for the hearing will be published at least thirty (30) days in advance of the hearing.

Interested persons may obtain copies of the administrative record or parts thereof by paying **five (5) cents per page copying costs**. Please send written requests to the Oahu office of the Clean Air Branch listed above or call Mr. Dale Hamamoto (CSPs for Hamakua Energy and KPLP facilities) or Mr. Michael Madsen (CSPs for AES, HECO, HELCO, and MECO facilities) at the Clean Air Branch office at (808) 586-4200. Electronic copies of the draft permits, permit reviews, and GHG emission reduction plans may be found online at <http://health.hawaii.gov/cab/public-notices/>.

Comments on the draft permits should address, but need not be limited to, the permit conditions and the facility's compliance with federal and state air pollution laws, including: (1) the National and State Ambient Air Quality Standards; and (2) HRS, Chapter 342B and HAR, Chapter 11-60.1.

DOH will make a final decision on the permits after considering all comments and will send notice of the final decision to each person who has submitted comments or requested such notice.

Bruce S. Anderson, Ph.D.  
Director of Health

**DRAFT PERMIT**

DATE

**CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**  
(xxxx xxxx xxxx xxxx xxxx)

20-xxxE CAB  
File No. 0235

Mr. Norman M. Uchida, P.E.  
Director, Production Division  
Hawaii Electric Light Company, Inc.  
P.O. Box 1027  
Hilo, Hawaii 96721-1027

Dear Mr. Uchida:

**SUBJECT: Amendment of Covered Source Permit (CSP) No. 0235-01-C  
Application for Significant Modification No. 0235-04  
Hawaii Electric Light Company, Inc. (HELCO)  
Puna Generating Station  
One (1) 20 MW Combustion Turbine with a 600 KW Black Start Diesel Engine  
Generator (DEG) and One (1) 15.5 MW Boiler with a Multi-Cyclone Dust Collector  
Located At: Puna Mill Road, Keaau, Hawaii  
UTM: 86,646 Meters East and 2,172,337 Meters North, Zone 5  
Date of Expiration: October 11, 2023**

In accordance with Hawaii Administrative Rules (HAR), Chapter 11-60.1, and pursuant to your application for a significant modification received on March 28, 2018, the updated greenhouse gas (GHG) emission reduction plans received on October 19, 2018, May 15, 2019, and July 26, 2019, revision to application for significant permit modification received on December 26, 2018, for the Campbell Industrial Park (CIP) Generating Station, revision to the application for significant permit modification received on July 26, 2019, for the subject facility, and the additional information received on January 23, 2020, February 14, 2020, April 2, 2020, May 22, 2020, and June 9, 2020, from Hawaiian Electric Company, Inc. submitted on behalf of the partnership for cap adjustments, the Department of Health, Clean Air Branch (herein after referred to as Department), hereby amends CSP No. 0235-01-C issued to HELCO for the Puna Generating Station on October 12, 2018.

In accordance with HAR, Chapter 11-60.1, Subchapter 11, the amendment incorporates provisions for partnering with other affected plants to combine emissions for flexibility in achieving GHG reductions. The amendment includes GHG emission cap adjustments for 2019 and a total combined GHG emission cap for 2020 and beyond that is a sixteen percent (16%) reduction from the combined partnership baseline GHG emissions level. The amendment also includes alternate operating scenarios in the event delays are encountered in restoring the Puna Geothermal Venture (PGV) facility on the island of Hawaii to the net generation that preceded

Mr. Norman M. Uchida, P.E.

DATE

Page 2

its shutdown in 2018. Individual and total combined GHG emission caps established in each facility's GHG emission reduction plan are incorporated in the amendment with associated provisions pursuant to HAR §11-60.1-204(d)(6)(C). The partnering facilities included in this amendment are:

#### Independent Power Producers (IPPs)

- AES Hawaii, LLC (AES), CSP No. 0087-02-C
- Hamakua Energy, LLC (Hamakua Energy), CSP No. 0243-01-C
- Kalaeloa Partners, L.P. (KPLP), CSP No. 0214-01-C

#### Hawaiian Electric Companies

- Hawaiian Electric Company, Inc. (HECO), CSP No. 0548-0-C
- Hawaiian Electric Company, Inc. (HECO), CSP No. 0238-01-C
- Hawaiian Electric Company, Inc. (HECO), CSP No. 0239-01-C
- Hawaiian Electric Company, Inc. (HECO), CSP No. 0240-01-C
- Hawaii Electric Light Company, Inc. (HELCO), CSP No. 0007-01-C
- Hawaii Electric Light Company, Inc. (HELCO), CSP No. 0234-01-C
- Hawaii Electric Light Company, Inc. (HELCO), CSP No. 0235-01-C
- Maui Electric Company, Ltd. (MECO), CSP No. 0031-04-C
- Maui Electric Company, Ltd. (MECO), CSP No. 0067-01-C
- Maui Electric Company, Ltd. (MECO), CSP No. 0232-01-C

The three (3) IPP permits and CSP No. 0548-01-C (HECO's CIP Generating Station) will specify individual and total combine GHG emission caps established for all of the partnering facilities. Any GHG emission cap revision, except for reasonably anticipated alternate operating scenarios due to the PGV facility shutdown, will require each of these facilities (AES, Hamakua Energy, KPLP, and HECO CIP) to submit a significant permit modification.

The permits for the remaining partnering facilities operated by HECO, HELCO, and MECO will not specify individual and total combine GHG emission caps, but will reference GHG emission caps included in CSP No. 0548-01-C. Designating CSP No. 0548-01-C as the main HECO permit will reduce the burden of modifying all Hawaiian Electric Companies' permits should an emission cap be revised. Only CSP No. 0548-01-C would require modification as the emission caps will not be incorporated separately into each facility's permit.

The following enclosed Attachment II – GHG and monitoring report form are hereby added to CSP No. 0235-01-C issued on October 12, 2018, to incorporate the GHG permitting provisions:

- 1) Attachment II - GHG: Special Conditions – GHG Reduction Requirements
- 2) Monitoring Report Form: GHG Emissions

All other permit conditions of CSP No. 0235-01-C issued on October 12, 2018, shall not be affected and shall remain valid.

Mr. Norman M. Uchida, P.E.  
DATE  
Page 3

If there are any questions regarding these matters, please contact Mr. Michael Madsen of the Clean Air Branch at (808) 586-4200.

Sincerely,

\_\_\_\_\_, P.E., ACTING CHIEF  
Environmental Management Division

MM:tkg

Enclosures

DRAFT

**ATTACHMENT II - GHG: SPECIAL CONDITIONS  
GHG REDUCTION REQUIREMENTS  
COVERED SOURCE PERMIT NO. 0235-01-C**

**Amended Date:** DATE

**Expiration Date:** October 11, 2023

In addition to the standard conditions of the CSP, the following special conditions shall apply to the permitted facility:

**Section A. Equipment Description**

1. Attachment II - GHG of this permit encompasses the following equipment for Puna Generating Station:

<u>Unit</u>	<u>Description</u>
-------------	--------------------

CT-3	20 MW Nominal (24.66 MW Peak Load) General Electric Combustion Turbine, Model No. LM 2500, Serial No. 481-651, 275 MMBtu/hr.
------	--

PBSG1	600 kW Black Start DEG Unit, Model No. PBSG1, Serial No. 5A9885R.
-------	---

Boiler	15.5 MW Combustion Engineering Boiler, Model No. VU-40, 249 MMBtu/hr.
--------	---

(Auth.: HAR §11-60.1-3)

2. The equipment is subject to GHG emission reduction requirements of HAR, Chapter 11-60.1, Subchapter 11 and associated permit conditions based on information from the GHG emission reduction plan and permit application for significant modification. The GHG emission reduction plan shall become a part of the CSP application process for renewals and any required modifications pursuant to HAR, Chapter 11-60.1, Subchapter 5. With each subsequent GHG emission reduction plan submittal, the permittee shall report:
  - a. The GHG emission reduction status;
  - b. Factors contributing to the emission changes;
  - c. Any control measure updates; and
  - d. Any new developments or changes that would affect the basis of the facility-wide GHG emissions cap.

(Auth.: HAR §11-60.1-5, §11-60.1-204(g))

**Section B. GHG Permit Conditions**

1. Permit conditions specified in Attachment II – GHG, including provisions to limit maximum potential GHG emissions, are state-only enforceable requirements which are not federally enforceable under the federal Clean Air Act.

(Auth.: HAR §11-60.1-3, §11-60.1-90, 11-60.1-161; 40 CFR §70.6)<sup>1</sup>



2. The permittee shall comply with all applicable provisions of these conditions, including all emission limits, notification, testing, monitoring, and reporting requirements. The major requirements of these provisions are detailed in the special conditions of this attachment.

(Auth.: HAR §11-60.1-3, §11-60.1-90, 11-60.1-161)

### **Section C. GHG Emission Limitations**

#### 1. GHG Emission Caps

- a. Puna Generating Station shall not emit or cause to be emitted carbon dioxide equivalent (CO<sub>2</sub>e) emissions in excess of its individual caps specified in Attachment II - GHG, Special Condition No. C.1.a of CSP No. 0548-01-C for CIP Generating Station, except as specified in Attachment II - GHG, Special Condition No. C.1.c.iv of this permit.
- b. All partnering facilities shall not emit or cause to be emitted total combined CO<sub>2</sub>e emissions in excess of the combined limits specified in Attachment II - GHG, Special Condition No. C.1.b of CSP No. 0548-01-C for CIP Generating Station.
- c. For purposes of the CO<sub>2</sub>e emission limits in Attachment II - GHG, Special Condition Nos. C.1.a and C.1.b of this permit:
  - i. The CO<sub>2</sub>e emissions shall have the same meaning as that specified in HAR §11-60.1-1;
  - ii. In accordance with HAR §11-60.1-204(d)(6)(B), biogenic carbon dioxide (CO<sub>2</sub>) emissions shall not be included when determining compliance with the emission limits;
  - iii. The permittee shall be in compliance with the applicable emission limits by the end of 2019 and each calendar year thereafter;
  - iv. The permittee may exceed the emissions cap specified in Attachment II – GHG, Special Condition No. C.1.a, if the GHG emissions limit specified in Attachment II – GHG, Special Condition No. C.1.b is met; and
  - v. At no time shall the permittee exceed Attachment II – GHG, Special Condition Nos. C.1.a and C.1.b simultaneously over a calendar year. For incidences when Attachment II – GHG, Special Condition Nos. C.1.a and C.1.b are exceeded simultaneously, emissions in excess of the total combined cap shall be allocated according to the following equation for compliance purposes:

$$X = XG \frac{(A - C)}{\sum_{A_i > C_i} (A_i - C_i)}$$

Where:

- X = Adjusted portion in metric tons or short tons of GHG emissions that are in excess of total combined cap specified in Attachment II – GHG, Special Condition No. C.1.b. The equation applies to all affected facilities that do not meet the individual and total combined GHG emission caps specified in Attachment II – GHG, Special Condition Nos. C.1.a and C.1.b, respectively.
- XG = Total combined actual GHG emissions from affected facilities minus total combined GHG emissions cap.
- A = Actual GHG emissions from the affected facility.
- C = GHG emissions cap for the affected facility.
- $\sum_{A_i > C_i} (A_i - C_i)$  = The sum of the difference between the actual emissions and cap emissions for all facilities that did not achieve the individual facility-wide GHG emissions cap.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90, §11-60.1-204)

## 2. GHG Emission Cap Revisions

- a. The facility-wide GHG emissions cap may be re-evaluated and revised by the Department in accordance with HAR §11-60.1-204(h).
- b. Any revision to the facility-wide GHG emissions caps shall be considered a significant modification subject to the application and review requirements of HAR §11-60.1-104. For each GHG emission cap revision, the Department may impose additional emission limits or requirements, or limit the time-frame allowed for the revised GHG emissions cap.

(Auth.: HAR §11-60.1-3, §11-60.1-90, §11-60.1-204)

## 3. Alternate Operating Scenarios

The alternate operating scenario for the PGV facility shutdown due to volcanic activity on the island of Hawaii in 2018, shall remain in effect until an additional net generation of 26,883 MWh per month from the PGV facility is reached in any month of the year. The following shall apply to the individual and total combined alternate operating scenario GHG emission cap adjustments starting January 1, 2020, and for any subsequent year until these alternate operating scenarios no longer apply:

- a. Attachment II – GHG, Special Condition No. C.3 no longer applies when:

$$NG_{PGV-R} \geq NG_{PGV2017}$$

Where:

- $NG_{PGV2017}$  = 26,883 Net Generating capacity from the PGV facility in calendar year 2017 on an average monthly basis (MWh) preceding its shutdown.
- $NG_{PGV-R}$  = Net Generation from the restored PGV facility (MWh per month)

- b. The alternate scenario individual GHG emission cap adjustment for calendar year 2019 is 97,524 short tons for Hamakua Energy, LLC, 17,132 short tons for Kanoelehua-Hill Generating Station, 31,213 short tons for Keahole Generating Station, and 39,535 short tons for Puna Generating Station. Starting on January 1, 2020, and for any subsequent year, the alternate scenario GHG emissions individual cap adjustment for each of the foregoing island of Hawaii partnering facilities shall be calculated by adding one-twelfth (1/12) of the 2019 annual adjustment for each facility's individual GHG emissions cap specified in Attachment II – GHG, Special Condition No. C.1.a.ii of CSP No. 0548-01-C for CIP Generating Station per month for the facilities from January 1 of that year. Monthly adjustments to the individual GHG emission caps shall be determined as specified in Attachment II – GHG, Special Condition No. C.3.d until this alternate operating scenario no longer applies as specified in Attachment II – GHG, Special Condition No. C.3.a. A full one-twelfth (1/12) of the annual cap adjustment shall apply per month until the criteria in Attachment II – GHG, Special Condition No. C.3.a are met and not thereafter.
- c. The PGV alternate scenario total combined cap adjustment for calendar year 2019 is 185,404 short tons. Starting on January 1, 2020, and for any subsequent year, the PGV alternate operating scenario total combined GHG emissions cap adjustment shall be calculated by adding one-twelfth (1/12) of the 2019 annual adjustment of 15,450 short tons to the total combined cap specified in Attachment II – GHG, Special Condition No. C.1.b.ii of CSP No. 0548-01-C for CIP Generating Station per month from January 1 of that year. Monthly adjustments to the total combined GHG emissions cap shall be determined as specified in Attachment II – GHG, Special Condition No. C.3.d until this alternate operating scenario no longer applies as specified in Attachment II – GHG, Special Condition No. C.3.a. A full one-twelfth (1/12) of the annual cap adjustment shall apply per month until the criteria in Attachment II – GHG, Special Condition No. C.3.a are met and not thereafter.
- d. Monthly adjustments to the individual and total combined GHG emission caps shall be determined with the following equation:

$$AC = FAC/12$$

Where:

FAC = Full Adjustment to CO<sub>2</sub>e caps (short tons – refer to table below)  
AC = Monthly adjustment to GHG Emissions Caps

<b>Generating Station</b>	<b>Full Adjustment to CO<sub>2</sub>e Caps (Short Tons)</b>	<b>2020 CO<sub>2</sub>e Cap (Short Tons)</b>	<b>FAC/12 (Short Tons)<sup>b</sup></b>
Hamakua Energy	97,524	153,699	8,127
Kanoelehua-Hill	17,132	172,456	1,428
Keahole	31,213	242,208	2,601
Puna	39,535	31,747	3,295
Combined	185,404	see note <sup>a</sup>	15,450

<sup>a</sup>Total combined CO<sub>2</sub>e cap for all partnering facilities is 7,023,257 short tons.

<sup>b</sup>Monthly full CO<sub>2</sub>e cap adjustment.

- e. Individual GHG emission cap adjustments, affecting the total combined GHG emissions cap, shall only apply to partnering facilities on the island of Hawaii.
- f. The permittee may exceed the adjusted individual GHG emissions cap as determined in Attachment II – GHG, Special Condition No. C.3.b, if the adjusted total combined GHG emission cap as determined in Attachment II – GHG, Special Condition No. C.3.c is met.
- g. Alternate operating scenario records shall be maintained in accordance with Attachment II - GHG, Special Condition No. D.3.
- h. The terms and conditions under each operating scenario shall meet all applicable requirements, including the special conditions of this permit.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-204(h))

#### **Section D. Monitoring and Recordkeeping Requirements**

##### 1. GHG Emissions

For calculating CO<sub>2</sub>e emissions to assess fees, determining compliance with the GHG emission caps, and quality assurance/quality control requirements, the permittee shall:

- a. Monitor CO<sub>2</sub> mass emissions data for the stationary source combustion units listed in Attachment II – GHG, Special Condition No. A.1 in accordance with 40 Code of Federal Regulations (CFR) §98.34;
- b. Estimate missing data in accordance with the applicable procedures in 40 CFR §98.35;
- c. Determine the metric tons of CO<sub>2</sub>, methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) in accordance with 40 CFR §98.33;
- d. Calculate the GHG emissions, expressed in metric tons of CO<sub>2</sub>e, using Equation A-1 of 40 CFR §98.2;
- e. Convert the metric tons of CO<sub>2</sub>e emissions to short tons for monitoring and annual emissions reporting as applicable. For the conversion, one (1) short ton is equal to 0.90718474 metric tons;
- f. Provide total actual CO<sub>2</sub>e emissions semi-annually to HECO in Item 1 of **Monitoring Report Form: GHG Emissions**. The monitoring report form, with Item 1 emissions data, shall be signed and dated by a responsible official; and
- g. Report the total combined CO<sub>2</sub>e emissions to the Department in accordance with Attachment II - GHG Special Condition No. E.4.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90; §11-60.1-204d(6)(c); 40 CFR §98.2, §98.33, §98.34, §98.35)<sup>1</sup>

2. Records

All records, including support information, shall be maintained for **at least five (5) years** from the date of the monitoring sample, measurement, test, report, or applications. Support information includes all maintenance, inspection, and repair records, and copies of all reports required by this permit. These records shall be true, accurate, and maintained in a permanent form suitable for inspection and be made available to the Department or authorized representative(s) upon request.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-11, §11-60.1-90)

3. Alternate Operating Scenarios

- a. The permittee shall contemporaneously with making a change from one operating scenario to another record in a log, the scenario under which it is operating.
- b. The permittee shall maintain all records corresponding to the implementation of an alternate operating scenario.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90)

**Section E. Notification and Reporting Requirements**

1. Standard Condition Reporting

Notification and reporting pertaining to the following events shall be done in accordance with Attachment I, Standard Condition Nos. 17 and 24, respectively:

- a. Emissions of air pollutants in violation of HAR, Chapter 11-60.1 or this permit (excluding technology-based emission exceedances due to emergencies); and
- b. Permanent discontinuance of construction, modification, relocation, or operation of the facility covered by this permit.

(Auth.: HAR §11-60.1-8, §11-60.1-15, §11-60.1-16, §11-60.1-90; SIP §11-60-10, SIP §11-60-16)<sup>2</sup>

2. Deviations

- a. Except as specified in Attachment II – GHG, Special Condition No. E.2.b, the permittee shall report in writing **within five (5) working days** any deviations from permit requirements, including those attributed to upset conditions, the probable cause of such deviations, and any corrective actions or preventive measures taken. Corrective actions may include a requirement for testing, or more frequent monitoring, or could trigger implementation of a corrective action plan.

- b. The permittee shall report, in writing, deviations from Attachment II – GHG, Special Condition No. C.1.c.v, the probable cause of such deviations, and any corrective actions or preventive measures taken. Corrective actions may include a requirement for testing, more frequent monitoring, or could trigger implementation of a corrective action plan. Reports shall be submitted **within sixty (60) days** following the end of each calendar year.

(Auth.: HAR §11-60.1-3, §11-60.1-15, §11-60.1-16, §11-60.1-90)

### 3. Compliance Certification

- a. During the permit term, the permittee shall submit at least **annually** to the Department and U.S. Environmental Protection Agency (EPA), Region 9, the attached **Compliance Certification Form** pursuant to HAR, Subsection 11-60.1-86. The permittee shall indicate whether or not compliance is being met with each term or condition of this permit. For making this certification for the partnering facility conditions in Attachment II – GHG, the permittee is relying on information provided by other partners that these partners independently certify. The compliance certification shall include, at a minimum, the following information:
  - i. The identification of each term or condition of the permit that is the basis of the certification;
  - ii. The compliance status;
  - iii. Whether compliance was continuous or intermittent;
  - iv. The methods used for determining the compliance status of the source currently and over the reporting period;
  - v. Any additional information indicating the source's compliance status with any applicable enhanced monitoring and compliance certification, including the requirements of Section 114(a)(3) of the Clean Air Act or any applicable monitoring and analysis provisions of Section 504(b) of the Clean Air Act;
  - vi. Brief description of any deviations including identifying as possible exceptions to compliance any periods during which compliance is required and which the excursion or exceedances as defined in 40 CFR Part 64 occurred; and
  - vii. Any additional information as required by the Department, including information to determine compliance.
- b. The compliance certification shall be submitted within **sixty (60) days after** the end of each calendar year and shall be signed and dated by a responsible official.
- c. Upon the written request of the permittee, the deadline for submitting the compliance certification may be extended, if the Department determines that reasonable justification exists for the extension.

(Auth.: HAR §11-60.1-4, §11-60.1-86, §11-60.1-90)

4. Monitoring Reports

- a. The permittee shall complete and submit **semi-annual** monitoring reports to the Department that provide the metric tons and short tons of CO<sub>2</sub>e emitted by all partnering facilities, except that biogenic CO<sub>2</sub> shall be excluded from the total CO<sub>2</sub>e emissions. All reports shall be submitted **within sixty (60) days after** the end of each semi-annual calendar period (January 1 – June 30 and July 1 – December 31). The following enclosed form, or equivalent form, shall be used for reporting and shall be signed and dated by a responsible official:

**Monitoring Report Form: GHG Emissions**

- b. For calendar year 2019, the permittee shall report the CO<sub>2</sub>e emissions **within sixty (60) days** after the issuance of this permit or **within sixty (60) days after December 31, 2019**, whichever is later. The Monitoring Report Form: GHG Emissions, or equivalent form, for the 2019 calendar year shall be used for reporting and shall be signed and dated by a responsible official.
- c. For calendar year 2020, the permittee shall report the CO<sub>2</sub>e emissions **within sixty (60) days** after the issuance of this permit or **within sixty (60) days** after the end of the semi-annual calendar period, whichever is later. The Monitoring Report Form: GHG Emissions, or equivalent form, for the 2020 calendar year shall be used for reporting and shall be signed and dated by a responsible official.

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90)

**Section F. Agency Notification**

Any document (including reports) required to be submitted by this permit shall be done in accordance with Attachment I, Standard Condition No. 28.

(Auth.: HAR §11-60.1-4, §11-60.1-90)

---

<sup>1</sup>The citations to the CFR identified under a particular condition, indicate that the permit condition complies with the specified provision(s) of the CFR. Due to the integration of the preconstruction and operating permit requirements, permit conditions may incorporate more stringent requirements than those set forth in the CFR.

<sup>2</sup>The citations to the State Implementation Plan (SIP) identified under a particular condition, indicate that the permit condition complies with the specified provision(s) of the SIP.

**MONITORING REPORT FORM  
GHG EMISSIONS  
COVERED SOURCE PERMIT NO. 0235-01-C  
(PAGE 1 OF 2)**

**Amended Date: DATE**

**Expiration Date: October 11, 2023**

In accordance with the HAR, Title 11, Chapter 60.1, Air Pollution Control, the permittee shall report to the Department of Health the following information semi-annually:

(Make Copies for Future Use)

For Period: \_\_\_\_\_ Date: \_\_\_\_\_

Facility Name: \_\_\_\_\_

Location: \_\_\_\_\_

**I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. In making this certification for the partnering facility conditions in Items 2 and 3 of this form, I am relying on information provided by other partners that they independently certify.**

Responsible Official (Print): \_\_\_\_\_

Title: \_\_\_\_\_

Responsible Official (Signature): \_\_\_\_\_

1. Report the CO<sub>2</sub>e emitted by Puna Generating Station during each reporting period for purposes of the facility's individual GHG emissions cap:

Emission Year Reporting For _____					
Reporting Period	Puna Generating Station Emissions (Metric Tons of CO <sub>2</sub> e)			Puna Generating Station Emissions (Total CO <sub>2</sub> e)	
	CO <sub>2</sub> (Non-biogenic)	CH <sub>4</sub>	N <sub>2</sub> O	Metric Tons	Short Tons
January 1 – June 30 (1 <sup>st</sup> Semi-annual Period)					
July 1 – December 31 (2 <sup>nd</sup> Semi-annual Period)					
Total Emissions →					

Provide the CO<sub>2</sub>e emitted by Puna Generating Station in Item 1 above to HECO during each reporting period for purposes of calculating the total combined GHG emissions from the partnering facilities.



**MONITORING REPORT FORM  
GHG EMISSIONS  
COVERED SOURCE PERMIT NO. 0235-01-C  
(CONTINUED, PAGE 2 OF 2)**

**Amended Date:** DATE

**Expiration Date:** October 11, 2023

In accordance with the HAR, Title 11, Chapter 60.1, Air Pollution Control, the permittee shall report to the Department of Health the following information semi-annually:

- Report the total combined CO<sub>2</sub>e emitted by all partnering facilities during each reporting period for purposes of the total combined GHG emissions cap for these facilities:

Emission Year Reporting For _____					
Reporting Period	Total Combined Emissions from All Partnering Facilities (Metric Tons of CO <sub>2</sub> e)			Total CO <sub>2</sub> e	
	CO <sub>2</sub> (Non-biogenic)	CH <sub>4</sub>	N <sub>2</sub> O	Metric-tons	Short Tons
January 1 – June 30 (1 <sup>st</sup> Semi-annual Period)					
July 1 – December 31 (2 <sup>nd</sup> Semi-annual Period)					
Total Emissions →					

- For incidences when the individual cap for Puna Generating Station and total combined cap for all partnering facilities are exceeded, report the emissions in excess of the total combined cap using the following equation:

$$X = XG \frac{(A-C)}{\sum_{A_i > C_i} (A_i - C_i)} = \frac{\quad}{\quad}$$

Where:

X = Adjusted portion in metric tons or short tons of GHG emissions that are in excess of total combined cap specified in Attachment II – GHG, Special Condition No. C.1.b. The equation applies to all affected facilities that do not meet the individual and total combined GHG emission caps specified in Attachment II – GHG, Special Condition Nos. C.1.a and C.1.b, respectively.

XG = Total combined actual GHG emissions from affected facilities minus total combined GHG emissions cap.

A = Actual GHG emissions from the affected facility.

C = GHG emissions cap for the affected facility.

$\sum_{A_i > C_i} (A_i - C_i)$  = The sum of the difference between the actual emissions and cap emissions for all facilities that did not achieve the individual facility-wide GHG emissions cap.

# **DRAFT REVIEW SUMMARY**

**PERMIT APPLICATION REVIEW  
GREENHOUSE GAS (GHG) EMISSION REDUCTION PLAN  
Covered Source Permit (CSP) No. 0235-01-C  
Application for Significant Permit Modification No. 0235-04**

**Applicant:** Hawaii Electric Light Company, Inc. (HELCO)  
**Facility:** Puna Generating Station  
**Located At:** Puna Mill Road, Keaau, Hawaii  
UTM Coordinates: 2,172,337 Meters N and 286,646 Meters E

**Mailing**

**Address:** P.O. Box 1027  
Hilo, Hawaii 96721-1027

**Responsible**

**Official:** Norman M. Uchida, P.E.  
Director, Production Division  
HELCO  
(808) 969-0422

**Contact:**

Karin Kimura  
Director, Environmental Division  
Hawaiian Electric Company, Inc. (HECO)  
(808) 543-4500  
[karin.kimura@hawaiianelectric.com](mailto:karin.kimura@hawaiianelectric.com)

**Background**

HELCO has applied for significant modification to CSP No. 0235-01-C for Puna Generating Station to incorporate facility-wide GHG emission caps as defined in Hawaii Administrative Rules (HAR) §11-60.1-202. Site specific limits were previously established in the Hawaiian Electric Companies' GHG emission reduction plan that was updated on July 26, 2019, January 23, 2020, February 14, 2020, April 2, 2020, May 22, 2020, and June 9, 2020 for modifying the permit. Updates include proposed cap adjustments due to complications arising from the shutdown of a geothermal energy plant and allocation of emissions for reducing the individual GHG emissions cap for the AES Hawaii, LLC cogeneration plant by 16% below its baseline level. Affected facilities subject to GHG reductions are existing covered sources with maximum potential carbon dioxide equivalent (CO<sub>2</sub>e) emissions (biogenic plus non-biogenic) equal to or greater than 100,000 short tons per year. The emission reductions are required by HAR, Subchapter 11 pursuant to Hawaii Act 234, 2007 which directed the Department of Health Clean Air Branch (CAB) to develop rules for regulating GHGs. Partnering will be used as a measure to comply with the emission caps in accordance with HAR §11-60.1-204(d)(6)(A).

Puna Generating Station is partnering with affected facilities of three (3) independent power producers (IPPs) and nine (9) affected plants owned and operated by the Hawaiian Electric Companies to allow flexibility in dispatching generating units for meeting requirements to cap GHGs. The three (3) IPPs are AES Hawaii, LLC, Hamakua Energy, LLC, and Kalaeloa Partners, L.P. Hawaiian Electric Companies' affected plants are from HECO, HELCO, and Maui Electric Company, Limited (MECO). Flexibility for dispatching units is a concern in the event a facility has unplanned outages or there is reduced output from renewable generation such as solar (e.g., due to extended cloudy or rainy weather) or geothermal (e.g., deactivation of 38 megawatt (MW) geothermal plant due to volcanic activity on Hawaii Island). The table below lists affected facilities that have mutually agreed to partner.

<b>Partnering Facilities<sup>a</sup></b>			
<b>IPP Plants</b>			
<b>Facility</b>	<b>Permit No.</b>	<b>Description</b>	<b>Island</b>
AES Hawaii, LLC Cogeneration Plant	CSP No. 0087-02-C	203 MW Coal Fired Generation Plant Consisting of Two (2) CFB Boilers and Two (2) Limestone Dryers. The Boilers are Each Equipped with Lime Injection, SNCR, and a Baghouse.	Oahu
Hamakua Energy, LLC Cogeneration Plant	CSP No. 0243-01-C	65 MW Cogeneration Facility Consisting of Two (2) 23 MW CTs with Water Injection and SCR, Two (2) HRSGs, 1,250 kW Black Start DEG, and 19 MW Steam Turbine.	Hawaii
Kalaeloa Partners, L.P. Cogeneration Plant	CSP No. 0214-01-C	Two (2) 86 MW CTs with Steam Injection, Two (2) HRSGs, and 51 MW Steam Turbine.	Oahu
<b>HECO Plants</b>			
<b>Facility</b>	<b>Permit No.</b>	<b>Description</b>	<b>Island</b>
Campbell Industrial Park Generating Station	CSP No. 0548-01-C	135 MW CT with Water Injection and Two (2) 2,250 kW Black Start DEGs.	Oahu
Honolulu Power Plant	CSP No. 0238-01-C	56 MW Boiler and 57 MW Boiler.	Oahu
Kahe Power Plant	CSP No. 0240-01-C	Six (6) Boilers (92 MW to 142 MW) and Two (2) 2.5 MW Black Start DEGs. A 142 MW Boiler is Equipped with Low NO <sub>x</sub> Burners.	Oahu
Waiiau Power Plant	CSP No. 0239-01-C	Six (6) Boilers (49 MW to 92 MW), 50 MW CT and 52 MW CT.	Oahu
<b>HELCO Plants</b>			
<b>Facility</b>	<b>Permit No.</b>	<b>Description</b>	<b>Island</b>
Kanoelehua-Hill Power Plant	CSP No. 0234-01-C	14.1 MW Boiler, 23 MW Boiler, 11.6 MW CT, 2.0 MW DEG with Oxidation Catalyst, and Three (3) 2.75 MW DEGs with Oxidation Catalyst.	Hawaii
Keahole Power Plant	CSP No. 0007-01-C	Two (2) 20 MW CTs with Water Injection and SCR, Two (2) HRSGs, Three (3) 2.5 MW DEGs with FITR and Oxidation Catalyst, 500 kW Black Start DEG, 16 MW Steam Turbine, and 18 MW CT with Water Injection.	Hawaii
Puna Power Plant	CSP No. 0235-01-C	20 MW CT with water injection, 1,250 hp Black Start DEG, and 15.5 MW Boiler with Multicyclone Dust Collector.	Hawaii
<b>MECO Plants</b>			
<b>Facility</b>	<b>Permit No.</b>	<b>Description</b>	<b>Island</b>
Kahului Power Plant	CSP No. 0232-01-C	Two (2) 5.0 MW Boilers, One (1) 11.5 MW Boiler, and 12.5 MW Boiler.	Maui
Maalaea Power Plant	CSP No. 0067-01-C	Three (3) 2.5 MW DEGs with Oxidation Catalyst and Lube Oil Separator, Six (6) 5.6 MW DEGs with Oxidation Catalyst and Open Crankcase Filtration System, Two (2) 12.5 MW DEGs with Oxidation Catalyst and Open Crankcase Filtration System, Two (2) 12.5 MW DEGs with Oxidation Catalyst, Crankcase Filtration System, and FITR, Two (2) 20 MW CTs with Water Injection, Two (2) HRSGs, 18 MW Steam Turbine, Two (2) 20 MW CTs with Water Injection, HRSG, Two (2) 2.5 MW DEGs with Oxidation Catalyst, Lube Oil Separator, and FITR, and 600 kW Black Start DEG.	Maui
Palaau Power Plant	CSP No. 0031-04-C	Two (2) 1.25 MW DEGs with FITR and Oxidation Catalyst, Four (4) 1.0 MW DEGs with FITR and Oxidation Catalyst, Three (3) 2.2 MW DEGs with FITR, Oxidation Catalyst, and intake cooling, and 2.0 MW CT.	Molokai

<sup>a</sup>CFB-circulating fluidized bed, CT- combustion turbine, DEG-diesel engine generator, FITR-fuel injection timing retard, HRSG-heat recovery steam generator, kW-kilowatt, MW-megawatt, SCR-selective catalytic reduction, and SNCR-selective non-catalytic reduction.

The GHG emission reduction plan for Puna Generating Station establishes the following for the significant permit modification to CSP No. 0235-01-C to incorporate GHG emission caps:

1. A total combined cap on CO<sub>2</sub>e emissions from affected facilities operated by HECO, HELCO, MECO, and three (3) IPPs not to exceed 7,023,057 short tons (6,371,392 metric tons) per calendar year, except for calendar year 2019;
2. A total combined cap on CO<sub>2</sub>e emissions from affected facilities operated by HECO, HELCO, MECO, and three (3) IPPs not to exceed 7,208,661 short tons (6,539,587 metric tons) for calendar year 2019;
3. An individual facility-wide cap on CO<sub>2</sub>e emissions from the Puna Generating Station for 2019 not to exceed 71,282 short tons (64,666 metric tons) per calendar year that will not apply as long as the total combined cap among partnering facilities is met;
4. An individual facility-wide cap on CO<sub>2</sub>e emissions from the Puna Generating Station for 2020 and beyond not to exceed 31,747 short tons (28,800 metric tons) per calendar year that will not apply as long as the total combined cap among partnering facilities is met; and
5. An equation allocating GHG emissions in excess of the total combined cap for facilities violating the individual and total combined GHG emission caps.

CSP No. 0548-01-C for Campbell Industrial Park (CIP) Generating Station will be the main permit for specifying individual and total combined GHG emission caps for all partnering facilities that will be referenced in permits issued to the HECO, HELCO, and MECO affected facilities. This will enable the modification of a single permit if CO<sub>2</sub>e emission caps need to be revised and reduce the burden of modifying all of Hawaiian Electric Companies' permits had the caps been incorporated separately into each facility's permit.

The IPPs will have separate permits specifying individual and total combined GHG caps. Any GHG emissions cap revision will require each IPP to submit a separate permit application for significant modification since caps will be incorporated separately into each affected facility's permit.

An opportunity for public comment on the draft GHG emissions reduction plan and revised permit for Puna Generating Station will be provided in accordance with HAR §11-60.1-205.

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

### **Permitted Equipment Subject to GHG Emissions Cap**

The following permitted equipment and associated appurtenances are subject to GHG emission reductions specified in Subchapter 11 of the HAR:

<u>Unit</u>	<u>Description</u>
CT-3	20 MW Nominal (24.66 MW Peak Load) General Electric Combustion Turbine, Model No. LM 2500, Serial No. 481-651, 275 MMBtu/hr;
PBSG1	600 kW Black Start Diesel Engine Generator (DEG) Unit, Model No. PBSG1, Serial No. 5A9885R; and
Boiler	15.5 MW Combustion Engineering Boiler, Model No. VU-40, 249 MMBtu/hr.

## **Air Pollution Controls**

Water injection is used for CT-3 to reduce and control nitrogen oxide (NO<sub>x</sub>) emissions to forty-two (42) ppmvd at fifteen percent (15%) O<sub>2</sub> with fuel bound nitrogen content of 0.015% or less.

The boiler exhaust is ducted through an eighty-five percent (85%) efficiency multicyclone dust collector to control particulate matter (PM) emissions.

Sulfur dioxide (SO<sub>2</sub>) emissions are controlled by limiting the fuel sulfur content to 0.4% by weight for CT-3 and PBSG1, and two percent (2%) by weight for the boiler. PM, carbon monoxide (CO), and volatile organic compound (VOC) emissions are controlled by combustion design and good combustion practice.

## **Applicable Requirements**

### **State Requirements:**

#### Hawaii Administrative Rules

Title 11, Chapter 60.1	Air Pollution Control
Subchapter 1	General Requirements
HAR 11-60.1-1	Definitions
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
HAR 11-60.1-39	Storage of Volatile Organic Compounds
Subchapter 5	Covered Sources
HAR 11-60.1-81	Definitions
HAR 11-60.1-104	Applications for Significant Modification
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
HAR 11-60.1-115	Basis of Annual Fees for Covered Sources
Subchapter 9	Hazardous Air Pollution Sources
HAR 11-60.1-174	Maximum Achievable Control Technology (MACT) Emission Standards
Subchapter 11	Greenhouse Gas Emissions

HAR Chapter 11-60.1, Subchapter 11, §11-60.1-204 GHG Emission Reduction Plan

#### 1. Applicability to Subchapter 11 Pursuant to HAR §11-60.1-204(a)

HAR §11-60.1-204 is applicable to the Puna Generating Station since this facility is a permitted covered source with potential CO<sub>2</sub>e emissions (biogenic plus non-biogenic) equal to or above 100,000 tons per year.

## 2. Baseline Emission Rate and Cap

Pursuant to HAR §11-60.1-204(b) and (c), HELCO is proposing to establish annual facility-wide GHG emission caps for Puna Generating Station. As provisioned in HAR §11-60.1-204(d)(6)(A), HELCO is further proposing to combine the Puna Generating Station's GHG emissions cap with other GHG emission caps established for partnering facilities to leverage emission reductions. Each facility may exceed its individual cap as long as the total combined cap is met.

Partnering facilities used 2010 as the baseline year to establish the caps, except for the Kalaeloa Cogeneration Plant which used 2009 as the baseline year because 2010 was deemed unrepresentative due to an overhaul of the facility's steam turbine generator.

During the public comment period held from April 16, 2019 to May 15, 2019 to consider draft permits for the partnering facilities, the Hawaiian Electric Companies requested a temporary adjustment to the collective partnership GHG emissions cap. The Hawaiian Electric Companies stated that the loss of renewable energy from PGV on Hawaii Island and the delay of new renewable energy projects planned for 2019, for reasons outside the direct control of the companies, has eliminated the additional compliance margin anticipated and relied upon in the GHG emission calculations. As indicated by the Hawaiian Electric Companies, the PGV plant was shut down in May 2018 due to the Kilauea eruption. Also, lava destroyed the Puna complex substation, the adjacent warehouse, and covered a few of PGV's geothermal wells, as well as cut off access to the PGV power plant. HECO, ultimately requested a 185,404 ton increase to the original partnership GHG emissions cap due to the loss of PGV for the entire 2019 operating year. This adjustment is documented in HECO's July 26, 2019 greenhouse gas emissions reduction plan.

According to HECO's February 14, 2020 correspondence, although a substantial amount of renewable energy was added, other renewable energy projects for 2019 and 2020 have been delayed until 2021. Preliminary GHG emissions of the partnership for calendar year 2019 are estimated to be 7,103,530 tons per year. This level of emissions exceeds the overall partnership GHG emissions cap of 7,023,257 tons per year that results in a 16% reduction of GHG emissions from the total combined baseline emissions level.

Upon incorporating the temporary increase requested in HECO's February 14, 2020 correspondence, the DOH returned the revised draft permits to HECO and the partnering IPPs for another review on March 18, 2020. In April 2, 2020 correspondence, HECO requested the DOH to consider a provision in the permits that allows the 2020 PGV allowance to be increased to the 2019 level adjusted for the loss of PGV in the event the PGV plant implementation is delayed until later in 2020; and additionally allow for the 2019 level adjusted for the loss of PGV to be continued into 2021 if implementation is delayed into 2021. HECO, AES Hawaii, LLC, and Kalaeloa Partners, L.P. also requested that the DOH clarify that no penalties could be asserted for that period given that GHG levels for 2019 are already documented and the permit will be approved after year end 2019.

To address concerns after a public hearing on September 26, 2019 and second public comment period from August 14, 2019 to September 27, 2019, HECO stated in a May 22, 2020 email that AES Hawaii, LLC has agreed to reduce its individual GHG emissions cap by 16% from its baseline emissions level. It was also HECO's understanding that PGV will not likely return to its level of pre-volcanic service by the end of 2020.

Recognizing the magnitude of legal uncertainties, an alternate operating scenario was incorporated into permits to address HECO's concerns on the delay in restoring operation of the PGV facility. The modification for CSP 0548-01-C was redrafted and returned to HECO for review on May 29, 2020.

The following provisions in the HAR allow the GHG emissions cap to be adjusted for events that are beyond the control of the owner or operator of an affected facility:

- a. HAR §11-60.1-204(h)(4) allows the facility-wide GHG emissions cap to be re-evaluated and revised if renewable energy producers cease operations or fail to meet contractual obligations with the affected source, and there are no other reasonable alternatives.
- b. HAR §11-60.1-204(h)(5) allows the facility-wide GHG emissions cap to be re-evaluated and revised when there are unforeseen events beyond the control of the permittee, resulting in long-term or temporary emission changes, whereby maintenance of the GHG emissions cap would be detrimental to the health and welfare of the public.

Based on the recent unforeseen events, the proposed revision to the facility-wide emissions cap for calendar year 2019 and the alternate operating scenario to address the delay in restoring operation to the PGV facility are considered to be within the provisions of HAR §11-60.1-204(h).

DRAFT



Pursuant to HAR §11-60.1-204(h)(4) and HAR §11-60.1-204(h)(5), CAB has agreed to temporarily adjust the GHG emission caps for calendar year 2019 due to the PGV shutdown. Calculations to reallocate emissions for facilities on Hawaii Island were provided by the Hawaiian Electric Companies and were updated on July 7, 2019 with lower numbers. For the adjustment, HECO determined the difference in emissions between electric plants on the Big Island operating with and without PGV. Emissions with PGV in operation were based on 2017 numbers from EPA's electronic Greenhouse Reporting Tool (e-GGRT). Since the PGV plant shutdown in May 2018, GHG emissions without PGV in operation were based on twelve (12) months of data from Hawaii Island electric plants from the beginning of July 2018 to the end of June 2019. The following tables provide results from HECO's evaluation to determine extra yearly GHG emissions from fossil fuel fired electric plants without renewable energy from PGV:

<b>Big Island Plant GHG Emissions</b>				
<b>Big Island Plant</b>	<b>GHG Emissions (tons)</b>			
	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>July 2018- June 2019</b>
	<b>e-GGRT</b>	<b>Jul-Dec</b>	<b>Jan-Jun</b>	
Hamakua Energy, LLC	98,962	112,722	126,252	238,974
HELCO Kanoelehua-Hill	193,103	90,662	89,683	180,345
HELCO Keahole	243,346	144,943	115,147	260,090
HELCO Puna	26,400	34,188	33,618	67,806
Total→	561,811	382,515	364,700	747,215

<b>GHG Emissions Cap Adjustment for PGV Shutdown</b>		
<b>GHG Emissions (tons)</b>		
<b>2017 e-GGRT</b>	<b>July 2018- June 2019</b>	<b>Cap Adjustment (July 2018 – June 2019) Minus (2017 e-GGRT)</b>
561,811	747,215	185,404

<b>Individual GHG Emissions Caps for PGV Shutdown</b>			
<b>Big Island Plant</b>	<b>GHG Cap (tons)</b>	<b>Temporary GHG Cap (tons)</b>	
	<b>July 26, 2019 Greenhouse Gas Emission Reduction Plan (Page A-1)</b>	<b>Adjustment</b>	<b>CAP After PGV Shutdown</b>
Hamakua Energy, LLC	153,699	97,524	251,223
HELCO Kanoelehua-Hill	172,456	17,132	189,588
HELCO Keahole	242,208	31,213	273,421
HELCO Puna	31,747	39,535	71,282
Total→		185,404	785,514

The CAB has agreed to revise the permits to temporarily adjust individual and total combined GHG emission caps for calendar year 2019 as a result of the PGV shutdown. The GHG emission cap adjustment for calendar year 2019 adds 185,404 short tons per year of GHG emissions to the original total combined cap referenced in the July 26, 2019 greenhouse gas emission reduction plan with PGV in operation. The adjustment is the extra amount of GHG emissions that would result from fossil fuel combustion to replace renewable energy provided by PGV that is distributed to partnering facilities on the island of Hawaii that include Hamakua Energy, LLC, Kanoelehua-Hill Generating Station, Keahole Generating Station, and Puna Generating Station. Temporary adjustments to the caps are as follows for the 2019 emission year:

2019 Temporary CO <sub>2</sub> e Cap Adjustment due to PGV Shutdown			
Generating Station	CSP Permit No.	CO <sub>2</sub> e Emission Cap <sup>c, d</sup>	
		Metric Tons per Year <sup>b</sup>	Short Tons per Year
AES Hawaii, LLC Cogeneration Plant <sup>a</sup>	0087-02-C	1,534,598	1,691,605
Hamakua Energy, LLC Cogeneration Plant	0243-01-C	227,906	251,223
Kalaeloa Partners, L.P. Cogeneration Plant	0214-01-C	993,198	1,094,813
HECO Campbell Industrial Park Generating Station	0548-01-C	48,752	53,740
HECO Honolulu Generating Station	0238-01-C	0	0
HECO Kahe Generating Station	0240-01-C	1,935,707	2,133,752
HECO Waiiau Generating Station	0239-01-C	733,265	808,286
HELCO Kanoelehua-Hill Generating Station	0234-01-C	171,991	189,588
HELCO Keahole Generating Station	0007-01-C	248,043	273,421
HELCO Puna Generating Station	0235-01-C	64,666	71,282
HELCO Shipman Generating Station	0236-01-C	0	0
MECO Kahului Generating Station	0232-01-C	140,281	154,633
MECO Maalaea Generating Station	0067-01-C	417,182	459,864
MECO Palaau Generating Station	0031-04-C	23,999	26,454
Combined		6,539,587	7,208,661

<sup>a</sup> AES Hawaii, LLC proposal cap is 10,000 short tons of CO<sub>2</sub>e emissions above the baseline of 1,681,605 short tons.

<sup>b</sup> Metric Tons = (0.90718474) x (Short Tons).

<sup>c</sup> Individual caps that were adjusted for facilities on Hawaii Island due to the PGV shutdown are highlighted in red.

<sup>d</sup> Totals may not sum due to independent rounding.

The temporary combined emissions caps for 2019 will be made part of the permit for each partnering facility in accordance with HAR §11-60.1-204(d)(6)(C). Pursuant to HAR §11-60.1-202, a “facility-wide GHG emissions cap” means a permit emissions limitation, applicable to a covered source, limiting the entire source’s annual non-biogenic GHG, and biogenic nitrous oxide and methane emissions. In accordance with HAR §11-60.1-202, a facility-wide GHG emissions cap may also be defined in multiple CSPs to identify partnering facilities with an approved combined GHG emissions cap as described in HAR §11-60.1-204(d)(6)(A).

The temporary total combined cap of 7,208,661 short tons for operating year 2019 is a 13.78% reduction from the total combined baseline emissions of 8,361,021 short tons. Although the reduction is less than 16% from the total combined baseline GHG emissions level, there are no provisions in HAR §11-60.1-204(h) that require a GHG control assessment for revising the cap due to reasonably unforeseen events beyond the control of the owner or operator of an affected source.

In response to public comments on draft permits to incorporate GHG cap provisions to limit GHGs, AES Hawaii, LLC negotiated adjustments to its initial individual GHG cap proposal of 1,691,605 short tons. The initial cap proposal by AES Hawaii, LLC was 10,000 short tons above its individual GHG baseline level of 1,681,605 short tons. As indicated in HECO's January 23, 2020 letter regarding the adjustment of site-specific caps, AES Hawaii, LLC agreed to reduce its individual GHG emissions cap by 10,000 short tons for a zero percent reduction from its individual baseline level.

After further negotiations, AES Hawaii, LLC ultimately agreed to a GHG cap adjustment of 16% below its baseline level which is documented in May 22, 2020 and June 9, 2020 emails from HECO. This 16% reduction (269,075 short tons of CO<sub>2</sub>e) from the GHG baseline plus 10,000 short tons reduction from the initial GHG cap proposal of 1,691,605 short tons was distributed evenly among four (4) partnering facilities on Oahu that included Kalaeloa Partners, L.P, HECO Campbell Industrial Park Generating Station, HECO Kahe Generating Station, and HECO Waiiau Generating Station. Each individual cap for these four (4) facilities was increased by 69,764 short tons of CO<sub>2</sub>e emissions for a total combined CO<sub>2</sub>e emission increase of 279,056 short tons. Therefore, the total combined partnership GHG emissions cap is unchanged. This adjustment to distribute emissions to Oahu partnering plants excluded HECO Honolulu Generating Station and the AES Hawaii, LLC cogeneration plant.

For 2020 and beyond, individual caps will remain at the levels originally proposed by the partnering facilities, except that for AES, Hawaii, LLC, Kalaeloa Partners, L.P, HECO Campbell Industrial Park Generating Station, HECO Kahe Generating Station, and HECO Waiiau Generating Station, individual caps will remain at the level agreed in the partnership for distributing emissions after adjusting the individual GHG emission cap for AES Hawaii, LLC. The individual GHG emissions cap for AES Hawaii, LLC will be a 16% reduction from its individual GHG emission baseline level.

Individual caps for the Hawaii Island facilities will return to the levels proposed prior to the PGV shutdown. The levels are provided in the table on page 7 showing GHG caps proposed on page A-1 of the GHG emission reduction plan before deciding to request an adjustment to the caps due to the shutdown of PGV as a result of volcanic activity.

The CO<sub>2</sub>e emission baselines and GHG emission caps proposed for the partnering facilities, that achieve a 16% reduction in GHG emissions from the total combined baseline level, are provided in the following table pursuant to HECO's June 9, 2020 email for calendar year 2020 and beyond:

2020 and Beyond CO <sub>2</sub> e Facility Emission Caps and Actual GHG Baseline						
Plant	CSP Permit No.	Emissions (short tons)				% Reduction
		Baseline CO <sub>2</sub> e	Baseline Biogenic CO <sub>2</sub>	Baseline CO <sub>2</sub> e Less Biogenic CO <sub>2</sub>	CO <sub>2</sub> e Cap (see notes a,b,& c)	
		(a)	(b)	(c)=(a)-(b)	Proposed	
AES	0087-02-C	1,681,605	0	1,681,605	1,412,548	16.0%
Hamakua	0243-01-C	182,975	0	139,433	153,699	16.0%
Kalaeloa	0214-01-C	1,094,813	0	1,094,813	1,164,577	-6.4%
HECO CIP	0548-01-C	19,179	4,233	14,946	123,504	-726.3%
HECO Honolulu <sup>a</sup>	0238-01-C	133,609	0	133,609	0	100%
HECO Kahe	0240-01-C	2,776,073	0	2,776,073	2,203,516	20.6%
HECO Waiiau	0239-01-C	1,074,359	0	1,074,359	878,050	18.3%
HELCO Hill	0234-01-C	222,784	0	222,784	172,456	22.6%
HELCO Keahole	0007-01-C	191,387	0	191,387	242,208	-26.6%
HELCO Puna	0235-01-C	99,691	0	99,691	31,747	68.2%
HELCO Shipman	0236-01-C	10,192	0	10,192	0	100% Plant Closed
MECO Kahului	0232-02-C	230,839	0	230,839	154,633	33.0%
MECO Maalaea	0067-01-C	620,654	1,142	619,512	459,864	25.8%
MECO Palaa	0031-04-C	28,236	0	28,236	26,454	6.3%
Combined		8,366,396	5,375	8,361,021 <sup>d</sup>	7,023,256 <sup>d</sup>	16.0%

<sup>a</sup> HECO Honolulu Generating Station is currently deactivated (not operating but could restart if necessary).

<sup>b</sup> AES Hawaii, LLC individual cap was adjusted to reduce the cap by 10,000 short tons plus 16% reduction (269,057 short tons) below baseline level for a total 279,057 short ton reduction as shown in brown. AES Hawaii, LLC's individual GHG cap was adjusted to reduce the cap by 279,057 short tons.

<sup>c</sup> Adjustment due to AES Hawaii, LLC cap reduction is 69,764 short tons that add up to 279,056 tons for four (4) facilities highlighted in red. Adjustments in the table above were made to individual caps proposed on page A-1 of HECO's greenhouse gas emission reduction plan submitted on July 26, 2019 pursuant to HECO's June 9, 2020 email with documents prepared by the partners. Individual caps were adjusted for facilities in the table above due to the PGV shutdown and the AES Hawaii, LLC individual cap adjustment. The AES Hawaii, LLC cap adjustment is a 10,000 short ton reduction from the previous proposal plus a 16% reduction (269,057 short tons) from the individual baseline level from another proposal. Adjustments were distributed equally among four (4) Oahu facilities excluding AES Hawaii, LLC and the Honolulu Generating Station. The Individual cap adjustment to these facilities was an additional 69,764 short tons of CO<sub>2</sub>e emissions for each of the four (4) facilities highlighted in red. Totals may not sum due to independent rounding.

<sup>d</sup> Total combined partnering facility proposed GHG baseline and GHG emission cap are 8,361,022 and 7,023,257 short tons, respectively. Totals may not sum due to independent rounding.

The combined emissions cap for 2020 and beyond will be made part of the permit for each partnering facility in accordance with HAR §11-60.1-204(d)(6)(C). Pursuant to HAR §11-60.1-202, a "facility-wide GHG emissions cap" means a permit emissions limitation, applicable to a covered source, limiting the entire source's annual non-biogenic GHG, and biogenic nitrous oxide and methane emissions. In accordance with HAR §11-60.1-202, a facility-wide GHG emissions cap may also be defined in multiple CSPs to identify partnering facilities with an approved combined GHG emissions cap as described in HAR §11-60.1-204(d)(6)(A).

The total combined GHG emissions cap for 2020 and beyond is a 16% reduction from the total combined baseline emissions level established for the partnering facilities.

For information, the table below titled “Actual GHG Baseline and Notional 16% CO<sub>2e</sub> Facility Emission Caps” shows the total combined baseline and GHG emissions cap if a sixteen percent (16%) reduction had been applied to each partnering facility separately. The total combined emissions cap in the table below achieves the same reduction as that proposed for the partnering facilities that have combined their facility-wide emission caps to leverage emission reductions in meeting the combined GHG emission caps in accordance with HAR Subparagraph 11-60.1-204(d)(6)(A). The total combined CO<sub>2e</sub> cap in the table below for the notional cap is 7,023,258 short tons per year which is a 16% reduction from the total combined baseline. The total combined CO<sub>2e</sub> emission cap proposed, as shown in the table on Page 10 of this review for 2020 and beyond, is 7,023,257 short tons per year which is a 16% reduction from the total combined baseline. Totals may not sum due to independent rounding.

<b>Actual GHG Baseline and Notional 16% CO<sub>2e</sub> Facility Emission Caps</b>						
Plant	CSP Permit No.	Emissions (short tons)				% Reduction
		Baseline CO <sub>2e</sub>	Baseline Biogenic CO <sub>2</sub>	Baseline CO <sub>2e</sub> Less Biogenic CO <sub>2</sub>	CO <sub>2e</sub> Cap	
		(a)	(b)	(c)=(a)-(b)	Notional	
AES	0087-02-C	1,681,605	0	1,681,605	1,412,548	16.0%
Hamakua	0243-01-C	182,975	0	182,975	153,699	16.0%
Kalaeloa	0214-01-C	1,094,813	0	1,094,813	919,643	16.0%
HECO CIP	0548-01-C	19,179	4,233	14,946	12,555	16.0%
HECO Honolulu <sup>a</sup>	0238-01-C	133,609	0	133,609	112,232	16.0%
HECO Kahe	0240-01-C	2,776,073	0	2,776,073	2,331,901	16.0%
HECO Waiiau	0239-01-C	1,074,360	0	1,074,360	902,462	16.0%
HELCO Hill	0234-01-C	222,784	0	222,784	187,139	16.0%
HELCO Keahole	0007-01-C	191,387	0	191,387	160,765	16.0%
HELCO Puna	0235-01-C	99,691	0	99,691	83,740	16.0%
HELCO Shipman	0236-01-C	10,192	0	10,192	8,561	16.0%
MECO Kahului	0232-02-C	230,839	0	230,839	193,905	16.0%
MECO Maalaea	0067-01-C	620,654	1,142	619,512	520,390	16.0%
MECO Palaau	0031-04-C	28,236	0	28,236	23,718	16.0%
Combined		8,366,396	5,375	8,361,022	7,023,258	16.0%

<sup>a</sup>The HECO Honolulu Generating Station is currently deactivated (not operating but could restart if necessary).

For information, the CAB requested HECO to address GHG emission reductions as a result of the ongoing pandemic. According to an April 9, 2020 press release from Hawaiian Electric at: <https://www.hawaiianelectric.com/hawaiian-electric-sees-drop-in-demand-during-pandemic>, there has been a significant reduction in the use of electricity as tourism activities cease, businesses close, and thousands of residents stay home to slow the spread of COVID-19.

In a May 22, 2020 email, Hawaiian Electric anticipates that the resumption of economic activity will increase the use of electricity to levels that could approach pre-COVID-19 conditions; however, it is not clear to HECO when that will occur.

The CAB used a Tier 1 methodology in 40 Code of Federal Regulations (CFR) Part 98, §98.33, to validate the proposed individual and total combined GHG emission caps. Enclosure 1 provides a bar chart of fuel consumption for Puna Generating station. Enclosure 2 provides data on fuel consumption and spreadsheet calculations of GHG emissions. Enclosure 3 shows curves in tons and metric tons of GHGs emitted from Puna Generating Station between years 2005 and 2016. Emissions for these curves are provided in Enclosure 2. Enclosure 4 shows curves in tons and metric tons of the total combined GHGs emitted by partnering facilities between years 2005 and 2016.

Calculations in Enclosure 2 show that the 2010 baseline GHG emissions proposed for Puna Generating Station are about 0.133% higher than those estimated by the CAB. The CAB used default heating values for estimating GHGs whereas HECO used the Tier 2 methodology prescribed by Environmental Protection Agency (EPA) under 40 CFR Part 98 with actual fuel heating values from sampling fuel. Since actual heating values were used, HELCO's estimates are considered to be more representative of actual emissions.

### 3. Proposed Control Strategy

HELCO is forecasting a sixteen percent (16%) combined facility-wide reduction in GHG emissions based on implementation of various strategies that will allow a portion of the increased demand for electricity to be met from non-fossil fueled resources. As new renewable energy projects come online, the operation of existing fossil-fuel units can be reduced. As indicated by HECO at a meeting that took place on May 2, 2017, an E3 Plan in the Power Supply Improvement Plan (PSIP) will be used as the preferred plan to achieve one hundred percent (100%) renewable energy. According to Hawaiian Electric Companies' December 2016 Power Supply Improvement Plan (PSIP) Update Report, new alternative generating resources from the E3 Plan include:

- a. A 24 MW Na Pua Makani Wind Project, 109.6 MW Replacement Waiver Projects, 15 MW Grid-Scale photovoltaic (PV)-Community Based Renewable Energy (CBRE), 70 MW Contingency Battery, and 20 MW West Loch PV project by the end of 2019, as forecasted for HECO;
- b. 5.74 MW from PV Projects, Install 1 MW Grid-Scale PV-CBRE, Install 2 MW Wind-CBRE, and 9 MW Contingency Battery by the end of 2019 as forecasted for MECO; and
- c. Install 1 MW Grid-Scale PV-CBRE and 2 MW Wind-CBRE by the end of 2019, as forecasted by HELCO.

#### Federal Requirements:

40 CFR Part 98, Subpart A, Mandatory Greenhouse Gas Reporting is applicable to this facility because actual CO<sub>2</sub>e emissions from stationary fuel combustion units at Puna Generating Station are greater than 25,000 metric tons per year.

40 CFR Part 98, Subpart C, General Stationary Fuel Combustion Sources is applicable to this facility because the combustion turbine generator, DEG, and boiler are stationary fuel combustion sources as defined in §98.30 and Puna Generating Station meets the applicability requirements of 40 CFR §98.2(a)(2).

40 CFR Part 63 - National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories (Maximum Achievable Control Technologies (MACT) Standards) are listed as follows:

The black start diesel engine is subject to 40 CFR Part 63 Subpart ZZZZ - NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE) since the unit was constructed before June 12, 2006, and is an existing stationary RICE located at an area source of hazardous air pollutant (HAP) emissions. However, as an emergency engine it must operate in accordance with §63.6640(f)(2) of Subpart ZZZZ.

40 CFR Part 63, Subpart JJJJJJ, NESHAP requirements for Area Sources: Industrial, Commercial, and Institutional Boilers Area Sources apply to the boiler. As indicated on Page 7-1 of HELCO's Energy Assessment of February 2014, the boiler is equipped with oxygen trim system that continuously measures the amount of free oxygen in the boiler combustion air, and then adjusts the amount of air into the combustion chamber for optimum performance. Since the unit uses an oxygen trim system, the boiler is subject to five (5) year tune-ups instead of biennial tune-ups. Subpart JJJJJJ standards were incorporated into the permit pursuant to permit renewal application No. 0235-02.

40 CFR Part 60, Subpart GG, New Source Performance Standards, Standards of Performance for Stationary Gas Turbines is applicable to stationary gas turbines with a heat input at peak load equal to or greater than ten (10) MMBtu/hr and at facilities with these units that commence construction, reconstruction, or modification after October 3, 1977. This facility is subject to Subpart GG because CT-3 has a heat input capacity of 275 MMBtu/hr and it was installed on January 30, 1992.

40 CFR Part 52 - Approval and Promulgation of Implementation Plans; State of Hawaii; Regional Haze Federal Implementation Plan (RH-FIP); Subpart M - Hawaii, §52.633, Visibility Protection. The RH-FIP was issued for the State of Hawaii on October 9, 2012. Hawaii's RH-FIP specifies a total SO<sub>2</sub> emissions cap for fuel oil-fired boilers at the Kanoelehua-Hill, Shipman, and Puna plants of 3,550 tons per year, beginning on January 1, 2018. The SO<sub>2</sub> emissions cap and associated conditions were incorporate into the permit pursuant to permit renewal application for No. 0235-02.

### **Non-Applicable Requirements**

#### **State Requirements:**

##### Hawaii Administrative Rules (HAR)

Title 11, Chapter 60.1	Air Pollution Control
Subchapter 3	Open Burning
Subchapter 4	Noncovered Sources
Subchapter 7	Prevention of Significant Deterioration Review
Subchapter 9	Hazardous Air Pollution Sources
HAR 11-60.1-180	National Emission Standards for Hazardous Air Pollutants
Subchapter 11	
HAR 11-60.1-204(d)(2)	GHG Control Assessment
HAR 11-60.1-204(d)(3)	Available Control Measures
HAR 11-60.1-204(d)(4)	The Technically Feasible Measures
HAR 11-60.1-204(d)(5)	Control Effectiveness and Cost Evaluation



## GHG Control Assessment

HELCO will be limited to a total combined GHG emissions reduction of sixteen percent (16%) below the combined partnering facility baseline level by the end of 2020 using the total combined baseline emissions estimated for the partnering facilities to establish the cap. An alternate operating scenario will apply if the generating capacity of the PGV facility is not restored to levels preceding its shutdown due to volcanic activity in 2018. Pursuant to HAR §11-60.1-202, a facility-wide GHG emissions cap may be defined in multiple covered source permits to identify partnering facilities with an approved combined GHG emissions cap as described in HAR §11-60.1-204(d)(6)(A).

As specified in HAR §11-60.1-204(d)(2), if the required GHG emissions cap requiring a sixteen percent (16%) emissions reduction from baseline year is deemed unattainable, the permittee shall conduct a GHG control assessment.

Since the facility-wide GHG emissions cap (total combined GHG cap for partnering facilities) is sixteen percent (16%) below the total combined baseline GHG emissions level, a GHG control assessment is not required for determining whether the required GHG emissions cap is attainable for 2020 and beyond.

A GHG control assessment is also not required for temporary cap adjustments due to events which are beyond the control of the owner or operator of an affected facility. The PGV facility shutdown due to volcanic activity on the Big Island is outside the control of the partnering facilities.

Although a GHG control assessment is not required, the GHG emission reduction plan for the Hawaiian Electric Companies evaluated GHG emission control options. The following table summarizes the GHG control assessment provided in the GHG emission reduction plan for the Hawaiian Electric Companies' affected facilities:

<b>GHG Control Option</b>	<b>Feasibility and Benefit</b>
Carbon Capture and Storage (CCS)	Not economically viable. Please refer to Attachment B of the GHG emission reduction plan.
Fuel Switching or Co-Fired Fuels (Natural Gas)	Not feasible – Hawaiian Electric Companies explored importing liquefied natural gas. However, the Hawaii Public Utilities Commission (PUC) rejected that option as part of its decision to deny the merger of the Hawaiian Electric Companies with NextEra. Please refer to Attachment C of the GHG emission reduction plan.
Fuel Switching or Co-Fired Fuels (Biofuels)	Not feasible on a large scale – Hawaiian Electric Companies are currently permitted and are burning limited quantities of biodiesel as indicated in Attachment D of the GHG emission reduction plan.
Energy Efficiency Upgrades and Combustion Improvements	No economically viable improvements were identified that would contribute significantly towards reducing GHG emissions. Please refer to Attachment E of the GHG emission reduction plan.



<b>GHG Control Option</b>	<b>Feasibility and Benefit</b>
Restrictive Operations or Equipment Retirement	<p>If one of the generating facilities in the Hawaiian Electric Companies' electrical grids restricts operation to limit its GHG emissions, other facilities must operate more to meet customer demand. The partnership concept provides flexibility for lower emitting facilities to operate more to lower overall emissions and Hawaiian Electric intends to do this as much as possible within the system and economic constraints.</p> <p>As new renewable energy projects come online, the operation of existing fossil-fueled units can be reduced or these units can be retired. The Hawaiian Electric Companies' have deactivated or retired the following facilities:</p> <ul style="list-style-type: none"> <li>• Shipman Generating Station closed December 31, 2015.</li> <li>• Honolulu Generating Station was deactivated January 2014.</li> </ul>
Renewable Energy Projects (Wind and Solar) and Battery Energy Storage Systems.	Please refer to control strategies in the December 2016 PSIP for the Hawaiian Electric companies.

Federal Requirements:

40 CFR Part 52.21 - Prevention of Significant Deterioration of Air Quality  
40 CFR Part 61 - NESHAPS

**Best Available Control Technology (BACT)**

The BACT analyses from the previous permit application review is still valid. A BACT analysis is required for new or modified sources that have the potential to emit or increase emissions above significant amounts as defined in HAR 11-60.1-1. Since this is not a new source, nor are any modifications proposed that have the potential to cause a significant increase in air emissions, a BACT analysis is not required.

**Prevention of Significant Deterioration (PSD)**

The PSD determination from the previous permit application review is still valid and additional PSD review is not required. 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 Part 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.

**Major Source/ Synthetic Minor Applicability**

The facility's classification as a major source remains unchanged from the previous permit application review.

A synthetic minor source is a facility with operational limitations in order to keep potential emissions lower than major source levels ( $\geq$  one hundred (100) tons per year of criteria pollutants or  $\geq$  ten (10) tons per year of individual HAP or twenty-five (25) tons per year of a combination of HAPs). This facility is a major source and therefore is not a synthetic minor source.

**Compliance Assurance Monitoring (CAM), 40 CFR Part 64**

The purpose of CAM is to provide reasonable assurance that compliance is being achieved with large emission 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; and
- (5) Not otherwise be exempt from CAM.

CAM is not applicable. Although CT-3 relies on a water injection system to achieve compliance with federal NO<sub>x</sub> standards (PSD/BACT and Subpart GG), a continuous monitoring system (CEMS) is used to determine compliance with the NO<sub>x</sub> emissions limit. Also, water injection is not considered a control device as defined in §64.1 of the CAM regulation. For the boiler, a multicyclone dust collector is used to control particulate; however, there is no particulate emission limit that applies to this equipment. There are no emission limits that apply to the black start DEG.

**Air Emissions Reporting Requirements (AERR)**

40 CFR Part 51, Subpart A – AERR, is based on the emissions of criteria air pollutants from point sources (as defined in 40 CFR Part 51, Subpart A), which exceed the AERR thresholds as shown in the following table:

Pollutant	Potential Emissions (TPY) <sup>1</sup>	AERR Triggering Levels <sup>1</sup> (TPY)		Pollutant	In-house Total Facility Triggering Levels <sup>1</sup> (TPY)
		1 Year Cycle (Type A)	3 Year Cycle (Type B)		
NO <sub>x</sub>	1,025	$\geq 2,500$	100	NO <sub>x</sub>	$\geq 25$
SO <sub>2</sub>	2,881	$\geq 2,500$	100	SO <sub>2</sub>	$\geq 25$
CO	213	$\geq 2,500$	1,000	CO	$\geq 250$
PM <sub>10</sub> /PM <sub>2.5</sub>	399	$\geq 250/250$	100	PM <sub>10</sub> /PM <sub>2.5</sub>	$\geq 25/25$
VOC	15	$\geq 250$	100	VOC	$\geq 25$
Pb (see note 2)	0.004	---	$\geq 0.5$ (actual)	Pb	$\geq 5$
HAPs	3.45	---	---	HAPs	$\geq 5$

<sup>1</sup>Criteria pollutants include NO<sub>x</sub>, SO<sub>2</sub>, CO, particulate matter less than ten (10) microns in diameter (PM<sub>10</sub>), particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), ozone (formed from precursor volatile organic compounds (VOCs), and lead (Pb).

<sup>2</sup>Based on 2016 actual emissions.

This facility exceeds Type A and B triggering levels. Therefore, AERR requirements are applicable.

The CAB also requests annual emissions reporting from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels or is a covered source. Annual emissions reporting for the facility will be required for in-house recordkeeping purposes since this is a covered source.

**Insignificant Activities**

Insignificant activities listed in the previous permit application review that meet the exemption criteria specified in HAR §11-60.1-82(f) and (g) are listed as follows:

<u>Basis for Exemption</u>	<u>Description</u>
§11-60.1-82(f)(1)	1. A 10,521 gallon fixed roof day tank for CT-3; 2. A 10,920 gallon fixed roof day tank for the boiler; 3. A 3,990 gallon fixed roof igniter tank for storing #2 fuel oil.
§11-60.1-82(f)(2)	There may occasionally be fuel burning equipment with a heat input capacity less than one (1) MMBtu/hr used at the station.
§11-60.1-82(f)(5)	There may occasionally be standby generators and other emergency equipment.
§11-60.1-82(f)(6)	Spray paint booths
§11-60.1-82(f)(7)	1. A 209,286 gallon fuel oil #6 storage tank; 2. A 461,160 gallon fuel oil #6 storage tank; 3. Two (2) 169,344 gallon #2 diesel fuel storage tanks; 4. Fugitive equipment leaks from valves, flanges, pump seals and any VOC water separators; 5. Solvents used for maintenance purposes; 6. Acid or vertan may be sued for periodic boiler cleaning.
§11-60.1-82(g)(1)	Welding booths
§11-60.1-82(g)(2)	Hand held equipment for maintenance and testing purposes, with reasonable precautions taken to prevent particulate matter from becoming airborne.
§11-60.1-82(g)(3)	Laboratory equipment for chemical and physical analysis
§11-60.1-82(g)(6)	Diesel powered fire pump
§11-60.1-82(g)(8)	Gasoline fired portable industrial equipment less than twenty-five (25) hp.
§11-60.1-82(g)(9)	Plant maintenance and upkeep activities, such as painting, sandblasting, woodworking, painting, etc.
§11-60.1-82(g)(12)	Stacks and vents to prevent escape of seer gases through plumbing traps.
§11-60.1-82(g)(13)	Consumer use of office equipment and products

## Alternate Operating Scenarios

The application for significant modification did not propose any new alternate operating scenarios, however, in April 2, 2020 correspondence, HECO requested the DOH to consider provisions in the permits that allows the emissions cap for partnering facilities to be increased for calendar years 2019 and 2020 in the event the start-up of PGV operations is delayed. In response, the DOH has agreed to amend the permits to incorporate the following alternate operating scenarios:

For the PGV facility shutdown due to volcanic activity on the island of Hawaii in 2018, if the combined generation of the PGV facility and other renewable energy sources on Hawaii Island are not restored to levels that PGV had preceding its shutdown, the following alternate individual and total combined GHG emissions caps will be calculated as follows:

- a. One twelfth (1/12) of the 2019 individual GHG emission cap adjustments for Hawaii Island partnering facilities less combined net generation from additional Hawaii Island renewable energy sources will be added to the individual GHG emission caps of these facilities set forth for 2020 and beyond for each month the renewable energy levels are not restored to PGV system levels preceding its shutdown.
- b. One twelfth (1/12) of the total combined cap adjustment for 2019 of 185,404 short tons less combined net generation from additional Hawaii Island renewable energy sources will be added to the total combined GHG emission cap specified for 2020 and beyond for each month renewable energy levels are not restored to PGV system levels preceding its shutdown.

## Project Emissions

Emissions of NO<sub>x</sub>, CO, VOC, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and HAPs were evaluated. Emissions were based on the maximum capacity of the equipment and 8,760 hours per year of operation. It was assumed, conservatively, that PM is equal to PM<sub>10</sub> and PM<sub>10</sub> is equal to PM<sub>2.5</sub>. Because of the uncertainties associated with AP-42 emission factors, compliance factors (based on stack test data) greater than AP-42 emission factors were used to determine certain emission rates. Some of the HAP emissions were determined using EPRI PISCES Air Toxic Database, while some were based on 1994 test data from HECO's Waiau Generating Station.

<b>NO<sub>x</sub> Emissions</b>					
<b>Unit</b>	<b>AP-42 EF (lb/MMBtu)</b>	<b>Assumed EF (lb/MMBtu)</b>	<b>Heat Input (MMBtu/hr)</b>	<b>Emission Rate (lb/hr)</b>	<b>Emission Rate (TPY)</b>
Boiler	0.313	0.767	249	191	837
CT-3 (peak load)	Not Applicable	0.154	275	42.3	185
PBSG1 (see Note a)	3.200	3.200	6.34	20.3	3.0
Total→					1,025

<sup>a</sup>Based on 300 hours per year operation.

CO Emissions					
Unit	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (TPY)
Boiler	0.033	0.066	249	16.5	72
CT-3 (peak load)	Not Applicable	0.097	275	26.8	117
PBSG1 (see Note a)	0.850	0.850	6.34	5.39	24
Total →					213

<sup>a</sup>Based on 300 hours per year operation.

VOC Emissions					
Unit	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (TPY)
Boiler	0.76	0.010	249	2.49	11
CT-3 (peak load)	Not applicable	0.003	275	0.80	3.5
PBSG1 (see Note a)	0.082	0.082	6.34	0.52	0.1
Total →					15

<sup>a</sup>Based on 300 hours per year operation.

PM/PM <sub>10</sub> /PM <sub>2.5</sub> Emissions					
Unit	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (TPY)
Boiler	0.144	0.287	249	71.5	313
CT-3 (peak load)	Not applicable	0.072	275	19.7	86
PBSG1 (see Note a)	0.012	0.0697	6.34	0.44	0.1
Total →					399

<sup>a</sup>Based on 300 hours per year operation.

SO <sub>2</sub> Emissions					
Unit	AP-42 EF (lb/MMBtu)	Assumed EF (lb/MMBtu)	Heat Input (MMBtu/hr)	Emission Rate (lb/hr)	Emission Rate (TPY)
Boiler	2.08	2.20	249	547.80	2,399
CT-3 (peak load)	Not applicable	0.40	275	110.0	482
PBSG1 (see Note a)	N/A	0.40	6.34	2.54	0.4
Total →					2,881

<sup>a</sup>Based on 300 hours per year operation.

HAP emissions from the permit renewal application review are summarized as follows:

HAP	Emissions (TPY)			
	Boiler	CT-3	PBSG1	Total
Acetaldehyde	2.38 E-03		2.40E-05	<b>2.40E-03</b>
Acrolein			7.49E-06	<b>7.49E-06</b>
1,3 Butadiene		1.93E-02		<b>1.93E-02</b>
Benzene	3.34E-03	6.62E-02	7.38E-04	<b>7.03E-02</b>
Ethylbenzene	4.62E-04			<b>4.62E-04</b>
Formaldehyde	2.40E-01	3.37E-01	7.50E-05	<b>5.77E-01</b>
Phosphorus	6.88E-02			<b>6.88E-02</b>
1,1,1-Trichloroethane	1.72E-03			<b>1.72E-03</b>
Toluene	4.51E-02		2.67E-04	<b>4.53E-02</b>
Xylene	7.93E-04		1.84E-04	<b>9.76E-04</b>
POM	9.45E-03	4.82E-02	2.02E-04	<b>5.78E-02</b>
Antimony Compounds	3.82E-02			<b>3.82E-02</b>
Arsenic Compounds	9.60E-03	1.32E-02		<b>2.28E-02</b>
Beryllium Compounds	2.02E-04	3.37E-04		<b>5.76E-04</b>
Cadmium Compounds	2.89E-03	5.78E-03		<b>8.68E-03</b>
Chromium Compounds	7.95E-03	1.32E-02		<b>2.12E-02</b>
Cobalt Compounds	4.38E-02			<b>4.38E-02</b>
Lead Compounds	1.10E-02	1.69E-02		<b>2.78E-02</b>
Manganese Compounds	2.55E-02	9.52E-01		<b>9.77E-01</b>
Mercury Compounds	5.43E-03	1.45E-03		<b>6.88E-03</b>
Nickel Compounds	1.42E+00	5.54E-03		<b>1.42E+00</b>
Selenium Compounds	4.97E-03	3.01E-02		<b>3.51E-02</b>
Total	<b>1.94</b>	<b>1.51</b>	<b>1.50</b>	<b>3.45</b>

Maximum potential GHG emissions from the permit application for significant modification are summarized as follows:

**MAXIMUM POTENTIAL CO<sub>2</sub>e EMISSIONS FOR GENERATING STATION**

Description →	ΣGHG Mass-Based Emissions	GWP	CO <sub>2</sub> e Emissions Rate	
Source Reference or Derivation →	(tons/year)	40 CFR §98 Table A-1	(a)*(b)	[(a)*(b)]/1.10231
Unit of Measure →		None	(tons/year)	(Metric tons/year)
GHG Pollutant ↓	(a)	(b)	(c)	(d)
Carbon Dioxide (CO <sub>2</sub> )	377,124	1	377,124	342,121
Methane (CH <sub>4</sub> )	15.16	25	379	344
Nitrous Oxide (N <sub>2</sub> O)	3.04	298	905	821
Maximum Potential CO <sub>2</sub> e Emissions			378,408	343,286

HELCO is proposing an individual CO<sub>2</sub>e emissions cap of 31,747 short tons (28,000 metric tons) per calendar year for Puna Generating Station for operating year 2020 and beyond. This individual cap is an approximate 68.2% decrease in GHG emissions from the baseline GHG level of 99,691 short tons (90,438 metric tons). While this individual limit may be exceeded, the proposed total combined GHG emissions limit is expected to reduce overall GHG emissions among partnering facilities by sixteen percent (16%) from the total combined baseline emissions.

## **Ambient Air Quality Assessment**

An ambient air quality impact assessment was not performed since there are no increases in emissions for the modification to incorporate GHG emission caps.

### **Significant Permit Conditions**

1. The following individual CO<sub>2</sub>e caps will be specified in Attachment II – GHG, Special Condition No. C.1.a of CSP No. 0548-01-C for CIP Generating Station and referenced in Attachment II – GHG, Special Condition No. C.1.a of CSP No. 0235-01-C for Puna Generating Station.
  - a. Puna Generating Station shall not emit or cause to be emitted CO<sub>2</sub>e emissions in excess of 28,800 metric tons (31,747 short tons) per calendar year, except as specified for calendar year 2019 and Attachment II – GHG, Special Condition Nos. C.1.c.iv and C.3 of the permit.
  - b. For calendar year 2019, Puna Generating Station shall not emit or cause to be emitted CO<sub>2</sub>e emissions in excess of 64,666 metric tons (71,282 short tons) per calendar year, except as specified in Attachment II – GHG, Special Condition No. C.1.c.iv of the permit.

Reason: HAR §11-60.1-204(d)(6)(A), §11-60.1-204(h)(4), and §11-60.1-204(h)(5).

2. The following total combined CO<sub>2</sub>e emissions caps will be specified in Attachment II – GHG Special Condition No. C.1.b of CSP No. 0548-01-C for CIP Generating Station and referenced in Attachment II – GHG, Special Condition No. C.1.b of CSP No. 0235-01-C for Puna Generating Station.
  - a. For 2019, all partnering facilities shall not emit or cause to be emitted total combined CO<sub>2</sub>e emissions in excess of 6,539,587 metric tons (7,208,661 short tons) per calendar year.
  - b. For 2020 and beyond, all partnering facilities shall not emit or cause to be emitted total combined CO<sub>2</sub>e emissions in excess of 6,371,392 metric tons (7,023,258 short tons) per calendar year except as specified for calendar year 2019 and Attachment II – GHG, Special Condition No. C.3 of the permit.

Reason: HAR §11-60.1-204(d)(6)(A), §11-60.1-204(h)(4), and §11-60.1-204(h)(5).

3. For purposes of the CO<sub>2</sub>e emission limits in Attachment II – GHG Special Condition Nos. C.1.a and C.1.b for Puna Generating Station:
  - a. The CO<sub>2</sub>e emissions shall have the same meaning as that specified in HAR §11-60.1-1;
  - b. In accordance with HAR §11-60.1-204(d)(6)(B), biogenic carbon dioxide (CO<sub>2</sub>) emissions are not included when determining compliance with the emissions limit;
  - c. The permittee shall be in compliance with the applicable emission limits by the end of 2019 and each calendar year thereafter;
  - d. The permittee may exceed the emissions cap specified in Attachment II – GHG, Special Condition No. C.1.a, if the GHG emissions limit specified in Attachment II – GHG Special Condition No. C.1.b. is met; and

- e. At no time shall the permittee exceed Attachment II – GHG Special Condition Nos. C.1.a and C.1.b simultaneously over a calendar year. For incidences when Attachment II – GHG Special Condition Nos. C.1.a and C.1.b of this permit are exceeded simultaneously, emissions in excess of the total combined cap shall be allocated according to the following equation for compliance purposes:

$$X = XG \frac{(A - C)}{\sum_{A_i > C_i} (A_i - C_i)}$$

Where:

- X = Adjusted portion in metric tons or short tons of GHG emissions that are in excess of total combined cap specified in Attachment II – GHG, Special Condition No. C.1.b. The equation applies to all affected facilities that do not meet the individual and total combined GHG emission caps specified in Attachment II – GHG, Special Condition Nos. C.1.a and C.1.b, respectively.
- XG = Total combined actual GHG emissions from affected facilities minus total combined GHG emissions cap. Total combined emissions cap cannot be less than sixteen percent (16%) of total combined baseline emission.
- A = Actual GHG emissions from the affected facility.
- C = GHG emissions cap for the affected facility.
- $\sum_{A_i > C_i} (A_i - C_i)$  = The sum of the difference between the actual emissions and cap emissions for all facilities that did not achieve the individual facility-wide GHG emissions cap.

Reason: Required by HAR §11-60.1-3, §11-60.1-90, §11-60.1-204.

4. The alternate operating scenario for the PGV facility shutdown due to volcanic activity on the island of Hawaii in 2018, shall remain in effect until an additional net energy generation of 26,883 MWh per month from the PGV facility is reached in any month of the year. The following shall apply to the individual and total combined alternate operating scenario GHG emission cap adjustments starting January 1, 2020 and for any subsequent year until these alternate operating scenarios no longer apply:
- a. Attachment II – GHG, Special Condition No. C.3 no longer applies when,

$$NG_{PGV-R} \geq NG_{PGV2017}$$

Where,

- $NG_{PGV2017}$  = 26,883 Net Generating capacity from the PGV facility in calendar year 2017 on an average monthly basis (MWh) preceding its shutdown.
- $NG_{PGV-R}$  = Net Generation from the restored PGV facility (MWh per month)

- b. The alternate scenario individual GHG emission cap adjustment for calendar year 2019 is 97,524 short tons for Hamakua Energy, LLC, 17,132 short tons for Kanoelehua-Hill Generating Station, 31,213 short tons for Keahole Generating Station, and 39,535 short tons for Puna Generating Station. Starting on January 1, 2020, and for any subsequent year, the alternate scenario GHG emissions individual cap adjustment for each of the foregoing island of Hawaii partnering facilities shall be calculated by adding one twelfth (1/12) of the 2019 annual adjustment for each facility's individual GHG emissions cap specified in Attachment II – GHG, Special Condition No. C.1.a.ii of CSP No. 0548-01-C for CIP Generating Station per month for the facilities from January 1 of that year. Monthly adjustments to the individual GHG emission caps shall be determined as specified in Attachment II – GHG, Special Condition No. C.3.d until this alternate operating scenario no longer applies as specified in Attachment II – GHG, Special Condition No. C.3.a. A full one-twelfth (1/12) of the annual cap adjustment shall apply per month until the criteria in Attachment II – GHG, Special Condition No. C.3.a are met and not thereafter.



- c. The PGV alternate scenario total combined cap adjustment for calendar year 2019 is 185,404 short tons. Starting on January 1, 2020, and for any subsequent year, the PGV alternate operating scenario total combined GHG emissions cap adjustment shall be calculated by adding one twelfth (1/12) of the 2019 annual adjustment of 15,450 short tons to the total combined cap specified in Attachment II – GHG, Special Condition No. C.1.b.ii of CSP No. 0548-01-C for CIP Generating Station per month from January 1 of that year. Monthly adjustments to the total combined GHG emissions cap shall be determined as specified in Attachment II – GHG, Special Condition No. C.3.d until this alternate operating scenario no longer applies as specified in Attachment II – GHG, Special Condition No. C.3.a. A full one-twelfth (1/12) of the annual cap adjustment shall apply per month until the criteria in Attachment II – GHG, Special Condition No. C.3.a are met and not thereafter.
- d. Monthly adjustments to the individual and total combined GHG emission caps shall be determined with the following equation:

$$AC = FAC/12$$

Where,

FAC = Full Adjustment to CO<sub>2</sub>e caps (short tons – refer to table below)  
 AC = Monthly adjustment to GHG emissions caps

Generating Station	Full Adjustment to CO <sub>2</sub> e Caps (Short Tons)	2020 CO <sub>2</sub> e Cap (Short Tons)	FAC/12 (Short Tons) <sup>b</sup>
Hamakua Energy	97,524	153,699	8,127
Kanoelehua-Hill	17,132	172,456	1,428
Keahole	31,213	242,208	2,601
Puna	39,535	31,747	3,295
Combined	185,404	see note <sup>a</sup>	15,450

a. Total combined CO<sub>2</sub>e cap for all partnering facilities is 7,023,257 short tons.

b. Monthly full CO<sub>2</sub>e cap adjustment.

- e. Individual GHG emission cap adjustments, affecting the total combined GHG emissions cap, shall only apply to partnering facilities on the island of Hawaii.
- f. The permittee may exceed the adjusted individual GHG emissions cap as determined in Attachment II – GHG, Special Condition No. C.3.b, if the adjusted total combined GHG emission cap as determined in Attachment II – GHG, Special Condition No. C.3.c is met.
- g. Alternate operating scenario records shall be maintained in accordance with Attachment II - GHG, Special Condition No. D.3.
- h. The terms and conditions under each operating scenario shall meet all applicable requirements, including the special conditions of this permit.

Reason HAR §11-60.1-3, §11-60.1-5, §11-60.1-204(h).

5. Semi-annual monitoring report submittals for the GHG emission caps and allocating excess emissions pursuant to Attachment II – GHG, Special Condition No. C.1.c.v are as follows:
  - a. The permittee shall complete and submit **semi-annual** monitoring reports to the Department. All reports shall be submitted **within sixty (60) days after** the end of each semi-annual calendar period (January 1 – June 30 and July 1 – December 31), be signed and dated by a responsible official, except that biogenic CO<sub>2</sub> emissions shall be excluded from the total CO<sub>2</sub>e emissions.
  - b. For calendar year 2019, the permittee shall report the CO<sub>2</sub>e emissions **within sixty (60) days** after the issuance of this permit. The Monitoring Report Form: GHG Emissions, or equivalent form, for the 2019 calendar year shall be used for reporting and shall be signed and dated by a responsible official.
  - c. For calendar year 2020, the permittee shall report the CO<sub>2</sub>e emissions **within sixty (60) days** after issuance of this permit or **within sixty (60) days** after the end of the semi-annual calendar period, whichever is later. The Monitoring Report Form: GHG Emissions, or equivalent form, for the 2020 calendar year shall be used for reporting and shall be signed and dated by a responsible official.

Reason: HAR §11-60.1-3, §11-60.1-5, and §11-60.1-90.

### **Conclusion and Recommendation**

HELCO applied for significant permit modification to incorporate GHG emission caps and significant permit conditions to implement GHG reduction measures established in the GHG emissions reduction plan.

The HECO, HELCO, MECO, and IPP plants are proposing a sixteen percent (16%) GHG emissions reduction from the total combined baseline GHG emissions for calendar year 2020 and beyond; and to use a total combined GHG emission cap by partnering pursuant to HAR §11-60.1-204(d)(6)(A).

HELCO's GHG emissions reduction plan for Puna Generating Station was reviewed and determined to be in compliance with HAR §11-60.1-204. The proposed baseline emission rate and emission caps were evaluated using past fuel consumption data and determined to be reasonably representative as documented in Enclosures 1 through 3. Further review based on a Tier 1 calculation methodology in Enclosure 4 shows total combined GHG emissions from partnering facilities following calendar year 2005 have steadily declined to slightly more than sixteen percent (16%) below a 2010 baseline emissions level as of the end of calendar year 2016 based on a Tier 1 calculation methodology. Preliminary GHG emissions estimated for the partnership for calendar year 2019, however, are 7,103,530 tons per year which is less than a 16% reduction from the 2010 GHG emissions level in Enclosure 4.

For calendar year 2019 and 2020, the overall partnership caps are adjusted in accordance with HAR §11-60.1-204(h) due to unforeseen events. The shutdown of the PGV geothermal plant towards the end of 2018 due to volcanic activity and delay in renewable energy projects until 2021 are beyond the control of the partnering facilities.

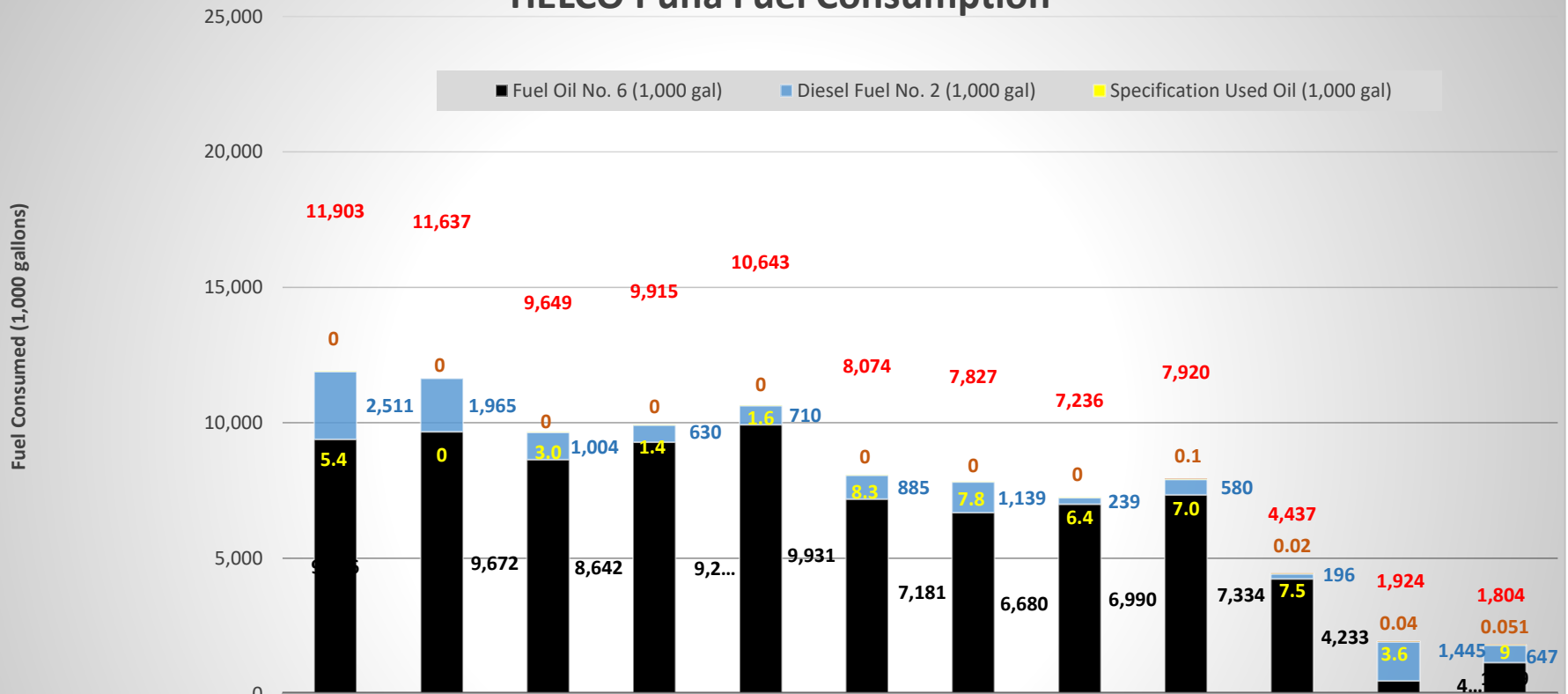
As specified into HAR §11-60.1-204(g), once a facility-wide GHG emission cap is established and incorporated in the CSP, the GHG emission reduction plan shall become part of the permit application process for renewals and any required modifications.

Recommend issuance of the significant modification to the CSP subject to thirty-day (30-day) public review and comment period in accordance with HAR §11-60.1-205, forty-five day (45-day) EPA review period, and incorporation of the significant permit conditions.

Mike Madsen  
July 9, 2020

DRAFT

## HELCO Puna Fuel Consumption



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total	11,903	11,637	9,649	9,915	10,643	8,074	7,827	7,236	7,920	4,437	1,924	1,804
ULSD (,1000 gal)	0	0	0	0	0	0	0	0	0.1	0.02	0.04	0.051
Specification Used Oil (1,000 gal)	5.4	0	3.0	1.4	1.6	8.3	7.8	6.4	7.0	7.5	3.6	9
Diesel Fuel No. 2 (1,000 gal)	2,511	1,965	1,004	630	710	885	1,139	239	580	196	1,445	647
Fuel Oil No. 6 (1,000 gal)	9,386	9,672	8,642	9,284	9,931	7,181	6,680	6,990	7,334	4,233	475	1,149

Enclosure 1: Bar chart showing fuel consumption for Puna Generating Station from 2005 to 2016. Fuel consumption data is provided in spreadsheet from Enclosure 2. The facility burns fuel oil No. 6 in black as the primary fuel and fuel oil No. 2 in blue as a secondary fuel. Numbers in red provide the total combined fuel consumption in units of 1,000 gallons.

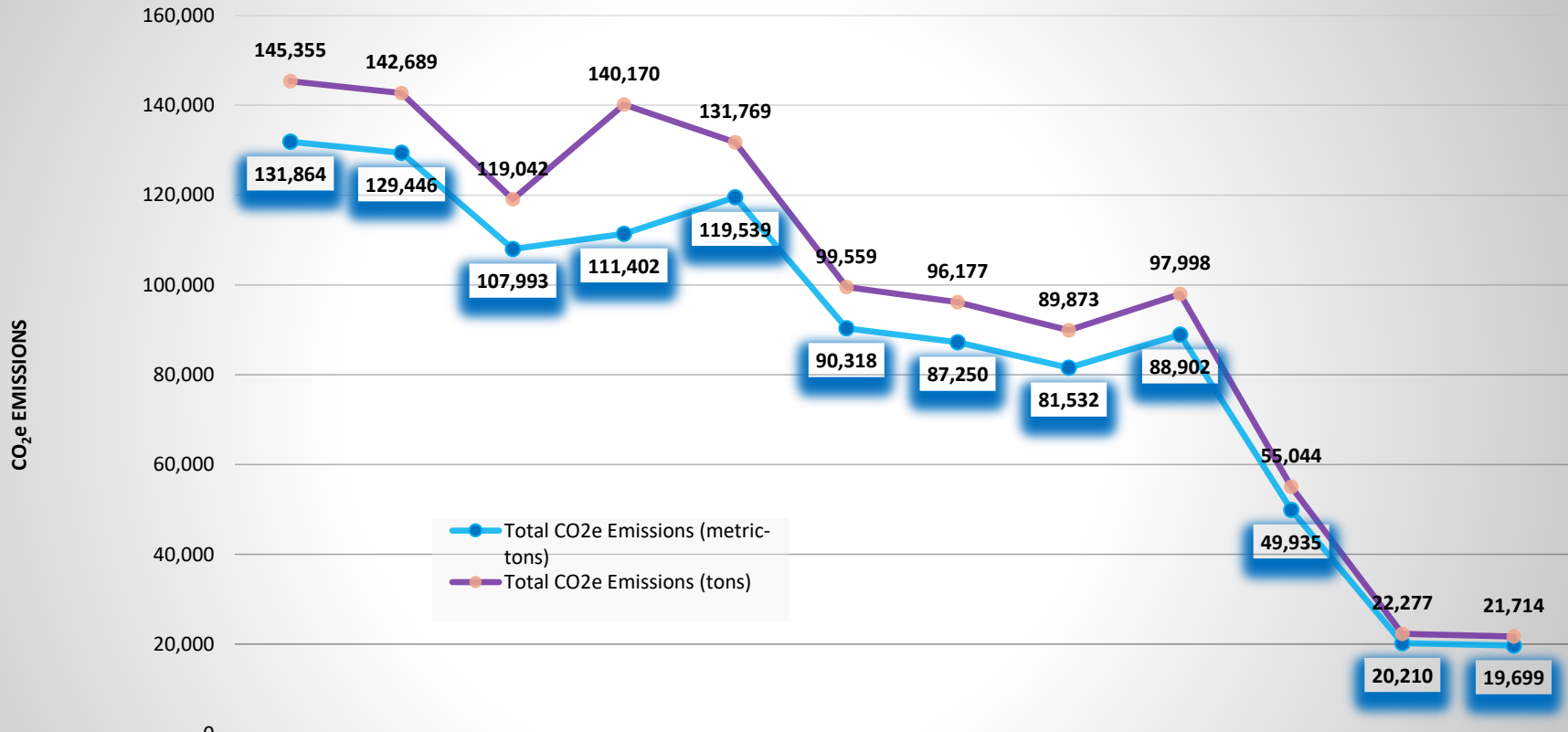
HELCO PUNA															
FUEL CONSUMPTION DATA															
Ref	Source or Derivation	Calendar Year→	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
(a)	See Data Source	Fuel Oil No. 6 (1,000 gal)	9,386	9,672	8,642	9,284	9,931	7,181	6,680	6,990	7,334	4,233	475	1,149	
(b)	See Data Source	Diesel Fuel No. 2 (1,000 gal)	2,511	1,965	1,004	630	710	885	1,139	239	580	196	1,445	647	
(c)	See Data Source	Specification Used Oil (1,000 gal)	5.4	0	3.0	1.4	1.6	8.3	7.8	6.4	7.0	7.5	3.6	9	
(d)	See Data Source	ULSD (.1000 gal)	0	0	0	0	0	0	0	0	0.1	0.02	0.04	0.051	
	(a) + (b) + (c) + (d)	<b>Total</b>	<b>11,903</b>	<b>11,637</b>	<b>9,649</b>	<b>9,915</b>	<b>10,643</b>	<b>8,074</b>	<b>7,827</b>	<b>7,236</b>	<b>7,920</b>	<b>4,437</b>	<b>1,924</b>	<b>1,804</b>	
DATA SOURCE→			Emission Inventory Fuel Consumption Data						SLEIS						
PARAMETERS FOR DETERMINING CO <sub>2</sub> e EMISSIONS															
(e)	40CFR98 Table C-1 [Emission Factors]	Heating Value FO#6 (MMBtu/gal)	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
(f)		Heating Value FO#2 (MMBtu/gal)	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	
(g)		Heating Value Specification Used Oil (MMBtu/gal)	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	
(h)		Heating Value USLD (MMBtu/gal)	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	
(i)		CO <sub>2</sub> EF FO#6 (kg/MMBtu)	75.10	75.10	75.10	75.10	75.10	75.10	75.10	75.10	75.10	75.10	75.10	75.10	
(j)		CO <sub>2</sub> EF FO#2 (kg/MMBtu)	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	
(k)		CO <sub>2</sub> EF Specification Used Oil (kg/MMBtu)	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	74.00	
(l)		CO <sub>2</sub> EF ULSD (kg/MMBtu)	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	73.96	
(m)		40CFR98 Table C-2 [Emission Factors]	CH <sub>4</sub> EF FO#6 (kg/MMBtu)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
(n)			CH <sub>4</sub> EF FO#2 (kg/MMBtu)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
(o)	CH <sub>4</sub> EF Specification Use Oil (kg/MMBtu)		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	
(p)	CH <sub>4</sub> EF ULSD (kg/MMBtu)		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	
(q)	N <sub>2</sub> O EF FO#6 (kg/MMBtu)		0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	
(r)	N <sub>2</sub> O EF FO#2 (kg/MMBtu)		0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	
(s)	N <sub>2</sub> O EF Specification Used Oil (kg/MMBtu)		0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	
(t)	N <sub>2</sub> O EF ULSD (kg/MMBtu)		0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	
(u)	40CFR98 Table A-1 [Global Warming Potential]		GWP CO <sub>2</sub>	1	1	1	1	1	1	1	1	1	1	1	1
(v)			GWP CH <sub>4</sub>	25	25	25	25	25	25	25	25	25	25	25	25
(w)		GWP N <sub>2</sub> O	298	298	298	298	298	298	298	298	298	298	298	298	
CALCULATE FUEL CONSUMPTION IN MMBTU															
(x)	(a)*(e)*10 <sup>3</sup>	FO#6 (MMBtu)	1,407,905	1,450,777	1,296,282	1,392,596	1,489,597	1,077,218	1,002,035	1,048,566	1,100,062	634,996	71,303	172,337	
(y)	(b)*(f)*10 <sup>3</sup>	FO#2 (MMBtu)	346,540	271,164	138,558	86,922	98,041	122,095	157,164	33,046	79,973	27,068	199,413	89,243	
(z)	(c)*(g)*10 <sup>3</sup>	Specification Used Oil (MMBtu)	745	0	414	186	217	1,139	1,071	889	970	1,029	497	1,200	
(aa)	(c)*(g)*10 <sup>3</sup>	ULSD (MMBtu)	0	0	0	0	0	0	0	0	15	3	6	7	
(bb)	(n)+(o)+(p)+(q)	Total (MMBtu)	1,755,190	1,721,940	1,435,254	1,479,705	1,587,855	1,200,453	1,160,269	1,082,501	1,181,020	663,096	271,220	262,787	
CALCULATE MASS EMISSIONS															
(cc)	[(i)*(x) + (j)*(y) + (k)*(z) + (l)*(aa)]	CO <sub>2</sub> Mass Emissions (kg)	131,418,892	129,008,576	107,629,136	111,026,539	119,135,884	90,013,542	86,955,880	81,257,146	88,602,350	49,766,497	20,140,737	19,632,234	
(dd)	[(m)*(x) + (n)*(y) + (o)*(z) + (p)*(aa)]	CH <sub>4</sub> Mass Emissions (kg)	5,266	5,166	4,306	4,439	4,764	3,601	3,481	3,248	3,543	1,989	814	788	
(ee)	[(q)*(x) + (r)*(y) + (s)*(z) + (t)*(aa)]	N <sub>2</sub> O Mass Emissions (kg)	1,053	1,033	861	888	953	720	696	650	709	398	163	158	
CALCULATE CO <sub>2</sub> e EMISSIONS AND COMPARE WITH BASELINE IN GHG REDUCTION PLAN															
(ff)	(u)*(cc) + (v)*(dd) + (w)*(ee)	CO <sub>2</sub> e Emissions (kg)	131,864,359	129,445,605	107,993,404	111,402,089	119,538,882	90,318,217	87,250,356	81,531,885	88,902,092	49,934,791	20,209,572	19,698,929	
(gg)	(ff)/10 <sup>3</sup>	CO <sub>2</sub> e Emissions (metric-tons)	131,864	129,446	107,993	111,402	119,539	90,318	87,250	81,532	88,902	49,935	20,210	19,699	
(hh)	<b>Puna GHG Plan</b>	<b>Puna CO<sub>2</sub>e Baseline Emissions (metric-tons)</b>						<b>90,438</b>							
(ii)		<b>Deviation Lower (-) or Higher than CAB Estimate</b>						<b>0.133%</b>							
(jj)	(gg)*1.10231	<b>CO<sub>2</sub>e Emissions (tpy)</b>	<b>145,355</b>	<b>142,689</b>	<b>119,042</b>	<b>122,800</b>	<b>131,769</b>	<b>99,559</b>	<b>96,177</b>	<b>89,873</b>	<b>97,998</b>	<b>55,044</b>	<b>22,277</b>	<b>21,714</b>	
CALCULATE CO <sub>2</sub> e CAP AND COMPARE WITH INDIVIDUAL CAP IN GHG REDUCTION PLAN															
(kk)		Biogenic CO <sub>2</sub> e Emissions (metric-tons)	0	0	0	0	0	0	0	0	0	0	0	0	
(ll)	(kk)*1.10231	Biogenic CO <sub>2</sub> e Emissions (tons)	0	0	0	0	0	0	0	0	0	0	0	0	
(mm)	(1.00-0.682)*(jj)-(kk)	2020 CO <sub>2</sub> e Emissions Cap (tons)	46,223	45,375	37,855	39,050	41,903	31,660	30,584	28,580	31,163	17,504	7,084	6,905	
(nn)	<b>Puna GHG Plan</b>	<b>Puna CO<sub>2</sub>e Emissions CAP (tons)</b>						<b>31,747</b>							
(nn)	(mm)-(nn)	Lower (-) or (Higher) than CAB Estimate (tons)												87	

1 metric-ton=1,10231 tons  
1 metric-ton=1000 Kg

Enclosure 2: Fuel consumption data for bar chart shown in Enclosure 1 and spreadsheet calculations of GHG emissions for Puna Generating Station between years 2005 and 2016. This data was used to prepare GHG emission curves in Enclosure 3.

Data Source: CAB estimates based on reported fuel consumption

## Total HELCO Puna CO<sub>2</sub>e Emissions

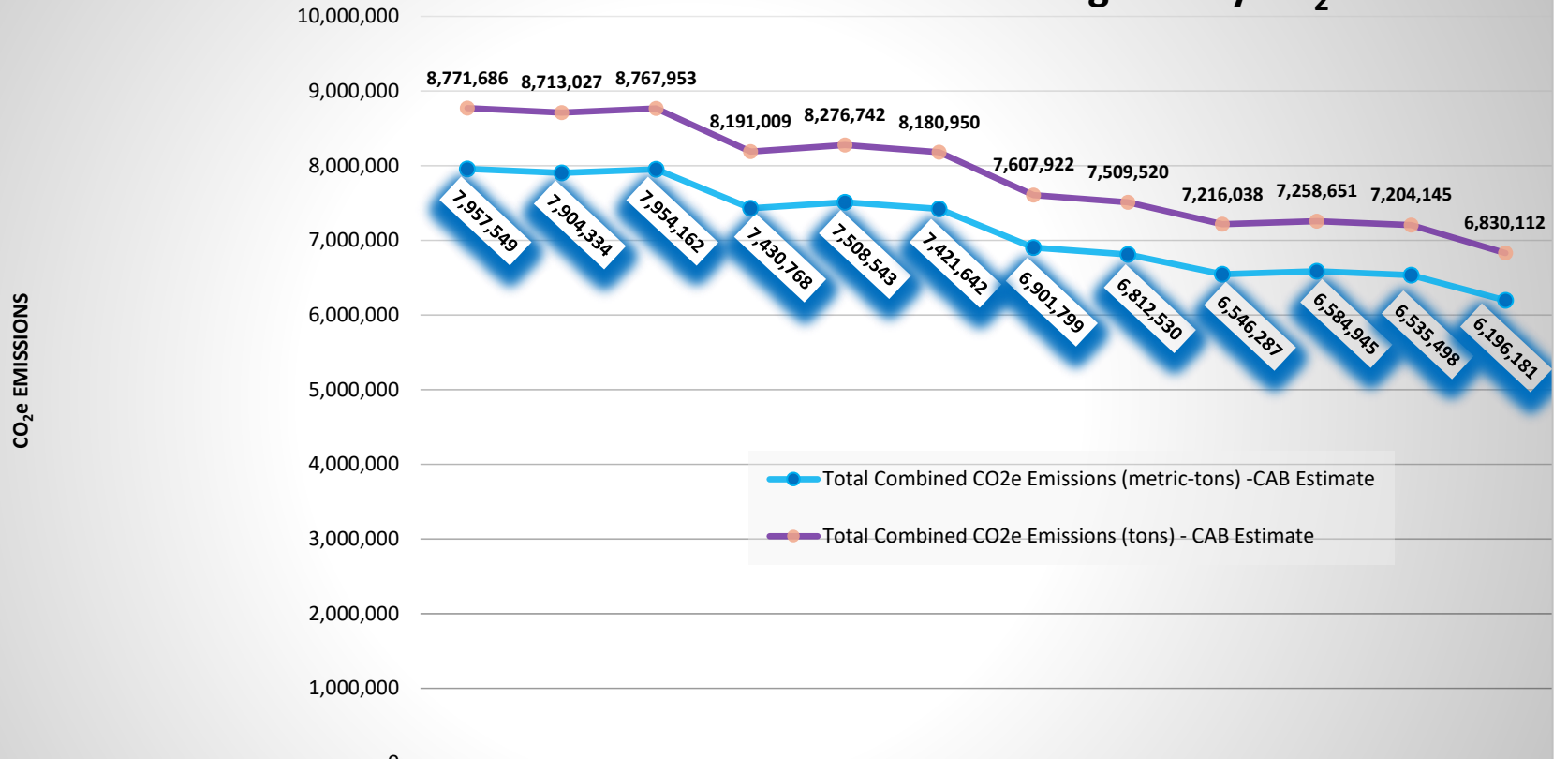


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total CO <sub>2</sub> e Emissions (metric-tons)	131,864	129,446	107,993	111,402	119,539	90,318	87,250	81,532	88,902	49,935	20,210	19,699
Total CO <sub>2</sub> e Emissions (tons)	145,355	142,689	119,042	140,170	131,769	99,559	96,177	89,873	97,998	55,044	22,277	21,714

Enclosure 3: Curves showing GHG emissions for Puna Generating Station between years 2005 and 2016. Blue curve provides emissions in metric tons with numbers that are highlighted in blue. Purple curve shows GHG emissions in short tons with numbers that are not highlighted. The GHG emissions are based on a Tier 1 calculation methodology.

Data Source: CAB estimates based on reported fuel consumption

## Total Combined Partnering Facility CO<sub>2</sub>e Emissions



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Combined CO <sub>2</sub> e Emissions (metric-tons) -CAB Estimate	7,957,549	7,904,334	7,954,162	7,430,768	7,508,543	7,421,642	6,901,799	6,812,530	6,546,287	6,584,945	6,535,498	6,196,181
Total Combined CO <sub>2</sub> e Emissions (tons) - CAB Estimate	8,771,686	8,713,027	8,767,953	8,191,009	8,276,742	8,180,950	7,607,922	7,509,520	7,216,038	7,258,651	7,204,145	6,830,112

Enclosure 4: Curves showing total combined GHG emissions from Shipman Generating Station and all partnering facilities that include three (3) IPPs and ten (10) facilities operated by the Hawaiian Electric Companies. Blue curve shows GHG emissions with numbers in metric tons that are outlined in blue. Purple curve shows GHG emissions with numbers in short tons that are not highlighted. The GHG emissions are based on a Tier 1 calculation methodology.

# **APPLICATION AND SUPPORTING INFORMATION**



**Re: Hawaiian Electric GHG ERP Draft Revision of Permit****Hamamoto, Dale**

Tue 6/9/2020 9:26 AM

**To:** Peterson, Sharon**Cc:** Madsen, Michael A; Takamoto, Clayton ; Tandi, Myrna; Kimura, Karin ; Smith, Lee

Hi Sharon,

With regards to your question, "Will the Partners have another opportunity to review the draft permit with DOH's revisions before it goes out for public comment?".

The answer to your question is yes. We are reviewing Hawaiian Electric comments and we plan to incorporate the final agreed upon changes into the draft permit modifications for all partnering facilities. Once completed, I'll be sending all the permits out for a final review.

In hindsight, I believe we need to clearly define the net generating capacity of the Puna Geothermal Venture facility that preceded its shutdown. I'll be doing further research and validation on this today.

Please let me know if you have further questions and/or comments.

Respectfully,

Dale

---

**From:** Peterson, Sharon**Sent:** Tuesday, June 9, 2020 8:59 AM**To:** Hamamoto, Dale**Cc:** Madsen, Michael A; Takamoto, Clayton; Tandi, Myrna; Kimura, Karin; Smith, Lee**Subject:** [EXTERNAL] RE: Hawaiian Electric GHG ERP Draft Revision of Permit

Hi Dale,

Hawaiian Electric circulated the draft CSP 0548-01-C you provided on May 29, 2020 to the Hawaiian Electric GHG ERP partners (Partners) for review and comment. Please see the attached documents with comments prepared by the Partners. The attached PDF includes proposed revisions to the *Calendar Year 2019* (renamed by the partners as ERP Partnership 2019 CSP Limits) and *Calendar Year 2020 and Beyond* (renamed by the partners as ERP Partnership Baseline CO2e Emissions) tables that are located in Attachment II – GHG, Section C.1. (GHG Emissions Caps) of the draft CSP. The attached Word document includes proposed revisions to Attachment II – GHG, Section C.3. (Alternate Operating Scenarios) of the draft CSP.

Will the Partners have another opportunity to review the draft permit with DOH's revisions before it goes out for public comment? Due to the number of redlines we would like a day to review for accuracy after the permit is revised.

Please let me know if you have any questions.

Thanks,

**SHARON PETERSON**

Principal Environmental Scientist, Air Quality &amp; Noise

O: 808.543.4521 | M: 808.430.6885

**Hawaiian Electric**

PO Box 2750, Honolulu, HI 96840



---

**From:** Hamamoto, Dale **Sent:** Monday, June 08, 2020 8:45 AM  
**To:** Peterson, Sharon  
**Cc:** Madsen, Michael A; Takamoto, Clayton ; Tandi, Myrna  
**Subject:** Re: Hawaiian Electric GHG ERP Draft Revision of Permit

Sharon,

OK Great!

Thanks,

Dale

---

**From:** Peterson, Sharon  
**Sent:** Monday, June 8, 2020 8:43 AM  
**To:** Hamamoto, Dale  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** [EXTERNAL] RE: Hawaiian Electric GHG ERP Draft Revision of Permit

Hi Dale,

We are waiting for final review of the comments and revised charts from the partners. We should have the comments for you tomorrow, 6/9.

Thanks,  
Sharon

---

**From:** Hamamoto, Dale  
**Sent:** Monday, June 08, 2020 8:20 AM  
**To:** Peterson, Sharon  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** Re: Hawaiian Electric GHG ERP Draft Revision of Permit

Sharon,

Please let us know how much additional time you will need.

Dale

---

**From:** Peterson, Sharon  
**Sent:** Monday, June 8, 2020 8:14 AM

**To:** Hamamoto, Dale  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** [EXTERNAL] RE: Hawaiian Electric GHG ERP Draft Revision of Permit

Hi Dale,

The draft permit was circulated to the partners for their review and comment and we are still working on the comments. I'll provide you with updates as I hear about the progress, but I think we are pretty close to having a response ready for you. I'm sorry, I thought you were aware of our need for additional time. Going forward I will communicate this with you directly.

Thanks,  
Sharon

---

**From:** Hamamoto, Dale  
**Sent:** Monday, June 08, 2020 7:35 AM  
**To:** Peterson, Sharon  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** Re: Hawaiian Electric GHG ERP Draft Revision of Permit

Hi Sharon,

Please update us on the status of Hawaiian Electric's review of DOH's re-draft to CSP 0548-01-C?

Dale

---

**From:** Peterson, Sharon  
**Sent:** Friday, May 29, 2020 3:26 PM  
**To:** Hamamoto, Dale  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** [EXTERNAL] RE: Hawaiian Electric GHG ERP Draft Revision of Permit

Hi Dale,

We've received the draft permit. We will review and get back to you with any comments by June 5, 2020.

Have a great weekend!

Thanks,  
Sharon

---

**From:** Hamamoto, Dale  
**Sent:** Friday, May 29, 2020 3:17 PM  
**To:** Peterson, Sharon  
**Cc:** Madsen, Michael A; [Takamoto, Clayton](#); [Tandi, Myrna](#)  
**Subject:** Hawaiian Electric GHG ERP Draft Revision of Permit

[This email is coming from an EXTERNAL source. Please use caution when opening attachments or links in suspicious email.]

Good Afternoon Sharon.

Hope your day has been pleasant.

In response to Hawaiian Electric's email response on May 22, 2020 and prior correspondence, the Department of Health Clean Air Branch (DOH) is sending another draft of CSP No. 0548-01-C for Hawaiian Electric's review and comment. Significant changes include the addition of alternate operating scenarios to allow for the approval of changes to the emission caps due to the shutdown and resurrection of Puna Geothermal Venture (PGV) facility and the reallocation of emission caps to the numbers that was submitted in your email response on May 22, 2020.

To expedite the process, the DOH is using the draft permit for Hawaiian Electric's Campbell Industrial Park as a template for the remaining partnering permits. The DOH requests for Hawaiian Electric's comments by April 5, 2020.

If you have any questions regarding this request, please feel free to contact me.

Very Respectfully,

Dale Hamamoto  
Environmental Engineer  
State of Hawaii, Department of Health  
Clean Air Branch  
Phone: (808) 586-4200

---

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

---

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

---

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

---

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

## ERP Partnership Baseline CO<sub>2</sub>e Emissions

Company	Covered Source	CO <sub>2</sub> e Emissions <sup>(1,2)</sup>		CSP Limits With AES Reductions <sup>(4)</sup>		
		(metric tpy)	(tpy)	CO <sub>2</sub> e Reduction (%)	CO <sub>2</sub> e Reduction (tpy)	CO <sub>2</sub> e Limit (tpy)
Hawaiian Electric (HE)	Kahe	2,518,411	2,776,073	20.6%	572,556	2,203,516
	Waiau	974,642	1,074,359	18.3%	196,309	878,050
	Honolulu	121,208	133,609	100.0%	133,609	0
	CIPGS <sup>(3)</sup>	13,559	14,946	-726.3%	-108,558	123,504
<b>HE Subtotal</b>		<b>3,627,821</b>	<b>3,998,988</b>	<b>19.9%</b>	<b>793,917</b>	<b>3,205,071</b>
Maui Electric (ME)	Kahului	209,414	230,839	33.0%	76,206	154,633
	Maalaea	562,012	619,512	25.8%	159,648	459,864
	Palaau	25,615	28,236	6.3%	1,782	26,454
<b>ME Subtotal</b>		<b>797,041</b>	<b>878,587</b>	<b>27.0%</b>	<b>237,636</b>	<b>640,951</b>
Hawai'i Electric Light (HL)	Kanoelehua-Hill	202,106	222,784	22.6%	50,328	172,456
	Keahole	173,623	191,387	-26.6%	-50,821	242,208
	Puna	90,438	99,691	68.2%	67,944	31,747
	Shipman	9,246	10,192	100.0%	10,192	0
<b>HL Subtotal</b>		<b>475,413</b>	<b>524,053</b>	<b>14.8%</b>	<b>77,642</b>	<b>446,411</b>
<b>Hawaiian Electric Companies</b>		<b>4,900,275</b>	<b>5,401,629</b>	<b>20.5%</b>	<b>1,109,195</b>	<b>4,292,433</b>
<b>AES Hawai'i</b>		<b>1,525,526</b>	<b>1,681,605</b>	16.0%	269,057	<b>1,412,548</b>
<b>Hamakua Energy Power</b>		<b>165,992</b>	<b>182,975</b>	16.0%	29,276	<b>153,699</b>
<b>Kalaeloa Partners, LP</b>		<b>993,198</b>	<b>1,094,813</b>	-6.4%	-69,764	<b>1,164,577</b>
<b>Partnership Total</b>		<b>7,584,991</b>	<b>8,361,022</b>	<b>16.00%</b>	<b>1,337,764</b>	<b>7,023,257<sup>(5)</sup></b>

**Notes:**

(1) Excludes biogenic CO<sub>2</sub> emissions per HAR §11-60.1-204(d)(6)(B).

(2) Selections of facility emissions baselines are described in the individual GHG Emission Reduction Plans for the Hawaiian Electric Companies, AES Hawai'i, Kalaeloa Partners, LP (KPLP), and Hamakua Energy Power (HEP).

(3) CIPGS (Campbell Industrial Park Generating Station) is designated as the Main CSP for the Hawaiian Electric Companies' Emissions Reduction Plan.

(4) Includes AES' voluntary reduction of 10,000 tons and 16% GHG emissions distributed to Oahu partners except AES and Honolulu.

(5) Does not include additional requested PGV allowances per HAR 11-60.1-204(h)(5).

## ERP Partnership 2019 CSP Limits

Company	Covered Source	PGV 100% Operation	With PGV allowance	
		CO <sub>2</sub> e Emissions <sup>(1,2)</sup> (tpy)	CO <sub>2</sub> e Limit Adjustment (tpy)	CO <sub>2</sub> e Limit <sup>(4)</sup> (tpy)
Hawaiian Electric (HE)	Kahe	2,133,752	0	2,133,752
	Waiau	808,286	0	808,286
	Honolulu	0	0	0
	CIPGS <sup>(3)</sup>	53,740	0	53,740
<b>HE Subtotal</b>		<b>2,995,778</b>	<b>0</b>	<b>2,995,778</b>
Maui Electric (ME)	Kahului	154,633	0	154,633
	Maalaea	459,864	0	459,864
	Palaau	26,454	0	26,454
<b>ME Subtotal</b>		<b>640,951</b>	<b>0</b>	<b>640,951</b>
Hawai'i Electric Light (HL)	Kanoelehua-Hill	172,456	17,132	189,588
	Keahole	242,208	31,213	273,421
	Puna	31,747	39,535	71,282
	Shipman	0	0	0
<b>HL Subtotal</b>		<b>446,411</b>	<b>87,880</b>	<b>534,291</b>
<b>Hawaiian Electric Companies</b>		<b>4,083,140</b>	<b>87,880</b>	<b>4,171,020</b>
<b>AES Hawai'i</b>		<b>1,691,605</b>	<b>0</b>	<b>1,691,605</b>
<b>Hamakua Energy Power</b>		<b>153,699</b>	<b>97,524</b>	<b>251,223 <sup>(6)</sup></b>
<b>Kalaeloa Partners, LP</b>		<b>1,094,813</b>	<b>0</b>	<b>1,094,813</b>
<b>Partnership Total</b>		<b>7,023,257</b>	<b>185,404</b>	<b>7,208,661 <sup>(5)</sup></b>

**Notes:**

(1) Excludes biogenic CO<sub>2</sub> emissions per HAR §11-60.1-204(d)(6)(B).

(2) Selections of facility emissions baselines are described in the individual GHG Emission Reduction Plans for the Hawaiian AES Hawai'i, Kalaeloa Partners, LP (KPLP), and Hamakua Energy Power (HEP).

(3) CIPGS (Campbell Industrial Park Generating Station) is designated as the Main CSP for the Hawaiian Electric Companies' Emissions Reduction Plan.

(4) Does not include AES' 2020 voluntary reductions of 10,000 tons and 16% GHG emissions. PGV allowance is distributed to Hawai'i Island partners, except Shipman.

(5) Includes requested PGV allowance of 185,404 tons. The GHG Partners reserve the right to request an additional allowance for delays in renewable energy projects that are beyond their reasonable control.

(6) Hamakua's position is that the emission cap must remain at this cap amount beyond 2019 until such time as PGV is able to generate and transmit power to Hawai'i Electric Light's grid at pre-eruption amount.



JUL 29 2019  
JUL 26 2019

**ANTHONY KOYAMATSU**  
Director  
Environmental Division

Hawaiian Electric  
Campbell Industrial Park

July 26, 2019

**CERTIFIED MAIL NO. 7016 2710 0000 8739 2030**  
**RETURN RECEIPT REQUESTED**

Ms. Marianne Rossio, P.E.  
Manager, Clean Air Branch  
State of Hawaii Department of Health  
2827 Waimano Home Road  
Hale Ola Building, Room 130  
Pearl City, Hawaii 96782

Dear Ms. Rossio:

**Subject: Updated Greenhouse Gas Emissions Reduction Plan  
Second Revision to Significant Modification Applications  
Covered Source Permit Nos. 0548-01-C, 0240-01-C, 0238-01-C, 0239-01-C,  
0234-01-C, 0007-01-C, 0235-01-C, 0232-01-C, 0067-01-C, and 0031-04-C  
Attachment II-GHG  
Hawaiian Electric Company, Inc.  
Hawai'i Electric Light Company, Inc.  
Maui Electric Company, Ltd.**

Hawaiian Electric Company, Inc. (Hawaiian Electric), Hawai'i Electric Light Company, Inc. (Hawai'i Electric Light), and Maui Electric Company, Ltd. (Maui Electric), collectively referred to as "Companies", hereby submits an updated Greenhouse Gas Emissions Reduction Plan (GHG ERP) and the second revision to the significant modification applications dated March 28, 2018. These revisions reflect responses received from Department of Health to comments the Companies submitted on May 15, 2019 concerning the proposed CSPs.

The Companies request that DOH modify the partnership aggregate and Hawai'i Island site-specific emissions caps for calendar year 2019, as detailed in Attachment II – GHG, Special Condition C.1.b of the CIP CSP (Permit No. 0548-01-C), and cross-referenced in each of the GHG CSPs, to reflect the loss of renewable energy from Puna Geothermal Venture (PGV), which had previously been included in the calculations in the Companies' GHG ERP.

Table 1 attached shows the proposed cap adjustment as presented in Table A-2 of the enclosed GHG ERP. The derivation of the cap addition is explained in the enclosed GHG ERP Attachment F.

Revisions were also made to item I.E of Form S-6 for all the GHG ERP partnering facilities to update the reference to the corresponding GHG ERP. Enclosed is Form S-6 for each above reference facilities which are direct replacements for the Form S-6 in the applications previously submitted to the Department of Health. No other changes are proposed with this submittal.

Ms. Marianne Rossio, P.E.  
Updated GHG ERP and Second Revision to CSP Significant Modification  
July 26, 2019  
Page 2 of 2

If you have any questions regarding this submittal, please contact Myrna Tandl at 543-4535 or myrna.tandl@hawaiianelectric.com.

Sincerely,



- Attachment: (1) Table 1: Proposed 2019 GHG Limits for PGV Outage
- Enclosures: (1) Updated Greenhouse Gas Emissions Reduction Plan dated July 26, 2019  
(2) Revised Form S-6 for Kahe, Waiau, Honolulu, CIP, Kahului, Maalaea, Palaaau, Kanoelehua-Hill, Keahole, and Puna Generating Stations
- Ec (w/Encl.): Michael Madsen, Department of Health, michael.madsen@doh.hawaii.gov
- Cc (w/Encl.): **RETURN RECEIPT REQUESTED**  
Mr. Gerardo Rios [Certified Mail No.7016 2710 0000 8739 2047]  
Chief, Permits Office, Air Division  
U.S. EPA Region 9  
75 Hawthorne Street  
Mail Code: AIR-3  
San Francisco, CA 94105





**Table 1**  
Proposed 2019 GHG Limits for PGV Outage

Company	Covered Source	PGV 100% Operation	Calendar Year 2019 GHG Limits	
		CO <sub>2</sub> e Emissions Limit (tpy)	GHG Limit Adjustment (tpy)	CO <sub>2</sub> e Emissions Limit (tpy)
HE	Kahe	2,133,752	0	2,133,752
	Waiau	808,286	0	808,286
	Honolulu	0	0	0
	CIPGS	53,740	0	53,740
HE Subtotal		2,995,778	0	2,995,778
ME	Kahului	154,633	0	154,633
	Maalaea	459,864	0	459,864
	Palaau	26,454	0	26,454
ME Subtotal		640,951	0	640,951
HE	Kanoelehua-Hill	172,456	17,132	189,588
	Keahole	242,208	31,213	273,421
	Puna	31,747	39,535	71,282
	Shipman	0	0	0
HL Subtotal		446,411	87,880	534,291
Hawaiian Electric Companies		4,083,140	87,880	4,171,020
AES Hawai'i		1,691,605	0	1,691,605
Hamakua Energy Power		153,699	97,524	251,223
Kalaeloa Partners, LP		1,094,813	0	1,094,813
Partnership Total		7,023,257	185,404	7,208,661

JUL 29 2019



**Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light**

**Certification**

*This certification applies to the July 26, 2019 update of the **Greenhouse Gas Emissions Reduction Plan for the Hawaiian Electric Companies** that is being submitted to the Department of Health in accordance with HAR 11-60.1 Subchapter 11.*

*I certify that I have knowledge of the facts set forth therein, that the same are true, accurate, and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.*

Name: Robert C. Isler  
Title: Vice President, Power Supply, Hawaiian Electric Company

Signature:  Date: 7/24/19



Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light

JUL 29 2019  
F. [unclear]  
JUL 26 2019

# **Greenhouse Gas Emissions Reduction Plan for the Hawaiian Electric Companies**

**Submitted to Hawai'i Department of Health  
in accordance with HAR 11-60.1 Subchapter 11**

**July 26, 2019 Update**



## **Table of Contents**

<b>Record of Revisions.....</b>	<b>3</b>
<b>Introduction.....</b>	<b>4</b>
<b>Hawaiian Electric GHG Reduction Partnership.....</b>	<b>5</b>
<b>2019 GHG Cap Adjustments for PGV Outage.....</b>	<b>6</b>
<b>Emission Reduction Plan Required Elements .....</b>	<b>7</b>
Facility-wide Baseline Annual Emission Rate (tpy CO <sub>2</sub> e) .....	7
2020 Facility-wide GHG Emissions Cap.....	7
Monitoring and Reporting to Demonstrate GHG Emissions Reductions.....	8
Available Control Measures.....	8
Table 1 – Evaluation of GHG Emissions Control Options .....	10
Technically Feasible Measures .....	12
Control Effectiveness and Cost Evaluation.....	12
Proposed Control Strategy .....	13
<b>Table A-1 – Baseline CO<sub>2</sub>e Emissions and Proposed 2020 CO<sub>2</sub>e Limit.....</b>	<b>A-1</b>
<b>Table A-2 – Substitute 2019 GHG Limits for PGV Outage.....</b>	<b>A-2</b>
<b>Attachment B – Carbon Capture and Storage.....</b>	<b>B-1</b>
<b>Attachment C – Natural Gas Conversion GHG Emissions Reduction .....</b>	<b>C-1</b>
<b>Attachment D – Biofuel Conversion GHG Emissions Reduction .....</b>	<b>D-1</b>
<b>Attachment E – Potential Energy Efficiency Improvements .....</b>	<b>E-1</b>
Boilers.....	E-1
Combustion Turbines.....	E-2
Diesel Electric Generators .....	E-3
Summary of Potential Energy Efficiency Improvements .....	E-4
<b>Attachment F – Derivation of PGV Equivalent GHG Emissions.....</b>	<b>F-1</b>



## Record of Revisions

Revision No.	Date	Revisions
0	06/30/2015	Original submission to DOH
1	09/08/2017	Designate Campbell Industrial Park Generating Station (CIPGS) CSP No. 0548-01-C as the Main Permit for Partnership; update facility-specific GHG caps in Table A-1 based on latest forecasts; miscellaneous text updates.
2	02/28/2018	Add AES Hawai'i, Kalaeloa Partners LP (KPLP), and Hamakua Energy Power (HEP) as partners; revise GHG Partnership section; add Monitoring explanation.
3	10/15/2018	Change KPLP baseline and cap in Table A-1 to Tier 3 basis per agreement with DOH. Updates to Table 1 and text to address DOH comments rec'd 9/21/2018.
4	05/15/2019	Changes for consistency with CSP comments. Adjust 2019 Hawai'i Electric Light, HEP, and aggregate GHG caps for loss of PGV. Table A-2 added.
5	07/26/2019	Adjust 2019 Hawai'i Electric Light, HEP, and aggregate GHG caps for loss of PGV in accordance with response to comments received from DOH. Attachment F added.



## **Introduction**

Hawaiian Electric Company, Inc. (Hawaiian Electric) and its subsidiaries, Hawai'i Electric Light Company, Inc. (Hawai'i Electric Light) and Maui Electric Company, Ltd. (Maui Electric), (collectively, "Hawaiian Electric Companies" or "Companies") support Hawai'i's goal established in Act 234 of lowering GHG emissions in the state to 1990 levels.

In accordance with Hawai'i Administrative Rules (HAR) under §11-60.1 Subchapter 11, which were adopted to implement Act 234, facilities that have the potential to emit more than 100,000 tons per year of CO<sub>2</sub>e (carbon dioxide equivalent) emissions are designated as "Affected Sources." Affected Sources are required to reduce their GHG emissions at least 16% from their 2010 baseline levels by 2020 and thereafter unless the owner or operator can substantiate that a 16% reduction is unattainable and Hawai'i Department of Health (DOH) approves a lesser reduction.<sup>1</sup> The Act 234 regulations also allow Affected Sources to partner with one another to combine their facility-wide GHG emissions caps to leverage emission reductions among partnering facilities to meet the combined GHG emissions caps.<sup>2</sup>

The Hawaiian Electric Companies operated eleven generating facilities in 2010 that each had the potential to emit more than 100,000 tons per year of CO<sub>2</sub>e and, thus, qualify as Affected Sources. Act 234 regulations require an Affected Source to prepare a GHG Emissions Reduction Plan (ERP) that is used by DOH to set the Affected Source's CO<sub>2</sub>e emissions cap. The ERP also demonstrates how that cap will be met by 2020. The Hawaiian Electric Companies have prepared this ERP to satisfy that requirement.

The Hawaiian Electric Companies acquire power from Independent Power Producers (IPPs) and from renewable energy sources (e.g., rooftop solar panels, wind farms, utility scale solar installations) that are used to meet customer demand. In the event an IPP has unplanned outages or there is reduced energy output from renewable sources (e.g., due to cloudy or rainy weather, lack of wind, etc.), the Hawaiian Electric Companies must make up for the shortfall by increasing generation from other generating sources. Historically, the shortfall has been made up by the Companies' Affected Sources, thereby increasing their GHG emissions. In the future, the commissioning of new, rapid-response generators such as the Schofield Generating Station in 2018 as well as battery energy storage systems (BESS) charged by renewable energy sources will allow shifting some of that load to facilities that have lower GHG emissions.

---

<sup>1</sup> HAR 11-60.1-204(c)

<sup>2</sup> HAR 11-60.1-204(d)(6)(A)



**Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light**

## **GHG Reduction Partnership**

This section explains the partnership approach used by the Hawaiian Electric Companies and its Partners in preparing their GHG ERPs.

The power generation facilities operating on each of Hawai'i's islands are highly interdependent. If one or more of them cannot produce their scheduled power output, the other facilities on the island must generate more power than planned to make up for the shortfall. A scheduled or unscheduled outage that takes a major generating unit offline for an extended period can significantly shift GHG emissions from one facility to another. Assigning firm GHG emissions caps to individual facilities does not provide sufficient flexibility to accommodate those types of system upsets that are a natural part of system operation.

For these reasons, the Hawaiian Electric Companies and three major Independent Power Producers (IPPs) have elected to use the partnering provisions in Act 234 Regulations<sup>3</sup> to create a Partnership involving all eleven of the Hawaiian Electric Companies' Affected Sources, the Hamakua Energy Power (HEP) facility, the AES Hawai'i facility, and the Kalaeloa Partners LP (KPLP) facility (collectively "Partnership Facilities" or "Partnership"). The Partnership has an overall GHG emissions cap that it commits to attain. Individual partnering facilities have site-specific GHG emissions reduction goals that are used to apportion penalties that may be assessed in the event the overall GHG emissions cap is exceeded. The DOH will include the site-specific goals as GHG emissions caps, along with implementing conditions, in each site's Covered Source Permit (CSP). Owing to the operating flexibility that partnering in this manner affords, the Partnership Facilities can commit to an aggregate 16% reduction of GHG emissions from their respective baselines for their facilities. The site-specific and overall GHG emissions reduction targets for the Partnership Facilities are listed in Tables A-1 and A-2 of Attachment A. The two tables present alternative operating scenarios with and without Puna Geothermal Venture (PGV) operating, as explained further in the next section. The Power Supply Improvement Plan (PSIP) for the Hawaiian Electric Companies that was approved by the Hawai'i Public Utilities Commission (PUC) on July 14, 2017<sup>4</sup> is the blueprint for how that reduction will be accomplished.

The Hawaiian Electric Companies, HEP, AES Hawai'i, and KPLP are submitting separate ERPs for their facilities. The ERPs share the same GHG emissions reduction goals provided in Table A-1 and A-2, but the individual plans explain the GHG baselines, monitoring, and other plan requirements specific to each partner.

---

<sup>3</sup> HAR 11-60.1-204(d)(6)(A).

<sup>4</sup> *Hawaiian Electric Companies' PSIP Update Report*, PUC Docket 2014-0183. December 23, 2016.



## **2019 GHG Cap Adjustments for PGV Outage**

PGV was forced to stop generating energy in early 2018 by volcanic activity, removing a substantial amount of renewable energy from the system and significantly increasing GHG emissions from the Hawai'i Electric Light and HEP units that have to offset that lost capacity. In 2017 PGV accounted for 33% of total energy generation on Hawai'i Island and is the largest single renewable energy generator in the State. PGV plans to return to operation but the timing is uncertain because of the significant infrastructure damage that occurred. PGV is not expected to return to operation until at least 2020. Loss of PGV qualifies as a reason for DOH to revise the GHG cap under HAR §11-60.1-204(4): "Renewable energy producers cease operations or fail to meet contractual obligations with the affected source, and there are no reasonable alternatives." There are no renewable alternatives to make up for 38 Megawatts (MW) of firm PGV capacity.

PGV's energy generation is equivalent to 185,404 tons of GHG emissions from the Hawai'i Electric Light and HEP fossil fuel units that must operate more to replace it, as detailed in Attachment F. That was calculated by comparing actual emissions in 2017, the last full year PGV operated, with the 12 months from July 2018 to June 2019 when PGV was offline. Table A-2 in Attachment A assigns those emissions to other generating units in proportion to their July 2018 to June 2019 operation. The Hawaiian Electric Companies propose that the caps in Table A-2 only apply for calendar year 2019 while more renewable energy is integrated into the system. For all succeeding years the caps in Table A-1 will apply.

It should be noted that the Companies have experienced delays beyond their direct control involving several new renewable energy projects anticipated in the PSIP that were counted on to lower GHG emissions. The Companies are not seeking an adjustment for these delays, but they have the effect of increasing GHG emissions more than 100,000 tons above what was expected in the earlier ERPs submitted to DOH.

Even with this cap adjustment the Partnering Facilities commit to doing what they can to hold emissions below the Table A-1 limits in 2019. That may include altering unit dispatch priorities to reduce GHG emissions to the extent practicable although large reductions cannot be expected by that means. Since changing dispatch order may be contrary to minimizing customer costs, some level of PUC approval may be required.





## Emission Reduction Plan Required Elements

Hawai'i Administrative Rule (HAR) §11-60.1-204(d) states the GHG Emissions Reduction Plan required of Affected Sources shall at a minimum include the following elements:

- (1) **Facility-wide Baseline Annual Emission Rate (tpy CO<sub>2</sub>e).** *Calendar year 2010 annual emissions shall be used as the baseline emissions to calculate the required facility-wide GHG emissions cap, unless another baseline year or period is approved by the director. Baseline emissions shall be determined in accordance with section 11-60.1-115, separated between biogenic and non-biogenic emissions, and exclude all emissions of noncompliance with an applicable requirement or permit limit. The owner or operator shall include the data and calculations used to determine the baseline emissions. If calendar year 2010 is deemed unrepresentative of normal operations, then the owner or operator may propose an alternate baseline annual emission rate...<sup>5</sup>*

Attachment A, Table A-1 lists the baseline GHG emissions for the Partnership Facilities. The Hawaiian Electric Companies' facilities all use 2010 calendar year emissions as their baselines. GHG emissions were calculated using the procedures specified in EPA's Mandatory GHG Reporting Rule (40 CFR Part 98, Subpart C). The Kahe, Waiiau, and Honolulu facilities used Tier 3 level calculations specified in §98.33 and the other facilities used Tier 2 level calculations. All baselines shown in Table A-1 for the Hawaiian Electric Companies' facilities are as reported via EPA's e-GGRT system for 2010 except for Campbell Industrial Park Generating Station (CIPGS) and Shipman. For calendar year 2010 CIPGS and Shipman GHG emissions were lower than the 25,000 metric ton reporting threshold under Part 98 so GHG emissions reporting was not required.

- (2) **2020 Facility-wide GHG Emissions Caps.** *Determine the facility-wide GHG emissions cap in accordance with subsection (c), using calendar year 2010 or the proposed GHG baseline emission rate determined by paragraph (1) above. If the required emissions cap requiring a sixteen percent (16%) emission reduction from baseline year emissions is deemed unattainable, the owner or operator shall provide [a justification and proposal for an alternative cap]...*

*In determining whether or not the required GHG emissions cap is attainable, the owner or operator of an affected source shall first conduct the GHG control assessment described in paragraphs (3) to (5). Available EPA*

---

<sup>5</sup> HAR 60.1-204(d)(1)



*guidelines for GHG Best Available Control Technology analysis and GHG control measures by source type shall be used as applicable for this assessment.*<sup>6</sup>

Attachment A, Tables A-1 and A-2 list the overall and facility-specific GHG emissions caps the Partnership Facilities commit to achieving by 2020 to comply with the Rule with all their Affected Sources grouped into one Partnership. The overall GHG emissions cap in Table A-1 reflects a 16% reduction in GHG from their GHG emissions baselines.

Table A-1 shows that the overall GHG emissions reduction target for the Hawaiian Electric Companies is 24.4%, which exceeds the overall 16% GHG emissions reduction for the Partnering Facilities because IPPs will continue to be preferentially dispatched for contractual reasons and because they are the lowest-cost power producers. Most of the generation displaced by renewable energy will come from reduced operation of Hawaiian Electric's Affected Sources.

One of the important benefits of the Partnership for customers is that it allows the GHG emissions reduction goal of Act 234 to be met while maintaining the lowest energy cost to customers.

### **Monitoring and Reporting to Demonstrate GHG Emissions Reductions**

The Hawaiian Electric Companies' facilities will use the same procedures used to establish their GHG baseline emissions, as described in paragraph (1), to calculate their annual GHG emissions and demonstrate the Partnership's compliance with the GHG emissions reduction requirement. GHG emissions for each facility will be reported annually on EPA's e-GGRT system and semi-annually to the DOH.

The Hawaiian Electric Companies' facilities use the GHG emissions calculation procedures specified in 40 CFR Part 98, Subpart C. They are not required to use Continuous Emissions Monitoring Systems (CEMS) for GHG emissions monitoring and do not have all the necessary instrumentation to be able to do so.

- (3) **Available Control Measures.** *Identify all available control measures with potential application for each source type, and all on-the-book control measures the facility is committed or will be required to implement affecting GHG emissions. At a minimum, the following shall be considered as applicable:*
- (A) *Available technologies for direct GHG capture and control;*
  - (B) *Fuel switching or co-fired fuels;*
  - (C) *Energy efficiency upgrades;*

---

<sup>6</sup> HAR 60.1-204(d)(2)



**Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light**

- (D) *Combustion or operational improvements;*
- (E) *Restrictive operations;*
- (F) *Planned upgrades, overhaul, or retirement of equipment;*
- (G) *Outstanding regulatory mandates, emission standards, and binding agreements; and*
- (H) *Other GHG reduction initiatives that may affect the facility's GHG emissions. Unless the owner or operator of the source has direct ownership or legal control over a GHG reduction initiative, that initiative cannot be relied upon as a proposed control strategy. Identification of GHG reduction initiatives, whether or not the owner or operator has ownership or legal control, will serve to highlight their potential importance for reducing GHG emissions in the state. The owner or operator of an affected source will only benefit from a GHG initiative if the initiative reduces or helps to reduce and maintain the source's GHG emissions below its permitted facility-wide GHG emissions cap.<sup>7</sup>*

Table 1 lists the potential GHG emissions control options cited above and their feasibility for the Hawaiian Electric Companies. ERP Attachments referenced in Table 1 further describe the GHG emissions control options and discuss their feasibility and costs.

---

<sup>7</sup> HAR 11-60.1-204(d)(3)



**TABLE 1 - EVALUATION OF GHG EMISSIONS CONTROL OPTIONS**

<b>GHG Control Option</b>	<b>Feasibility and Benefit</b>
(A) Carbon Capture and Storage (CCS)	Not Economically Viable - See Attachment B for details.
(B) Fuel switching or co-firing fuels (Natural Gas)	Not Feasible – The Hawaiian Electric Companies explored importing liquefied natural gas. However, the PUC rejected that option as part of its decision to deny the merger of the Hawaiian Electric Companies with NextEra. See Attachment C for details about the potential GHG emissions benefits.
(C) Fuel switching or co-firing fuels (Biofuels)	Not Feasible to do on a large scale – The Hawaiian Electric Companies are currently permitted and are burning limited quantities of biodiesel. Attachment D contains a discussion of the availability and cost of biodiesel.
(D) Energy efficiency upgrades and combustion improvements	Attachment E summarizes the Hawaiian Electric Companies' evaluation of energy efficiency improvements available to their power generating units. No economically viable improvements were identified that would contribute significantly towards reducing GHG emissions.
(E) Restrictive operations	If one of the generating facilities in the Hawaiian Electric Companies' electrical grids restricts operation to limit its GHG emissions, other facilities must operate more to meet customer demand so the result is that emissions are redistributed rather than reduced or eliminated. The Partnership concept provides flexibility for lower GHG emitting facilities to operate more to lower overall GHG emissions and Hawaiian Electric intends to do this as much as possible within system and economic constraints. However, the GHG emissions reductions available through this route are limited because the more efficient units (e.g., combined cycle combustion turbines) already operate preferentially because they tend to be lower cost generators.



**Hawaiian Electric  
Maui Electric  
Hawaii'i Electric Light**

As new renewable energy projects come online, the operation of existing fossil-fueled units can be reduced or ceased. The Hawaiian Electric Companies have deactivated or retired the following fossil-fuel units since the 2010 baseline year:

- (F) Planned upgrades, overhaul, or retirement of equipment
- Shipman S3 and S4. Permanently decommissioned and CSP closed December 31, 2015.
  - Honolulu H8 and H9. Deactivated January 2014.

Hawaii'i set a 100 percent Renewable Portfolio Standard (RPS) for electrical generation by 2045. The Hawaiian Electric Companies' December 2016 Power Supply Improvement Plan (PSIP) describes how the Companies intend to accomplish that goal.

(G) Outstanding regulatory mandates, emission standards, and binding agreements

EPA proposed the Affordable Clean Energy (ACE) Rule on August 31, 2018. It is not clear yet whether it will apply to the Hawaiian Electric Companies' oil-fired generating units. The emphasis of ACE Rule is to improve the efficiency of existing generators through measures to be adopted by the states.

The Hawaiian Electric Companies' main strategy for lowering GHG emissions is to continue replacing fossil-fueled generation with utility-scale and distributed (e.g., rooftop solar) renewable energy sources.

Other GHG emissions reduction initiatives:

The December 2016 PSIP includes additional utility scale RE coming online between 2017 and 2019:

Renewable Energy (RE) Projects:

- (H) Wind, Solar, and Battery Energy Storage Systems (BESS)
- Deployment of new flexible, rapid response generation to enable more integration of renewable energy sources.
  - Hawaiian Electric - 206.2 MW of new utility scale RE + 70MW BESS
  - Maui Electric - 8.74 MW of new RE + 9MW BESS
  - Hawaii'i Electric Light - 3 MW of new RE.

The December 2016 PSIP also describes new firm generation projects that provide the rapid response capability needed to work with the varying output from renewables. One of these is the Schofield Generating Station that came online in 2018.



- (4) **Technically Feasible Measures.** *For any new control measure identified for the facility, eliminate all technically infeasible options based on physical, chemical, or engineering principles that would preclude the successful operation of the control with the applicable emission unit or source. Document the basis of elimination, and generate the list of technically feasible control options for further evaluation. All committed and required on-the-book measures shall remain on the list.<sup>8</sup>*

As noted above, Table 1 lists the potential GHG emissions control options and their feasibility. Attachments referenced in Table 1 further describe the GHG emissions control options and discuss their feasibility and costs.

- (5) **Control Effectiveness and Cost Evaluation.** *List the technically feasible control options and identify the following for each control measure as applicable. All cost data shall be provided in present dollars.*
- (A) *Control effectiveness (percent pollutant removed);*
  - (B) *Expected emission rate (tons per year CO<sub>2</sub>e, pounds CO<sub>2</sub>e/kilowatt-hour);*
  - (C) *Expected emission reduction (tons per year CO<sub>2</sub>e);*
  - (D) *Energy impacts (BTU, kilowatt-hour);*
  - (E) *Environmental impacts (other media and the emissions of other regulated air pollutants);*
  - (F) *Any secondary emissions or impacts resulting from the production or acquisition of the control measure; and*
  - (G) *Economic impact (cost effectiveness: annualized control cost, dollar/megawatt-hr, dollar/ton CO<sub>2</sub>e removed, and incremental cost effectiveness between the control and status quo).*

*For committed or required on-the-books control measures and any other GHG control initiatives, identify at a minimum, items (A) through (C) above. Considering the energy, environmental, and economic impact, determine the GHG control or suite of controls found to be feasible in achieving the maximum degree of GHG reductions for the facility. Determine whether the required GHG emissions cap, pursuant to subsection (c) will be met. If an alternate cap must be proposed for approval, declare the proposed percentage GHG reduction and the alternate GHG reduction cap. Provide the justification and associated support information (e.g., references,*

---

<sup>8</sup> HAR 11-60.1-204(d)(4)



*assumptions, vendor quotes, sample calculations, etc.) to substantiate the control analysis and alternate GHG emissions cap.<sup>9</sup>*

As noted above, Table 1 lists the potential GHG emissions control options and their feasibility. Attachments referenced in Table 1 further describe the GHG emissions control options and discuss their feasibility and costs.

- (6) **Proposed Control Strategy.** *Present the listing of control measures to be used for implementation in meeting the required or proposed alternate 2020 facility-wide GHG emissions cap. Include discussion of the control effectiveness, control implementation schedule, and the overall expected GHG CO<sub>2</sub>e emission reductions (tpy) for the entire facility. Owners or operators shall also consider the following:*
- (A) *Affected sources may propose to combine their facility-wide GHG emissions caps to leverage emission reductions among partnering facilities in meeting the combined GHG emissions caps. If approved by the director, each partnering facility will be responsible for complying with its own adjusted GHG facility-wide emissions cap.*
  - (B) *Except for fee assessments and determining applicability to this section, biogenic CO<sub>2</sub> emissions will not be included when determining compliance with the facility-wide emissions cap until further guidance can be provided by EPA, or the director, through rulemaking.*
  - (C) *The approved facility-wide GHG emissions cap and the associated monitoring, recordkeeping, and reporting provisions will be made a part of the covered source permit, enforceable by the director.<sup>10</sup>*

The Hawaiian Electric Companies will collectively reduce their GHG emissions 16% from the 2010 baseline year, generally in accordance with the power generation forecasts described in their PSIP that was submitted in December 2016 and accepted by the PUC on July 14, 2017.<sup>11</sup> Although the PSIPs are not enforceable under Chapter 342B, HRS, Air Pollution Control, they do carry the weight of oversight by the PUC and public expectations.

The Hawaiian Electric Companies' GHG emissions reductions will result directly from increased state-wide reliance on renewable energy sources as detailed in the PSIP. The Hawaiian Electric Companies have consistently met, and exceeded, the Renewable Portfolio Standards (RPS) agreed to as part of the Hawai'i Clean Energy Initiative (HCEI). For instance, in 2015 23.2% of the Companies' overall power

---

<sup>9</sup> HAR 11-60.1-204(d)(5)

<sup>10</sup> HAR 11-60.1-204(d)(6)

<sup>11</sup> Public Utilities Commission of the State of Hawai'i Decision and Order No. 34696. July 14, 2017.



**Hawaiian Electric  
Maui Electric  
Hawai'i Electric Light**

generation was from renewable sources,<sup>12</sup> well ahead of the RPS goal of 15% by 2015.<sup>13</sup> In 2017, 26.8% of the Companies' power generation was from renewable sources. The RPS goals have increased due to House Bill 623, signed into law by Governor David Ige on June 5, 2015, which establishes a new RPS goal of 100% renewables by 2045. In 2017, the GHG emissions from the combined Hawaiian Electric Companies were 20.0% lower than the 2010 baseline year. Continued progress towards the RPS and PSIP goals will assist GHG emissions from power generation to decline further.

As explained in Table 1 and the supporting attachments, the Hawaiian Electric Companies' evaluation of potential GHG emissions control measures identified no additional measures that are technically feasible and cost effective. Accordingly, the Companies do not propose to implement any GHG emissions controls.

As described earlier, the Hawaiian Electric Companies' eleven affected facilities are partnering with three IPPs to meet the GHG emissions reduction target. Table A-1 lists the overall GHG annual emissions limit for the Partnership Facilities along with site-specific GHG emissions limits for each of the Partnering Facilities.

The Hawaiian Electric Companies have designated Campbell Industrial Park Generating Station (CIPGS) as the Main Permit for their affected facilities. The CIPGS CSP will list the Total Partnership GHG emissions cap and the site-specific emissions caps for the Hawaiian Electric Companies' other facilities. The CSPs for the Hawaiian Electric Companies' other facilities will reference the CIPGS CSP for GHG emissions limits.

---

<sup>12</sup> 2017-2018 Corporate Sustainability Report. Hawaiian Electric Companies. Page 4.

<sup>13</sup> HRS §269-92(2). It should be noted that the RPS allows affiliated electrical utilities to aggregate their renewable portfolios. HRS §269-93. Accordingly, all GHG emissions reductions referenced in this section represent the aggregate renewable portfolios for Hawaiian Electric, Hawai'i Electric Light, and Maui Electric.



**Table A-1: ERP Partnership Baseline CO<sub>2</sub>e Emissions and Proposed CSP Limits (1)**

Company	Covered Source	Baseline		CSP Limits			CO <sub>2</sub> e Limit (tpy)
		CO <sub>2</sub> e Emissions (metric tpy)	(tpy)	CO <sub>2</sub> e Reduction (%)	CO <sub>2</sub> e Reduction (tpy)		
Hawaiian Electric (HE)	Kahe	2,518,411	2,776,073	23.1%	642,321	2,133,752	
	Waiau	974,642	1,074,359	24.8%	266,074	808,286	
	Honolulu	121,208	133,609	100.0%	133,609	0	
	CIPGS	13,559	14,946	-259.6%	-38,794	53,740	
<b>HESubtotal</b>		<b>3,627,821</b>	<b>3,998,988</b>	<b>25.1%</b>	<b>1,003,210</b>	<b>2,995,778</b>	
Maui Electric (ME)	Kahului	209,414	230,839	33.0%	76,206	154,633	
	Maalaea	562,012	619,512	25.8%	159,649	459,864	
	Palaau	25,615	28,236	6.3%	1,782	26,454	
<b>ME Subtotal</b>		<b>797,041</b>	<b>878,587</b>	<b>27.0%</b>	<b>237,636</b>	<b>640,951</b>	
Hawai'i Electric Light (HEL)	Kanoelehua-Hill	202,106	222,784	22.6%	50,328	172,456	
	Keahole	173,623	191,387	-26.6%	-50,821	242,208	
	Puna	90,438	99,691	68.2%	67,944	31,747	
	Shipman	9,246	10,192	100.0%	10,192	0	
<b>HEL Subtotal</b>		<b>475,413</b>	<b>524,053</b>	<b>14.8%</b>	<b>77,642</b>	<b>446,411</b>	
<b>Hawaiian Electric Companies</b>		<b>4,900,275</b>	<b>5,401,629</b>	<b>24.4%</b>	<b>1,318,488</b>	<b>4,083,141</b>	
<b>AES Hawai'i</b>		<b>1,525,526</b>	<b>1,681,605</b>	<b>-0.6%</b>	<b>-10,000</b>	<b>1,691,605</b>	
<b>Hamakua Energy Power</b>		<b>165,992</b>	<b>182,975</b>	<b>16.0%</b>	<b>29,276</b>	<b>153,699</b>	
<b>Kalaeloa Partners, LP</b>		<b>993,198</b>	<b>1,094,813</b>	<b>0.0%</b>	<b>0</b>	<b>1,094,813</b>	
<b>Partnership Total</b>		<b>7,584,991</b>	<b>8,361,022</b>	<b>16.00%</b>	<b>1,337,764</b>	<b>7,023,258</b>	

**Notes:**

- (1) Table A-2 applies for calendar year 2019 only due to loss of PGV renewable energy.
- (2) Selections of facility emissions baselines are described in the individual GHG Emission Reduction Plans for the Hawaiian Electric Companies, AES Hawai'i, Kalaeloa Partners, LP (KPLP), and Hamakua Energy Power (HEP).
- (3) CIPGS (Campbell Industrial Park Generating Station) is designated as the Main CSP for the Hawaiian Electric Companies' Emissions Reduction Plan.

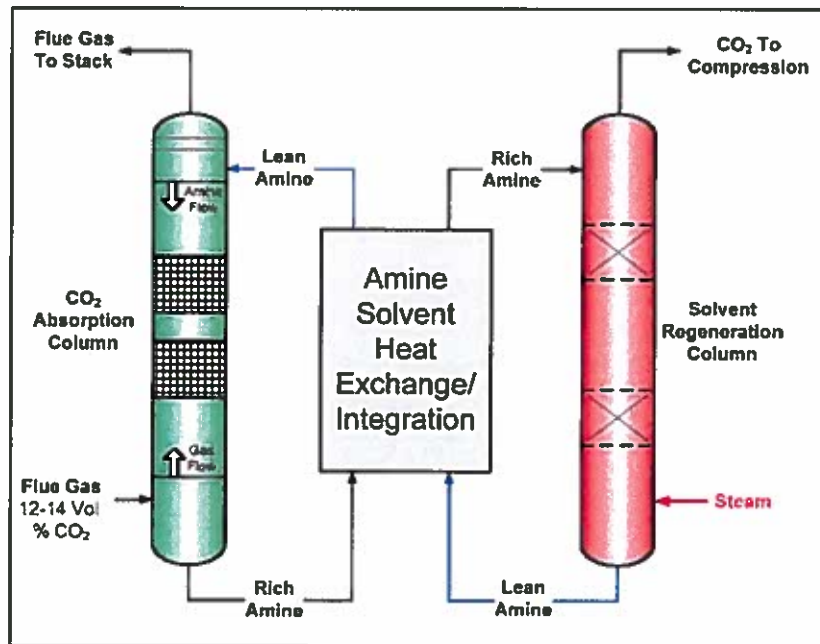
**Table A-2: Substitute 2019 GHG Limits for PGV Outage**

Company	Covered Source	PGV 100% Operation		Calendar Year 2019 GHG Limits	
		CO2e Emissions Limit (tpy)	GHG Limit Adjustment (tpy)	CO2e Emissions Limit (tpy)	CO2e Emissions Limit
HECO	Kahe	2,133,752	0	2,133,752	
	Waiau	808,286	0	808,286	
	Honolulu	0	0	0	
	CIPGS	53,740	0	53,740	
<b>HE Subtotal</b>		<b>2,995,778</b>	<b>0</b>	<b>2,995,778</b>	
MECO	Kahului	154,633	0	154,633	
	Maalaea	459,864	0	459,864	
	Palaa	26,454	0	26,454	
	<b>ME Subtotal</b>		<b>640,951</b>	<b>0</b>	<b>640,951</b>
HELCO	Kanolehua-Hill	172,456	17,132	189,588	
	Keahole	242,208	31,213	273,421	
	Puna	31,747	39,535	71,282	
	Shipman	0	0	0	
<b>HEL Subtotal</b>		<b>446,411</b>	<b>87,880</b>	<b>534,291</b>	
<b>Hawaiian Electric Companies</b>		<b>4,083,140</b>	<b>87,880</b>	<b>4,171,020</b>	
<b>AES Hawai'i</b>		<b>1,691,605</b>	<b>0</b>	<b>1,691,605</b>	
<b>Hamakua Energy Power</b>		<b>153,699</b>	<b>97,524</b>	<b>251,223</b>	
<b>Kalaeloa Partners, LP</b>		<b>1,094,813</b>	<b>0</b>	<b>1,094,813</b>	
<b>Partnership Total</b>		<b>7,023,257</b>	<b>185,404</b>	<b>7,208,661</b>	

## Carbon Capture and Storage

Carbon Capture and Storage (CCS) is composed of two major functions; CO<sub>2</sub> capture and CO<sub>2</sub> storage. A number of methods may potentially be used for separating the CO<sub>2</sub> from the exhaust gas stream, including adsorption, physical absorption, chemical absorption, cryogenic separation, and membrane separation (Wang et al., 2011). Many of these methods are either still in development or not suitable for treating power plant flue gas due to the characteristics of the exhaust stream (Wang, 2011; IPCC, 2005). Of the potentially applicable post-combustion CO<sub>2</sub> capture options, the use of an amine solvent such as monoethanolamine (MEA) is the most mature and well-documented technology (Kvamsdal et al., 2011). Figure B-1 illustrates the amine-based post-combustion capture process.

**FIGURE B-1 SCHEMATIC DIAGRAM OF AMINE-BASED CO<sub>2</sub> CAPTURE PROCESS**



Source: Interagency Task Force on Carbon Capture and Storage, 2010

EPA generally considers post-combustion CO<sub>2</sub> capture with an amine solvent to be technically feasible for natural gas fired combined cycle combustion turbines and coal fired power plants. However, this technology has not been demonstrated on simple cycle combustion turbines and reciprocating engines. Part of the reason is that the flue gas temperature from simple cycle turbines and reciprocating engines is much higher than from combined cycle turbines and boilers so the gases have to be cooled prior to scrubbing going to the CO<sub>2</sub> absorption column. While still feasible, that adds cost and makes it less economically practical. A more fundamental difficulty with using amine absorption for combustion turbines of either type as well as reciprocating engines is that the CO<sub>2</sub> concentration in the flue gas is

## Attachment B – Carbon Capture and Storage

lower than 6 percent. That concentration is much lower than other types of power plants, such as coal fired power plants, where the CO<sub>2</sub> concentration may be as high as 12-15 percent by volume in the post combustion flue gas stream. As a result, the amine system equipment has to be more than twice as large for the same amount of CO<sub>2</sub> captured. That greatly increases the treatment cost. Although significant challenges exist, CCS cost estimates are provided in Tables B-1 and B-2. The data in the tables do not reflect the higher cost associated with treating low-CO<sub>2</sub> concentration flue gases from combustion turbines and reciprocating engines.

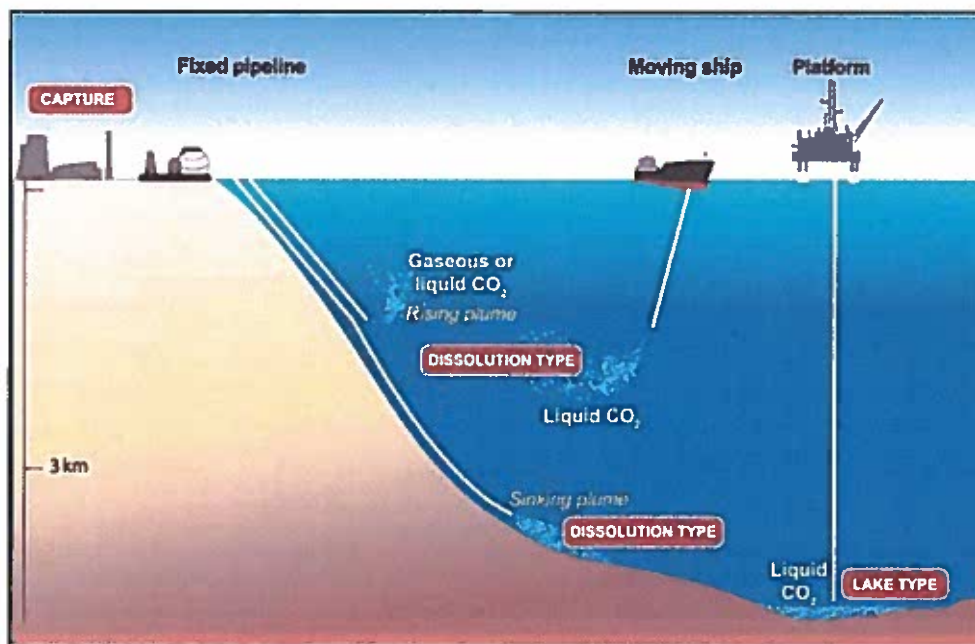
Hawai'i's remote location imposes many additional challenges implementing CO<sub>2</sub> storage that are not present for continental U.S. sources. Hawaiian Electric is not aware of any proven CO<sub>2</sub> geological storage sites on Hawai'i. Therefore, ocean storage, i.e., direct CO<sub>2</sub> release into the ocean water column or onto the deep seafloor, appears to be the most readily available CO<sub>2</sub> storage option.

As shown in Figure B-2, CO<sub>2</sub> ocean storage potentially could be implemented in two ways:

- By injecting and dissolving CO<sub>2</sub> into the water column (typically below 1,000 meters) via a fixed pipeline or a moving ship, or
- By depositing CO<sub>2</sub> via a fixed pipeline or an offshore platform onto the sea floor at depths below 3,000 m, where CO<sub>2</sub> is denser than water and is expected to form a "lake" that would delay dissolution of CO<sub>2</sub> into the surrounding environment.

Ocean storage and its ecological impacts are still in the research phase and the legal status of intentional ocean storage is unknown (Herzog, 2010; IPCC, 2005; Purdy, 2006).

**FIGURE B-2 OVERVIEW OF OCEAN STORAGE CONCEPTS**



Source: IPCC, 2005

## Attachment B – Carbon Capture and Storage

The first step to costing CCS is calculating CO<sub>2</sub> emission rates. CO<sub>2</sub> emissions from power generation are a function of fuel type and the heat rate of the generating unit. Due to the large number of generating units and the various current and future fuel types, the costing is based on typical generating unit configurations.

Table B-1 lists the estimated total annual cost on a \$/million Btu (MBtu) basis to add CCS based on fuel type. The estimate includes the amine absorber system cost, the onshore CO<sub>2</sub> storage cost, and the ocean injection cost. The total annual estimated cost ranges from \$5.64 to \$7.99 per MBtu of heat input.

As noted earlier, due to the absence of suitable subterranean formations, geological storage does not appear to be a viable option in Hawai'i. Even if available, using geological storage instead of ocean storage would not lower the cost. The listed estimated total ocean CO<sub>2</sub> storage cost of \$13.80 per ton (\$2.00 + \$4.81 + \$6.99 = \$13.80) is actually lower than the estimated total cost for geological storage (\$8.53 to \$19.51 per ton)<sup>14</sup>.

Table B-2 lists the estimated total annual cost for CCS on a \$/kW basis for various fuel and generating unit types. These costs range from 7¢ to 10¢ per kWh based on maximum operation. These costs would be higher based on actual operating levels. That means that power cost to customers would have to increase 25% or more from 2016 rates, depending on location, to pay for CCS.

---

<sup>14</sup> Table 9 of the National Energy Technology Laboratory report "Quality Guidelines for Energy System Studies: Estimating Carbon Dioxide Transport and Storage Costs" (DOE/NETL-2013/1614), dated March 14, 2013.

## Attachment B – Carbon Capture and Storage

### TABLE B-1 ESTIMATED TOTAL ANNUAL CCS COST (\$/MBTU)

Carbon Capture and Storage (CCS) Component	Cost (\$/ton CO <sub>2</sub> Captured)	CO <sub>2</sub> Emissions <sup>1</sup> (lb/MMBtu)	% Captured <sup>2</sup>	CO <sub>2</sub> Emissions Captured (lb/MMBtu)	Total Annual Cost (\$/MMBtu)
<b>No. 6 Fuel Oil</b>					
CO <sub>2</sub> Capture and Compression <sup>3</sup>	93.44				\$6.96
Onshore CO <sub>2</sub> Storage <sup>4</sup>	2.00	165.6	90%	149	\$0.15
Ship transport to injection ship <sup>4</sup>	4.81				\$0.36
Injection ship, pipe and nozzle <sup>4</sup>	6.99				\$0.52
<b>Total Cost (Biodiesel)</b>	<b>107.24</b>				<b>\$7.99</b>
<b>No. 2 Fuel Oil</b>					
CO <sub>2</sub> Capture and Compression <sup>3</sup>	93.44				\$6.87
Onshore CO <sub>2</sub> Storage <sup>4</sup>	2.00	163.1	90%	147	\$0.15
Ship transport to injection ship <sup>4</sup>	4.81				\$0.35
Injection ship, pipe and nozzle <sup>4</sup>	6.99				\$0.51
<b>Total Cost (Diesel)</b>	<b>107.24</b>				<b>\$7.88</b>
<b>Natural Gas</b>					
CO <sub>2</sub> Capture and Compression <sup>3</sup>	93.44				\$4.91
Onshore CO <sub>2</sub> Storage <sup>4</sup>	2.00	117.0	90%	105	\$0.11
Ship transport to injection ship <sup>4</sup>	4.81				\$0.25
Injection ship, pipe and nozzle <sup>4</sup>	6.99				\$0.37
<b>Total Cost (Natural Gas)</b>	<b>107.24</b>				<b>\$5.64</b>

**Notes:**

1. Emission factors from the Mandatory Greenhouse Gas Reporting rule (40 CFR Part 98 Subpart C, Table C-1).
2. Typical value for amine absorber systems (Interagency Task Force on Carbon Capture and Storage, 2010; NETL, 2013).
3. The CO<sub>2</sub> capture and compression cost is based on information presented in Figure III-1 of the Report of the Interagency Task Force on CCS, dated August 2010. The listed dollar per ton of CO<sub>2</sub> captured is the cost of applying post-combustion CCS to an existing natural gas fired combined cycle power plant. The listed cost (\$103 per metric ton or \$93.44 per ton) is based on continuous operation (8,760 hrs per unit per year at base load for each fuel type).
4. Costs are from Table 6.6 of the IPCC Special Report on Carbon Dioxide Capture and Storage, dated 2005.

## Attachment B – Carbon Capture and Storage

**TABLE B-2 ESTIMATED TOTAL ANNUAL CCS COST (\$/KWH)**

Unit Type	Typical Heat Rate (Btu/kWh)	Fuel Type	Total Annual Cost (\$/MMBtu)	CO <sub>2</sub> Removal Cost (\$/kWh)
Boiler	12,000	No. 6 Fuel Oil	\$7.99	0.10
		No. 2 Fuel Oil	\$7.88	0.09
		Natural Gas	\$5.64	0.07
Simple Cycle Combustion Turbine	9,500	No. 2 Fuel Oil	\$7.88	0.09
		Natural Gas	\$5.64	0.07
Combined Cycle Combustion Turbine	7,500	No. 2 Fuel Oil	\$7.88	0.09
		Natural Gas	\$5.64	0.07
Reciprocating Engine	8,000	No. 2 Fuel Oil	\$7.88	0.09
		Natural Gas	\$5.64	0.07

Note - Costs are based on continuous operation at base load. Costs based on actual operating levels would be higher.

### References

- Herzog, H.J., 2010. Scaling up carbon dioxide capture and storage: From megatons to gigatons, *Energy Econ.* doi:10.1016/j.eneco.2010.11.004
- Interagency Task Force on Carbon Capture and Storage, 2010. "Report of the Interagency Task Force on Carbon Capture and Storage," dated August 2010.
- Intergovernmental Panel on Climate Change, 2005. IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Kvamsdal, H., Chikukwa, A., Hillestad, M., Zakeri, A., & Einbu, A., 2011. A comparison of different parameter correlation models and the validation of an MEA-based absorber model. *Energy Procedia*, 4, 1526-1533.
- Purdy, Ray, 2006. The Legal Implications of Carbon Capture and Storage Under the Sea. *Sustainable Development Law and Policy*, Fall 2006, 22-26
- Wang, M., Lawal, A., Stephenson, P., Sidders, J., & Ramshaw, C., 2011. Post-combustion CO<sub>2</sub> capture with chemical absorption: A state-of-the-art review. *Chemical Engineering Research and Design*, 89, 1609-1624.

## Natural Gas Conversion GHG Emissions Reduction

The Hawaiian Electric Companies pursued importation of liquefied natural gas (LNG) to lower fuel costs and air emissions, including GHG. However, after the PUC denied the merger of the Hawaiian Electric Companies with NextEra<sup>15</sup> the Companies withdrew their application for approval of LNG Supply Agreements.

Substitution of natural gas fuel can significantly reduce GHG emissions from power generation. To the extent that LNG replaces no. 2 (diesel) fuel oil and no. 6 fuel oil, GHG emissions are 28 to 30 percent lower per million Btu (MMBtu) of fuel heat input as shown by the emissions factors in Table C-1. Net GHG emissions are reduced by a lesser amount, probably in the 25-28% range, because more heat input is typically required from gas than oil for the same amount of power generated. It is unlikely that LNG would make up 100% of the Companies' fuel consumption so the overall GHG reduction would be correspondingly lower.

**TABLE C-1 NATURAL GAS CONVERSION CO<sub>2</sub> EMISSIONS REDUCTION CALCULATION**

Fuel	GHG Pollutant <sup>1</sup>	Emission Factor <sup>2</sup> (kg/MMBtu)	Global Warming Potential <sup>3</sup>	Total GHG Emissions as CO <sub>2</sub> e (lb/MMBtu)
No. 6 Fuel Oil	CO <sub>2</sub>	75.10	1	165.6
	N <sub>2</sub> O	6.0E-04	298	0.3942
	CH <sub>4</sub>	3.0E-03	25	0.1653
<b>Total CO<sub>2</sub>e =</b>				<b>166.2</b>
No. 2 Fuel Oil	CO <sub>2</sub>	73.96	1	163.1
	N <sub>2</sub> O	6.0E-04	298	0.3942
	CH <sub>4</sub>	3.0E-03	25	0.1653
<b>Total CO<sub>2</sub>e =</b>				<b>163.7</b>
Natural Gas	CO <sub>2</sub>	53.06	1	117.0
	N <sub>2</sub> O	1.0E-04	298	0.0657
	CH <sub>4</sub>	1.0E-03	25	0.0551
<b>Total CO<sub>2</sub>e =</b>				<b>117.1</b>
<b>No. 6 Fuel Oil to Natural Gas Reduction = 29.5%</b>				
<b>No. 2 Fuel Oil to Natural Gas Reduction = 28.4%</b>				

Notes:

1. Greenhouse Gas (GHG) pollutants from the Mandatory Greenhouse Gas Reporting rule (40 CFR §98.32).
2. Emission factors from the Mandatory Greenhouse Gas Reporting rule (40 CFR Part 98 Subpart C, Tables C-1 and C-2).
3. Global Warming Potentials from the Mandatory Greenhouse Gas Reporting rule (40 CFR Part 98 Subpart A, Table A-1).

<sup>15</sup> Public Utilities Commission of the State of Hawai'i Decision and Order No. 33795. July 15, 2016.



## **Biofuel Conversion GHG Emissions Reduction**

### **1. Availability**

Biodiesel has been used as fuel for power generation on a limited scale but there is not enough supply to replace a significant portion of the fuel consumed by the Hawaiian Electric Companies. According to the U.S. Energy Information Administration (EIA) Biodiesel Production Report for July 2018, biodiesel (as B100) production capacity in Hawai'i was only about 6 million gallons per year (MGY). Campbell Industrial Park (CIPGS) alone burned 7.7 million gallons in 2017. U.S. production capacity was 2370 MGY but only 209 MGY of that was on the west coast where delivery to Hawai'i would be practical. By comparison, the Hawaiian Electric Companies used 370 million gallons of residual and distillate fuels in 2013.

In order for biodiesel to become sufficiently available to provide fuel for the State's electricity needs, dedicated energy crops would be required. But it is uncertain whether those crops would be adequate for the competing fuel needs throughout the State. Furthermore, biodiesel production is constrained by limited land availability and unpredictable financial incentives. A 2010 study on the potential for biofuel production in Hawai'i concluded that biodiesel produced from waste fats, oils, and greases would account for only one half of one percent of current diesel fuel usage (B&V, 2010). The same study estimated the theoretical biodiesel potential from waste oil as 2 to 2.5 million gallons per year (MGY).

Hawaiian Electric recently obtained a contract with Pacific Biodiesel to purchase approximately 3 MGY of biodiesel, primarily for CIPGS. At this time, Pacific Biodiesel is the only producer of biodiesel located in the State of Hawai'i. Another company, Imperium Renewables Hawai'i, announced plans to develop and build a biodiesel plant in Kapolei (O'ahu) several years ago but the project was unsuccessful due to financial reasons. Subsequently, the PUC rejected Hawaiian Electric's proposal to import biodiesel from Imperium's production plant in Washington State because of high costs. To the extent possible, Hawaiian Electric and the PUC would prefer to use locally-produced biofuels. But there simply is not enough biodiesel supply available to significantly lower Hawaiian Electric's greenhouse gas emissions without drastically increasing the cost.

### **2. Cost**

Table D-1 summarizes Hawaiian Electric's April 2015 fuel price forecasts. Historically, biodiesel has not been economically competitive compared to petroleum diesel without some type of governmental incentive. Our forecast shows that through 2019, the price of biodiesel will be approximately double that of our current fuel mix.

In addition to fuel cost, capital cost would be necessary to provide the infrastructure for receiving and storing biodiesel. Indirect costs such as permitting, performance testing, and engineering would likely add to the overall cost of switching to biodiesel. From an energy standpoint, biodiesel is similar to traditional diesel but contains about 7-10% less energy per gallon. Thus, the cost of biodiesel compared to diesel is higher but the energy content is lower.

## Attachment D – Biofuel Conversion GHG Emissions Reduction

Biodiesel prices are expected to continue to rise. Although current generation biodiesel production facilities are more efficient and benefit from economies of scale, feedstock costs have remained high (B&V, 2010). Generally, waste oils are the least expensive but are not always available in large quantities. Furthermore, the U.S. biodiesel industry is highly dependent on financial incentives such as the Federal blender tax credit. The unpredictability of the biofuel market does not align with Hawaiian Electric’s priority to provide reliable and low cost electricity. Further, we believe that it is questionable whether the PUC will approve large-scale conversions to biodiesel because of the potential cost impact on the Companies’ customers.

**TABLE D-1 BIODIESEL FUEL COST COMPARISON**

Hawaiian Electric’s 2018 Fuel Price Forecast				
	\$/million Btu			
Year	No. 2 Diesel	LSFO	ULSD	Biodiesel
2018	15.82	13.08	16.88	31.84
2019	14.96	12.17	16.02	31.76
2020	15.86	12.99	16.96	32.93
2021	16.20	13.26	17.32	33.71

### References

- EIA (U.S. Energy Information Administration), 2015. “Monthly Biodiesel Production Report,” dated March 2015.
- B&V (Black and Veatch Corp.), 2010. “The Potential for Biofuels Production in Hawai’i,” dated January 2010.
- Hawaiian Electric, 2018 Fuel Price Forecast. Received from C. Reyes 7/6/2018.

## Attachment E – Potential Energy Efficiency Improvements

### Potential Energy Efficiency Improvements

Improving the efficiency when fuel energy is converted to usable power output reduces the amount of fuel that has to be combusted to satisfy power demand, in turn decreasing the emissions of greenhouse gases and other air pollutants that are created in the combustion process. Additionally, improved energy efficiency reduces the cost of power generation because of the lower fuel requirement.

Energy efficiency of power generating units can be improved through changes to technology (equipment), processes, and practices. But most of the cost-effective improvements available to power generators have already been made to reduce fuel cost since fuel is such a large part of the total cost of power generation. That is especially true for Electrical Generating Units (EGU) like Hawaiian Electric's that burn oil, which is a relatively high cost fuel. Energy efficiency improvement is one of the four Building Blocks that EPA relied on to develop its proposed *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*.<sup>16</sup> In the preamble to the proposed rule EPA stated that they decided not to include efficiency improvement by oil-fired EGUs as an element of their Best System for Emissions Reduction (BSER) evaluation for GHG emissions because the potential GHG reductions are small compared to the reductions available from other types of power generation.<sup>17</sup>

Nevertheless, potential energy efficiency improvements for the Hawaiian Electric Companies' boilers, combustion turbines, and diesel electric generator sets are discussed in this section.

#### Boilers

The major portion of the Hawaiian Electric Companies' power generation comes from boilers that power steam turbine electric generators. The Hawaiian Electric Companies operate their boilers as efficiently as practicable. An important incentive for doing so is that the PUC establishes efficiency standards that must be met for the Company to fully recover the cost of the fuel used in power generation. Hawaiian Electric assures that its boilers operate at optimal energy efficiency a number of ways. One is by daily tracking and reporting of Heat Rate (HR) for each unit. Heat Rate, a measure of overall power generation efficiency that is commonly used in the power generation industry, is the ratio of the total fuel energy input divided by the net amount of power exported to customers, usually reported as Btu of fuel energy consumed per Kilowatt-hour of power exported (Btu/KWh). The lower the Heat Rate, the more efficiently the unit is operating. Heat Rate trends are a sensitive indicator of efficiency changes somewhere in the system. The Hawaiian Electric Companies also have aggressive Heat Rate improvement programs that follow the guidelines developed by the Electric Power Research

---

<sup>16</sup> 79 Fed. Reg. 34830, June 18, 2014.

<sup>17</sup> *Ibid.* p. 34877.

## Attachment E – Potential Energy Efficiency Improvements

Institute (EPRI).<sup>18</sup> Those guidelines are based on the best practices used in the industry for improving and maintaining energy efficiency.

Maui Electric's four boilers and Hawai'i Electric Light's two boilers underwent energy assessments and tune-ups in 2014 that were required by 40 CFR Part 63 Subpart JJJJJ, NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources. The assessments, performed by a certified independent combustion engineer, concluded that the overall condition of the boilers is good and that good efficiency practices are followed. All the Maui Electric and Hawai'i Electric Light boilers are tested annually to confirm their efficiency and tune-ups are required under Subpart JJJJJ once every five years.

Hawaiian Electric's boilers compare favorably for energy efficiency with other oil-fired EGUs in the U.S. The Energy Information Administration (EIA) collects and publishes Heat Rate data for several categories of EGUs. For the 2009 to 2013 period, EIA reported that the average HR for petroleum-fired EGUs was 10.9 MBtu/MWh.<sup>19</sup> By comparison, Hawaiian Electric's fourteen boilers on O'ahu averaged lower than 10.6 MBtu/MWh Heat Rate in the first 6 months of 2015. That is very good performance given the Hawaiian Electric boilers' operating rates.

Traditional style power plants were designed to operate near full capacity, often termed base-loaded, where they are most efficient. Operating them at lower and varying loads reduces their efficiency. Hawaiian Electric's boilers operate below full capacity. During 2012 through 2014, for instance, their average operating load was less than 60% of online capacity. There are two reasons for the lower load. One is that, unlike utilities on the mainland, Hawaiian Electric operates an isolated system. It cannot draw power from neighboring utilities in the event of system upsets so it must be entirely self-sufficient. To protect against power outages, Hawaiian Electric keeps enough unused generation capacity online as spinning reserve to absorb unexpected loss of the largest generation facility that is operating at any time.

Another factor that keeps operating load lower than ideal is imposed by the increasing amount of renewable energy that has been integrated into Hawaiian Electric's system. The output for renewable energy sources such as solar and wind is variable and intermittent because clouds reduce solar panel output and variable wind speeds reduce windmill output. Consequently, Hawaiian Electric's boilers must vary their operation in order to match overall system output with demand. The result of those constraints on operating load is that Hawaiian Electric's boilers typically operate below their peak efficiencies. Despite these constraints, as noted above, their HRs are competitive with those of mainland utilities, which generally do not have the same constraints.

---

<sup>18</sup> *Heat Rate Improvement Guidelines*. EPRI, Palo Alto, CA: 2012. Publication 1023913.

<sup>19</sup> *Electric Power Annual*. U.S. EIA. March 23, 2015 release, Table 8.1.

## **Attachment E – Potential Energy Efficiency Improvements**

### **Combustion Turbines**

Combustion Turbines (CT) represent the Hawaiian Electric Companies' second-largest source of power generation. The Company operates three CTs on O'ahu, four on Maui, and five on Hawai'i Island.

The energy efficiency of CTs is highest when they operate in combined cycle mode rather than simple cycle. In simple cycle, the hot gases from the turbine are exhausted to the atmosphere, whereas in combined cycle hot exhaust gases pass through a heat recovery steam generator, where steam passes through a turbine to generate additional power.

All four of Maui's and two of Hawai'i Island's CTs are capable of operating in combined cycle mode. No other significant energy efficiency improvements have been identified.

The remaining three CTs on Hawai'i Island and three on O'ahu are simple cycle units. Although their energy efficiency could be improved by converting them to combined cycle, the Companies evaluated doing so and concluded that it would not be feasible given the function that the simple cycle CTs serve on the current system. These units operate less than 10 percent of the time and instead are used to provide fast response power in case of shortages on the system. Unlike boilers, which take a long time to start up, simple-cycle CTs can be started up quickly when needed. In contrast, it takes significantly longer to bring a combined-cycle CT fully online. Operating the current simple-cycle CTs in combined-cycle mode would defeat much of the reason they are used. Hawaiian Electric has not identified any energy efficiency improvements for its CTs that fit within the current design of its system. That does not rule out system design changes that could accommodate combined cycle combustion turbines; however, such changes could not be implemented before 2020, the compliance date for Act 234 units.

### **Diesel Electric Generators**

Diesel electric generators (DEGs) have generally lower power output capability than boilers or combustion turbines and are mainly used to serve lower loads, typically in remote locations. DEGs also have the advantage that they can be brought online and ramped up quickly.

The Hawaiian Electric Companies operate DEGs that range in size from 1 MW to 12.5 MW each.

Hawaiian Electric received the following information from Valley Power Systems Northwest. Valley Power has supplied diesel generation equipment to the Hawaiian Electric Companies and is familiar with their DEGs.<sup>20</sup> Diesel electric generators are generally very efficient in converting fuel energy into electric power. There are few options available for improving their energy efficiency. One option is to install a turbocharger if a unit is not already equipped with one. However, all the DEGs covered by the Companies GHG Partnership already are equipped with

---

<sup>20</sup> Verbal communication between Dave Peterson of Valley Power Systems Northwest and Greg Narum of Hawaiian Electric, March 20, 2015.

## Attachment E – Potential Energy Efficiency Improvements

turbochargers. Another option is to upgrade from 2-pass to 4-pass after-coolers, which can improve efficiency 1-3%. However, this may not be practical for Hawaiian Electric Companies' units because of their age and design. The benefit in terms of GHG emissions reduction would be small in any case, amounting to about 120 metric tons per year of CO<sub>2</sub>e for a 2% efficiency improvement of a 1 MW generator.

An approach that would more substantially reduce GHG emissions would be to replace the existing diesel engine generators with newer, more efficient models. Hawaiian Electric estimates that heat rates could be improved 10% to 20%, depending on the unit, by replacing the Companies' larger DEGs with new units similar to those constructed at the Schofield Generating Station.<sup>21</sup> According to data Hawaiian Electric submitted to the Public Utilities Commission, the 2015 installed cost for new DEG capacity up to 100MW is \$2970/KWh.<sup>22</sup> Assuming a 15% heat rate improvement averaged over all the units, the fuel cost savings would be about \$280 per year per KW of capacity based on estimated 2015 fuel costs<sup>23</sup> and 8500 hours per year of operation. Therefore, it would require about 10 years for the energy savings to pay back the investment cost. That cost can only be justified if the existing unit is nearing the end of its useful life.

### Summary of Potential Energy Efficiency Improvements

The Hawaiian Electric Companies operate their power generating units at energy efficiencies that are equivalent to or better than mainland averages for oil-fired generators despite constraints imposed by their isolated location. The Company has researched additional opportunities for improving efficiency beyond steps already taken but has not identified any that are operationally and economically justified given current system designs and needs.

---

<sup>21</sup> Email from Robert Isler of Hawaiian Electric Generation Planning Department. June 22, 2015.

<sup>22</sup> *Hawaiian Electric Power Supply Improvement Plan*. Table F-11. Docket 2011-0206. August 2014.

<sup>23</sup> *Ibid*, Table F-5.

## Attachment F – Puna Geothermal Venture Equivalent GHG Emissions

The equivalent GHG emissions reduction from PGV’s energy generation was calculated by comparing the combined actual emissions from Hawai’i Electric Light and HEP in 2017, the last full year PGV operated, with the 12 months from July 2018 to June 2019 when PGV was offline. The difference, 185,404 tons, was distributed among the generating facilities in proportion to their July 2018 to June 2019 operation. The result is tabulated in Table A-2.

The derivation of PGV’s equivalent GHG emissions is summarized below.

Source	GHG Emissions, tons	
	PGV Online	PGV Offline
	2017	July 2018-June 2019
HELCO		
Keahole	193,103	260,090
Kaneolehua-Hill	243,346	180,345
Puna	26,400	67,806
HEP	98,962	238,974
HELCO-HEP Total	561,811	747,215
<b>GHG Adjustment for PGV</b>		<b>185,404</b>

8

JUL 29 2019

FCST/PAK  
JUL 26 2019

**Revised Form S-6  
Campbell Industrial Park Generating Station  
CSP No. 0548-01-C  
July 2019**



**S-6: Application for a Significant Modification to a Covered Source**

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. CIP1 is a Siemens Westinghouse Power Corporation SGT6-3000E (135 MW nominal) combustion turbine.
2. Fuel type. CIP1 is currently permitted to burn naphtha, fuel oil No. 2, biodiesel (B100 and B99), and blends of fuel oil No. 2 and biodiesel (B100 and B99) with a maximum sulfur content of 0.05% by weight.
3. Fuel use. CIP1 has a maximum hourly fuel consumption rate of 1,482.6 MMBtu/hr.
4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change CIP1's manufacturer's specifications.

**B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.**

Electrical power generation (SIC code 4911) is the only product or process.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

NO<sub>x</sub> emissions are controlled by water injection. SO<sub>2</sub> emissions are controlled by limiting the biodiesel fuel sulfur content to 50 ppm. Emissions of PM, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous air pollutants are controlled by the use of No. 2 diesel or biodiesel and combustion system design.

2. List all **new insignificant** activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when a unit must be run continuously for extended periods of time. Thus, this application does not include any daily, weekly, or monthly operating limits.
  2. Total hours per year. Up to 8,760 hours per year.
  3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.
- See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.
- Hawaiian Electric requests incorporation of the Greenhouse Gas emissions limitations into the Covered Source Permit CSP No. 0548-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan (GHG ERP) submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.
- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:

1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.
- II. Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. Provide other information as follows:**
- A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. The Director reserves the right to request the following information:**
- A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. An application shall be determined to be complete only when all of the following have been complied with:**
- A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. The Director shall not continue to act upon or consider an incomplete application.**
- A. The applicant shall be notified in writing whether the application is complete:
    1. For the requirements of subchapter 7, thirty days after receipt of the application.
    2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.

- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Kahe Generating Station  
CSP No. 0240-01-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

I. **In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

A. Equipment Specifications:

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - Fuel oil No. 6 with maximum sulfur content of 0.5% by weight for Units K-1 through K6.
  - Fuel oil No. 2 with maximum sulfur content 0.5% by weight for Units A and B.
  - A maximum of 115,000 gal/yr of specification (spec) used oil for Units K-1 through K-4.
  - Propane as igniter fuel for K-1 and K-2.
  - Fuel oil No. 2 with maximum sulfur content of 0.5% by weight as igniter fuel for K-3 through K-6.
  - Fuel oil No. 2 (diesel) with maximum 0.5% by weight sulfur as an alternate fuel for Boilers K-1 through K-6 as approved by the DOH on June 7, 2013.
  - Natural gas as alternate fuel for boilers K-1 through K-6 as approved by DOH on January 5, 2015.
3. Fuel use. Refer to the table below.

Unit ID	Maximum Design Fuel Use per Unit		
	Nominal Capacity	Heat Input (MMBtu/hr)	Ignition Fuel
K-1	92 MW	903	Propane
K-2	90 MW	900	Propane
K-3	92 MW	892	Diesel
K-4	93 MW	918	Diesel
K-5	142 MW	1,468	Diesel
K-6	142 MW	1,516	Diesel
A	2.5 MW	30.5	Diesel
B	2.5 MW	30.5	Diesel

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Kahe equipment's manufacturer's specifications.

- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Sulfur emissions are controlled by limiting the fuel sulfur content to 0.5 percent by weight. Emissions of NO<sub>x</sub>, PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of other HAP's are controlled by the use of No. 2 and No. 6 fuel oil and combustion system design. Unit 6 is equipped with low NO<sub>x</sub> burners to control NO<sub>x</sub> emissions.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month. Depending on future power dispatch requirements, specific boilers may cycle off-line daily, or operate at reduced loads. However, there may be times when a unit must be run continuously for extended periods of time. Thus, this application does not include any annual operating limits for Units K-1 through K-5. Unit K-6 is limited to a daily average fuel consumption of 8,610 gal/hr. Units A and B are limited to a combined annual operating hour limit of 300 hours.
2. Total hours per year. Up to 8,760 hours per year.
3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.

- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:

1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.

- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.

See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.

Hawaiian Electric requests incorporation of the Greenhouse Gas emissions limitations into the Covered Source Permit CSP No. 0240-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan (GHG ERP) submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.

- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not Applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.
- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
- A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
- A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
- A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**



- A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Waiau Generating Station  
CSP No. 0239-01-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

### I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:

#### A. Equipment Specifications:

1. Maximum design capacity. Refer to the table below.
2. Fuel type. \_\_\_\_\_  
 - Fuel oil No. 6 with a maximum sulfur content of 0.5% by weight for Units 3 through 8.  
 - Natural gas with maximum sulfur content of 175 grains per 100 SCF for Units 5 through 8.  
 - Specification used oil for Units 3 through 8 (no more than 50,000 gallons per any rolling 12-month period).  
 - Fuel oil No. 2 with a maximum sulfur content of 0.5% by weight for Units 9 and 10.
3. Fuel use. Refer to the table below.

**Maximum Capacity and Fuel Use Per Unit**

Unit ID	Manufacturer	Model Number	Serial Number	Capacity (Nominal)	Fuel Rate (MMBtu/hr)	Ignition Fuel
3	Babcock and Wilcox		RB-43	49 MW	576	Propane
4	Babcock and Wilcox		RB-92	49 MW	585	Propane
5	Babcock and Wilcox		RB-324	57 MW	633	Propane
6	Babcock and Wilcox		RB-328	58 MW	637	Propane
7	Combustion Engineering		20694	92 MW	923	Diesel
8	Combustion Engineering		20177	92 MW	922	Diesel
9	General Electric	MS7000	217725	50	682	Diesel
10	General Electric	MS7000	217724	52	691	Diesel

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Waiau equipment's manufacturer's specifications.

- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the generating station as described

below:

a. Unit operation during startup, shutdown, maintenance and testing of the combustion turbine generators and boilers. Boiler startup operations may range up to 7 hours and occur almost daily.

b. Alternate fuels. Hawaiian Electric may use alternate fuels and fuel additives with prior approval from the Department of Health.

c. Soot blowing is a necessary maintenance operation and may result in a temporary increase in opacity.

d. Use of a temporary 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 unit increases the likelihood of an interruption in electrical service, the down unit may be replaced with an equivalent unit. Emissions from the replacement unit will comply with the original unit's permitted emission limits.

e. Operate the combustion turbines, W9 and W10, below minimum load to address system disturbances and frequency issues. This request was submitted in a minor modification application dated May 6, 2015.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Sulfur emissions are controlled by limiting the fuel sulfur content to a maximum of 0.5% by weight. Emissions of NO<sub>x</sub>, PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous air pollutants are controlled by the use of fuel oil Nos. 6 and 2 and good combustion design.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month. Depending on future dispatch requirements, the plant may cycle off line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time. Thus, this application does not propose any annual operating limits.
2. Total hours per year. Up to 8,760 hours per year.
3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.

D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:

1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.

- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.

See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.

Hawaiian Electric requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0239-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.

- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.

- G. Provide detailed information to define permit terms and conditions for any proposed *emissions trading* within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.

- H. For *significant* modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For *new* covered sources or *significant* modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.

- J. Provide the following for Compliance purposes:

1. A compliance plan, Form C-1.
2. A compliance certification, Form C-2.

**II. Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**

**III. Provide other information as follows:**

- A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
- B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.

**IV. The Director reserves the right to request the following information:**

- A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
- B. Results of source emissions testing, ambient air quality monitoring, or both.

- C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
  - A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Honolulu Generating Station  
CSP No. 0238-01-C  
July 2019**

**S-6: Application for a Significant Modification to a Covered Source**

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
 Permits Office, Air Division  
 U.S. Environmental Protection Agency  
 Region 9  
 75 Hawthorne Street  
 San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. Units 8 and 9 are Babcock & Wilcox boilers with steam turbines. See response to I.A.3 for additional information.
2. Fuel type. No. 6 and No. 2 fuel oil with 0.5% (max) by weight sulfur content for Units 8 and 9. The boilers also burn small quantities of spec used oil (less than 15,000 gal/yr).
3. Fuel use. Refer to the table below.

Maximum Design Fuel Use per Unit			
Unit ID	Nominal Capacity	Fuel Rate	Ignition Fuel
Unit 8	56 MW	589.0 MMBtu/hr	Propane
Unit 9	57 MW	631.5 MMBtu/hr	Propane

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Honolulu equipment's manufacturer's specifications.

**B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.**

Electrical power generation through combustion of fossil fuels (SICC 4911) is the only product or process.

The alternative scenario is the ability to switch fuels. Should cheaper fuels become available, or the supply of No. 2 or No. 6 fuel becomes limited, Hawaiian Electric may propose an alternate scenario that would allow the fuel switch, provided that all permit conditions are met.

No additional changes to operating scenarios are proposed with this application.



1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.  
Sulfur emissions are controlled by limiting the fuel sulfur content to 0.5 percent by weight. Emissions of NO<sub>x</sub>, PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous pollutants are controlled by the use of No. 2 and No. 6 fuel oils and combustion system design.
  2. List all **new insignificant** activities in accordance with §11-60.1-82.  
No additional changes/additions to insignificant activities are proposed with this application.
- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. The planned operation of Units 8 and 9 is 24 hours per day 7 days a week. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. Unit 8 and 9 are currently deactivated.
  2. Total hours per year. Up to 8,760 hours per year.
  3. If operation is seasonal or irregular, describe. Unit 8 and 9 are currently deactivated.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.  
See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.  
Hawaiian Electric requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0238-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available

background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For *new* covered sources or *significant* modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
  - 1. A compliance plan, Form C-1.
  - 2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.

- B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Kanoelehua-Hill Generating Station  
CSP No. 0234-01-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - Hill 5 and 6 utilize fuel oils No. 6 and No. 2.
  - Hill 5 uses propane as an ignition fuel.
  - CT-1 utilizes fuel oil No. 2 with a maximum sulfur content of 0.4 percent by weight.
  - D-11, D-15, D-16, and D-17 utilize fuel oil No. 2 with a maximum sulfur content of 0.0015 percent by weight and a minimum Cetane index of 40 or a maximum aromatic content of 35 volume percent.
  - Hill 5 and Hill 6 may consume up to 36,500 gal/rolling 12-month period of specification used oil. On November 22, 2017, the DOH approved consumption of specification used oil from Hawaii Petroleum.
  - Hawai'i Electric Light requested the addition of biodiesel and biodiesel/diesel blends in D-11, D-15, D-16, and D-17 in a permit renewal application dated August 31, 2012.
3. Fuel use. Refer to the table below.

Maximum Design Fuel Use per Unit			
ID	Capacity (Nominal)	Fuel Flow (MMBtu/hr)	Ignition Fuel
Hill 5	14 MW	197	Diesel/ Propane
Hill 6	23 MW	249	Diesel
CT-1	11.6 MW	177.2	Diesel
D-11	2.0 MW	20.2	Diesel
D-15	2.5 MW	29.1	Diesel
D-16	2.5 MW	29.1	Diesel
D-17	2.5 MW	29.1	Diesel

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Kanoiehua-Hill equipment's manufacturer's specifications.

- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. The first includes the use of permanent and temporary replacement units in the event of a failure or major overhaul of an installed unit. In the event that the projected downtime 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 will comply with the original unit's emission limits.

The second alternative operating scenario is unit operation during start-up, shutdown, maintenance and testing. Boiler startup operations may range up to 7 hours. Maintenance activities include soot blowing. The time period of this maintenance operation will not exceed 1.5-hours in duration two times per day. These maintenance activities are required to maximize generation efficiency and minimizing fuel usage.

A third alternate scenario is the ability to switch fuels. Should cheaper fuels become available, or the supply of normal fuel become limited, Hawai'i Electric Light proposes an alternate scenario that would allow the fuel switch provided that all permit conditions are met.

A fourth alternative scenario occurs during emergency load conditions. Certain equipment malfunctions (such as sudden loss of a unit) may necessitate the operation of Hill 5 and 6, CT-1 and D-11, D-15, D-16, and D-17, at loads as high as 110% of peak load. The time period of this operation will be limited to no more than 30 minutes in duration. This operation will not result in a 3-hr average emission rate that exceeds the maximum emission limits proposed in this application.

A fifth alternative involves the use of fuel additives to reduce corrosion, control biological growth, and enhance combustion, etc. Emissions during this scenario will not affect emission estimates.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Sulfur emissions are controlled by limiting the fuel sulfur content to 0.4% by weight for CT-1, 0.0015% for the diesels, and 2% for the boilers. Emissions of PM<sub>10</sub>, CO, and VOC are controlled by combustion design. CO emissions from D-11, D-15, D-16, and D-17 are controlled by the Diesel Oxidation Catalyst (DOC). The DOC will reduce CO emissions by at least 70 percent or limit CO emissions to 23 ppmvd at 15 percent O<sub>2</sub>. Emissions of any hazardous pollutants are controlled by the use of No. 2 diesel oil for CT-1, D-11, D-15, D-16, and D-17 and No. 6 fuel oil used for the boilers and combustion system design for all units.

Compliance monitoring devices and activities are discussed in Form C-2.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. The planned operation of each unit is 24 hours per day, 365 days per year. Depending on future dispatch requirements, some units may cycle off-line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time. Thus, this application does not propose any annual operating limits.
  2. Total hours per year. Up to 8,760 hours per year.
  3. If operation is seasonal or irregular, describe. Operation is not seasonal or irregular.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.
- See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.
- With this application, Hawai'i Electric Light requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0234-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not Applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Does not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.
- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other

application requirements of subchapter 7. Does not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.

- J. Provide the following for Compliance purposes:
  - 1. A compliance plan, Form C-1.
  - 2. A compliance certification, Form C-2.
  
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
  
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
  
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
  
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
  
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
  
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**



- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.
- IX. The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.
- X. The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.
- XI. Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.

**Revised Form S-6  
Keahole Generating Station  
CSP No. 0007-01-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

### I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:

#### A. Equipment Specifications:

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - No. 2 diesel fuel with 0.4 percent by weight maximum sulfur content for units CT-4, CT-5, and BS-1.
  - Starting May 3, 2013, No. 2 diesel with 0.0015 percent by weight sulfur content, minimum Cetane index of 40 or maximum aromatic content of 35% volume, for units D-21, D-22, and D-23.
  - Biodiesel (B100) and biodiesel/diesel blends with up to 1% diesel (B99) as alternate fuels for CT-4 and CT-5 were approved by the DOH on December 16, 2013.
3. Fuel use. Refer to the table below.

**Maximum Capacity and Fuel Use Per Unit**

Unit ID	Manufacturer	Model Number	Serial Number	Capacity (Nominal)	Fuel Flow Rate
D-21	General Motors	20-645F4B	74-B1-1078	2.5 MW	28.1 MMBtu/hr
D-22	General Motors	20-645F4B	66-K1-1062	2.5 MW	28.1 MMBtu/hr
D-23	General Motors	20-645E4	69-H1-1057	2.5 MW	28.1 MMBtu/hr
BS-1	Caterpillar	3412	81Z07275	500 kW	5.57 MMBtu/hr
CT-4	General Electric	LM2500	481-688	20 MW	275 MMBtu/hr
CT-5	General Electric	LM2500	481-692	20 MW	275 MMBtu/hr
ST-7				16 MW	NA
CT-2	Jupiter	GT-35	JF88702	18 MW	198 MMBtu/hr

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Keahole equipment's manufacturer's specifications.

#### B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the generating station as described below:

a. Use of a temporary 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 unit increases the likelihood of an interruption in electrical service, the down unit would be replaced with an equivalent unit. Emissions from the replacement unit will comply with the original unit's permitted emission limits.

b. CT-4 and CT-5 may operate below 25% of peak load during testing of the heat recovery steam generators and steam turbine and steam blows needed to clean the steam tubes prior to initial operation.

c. Should less expensive fuels become available, or the supply of No. 2 diesel become limited, Hawai'i Electric Light may use alternative fuels with prior approval from the Department of Health.

d. In the event of emergency load conditions such as the sudden loss of a unit, CT-2, CT-4 and CT-5 may operate up to 110 percent of peak load for up to 30 minutes. Such operation will not exceed the permitted 3-hour average emission rates.

e. Fuel additives to reduce corrosion, control biological growth, and enhance combustion may be used in CT-4 and CT-5.

f. Hawai'i Electric Light, with the approval from the Department of Health, may use alternate means and methods to improve combustion and/or reduce emissions for CT-4 and CT-5.

g. Hawai'i Electric Light requested to operate the combustion turbine generators, CT-2, CT-4 and CT-5, below minimum load with water injection to address system disturbances and frequency issues in a minor modification application dated 12/10/2015.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Fuel injection timing retard (FITR) is used on D-21, D-22, and D-23 to control NO<sub>x</sub> emissions. When CT-4 and CT-5 are operating in combined cycle mode at loads less than 50% of peak load and simple cycle mode, water injection is used on CT-4 and CT-5 to reduce NO<sub>x</sub> emissions to 42 ppmvd at 15 percent O<sub>2</sub>, with a fuel-bound nitrogen content of 0.0015 percent or less. When CT-4 and CT-5 are operating in combined cycle mode at 50% or more of peak load, water injection in combination with selective catalytic reduction (SCR) is used to reduce NO<sub>x</sub> emissions to 15 ppmvd at 15 percent O<sub>2</sub>, with a fuel-bound nitrogen content of 0.015 percent or less. The design of the SCR system will limit ammonia slip to 10 ppmvd at 15 percent O<sub>2</sub>. Water injection is used on CT-2 reduce NO<sub>x</sub> emissions to 47 ppmvd at 15 percent O<sub>2</sub>, with a fuel-bound nitrogen content of 0.015 percent or less. SO<sub>2</sub> emissions are controlled by limiting the fuel sulfur content to 0.4 percent by weight for CT-4, CT-5, and BS-1 and 0.0015 percent by weight for D-21, D-22, and D-23. Emissions of PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. CO emissions for D-21, D-22, and D-23 will be controlled by a DOC. The DOC will reduce CO emissions by at least 70 percent or limit CO to 23 ppmvd at 15% O<sub>2</sub>. Emissions of hazardous air pollutants are controlled by the use of No. 2 fuel oil and combustion system design. Refer to Attachment S-1d for emission rate calculations.

Compliance monitoring devices and activities are discussed in Form C-2.

2. List all **new insignificant** activities in accordance with §11-60.1-82.  
No additional changes/additions to insignificant activities are proposed with this application.

C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month. The planned operation of units D-22, D-23, CT-4, and CT-5 is up to 24 hours per day, seven days per week. Units BS-1 and unit D-21 are operated as needed. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. While expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time. Fuel consumption is limited on a rolling 12-month basis to 12,301,254 gallons (292,887 barrels) for CT-2.
2. Total hours per year. Units D-22, D-23, CT-4, and CT-5 will operate 8760 hours per year. Fuel consumption is limited on a rolling 12-month basis to 70,000 gallons in D-21. Operation of BS-1 is limited to 300 hours on a rolling 12-month basis. Fuel consumption is limited on a rolling 12-month basis to 12,301,254 gallons (292,887 barrels) for CT-2.
3. If operation is seasonal or irregular, describe. Refer to D.1 and 2 above.

D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:

1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.

E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.

See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.

Hawai'i Electric Light requests incorporation of the Greenhouse Gas Emissions Limitations into the Keahole Covered Source Permit CSP No. 0007-01-C consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.

F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.

G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.

H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations

and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For *new* covered sources or *significant* modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
  1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    1. For the requirements of subchapter 7, thirty days after receipt of the application.
    2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.

- B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
  - A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Puna Generating Station  
CSP No. 0235-01-C  
July 2019**



## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

### I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:

#### A. Equipment Specifications:

1. Maximum design capacity. Refer to the table below.
2. Fuel type. CT-3 and PBSG1 burn No. 2 diesel fuel with a 0.4% maximum sulfur content. The boiler burns No. 2 and No. 6 fuel oil with a 2.0% maximum sulfur content. In addition the boiler burns a maximum of 200,000 gal/yr of specification used oil. On November 22, 2017, the DOH approved consumption of specification used oil from Hawaii Petroleum.
3. Fuel use. Refer to the table below.

Maximum Design Fuel Use per Unit		
Unit ID	Nominal Capacity	Heat Input (MMBtu/hr)
Boiler	15.5 MW	249
CT-3	20 MW	275
PBSG1	600 kW	6.34

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Puna's equipment's manufacturer's specifications.

#### B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. The first includes the use of a temporary replacement unit in the event of a failure or major overhaul of CT-3 or the boiler. In the event that the projected downtime increases the likelihood of an interruption in electrical service, CT-3 or the boiler would be temporarily replaced. Emissions from the replacement unit will comply with the original unit's operating restrictions and emission limits.

The second alternative operating scenario is unit operation during start-up, shut-down, maintenance, and testing of all units. Boiler start-up operations may range up to 8 hours. Maintenance activities include soot blowing. The time period of this maintenance operation

will not exceed 1-hour in duration two times per day. These maintenance activities are required to maximize generation efficiency and minimize fuel usage.

A third alternate scenario is the ability to switch fuels. Should cheaper fuels become available, or the supply of No. 2 or No. 6 fuel oil becomes limited, Hawai'i Electric Light proposes an alternate scenario that would allow the fuel switch provided that all emission limits and regulatory requirements are met.

A fourth alternative scenario occurs during emergency load conditions. Certain equipment malfunctions (such as sudden loss of a unit) may necessitate the operation of CT-3 at loads as high as 110% of peak load. The time period of this operation will be limited to no more than 30 minutes in duration. This operation will not result in a 3-hr average emission rate that exceeds the maximum emission limits.

A fifth alternative scenario occurs during unpredictable periods of equipment failure, upsets, or emergency conditions. During any emergency condition, Hawai'i Electric Light will operate the subject equipment in such a manner as to minimize emissions. Hawai'i Electric Light will comply with the Emergency Provisions (§11-60.1-16.5).

A sixth alternative scenario involves the burning of a maximum total of 200,000 gal/yr, 90 gal/hr, of specification (spec) used oil. The spec used oil consists of collected used oil, such as waste oil, lubricating oil, and waste diesel oil, crankcase oil, transformer oil (dielectric fluid), solvents and kerosene obtained from the equipment operating at the Hawai'i Electric Light facilities.

A seventh alternative scenario involves the use of fuel additives to reduce corrosion, control biological growth, enhance combustion, or other reasons. Additives used during this scenario shall not affect emission estimates.

Hawai'i Electric Light requested to operate the CT-3 below minimum load to address system disturbances and frequency issues in a minor modification application dated October 16, 2015.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Water injection is used on CT-3 to reduce NO<sub>x</sub> emissions to 42 ppmv at 15 percent O<sub>2</sub>, dry with a fuel-bound nitrogen content of 0.015 percent or less. Fuel sulfur content is limited to 0.4 percent by weight for CT-3 and PBSG1 and 2.0% by weight for the boiler. Emissions of PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous air pollutants are controlled by the use of No. 2 fuel oil for CT-3 and PBSG1, by the use of No. 6 fuel oil for the boiler, and combustion system design. Compliance monitoring devices and activities are discussed in form C-2.

2. List all ***new insignificant*** activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. Depending on future power dispatch requirements, some units may cycle off-line daily, or operate at reduced loads. However, there may be times when a unit must be run continuously for extended periods of time. Thus, this application does not propose any annual operating limits. Units PBSG1 is limited to an annual operating hour limit of 300 hours.
  2. Total hours per year. Up to 8,760 hours per year each for CT-3 and the boiler. Units PBSG1 is limited to an annual operating hour limit of 300 hours.
  3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.
- See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.
- With this application, Hawai'i Electric Light requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0235-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.
- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.

- J. Provide the following for Compliance purposes:
  - 1. A compliance plan, Form C-1.
  - 2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
  - A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.

- B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Kahului Generating Station  
CSP No. 0232-01-C  
July 2019**

**S-6: Application for a Significant Modification to a Covered Source**

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - No. 6 fuel oil with 2.0% (max) by weight sulfur content, and in emergencies, No. 2 fuel oil with 0.5% (max) sulfur by weight.
  - No more than 300,000 gal/yr of specification (spec) used oil. On December 13, 2017, the DOH approved consumption of specification used oil from Maui Petroleum.
3. Fuel use. Refer to the table below.

**Maximum Capacity and Fuel Use Per Unit**

Unit ID	Manufacturer	Model Number	Serial Number	Capacity (Nominal)	Fuel Flow Rate	Ignition Fuel
K-1	Combustion Engineering	None	13413	5.0 MW	94.0 MMBtu/hr	Electric
K-2	Combustion Engineering	None	15345	5.0 MW	94.0 MMBtu/hr	Propane
K-3	Combustion Engineering	None	17343	11.5 MW	172.0 MMBtu/hr	Propane
K-4	Babcock & Wilcox	None	PFI3030	12.5 MW	181.0 MMBtu/hr	Propane

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Kahului equipment's manufacturer's specifications.

**B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.**

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. The first alternative operating scenario is unit operation during start-up, shut-down, maintenance, and testing. Boiler start-up operations may occur up to 225 times per year per boiler and occasionally range up to 6 hours.

A second alternate scenario is the ability to switch fuels. Should cheaper fuels become available or the supply of No. 6 fuel oil become limited, MECO may propose an alternate scenario that would allow the fuel switch, provided that all emission limits and regulatory requirements of the DOH rules are met.

A third alternative scenario involves boiler soot-blowing. This is a necessary maintenance operation and may result in a temporary increase in opacity.

A fourth alternative scenario is the use of fuel additives and other products which may be used to control algae, inhibit corrosion, enhance combustion, etc. Emissions during this scenario will comply with all permit conditions.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Sulfur emissions are controlled by limiting the fuel sulfur content to 2 percent for No. 6 fuel oil and 0.5 percent for No. 2 fuel oil. Emissions of NO<sub>x</sub>, PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous air pollutants are controlled by the use of No. 6 fuel oil or No. 2 fuel oil and combustion system design.

Compliance monitoring devices and activities are discussed in Form C-2.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month. The planned operation of units K-1 through K-4 is 24 hours per day, seven days per week. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time.
2. Total hours per year. Up to 8,760 hours per year.
3. If operation is seasonal or irregular, describe. Operation is not seasonal or irregular.

D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:

1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.



- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.

See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.

With this application, Maui Electric requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0232-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.

- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.

- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.

- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.

- J. Provide the following for Compliance purposes:

1. A compliance plan, Form C-1.
2. A compliance certification, Form C-2.

**II. Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**

**III. Provide other information as follows:**

- A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
- B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.

**IV. The Director reserves the right to request the following information:**

- A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
- B. Results of source emissions testing, ambient air quality monitoring, or both.

- C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
    - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.
- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
  - A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Revised Form S-6  
Maalaea Generating Station  
CSP No. 0067-01-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - Fuel oil No. 2 diesel with 0.4% maximum sulfur content and biodiesel.
  - Spec used oil (not to exceed 150,000 gal/yr).
  - Fuel oil No. 2 with a maximum sulfur content of 0.0015 percent by weight and a minimum Cetane index of 40 or a maximum aromatic content of 35 volume percent.
3. Fuel use. Refer to the table below.

**Maximum Design Fuel Use per Unit**

Unit ID	Make	Model Number	Unit Type	Nominal Output	Nominal Heat Input
M1-M3	General Motors	20-645E4	Diesel Engine	2.5 MW	29.2 MMBtu/hr
M4 & M6	Cooper Bessemer	LSV-20-T	Diesel Engine	5.6 MW	58.8 MMBtu/hr
M5 & M7	Cooper Bessemer	LSV-20-T	Diesel Engine	5.6 MW	58.8 MMBtu/hr
M8-M9	Colt Industries	C-P PC2V	Diesel Engine	5.6 MW	60.2 MMBtu/hr
M10-M13	Mitsubishi Hvy. Ind.	185V52/55A	Diesel Engine	12.5 MW	122.7 MMBtu/hr
X1-X2	General Motors	20-645E4	Diesel Engine	2.5 MW	28.5 MMBtu/hr
SG1	General Motors / Detroit	12V92TAB/8 123-7416	Diesel Engine	600 kW	6.34 MMBtu/hr
M14 & M16	General Electric	LM2500	Combustion Turbine	20 MW	275 MMBtu/hr
M17 & M19	General Electric	LM2500	Combustion Turbine	20 MW	275 MMBtu/hr

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Maalaea equipment's manufacturer's specifications.

- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. The first alternative operating scenario is the ability to conduct steam blows activity.

The second alternative operating scenario includes the use of a temporary replacement unit for the diesel engine generators and combustion turbines, 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 temporarily replaced. Emissions from the temporary replacement unit will comply with the original unit's emission and operating limits.

A third alternative scenario is the ability to operate below the 25% load for maintenance and testing, provided that all emission limits and regulatory requirements of the DOH rules are met.

A fourth alternative scenario is the ability to burn alternative fuels. Should cheaper fuels become available or the supply of No. 6 fuel oil become limited, Maui Electric proposes an alternate scenario that would allow the fuel switch, provided that all emission limits and regulatory requirements of the DOH rules are met.

A fifth alternative operating scenario is the use of fuel additives and other products which may be used to control algae, inhibit corrosion, enhance combustion, etc. Emissions during this scenario will comply with all permit conditions.

A sixth alternative operating scenario is the ability to operate the combustion turbines up to 110% above peak load if equipment malfunction such as a sudden loss of a unit occurs, provided conditions specified in CSP No. 0067-01-C are met.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Fuel Injection Timing Retard (FITR) is used on diesel engine generating units M12, M13, X1, and X2 to control NOx emissions. Water injection is used on M14, M16, M17, and M19 to limit NOx emissions to 42 ppmvd at 15 percent O<sub>2</sub>, dry with a fuel-bound nitrogen content of 0.015 percent by weight or less. Sulfur emissions are controlled by limiting the fuel sulfur content to 0.4 percent for units M4 through M13, M14, M16, M17, and M19 and 0.0015% for units M1 through M3, X1, and X2. CO emissions from units M1 through M13, X1, and X2 are controlled by the Diesel Oxidation Catalyst (DOC). The DOC will reduce CO emissions by at least 70 percent or limit CO emissions to 23 ppmvd or less at 15 percent O<sub>2</sub>. Emissions of PM, PM10, CO and VOC are controlled by combustion design and good combustion practices. Emissions of hazardous air pollutants are controlled by the use of No. 2 fuel oil and combustion system design.

Compliance monitoring devices and activities are discussed in Form C-2.

2. List all **new insignificant** activities in accordance with §11-60.1-82.  
No additional changes/additions to insignificant activities are proposed with this application.
- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. The planned operation is full load the majority of the time. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time.
  2. Total hours per year. Up to 8,760 hours per year. Units X1 and X2 are limited by PSD Permit HI 86-02 to 4,380 hours per year, per unit. Unit SG1 is limited by PSD Permit HI 90-02 to 300 hours per year.
  3. If operation is seasonal or irregular, describe. Operation is not seasonal or irregular.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.  
See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.  
Maui Electric requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0067-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For *new* covered sources or *significant* modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
  1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    1. For the requirements of subchapter 7, thirty days after receipt of the application.
    2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.

- VII. **After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.
- VIII. **The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. **The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. **The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. **Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**



**Revised Form S-6  
Palaau Generating Station  
CSP No. 0031-04-C  
July 2019**

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of **two (2)** sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail **one (1)** set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

**I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:**

**A. Equipment Specifications:**

1. Maximum design capacity. Refer to the table below.
2. Fuel type.
  - No. 2 fuel oil with maximum sulfur content of 0.4 percent by weight for CT1.
  - No. 2 diesel with maximum 0.0015 percent by weight sulfur content, minimum Cetane index of 40 or maximum aromatic content of 35% volume for Units CAT1 and CAT2, CUM3 through CUM6, CAT7 through CAT9.
  - Specification used oil for Units CUM3 through CUM6 and CAT7 through CAT9.
3. Fuel use.
  - The total combined fuel consumption of CUM3-CUM6 shall not exceed 1,650,000 gallons in any rolling twelve-month (12-month) period.
  - The total combined specification used oil consumption of CUM3-CUM6 and CAT7-CAT9 shall not exceed 10,000 gallons in any rolling twelve-month (12-month) period.
  - The total fuel consumption of CT1 shall not exceed 1,230,000 gallons in any rolling twelve-month (12-month) period.

Maximum Design Fuel Use per Unit						
Unit ID	Make	Model Number	Unit Type	Nominal Rating (MW)	Nominal Heat Input (MMBtu/hr)	Fuel (gal/hr)
CUM3, CUM4, or CUM6	Cummins	KTA50	Diesel Engine	1.0	9.09	64.9
CUM5	Cummins	KTTA50	Diesel Engine	1.0	9.52	68.0
CAT7, CAT8, or CAT9	Caterpillar	3608	Diesel Engine	2.2	23.38	167.0
CAT1 or CAT2	Caterpillar	3516	Diesel Engine	1.25	12.62	90.63
CT1	Solar International	Centaur T4001	Combustion Turbine	2.0	34.0	240.0

4. Production capacity. Does not apply.
5. Production rates. Does not apply.
6. Raw materials. Does not apply.
7. Provide any manufacturer's literature. This application does not change any of Palaa equipment's manufacturer's specifications.

- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation through combustion of fossil fuels (SICC 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. A first alternate scenario includes the use of a temporary replacement unit in the event of a failure or major overhaul of an installed unit, provided the requirements in Attachment IIA Section C.7.a are met.

A second alternative scenario is the ability to switch fuels. Should cheaper fuels become available, Maui Electric may propose an alternate scenario that would allow the fuel switch, provided that all emission limits and regulatory requirements of the DOH rules are met.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

NO<sub>x</sub> emissions from Units CUM3 through CUM6, CAT1, and CAT2 are controlled by fuel injection timing retard (FITR). NO<sub>x</sub> emissions from Units CAT7 through CAT9 are controlled by FITR and intake air cooling. Emissions of PM/PM<sub>10</sub>, CO, and VOC are controlled by combustion design. SO<sub>2</sub> emissions are controlled by limiting the fuel sulfur content to 0.4 percent by weight for Unit CT1 and 0.0015 percent by weight for units CUM3 through CUM6, CAT7 through CAT9, CAT1, and CAT2. CO emissions will be controlled by the DOC for units CUM3 through CUM6, CAT7 through CAT9, CAT1, and CAT2. The DOC will reduce CO emissions by at least 70 percent or limit CO to 23 ppmvd at 15% O<sub>2</sub>. Emissions of any hazardous pollutants are controlled by the use of No. 2 fuel oil and combustion system design.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):

1. Total hours per day, per week, and/or per month. The planned operation of the facility is 24 hours per day, seven days per week. Depending on future dispatch requirements, the plant may cycle off-line daily, or operate at reduced loads. While these expected operating levels are less than continuous, there may be times when the units must be run continuously for extended periods of time. Thus, this application does not propose any annual operating limits.

2. Total hours per year. Up to 8,760 hours per year.

3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.

- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.
- Pollution controls include a fuel sulfur content limit, good combustion practices, and FITR.
- Maui Electric requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0031-04-C consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018, the subsequent updates submitted to the DOH on October 17, 2018 and May 15, 2019, and the latest update dated July 26, 2019, enclosed with this application.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.
- I. For **new** covered sources or **significant** modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.

II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**

**III. Provide other information as follows:**

- A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
- B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.

**IV. The Director reserves the right to request the following information:**

- A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
- B. Results of source emissions testing, ambient air quality monitoring, or both.
- C. Information on other available control technologies.

**V. An application shall be determined to be complete only when all of the following have been complied with:**

- A. All information required or requested in numbers I, III, and IV has been submitted.
- B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
- C. All applicable fees have been submitted.
- D. The director has certified that the application is complete.

**VI. The Director shall not continue to act upon or consider an incomplete application.**

- A. The applicant shall be notified in writing whether the application is complete:
  - 1. For the requirements of subchapter 7, thirty days after receipt of the application.
  - 2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
  - 3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
- B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.

**VII. After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**

- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.
- B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.

**VIII. The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**

- IX. The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**



on

**HAND DELIVERED**  
MAR 28 2018

Anthony H. Koyamatsu, P.E., PMP  
Manager  
Environmental Department

Hawai'i Electric Light  
Puna

March 28, 2018

**HAND DELIVERY**

Ms. Marianne Rossio, P.E.  
Manager, Clean Air Branch  
State of Hawaii Department of Health  
2827 Waimano Home Road  
Hale Ola Building, Room 130  
Pearl City, Hawaii 96782

Dear Ms. Rossio:

**Subject: Application for a Significant Modification to a Covered Source  
CSP No. 0235-01-C  
Puna Generating Station  
Hawai'i Electric Light Company (Hawai'i Electric Light)**

Enclosed are one original and one copy of the application for a Significant Modification to the Covered Source Permit No. 0235-01-C for the Puna Generating Station.

Hawai'i Electric Light requests incorporation of the Greenhouse Gas (GHG) Emissions Reduction Plan, submitted to the Department of Health on February 28, 2018, along with conditions implementing GHG reduction regulations under HAR Title 11 Chapter 60.1 Subchapter 13 into the Puna Generating Station's Covered Source Permit No. 0235-01-C.

Certifications in accordance with HAR 11-60.1-4 are included on Forms S-1, C-1, and C-2. Also enclosed is a check no. 545803 in the amount of \$1,000.00 for the significant modification application fee.

If you have any questions regarding this submittal, please contact Myrna Tandi at 543-4535 or [myrna.tandi@hawaiianelectric.com](mailto:myrna.tandi@hawaiianelectric.com).

Sincerely,

Karin Kimura, Principal Environmental Scientist  
for Anthony Koyamatsu

Enclosures: (1) CSP Significant Modification Application, one original and one copy  
(2) Application fee (check no. 545803)

Ms. Marianne Rossio, P.E.  
Application for a Significant Modification to a Covered Source  
CSP No. 0235-01-C  
March 28, 2018  
Page 2 of 2

cc w/ Encl.: **CERTIFIED MAIL RETURN RECEIPT REQUESTED**  
Mr. Gerardo Rios [Article No.7015 1660 0000 1839 2870]  
Chief, Permits Office, Air Division  
U.S. EPA Region 9  
75 Hawthorne Street  
Mail Code: AIR-3  
San Francisco, CA 94105



**S-1: Standard Air Pollution Control Permit Application Form**  
(Covered Source Permit and Noncovered Source Permit)

State of Hawaii  
Department of Health  
Environmental Management Division  
Clean Air Branch  
P. O. Box 3378 • Honolulu, HI 96801-3378 • Phone: (808) 586-4200

1. Company Name: Hawai'i Electric Light Company, Inc.
2. Facility Name (if different from the Company): Puna Generating Station
3. Mailing Address: P.O. Box 1027  
City: Hilo State: HI Zip Code: 96721-1027  
Phone Number: (808) 935-1711
4. Name of Owner/Owner's Agent: Anthony H. Koyamatsu (Owner's Agent)  
Title: Manager, Environmental Department Phone: (808) 543-4500  
Mailing Address: Hawaiian Electric Company; P.O. Box 2750  
City: Honolulu State: HI Zip Code: 96840-0001
5. Plant Site Manager/Other Contact: Norman M. Uchida, PE  
Title: Manager, Production Department Phone: (808) 969-0422  
Mailing Address: P.O. Box 1027  
City: Hilo State: HI Zip Code: 96721-1027
6. Permit Application Basis: (Check appropriate boxes)
- |  |  |
|--|--|
| <input type="checkbox"/> Initial Permit for a New Source   | <input type="checkbox"/> Initial Permit for an Existing Source |
| <input type="checkbox"/> Renewal of Existing Permit  | <input type="checkbox"/> General Permit                        |
| <input type="checkbox"/> Temporary Source  | <input type="checkbox"/> Transfer of Permit                    |
| <input checked="" type="checkbox"/> Modification to a Covered Source: → Is modification? <input checked="" type="checkbox"/> Significant <input type="checkbox"/> Minor <input type="checkbox"/> Uncertain |  |
| <input type="checkbox"/> Modification to a Noncovered Source   |  |
7. If renewal or modification, include existing permit number: CSP No. 0235-01-C
8. Does the Proposed Source require a County Special Management Area Permit?  Yes  No
9. Type of Source (Check One):  Covered Source  Covered & PSD Source  
 Noncovered Source  Uncertain
10. Standard Industrial Classification Code (SICC), if known: 4911

11. Proposed Equipment/Plant Location (e.g. street address): Puna Mill Road

City: Keaau State: HI Zip Code: 96749

UTM Coordinates (meters): East: 286,646 North: 2,172,337

UTM Zone: 5 UTM Horizontal Datum:  Old Hawaiian  NAD-27  NAD-83

12. General Nature of Business: Electrical Generation

13. Date of Planned Commencement of Installation or Modification: Not Applicable

14. Is **any** of the equipment to be leased to another individual or entity?  Yes  No

15. Type of Organization:  Corporation  Individual Owner  Partnership  
 Government Agency (Government Facility Code: \_\_\_\_\_ )  
 Other: \_\_\_\_\_

*Any applicant for a permit who fails to submit any relevant facts or who has submitted incorrect information in any permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. In addition, an applicant shall provide additional information as necessary to address any requirements that become applicable to the source after the date it filed a complete application, but prior to the issuance of the noncovered source permit or release of a draft covered source permit. (HAR § 11-60.1-64 & 11-60.1-84)*

### RESPONSIBLE OFFICIAL

(as defined in §11-60.1-1):

Name (Last): Uchida (First): Norman (MI): M.

Title: Manager, Production Department Phone: (808) 969-0422

Mailing Address: P.O. Box 1027

City: Hilo State: HI Zip Code: 96721-1027

### CERTIFICATION by Responsible Official

(pursuant to §11-60.1-4):

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

NAME (Print/Type): Norman M. Uchida, PE

(Signature): *Norman Uchida* Date: 3/22/18

#### FOR AGENCY USE ONLY:

File/Application No: \_\_\_\_\_

Island: \_\_\_\_\_

Date Received: \_\_\_\_\_

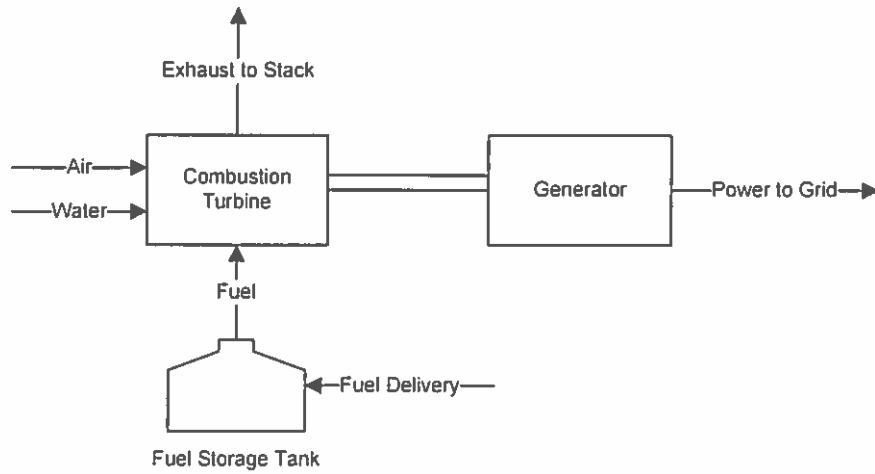
Submit the following documents as part of your application:

- A. The **Emissions Units Table**, filled in as completely as possible. Use separate sheets of paper as needed. General instructions include the following:
1. Identify each **emission point** with a unique number for this plant site, consistent with emission point identification used on the location drawing and previous permits; if known, provide the SICC number. Emission points shall be identified and described in sufficient detail to establish the basis for fees and applicability of requirements of HAR, Chapter 11-60.1. Examples of emission point names are: heater, vent, boiler, tank, baghouse, fugitive, etc. Abbreviations may be used.
    - a. For each emission point use as many lines as necessary to list regulated and hazardous air pollutant data. For hazardous air pollutants, also list the Chemical Abstracts Service number (CAS#).
    - b. Indicate the emission points that discharge together for any length of time.
    - c. The **Equipment Date** is the date of equipment construction, reconstruction, or modification. Provide supporting documentation.
  2. State the **maximum emission rates** in terms sufficient to establish compliance with the applicable requirements and standard reference test methods. Provide all supporting emission calculations and assumptions:
    - a. Include all regulated and hazardous air pollutants and air pollutants for which the source is major, as defined in HAR §11-60.1-1. Examples of regulated pollutant names are: Carbon Monoxide (CO), Nitrogen Oxides (NO<sub>x</sub>), Sulfur Dioxide (SO<sub>2</sub>), Volatile Organic Compounds (VOC), particulate matter (PM), and particulate less than 10 microns (PM<sub>10</sub>). Abbreviations may be used.
    - b. Include fugitive emissions.
    - c. **Pounds per hour (#/HR)** is the maximum potential emission rate expected by applicant.  
**Tons per year** is the annual maximum potential emissions expected by the applicant, taking into account the typical operating schedule.
  3. Describe **Stack Source Parameters**:
    - a. **Stack Height** is the height above the ground.
    - b. **Direction** refers to the exit direction of stack emissions: up, down or horizontal.
    - c. **Flow Rate** is the actual, not the calculated, flow rate.
  4. Provide any additional information, if applicable, as follows:
    - a. If combinations of different fuels are used that cause any of the stack source parameters to differ, complete one row for each possible set of stack parameters and identify each fuel in the **Equipment Description**.
    - b. For a rectangular stack, indicate the length and width.
    - c. Provide any information on stack parameters or any stack height limitations developed pursuant to Section 123 of the Clean Air Act.
- B. A **process flow diagram** identifying all equipment used in the process, including the following:
1. Identify and describe each emission point.
  2. Identify the locations of safety valves, bypasses, and other such devices which when activated may release air pollutants to the atmosphere.
- C. A **facility location map**, drawn to a reasonable scale and showing the following:
1. The property involved and all structures on it. Identify property/fence lines plainly.
  2. Layout of the facility.
  3. Location and identification of the proposed emissions unit on the property.
  4. Location of the property and equipment with respect to streets and all adjacent property. Show the location of all structures within 325 meters of the applicant's emissions unit. Provide the building dimensions (height, length, and width) of all structures that have heights greater than 40% of the stack height of the emissions unit.
- D. Provide a description of any proposed modifications or permit revisions. Include any justification or supporting information for the proposed modifications or permit revisions.

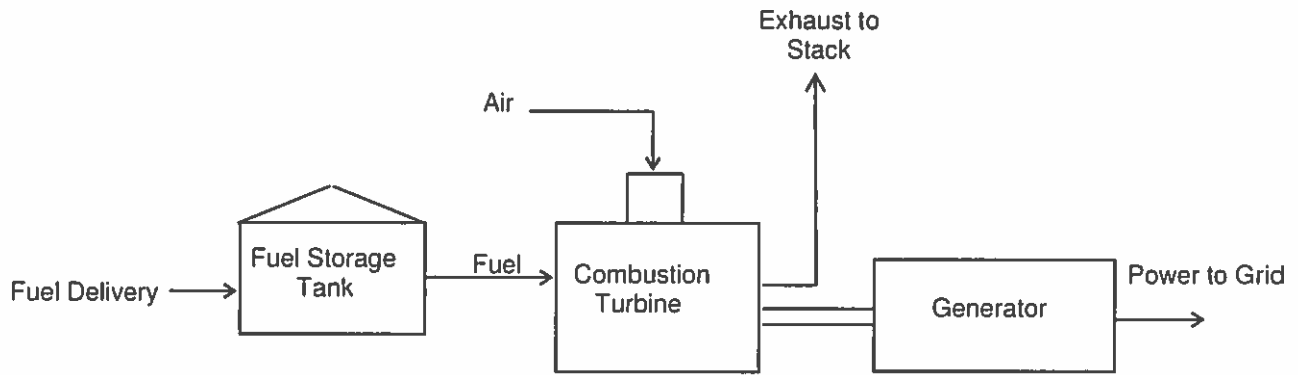
**Attachment S-1a**  
**Responses to Emission Unit Table Instructions for Form S-1**

A.1. Emission Point Identification and Description	See Forms S-1 Emissions Units Tables. The proposed changes do not impact emission point identification and description.
A.2. Maximum Emission Rates	See Forms S-1 Emissions Units Tables and Attachments S-1b, S-1c, S-1d, and S-1e. The proposed changes do not impact maximum emission rates.
A.3. Stack Parameters	See Forms S-1 Emissions Units Tables. The proposed changes do not impact stack parameters.
A.4. Additional Information	None
B. Process Flow Diagram	See Figures S-1.1, S-1.2, and S-1.3
C. Facility Location Map	See Figures S-1.4 and S-1.5.
D. Proposed Revisions	See Attachment S-6a.

**FIGURE S-1.1**  
**PROCESS FLOW DIAGRAM FOR CT-3**



**FIGURE S-1.2**  
**PROCESS FLOW DIAGRAM FOR CT-3**



**FIGURE S-1.3**  
**PROCESS FLOW DIAGRAM FOR BLACKSTART UNIT PBSG1**

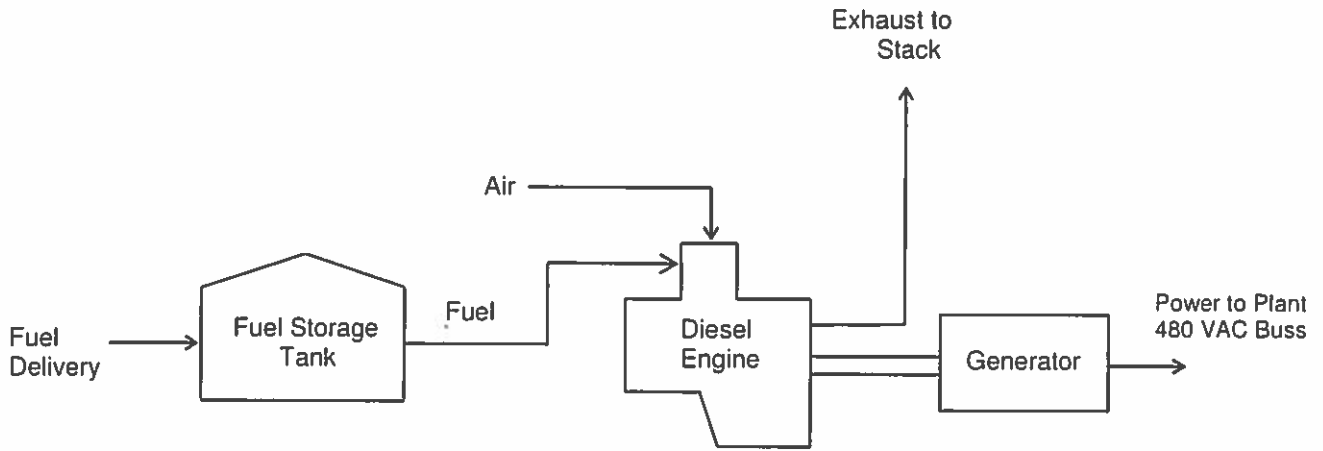


Figure S-1.4 Location Map

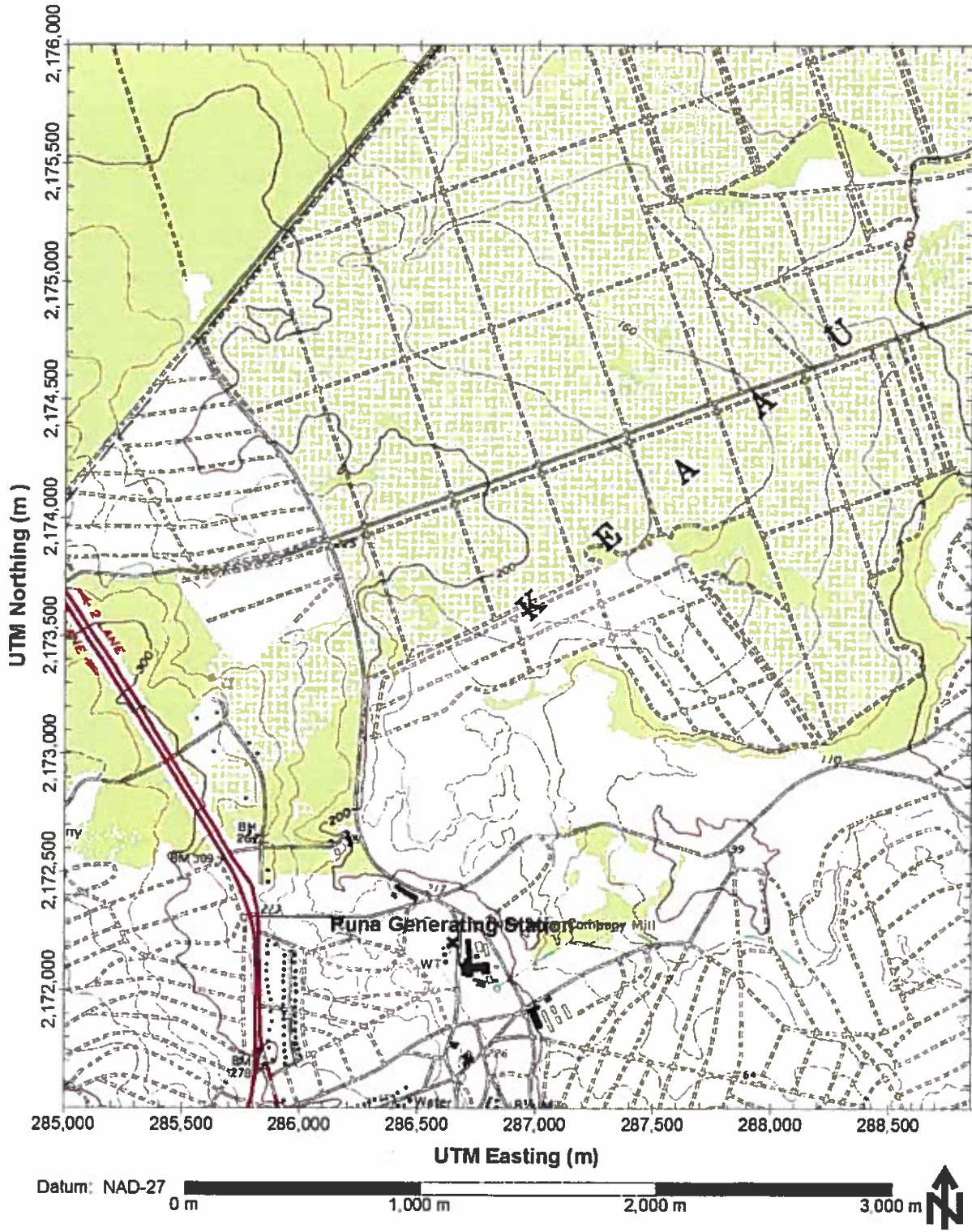
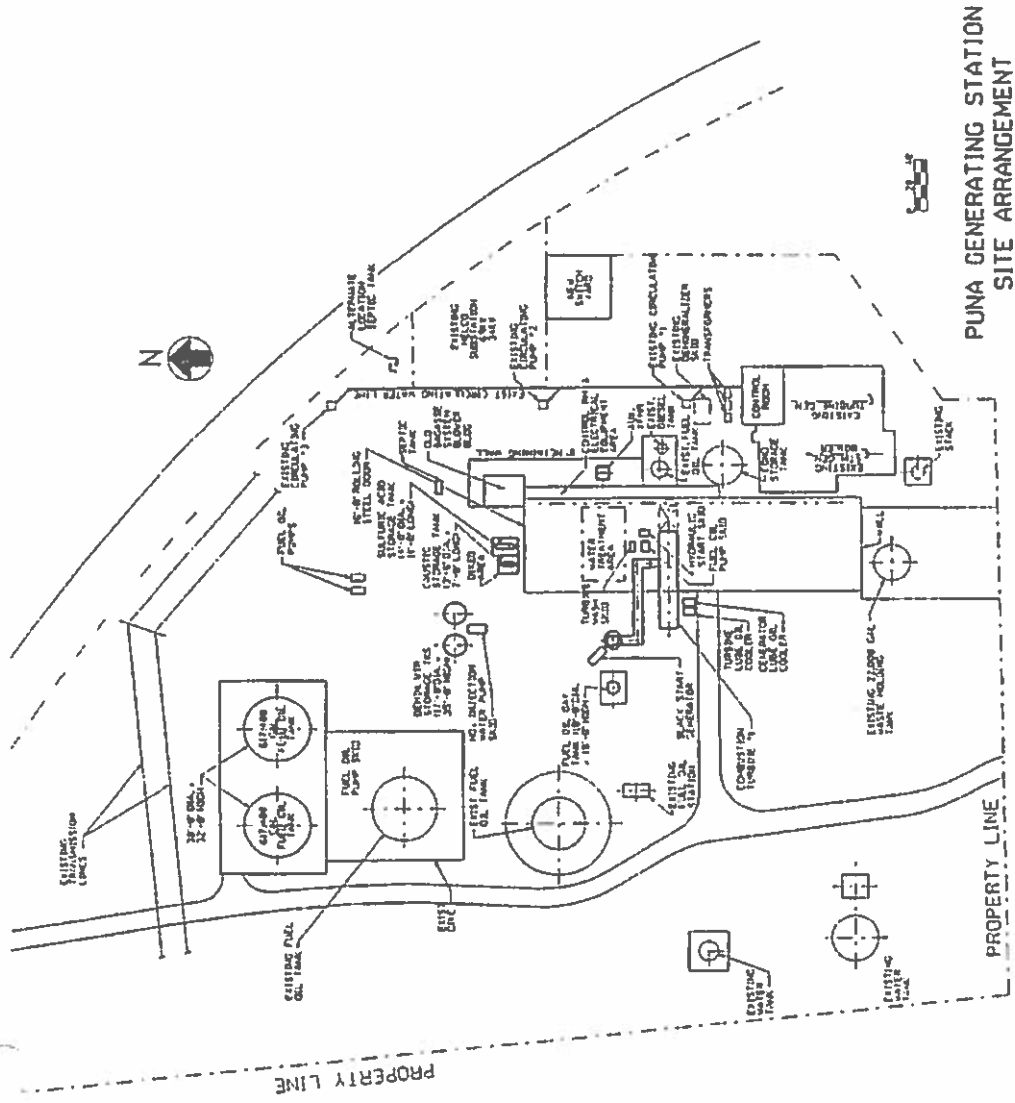




Figure S-1.5 – Plot Plan



(Make as many copies of this page as necessary)

## EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA - EMISSION POINTS			AIR POLLUTANT	AIR POLLUTANT EMISSION RATE		UTM Zone <u>5</u> Horizontal Datum * <u>Old Hawaiian</u>		STACK SOURCE PARAMETERS						
Stack No.	Unit No.	EQUIPMENT NAME/DESCRIPTION & SICC number	Equipment Date	Regulated/Hazardous Air Pollutant Name & CAS#	#/HR	Tons/Year	Coordinates (mtrs)	Stack Height (mtrs)	Direction (up/down)	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp (°K)	Capped (Y/N)
Puna Boiler	Puna Boiler	15.5 MW Nominal Combustion Engineering (WU-40) Boiler (248 MMBtu/hr) (SICC 4811)	1970	SO <sub>2</sub>	549.43	2.402	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				NO <sub>x</sub>	190.98	836.5	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				CO	16.49	72.2	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				VOC	2.51	10.99	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				PM <sub>10</sub> /PM <sub>2.5</sub>	71.57	313.5	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				H <sub>2</sub> SO <sub>4</sub> Mist	75.02	332.1	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				Pb	See Attachment S-1b		East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				Fluorides	2.02E-03	1.15E-02	East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				TRS	Not E-pected		East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				CFC	Not E-pected		East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				HAP	See Attachment S-1b		East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N
				GHG (CO <sub>2</sub> e)	See Attachment S-1e		East 286,700 North 2,172,260	51.8	U	3.15	10.2	79.4	422	N

\* Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27

\* Specify the direction of the stack exhaust as u=upward, d=downward, h=horizontal

**Notes:**

- The equipment date is the in-service date.
- Emission rate for SO<sub>2</sub> calculated using mass balance based on 2.0% sulfur content. No. 6 fuel oil heat content of 18,161 Btu/lb, and all sulfur converted to SO<sub>2</sub>. See Form S-1c for details.
- Emission rates for NO<sub>x</sub>, CO, VOC and PM<sub>10</sub> are based on an evaluation of AP-42 calculations & compliance factors. See Form S-1c for emission rate calculations.
- Emission rate for H<sub>2</sub>SO<sub>4</sub> is 13.83% of the SO<sub>2</sub> rate (0.73 lb/hr H<sub>2</sub>SO<sub>4</sub> / 5.28 lb/hr SO<sub>2</sub>). This ratio is derived from the August 19, 1994 SCEEC report of Maui Electric Company, Ltd. Maalaea Generating Station's M3 source tests.
- TPY values assume 8,760 hrs/yr of operation.
- Emission rate for Fluorides based on Maui Electric Company, Ltd. fuel test results of 0.2 ppm dated 04/11/85.

## EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA			EMISSION POINTS			AIR POLLUTANT EMISSION RATE		UTM Zone: <u>5</u> Horizontal Datum* <u>Old Hawaiian</u>		STACK SOURCE PARAMETERS					
Stack No.	Unit No	EQUIPMENT NAME/DESCRIPTION & SICC number	Equipment Date	Regulated/Hazardous Air Pollutant Name & CAS#	#HR.	Tons/Year	Coordinates (mtrs)	Stack Height (mtrs)	Direction (wdth)*	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp (°K)	Capped (Y/N)	
CT-3	CT-3	20 MW Nominal GE LM2500 Combustion Turbine, Simple Cycle, Peak Load (275 MMBtu/hr) (SICC 4811)	Jan. 30, 1992	SO <sub>2</sub>	110.0	481.8	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				NO <sub>x</sub>	42.3	185.3	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				CO	26.8	117.4	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				VOC	0.8	3.50	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				PMPM-10	19.7	86.3	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				H <sub>2</sub> SO <sub>4</sub> Mist	14.4	63.1	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				Pb	See Form S-1a		East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				Fluorides	2.77E-03	1.21E-02	East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				TRS	Not Expected		East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				CFC	Not Expected		East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				HAP	See Attachment S-1b		East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	
				GHG (CO <sub>2</sub> e)	See Attachment S-1e		East North 286.646 2,172,337	76.2	U	2.44	38.4	179.5	821	N	

\* Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27  
 † Specify the direction of the stack exhaust as up=upward, d=downward, h=horizontal

**Notes:**

- The equipment date is the date that PSD permit HI 90-04 was issued.
- Emission rates for SO<sub>2</sub>, NO<sub>x</sub>, CO, VOC, and PMPM<sub>10</sub> were established in HI 90-04.
- Emission rate for H<sub>2</sub>SO<sub>4</sub> is 13.12% of the SO<sub>2</sub> rate (5.57 lb/hr H<sub>2</sub>SO<sub>4</sub>/42.44 lb/hr SO<sub>2</sub>). This ratio is derived from the August 19, 1994 SCEC report of Maui Electric Company, Ltd. Maalaea Generating Station's M16 source tests.
- Emission rate for Fluorides based on Maui Electric Company, Ltd. fuel test results of 0.2 ppm dated 04/11/85.
- TPY values assume 0.760 hrs/yr of operation.

## EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA - EMISSION POINTS				AIR POLLUTANT EMISSION RATE		STACK SOURCE PARAMETERS									
Stack No.	Unit No	EQUIPMENT NAME/DESCRIPTION & SICC number	Equipment Date	Regulated/Hazardous Air Pollutant Name & CAS#	#/HR	Tons/Year	UTM Coordinates (mts)		Stack Height (mtrs)	Direction (u/d/h) <sup>a</sup>	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp (°K)	Capped (Y/N)
							Zone: <u>5</u>	Horizontal Datum <sup>4</sup> : <u>Old Hawaiian</u>							
CT-3	CT-3	20 MW Nominal GE LM2500 Combustion Turbine, Simple Cycle, 75% of Peak Load (SICC 4911)	Jan. 30, 1992	SO <sub>2</sub>	82.9	363.1	East	286,646	76.2	U	2.44	31.7	148.2	764	N
							North	2,172,337							
				NO <sub>x</sub>	42.3	185.3	East	286,646	76.2	U	2.44	31.7	148.2	764	N
							North	2,172,337							
				CO	56.4	247.0	East	286,646	76.2	U	2.44	31.7	148.2	764	N
							North	2,172,337							
				VOC	2.6	11.4	East	286,646	76.2	U	2.44	31.7	148.2	764	N
							North	2,172,337							
				PM <sub>10</sub>	19.7	86.3	East	286,646	76.2	U	2.44	31.7	148.2	764	N
							North	2,172,337							

<sup>1</sup> Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27  
<sup>2</sup> Specify the direction of the stack exhaust as u=upward, d=downward, h=horizontal

**Notes:**

- 1 The equipment date is the date that PSD permit HI 90-04 was issued
2. Emission rates for SO<sub>2</sub>, NO<sub>x</sub>, CO, VOC, and PM<sub>10</sub> were established in HI 90-04.
3. TPY values assume 8,760 hrs/yr of operation.

## EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA: EMISSION POINTS					AIR POLLUTANT		AIR POLLUTANT EMISSION RATE		STACK SOURCE PARAMETERS						
Stack No.	Unit No	EQUIPMENT NAME/DESCRIPTION & SICC number	Equipment Date	Regulated/Hazardous Air Pollutant Name & CAS#	#HR	Tons/Year	UTM Zone <u>5</u> Horizontal Datum <sup>a</sup> <u>Old Hawaiian</u>		Stack Height (mtrs)	Direction (u/d/s) <sup>b</sup>	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp (°K)	Capped (Y/N)
CT-3	CT-3	20 MW Nominal GE LM2500 Combustion Turbine, Simple Cycle, 50% of Peak Load (SICC 4911)	Jan. 30, 1992	SO <sub>2</sub>	58 0	254 0	East North	286.646 2,172.337	76.2	U	2.44	24.5	114.5	726	N
				NO <sub>x</sub>	42.3	195.3	East North	286.646 2,172.337	76.2	U	2.44	24.5	114.5	726	N
				CO	181.0	792.8	East North	286.646 2,172.337	76.2	U	2.44	24.5	114.5	728	N
				VOC	28.1	123.1	East North	286.646 2,172.337	76.2	U	2.44	24.5	114.5	728	N
				PM/PM-10	19.7	86.3	East North	286.646 2,172.337	76.2	U	2.44	24.5	114.5	728	N

<sup>a</sup> Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27  
<sup>b</sup> Specify the direction of the stack exhaust as u=upward, d=downward, h=horizontal

- Notes:
- The equipment date is the date that PSD permit HI 90-04 was issued
  - Emission rates for SO<sub>2</sub>, NO<sub>x</sub>, CO, VOC, and PM/PM<sub>10</sub> were established in HI 90-04
  - TPY values assume 8,760 hrs/yr of operation.

Company Name: Hawaii Electric Light Company, Inc. File No: \_\_\_\_\_  
 Location: Puna Generating Station Page 5  
 (Make as many copies of this page as necessary)

### EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table

AIR POLLUTANT DATA EMISSION POINTS			AIR POLLUTANT	AIR POLLUTANT EMISSION RATE		UTM Zone <u>5</u> Horizontal Datum <u>Old Hawaiian</u>		STACK SOURCE PARAMETERS						
Stack No.	Unit No	EQUIPMENT NAME/DESCRIPTION & SIC number	Equipment Date	Registered/Hazardous Air Pollutant Name & CAS#	#/HR	Tons/Year	Coordinates (mtrs)	Stack Height (mtrs)	Direction (u/d/h) <sup>a</sup>	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp. (°K)	Capped (Y/N)
CT-3	CT-3	20 MW Nominal GE LM2500 Combustion Turbine Simple Cycle, 25% of Peak Load (SICC 4911)	Jan. 30, 1992	SO <sub>2</sub>	39.0	170.8	East 286 646 2,172 337	76.2	U	2.44	18.2	85.1	701	N
				NO <sub>x</sub>	42.3	185.3	East 286 646 2,172 337	76.2	U	2.44	18.2	85.1	701	N
				CO	475.6	2,083	East 286 646 2,172 337	76.2	U	2.44	18.2	85.1	701	N
				VOC	297.6	1,303	East 286 646 2,172 337	76.2	U	2.44	18.2	85.1	701	N
				PM <sub>10</sub> PM <sub>2.5</sub>	19.7	86.3	East 286 646 2,172 337	76.2	U	2.44	18.2	85.1	701	N

<sup>a</sup> Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27  
<sup>b</sup> Specify the direction of the stack exhaust as u=upward, d=downward, h=horizontal

Notes:  
 1. The equipment data is the date that PSD permit HI 90-04 was issued.  
 2. Emission rates for SO<sub>2</sub>, NO<sub>x</sub>, CO, VOC, and PM/PM<sub>10</sub> were established in HI 90-04.  
 3. TPY values assume 8,760 hrs/yr of operation.

## EMISSIONS UNITS TABLE

Review of applications and issuance of permits will be expedited by supplying all necessary information on this table.

AIR POLLUTANT DATA - EMISSION POINTS			AIR POLLUTANT EMISSION RATE		UTM Zone: <u>5</u> Horizontal Datum: <u>Old Hawaiian</u>		STACK SOURCE PARAMETERS								
Stack No.	Unit No.	EQUIPMENT NAME/DESCRIPTION & SICC number	Equipment Date	AIR POLLUTANT	Regulated/Hazardous Air Pollutant Name & CAS#	#HR.	Tons/Yr	Coordinates (mtrs)	Stack Height (mtrs)	Direction (u/s/d) <sup>a</sup>	Inside Diameter (mtrs)	Velocity (m/s)	Flow Rate (m <sup>3</sup> /s)	Temp. (°K)	Capped (Y/N)
PBSG 1		600 kW Detroit Diesel (12V92) Backstop Unit. (SICC 4911)	Jan 30, 1992	SO <sub>2</sub>		2.56	0.38	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				NO <sub>x</sub>		20.30	3.05	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				CO		5.39	0.81	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				VOC		0.52	0.08	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				PMPM-10		0.44	0.07	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				H <sub>2</sub> SO <sub>4</sub> Mist		0.35	0.05	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				Pb		See Form S-1a		East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				Fluorides		6.39E-05	9.58E-06	East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				TRS		Not Expected		East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				CFC		Not Expected		East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				HAP		See Attachment S-1b		East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N
				GHG (CO <sub>2</sub> e)		See Attachment S-1e		East 286.646 North 2,172,337	76.2	U	0.25	57.4	2.8	725	N

<sup>a</sup> Specify UTM Horizontal Datum as Old Hawaiian, NAD-83, or NAD-27

<sup>b</sup> Specify the direction of the stack exhaust as u=upward, d=downward, h=horizontal

**Notes:**

- The equipment date is the date that PSD permit HI 90-04 was issued
- Emission rates for SO<sub>2</sub>, NO<sub>x</sub>, CO, PMPM<sub>10</sub> and VOC are from AP-42, Section 3.4, Table 3.4-1 dated October 1996
- TPY value based on annual operation limit of 300 hrs/yr
- Emission rate for H<sub>2</sub>SO<sub>4</sub> is 13.83% of the SO<sub>2</sub> rate (0.73 lb/hr H<sub>2</sub>SO<sub>4</sub> / 5.28 lb/hr SO<sub>2</sub>). This ratio is derived from the August 19, 1994 SCEC report of Maui Electric Company, Ltd. Maataea Generating Station's M3 source tests.
- Emission rate for Fluorides based on Maui Electric Company, Ltd. fuel test results of 0.2 ppm dated 04/11/85

**Attachment S-1b  
Air Toxic Emissions for Boiler**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (t/yr)
75-07-0	Acetaldehyde	1994 Waiou 7 Test Data	2.18E-06	249.0	5.43E-04	2.38E-03
60-35-5	Acetamide			249.0		
75-05-8	Acetonitrile			249.0		
98-86-2	Acetophenone			249.0		
53-96-3	2-Acetylaminofluorene			249.0		
107-02-8	Acrolein			249.0		
79-06-1	Acrylamide			249.0		
79-10-7	Acrylic acid			249.0		
107-13-1	Acrylonitrile			249.0		
107-05-1	Allyl chloride			249.0		
92-67-1	4-Aminobiphenyl			249.0		
62-53-3	Aniline			249.0		
90-04-0	o-Anisidine			249.0		
1332-21-4	Asbestos			249.0		
71-43-2	Benzene (including benzene from gasoline)	EPRI PISCES Air Toxic Database	3.06E-06	249.0	7.62E-04	3.34E-03
92-87-5	Benzidine			249.0		
98-07-7	Benzotrifluoride			249.0		
100-44-7	Benzyl chloride			249.0		
92-52-4	Biphenyl			249.0		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)			249.0		
542-88-1	Bis(chloromethyl) ether			249.0		
75-25-2	Bromoform			249.0		
106-99-0	1,3-Butadiene			249.0		
156-62-7	Calcium cyanamide			249.0		
105-60-2	Caprolactam (Removed 06/18/96, See 61FR30816)			249.0		
133-06-2	Captan			249.0		
63-25-2	Carbaryl			249.0		
75-15-0	Carbon disulfide			249.0		
56-23-5	Carbon tetrachloride			249.0		
463-58-1	Carbonyl sulfide			249.0		
120-80-9	Catechol			249.0		
133-90-4	Chloramben			249.0		
57-74-9	Chlordane			249.0		
7782-50-5	Chlone			249.0		
79-11-8	Chloroacetic acid			249.0		
532-27-4	2-Chloroacetophenone			249.0		
108-90-7	Chlorobenzene			249.0		
510-15-6	Chlorobenzilate			249.0		
67-66-3	Chloroform			249.0		
107-30-2	Chloromethyl methyl ether			249.0		
126-99-8	Chloroprene			249.0		
1319-77-3	Cresol/Cresylic acid (isomers and mixture)			249.0		
95-48-7	o-Cresol			249.0		
108-39-4	m-Cresol			249.0		
106-44-5	p-Cresol			249.0		
98-82-8	Cumene			249.0		
94-75-7	2,4-D. salts and esters			249.0		
72-55-9	DDT (1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)			249.0		
334-88-3	Diazomethane			249.0		
132-64-9	Dibenzofuran			249.0		
96-12-8	1,2-Dibromo-3-chloropropane			249.0		
84-74-2	Dibutyl phthalate			249.0		
106-46-7	1,4-Dichlorobenzene			249.0		
91-94-1	Dichlorobenzidine			249.0		
111-44-4	Dichloroethyl ether (Bis[2-chloroethyl] ether)			249.0		
542-75-6	1,3-Dichloropropene			249.0		
62-73-7	Dichlorvos			249.0		
111-42-2	Diethanolamine			249.0		
64-67-5	Diethyl sulfate			249.0		
119-90-4	3,3'-Dimethoxybenzidine			249.0		
60-11-7	4-Dimethylaminoazobenzene			249.0		
121-69-7	N,N-Dimethylaniline			249.0		
119-93-7	3,3'-Dimethylbenzidine			249.0		
79-44-7	Dimethylcarbamoyl chloride			249.0		
68-12-2	N,N-Dimethylformamide			249.0		
57-14-7	1,1-Dimethylhydrazine			249.0		
131-11-3	Dimethyl phthalate			249.0		
77-78-1	Dimethyl sulfate			249.0		
534-52-1	4,6-Dinitro-o-cresol (including salts)			249.0		
51-28-5	2,4-Dinitrophenol			249.0		
121-14-2	2,4-Dinitrotoluene			249.0		
123-91-1	1,4-Dioxane (1,4-Dioxolene oxide)			249.0		
122-66-7	1,2-Diphenylhydrazine			249.0		
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)			249.0		
106-88-7	1,2-Epoxybutane			249.0		
140-88-5	Ethyl acrylate			249.0		
100-41-4	Ethylbenzene			249.0		
51-79-6	Ethyl carbamate (Urethane)			249.0		
75-00-3	Ethyl chloride (Chloroethane)			249.0		
106-93-4	Ethylene dibromide (Dibromoethane)			249.0		
107-06-2	Ethylene dichloride (1,2-Dichloroethane)			249.0		
107-21-1	Ethylene glycol			249.0		



**Attachment S-1b  
Air Toxic Emissions for Boiler**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
151-56-4	Ethyleneimine (Aziridine)			249.0		
75-21-8	Ethylene oxide			249.0		
96-45-7	Ethylene thiourea			249.0		
75-34-3	Ethylene dichloride (1,1-Dichloroethane)			249.0		
50-00-0	Formaldehyde	1994 Waiuku 7 Test Data	4.14E-06	249.0	1.03E-03	4.52E-03
76-44-8	Heptachlor			249.0		
118-74-1	Hexachlorobenzene			249.0		
87-68-3	Hexachlorobutadiene			249.0		
77-47-4	Hexachlorocyclopentadiene			249.0		
67-72-1	Hexachloroethane			249.0		
822-06-0	Hexamethylene diisocyanate			249.0		
680-31-9	Hexamethylphosphoramide			249.0		
110-54-3	Hexane			249.0		
302-01-2	Hydrazine			249.0		
7647-01-0	Hydrochloric acid (Hydrogen chloride (gas only))			249.0		
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)			249.0		
123-31-9	Hydroquinone			249.0		
78-59-1	Isophorone			249.0		
58-89-9	Lindane (all isomers)			249.0		
108-31-6	Maleic anhydride			249.0		
67-56-1	Methanol			249.0		
72-43-5	Methoxychlor			249.0		
74-83-9	Methyl bromide (Bromomethane)			249.0		
74-87-3	Methyl chloride (Chloromethane)			249.0		
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)			249.0		
78-93-3	Methyl ethyl ketone (2-Butanone)(Removed 12/19/05. See 70FR75047)			249.0		
60-34-4	Methylhydrazine			249.0		
74-88-4	Methyl iodide (Iodomethane)			249.0		
108-10-1	Methyl isobutyl ketone (Hexone)			249.0		
624-83-9	Methyl isocyanate			249.0		
80-62-6	Methyl methacrylate			249.0		
1634-04-4	Methyl tert-butyl ether			249.0		
101-14-4	4,4'-Methylenebis(2-chloroaniline)			249.0		
75-09-2	Methylene chloride (Dichloromethane)			249.0		
101-68-8	4,4'-Methylenediphenyl diisocyanate (MDI)			249.0		
101-77-9	4,4'-Methylenedianiline			249.0		
91-20-3	Naphthalene			249.0		
98-95-3	Nitrobenzene			249.0		
92-93-3	4-Nitrobiphenyl			249.0		
100-02-7	4-Nitrophenol			249.0		
79-46-9	2-Nitropropane			249.0		
684-93-5	N-Nitroso-N-methylurea			249.0		
62-75-9	N-Nitrosodimethylamine			249.0		
59-89-2	N-Nitrosomorpholine			249.0		
56-38-2	Parathion			249.0		
82-68-8	Pentachloronitrobenzene (Quintobenzene)			249.0		
87-86-5	Pentachlorophenol			249.0		
108-95-2	Phenol			249.0		
106-50-3	p-Phenylenediamine			249.0		
75-44-5	Phosgene			249.0		
7803-51-2	Phosphine			249.0		
7723-14-0	Phosphorus	EPRI PISCES Air Toxic Database	2.66E-06	249.0	6.62E-04	2.90E-03
85-44-9	Phthalic anhydride			249.0		
1336-36-3	Polychlorinated biphenyls (Aroclors)			249.0		
1120-71-4	1,3-Propane sultone			249.0		
57-57-8	beta-Propiolactone			249.0		
123-38-6	Propionaldehyde			249.0		
114-26-1	Propoxur (Baygon)			249.0		
78-87-5	Propylene dichloride (1,2-Dichloropropane)			249.0		
75-56-9	Propylene oxide			249.0		
75-55-8	1,2-Propylenimine (2-Methylaziridine)			249.0		
91-22-5	Quinoline			249.0		
106-51-4	Quinone (p-Benzoquinone)			249.0		
100-42-5	Styrene			249.0		
96-09-3	Styrene oxide			249.0		
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			249.0		
79-34-5	1,1,2,2-Tetrachloroethane			249.0		
127-18-4	Tetrachloroethylene (Perchloroethylene)			249.0		
7550-45-0	Titanium tetrachloride			249.0		
108-88-3	Toluene	EPRI PISCES Air Toxic Database	6.14E-06	249.0	1.53E-03	6.70E-03
95-80-7	Toluene-2,4-diamine			249.0		
584-84-9	2,4-Toluene diisocyanate			249.0		
95-53-4	o-Toluidine			249.0		
8001-35-2	Toxaphene (chlorinated camphene)			249.0		
120-82-1	1,2,4-Trichlorobenzene			249.0		
79-00-5	1,1,2-Trichloroethane			249.0		
79-01-6	Trichloroethylene			249.0		
95-95-4	2,4,5-Trichlorophenol			249.0		
88-06-2	2,4,6-Trichlorophenol			249.0		
121-44-8	Triethylamine			249.0		
1582-09-8	Trifuralin			249.0		
540-84-1	2,2,4-Trimethylpentane			249.0		

**Attachment S-1b  
Air Toxic Emissions for Boiler**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
108-05-4	Vinyl acetate			249.0		
593-60-2	Vinyl bromide			249.0		
75-01-4	Vinyl chloride			249.0		
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)			249.0		
1330-20-7	Xylene (mixed isomers)			249.0		
95-47-6	o-Xylene			249.0		
108-38-3	m-Xylene			249.0		
106-42-3	p-Xylene			249.0		
	Antimony Compounds	EPRI PISCES Air Toxic Database	4.75E-06	249.0	1.18E-03	5.18E-03
	Arsenic Compounds (inorganic including arsine)	EPRI PISCES Air Toxic Database	3.38E-06	249.0	8.42E-04	3.69E-03
	Beryllium Compounds	EPRI PISCES Air Toxic Database	1.27E-07	249.0	3.16E-05	1.39E-04
	Cadmium Compounds	1994 Wai'au 7 Test Data	2.26E-06	249.0	5.63E-04	2.46E-03
	Chromium Compounds	EPRI PISCES Air Toxic Database	4.07E-07	249.0	1.01E-04	4.44E-04
	Cobalt Compounds	1994 Wai'au 7 Test Data	2.16E-05	249.0	5.38E-03	2.36E-02
	Coke Oven Emissions			249.0		
	Cyanide Compounds <sup>1</sup>			249.0		
	Glycol ethers <sup>3</sup>			249.0		
	Lead Compounds	EPRI PISCES Air Toxic Database	5.28E-06	249.0	1.31E-03	5.76E-03
	Manganese Compounds	EPRI PISCES Air Toxic Database	2.34E-05	249.0	5.83E-03	2.55E-02
	Mercury Compounds	EPRI PISCES Air Toxic Database	4.98E-06	249.0	1.24E-03	5.43E-03
	Fine mineral fibers <sup>4</sup>			249.0		
	Nickel Compounds	1994 Wai'au 7 Test Data	1.30E-03	249.0	3.24E-01	1.42E+00
	Polycyclic Organic Matter <sup>5</sup>	EPRI PISCES Air Toxic Database	3.60E-06	249.0	8.96E-04	3.93E-03
	Radionuclides (including radon) <sup>6</sup>			249.0		
	Selenium Compounds	EPRI PISCES Air Toxic Database	1.80E-06	249.0	4.48E-04	1.96E-03
	<b>Total</b>				<b>0.35</b>	<b>1.52</b>

**Notes:**

- For all listings above which contain the word "compounds" and for glycol ethers, the following applies. Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.
- X-CN where X = H<sup>+</sup> or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
- Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol, R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where n = 1, 2, or 3 and R = alkyl or aryl groups.
- Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
- Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
- A type of atom which spontaneously undergoes radioactive decay.

**Attachment S-1b  
Air Toxic Emissions for Boiler  
Specification Used Oils**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/1000 gal)	Hourly Usage (gal)	Annual Usage (gal)	Emissions (lb/yr)	Emissions (tpy)
75-07-0	Acetaldehyde			90	200,000		
60-35-5	Acetamide			90	200,000		
75-05-8	Acetonitrile			90	200,000		
98-86-2	Acetophenone			90	200,000		
53-96-3	2-Acetylaminofluorene			90	200,000		
107-02-8	Acrolein			90	200,000		
79-06-1	Acrylamide			90	200,000		
79-10-7	Acrylic acid			90	200,000		
107-13-1	Acrylonitrile			90	200,000		
107-05-1	Allyl chloride			90	200,000		
92-67-1	4-Aminobiphenyl			90	200,000		
62-53-3	Aniline			90	200,000		
90-04-0	o-Anisidine			90	200,000		
1332-21-4	Asbestos			90	200,000		
71-43-2	Benzene (including benzene from gasoline)			90	200,000		
92-87-5	Benidine			90	200,000		
98-07-7	Benzonitrile			90	200,000		
100-44-7	Benzyl chloride			90	200,000		
92-52-4	Biphenyl			90	200,000		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)			90	200,000		
542-88-1	Bis(chloromethyl) ether			90	200,000		
75-25-2	Bromoform			90	200,000		
106-99-0	1,3-Butadiene			90	200,000		
156-62-7	Calcium cyanamide			90	200,000		
105-60-2	Caprolactam (Removed 06/18/96, See 61FR30816)			90	200,000		
133-06-2	Captan			90	200,000		
63-25-2	Carbaryl			90	200,000		
75-15-0	Carbon disulfide			90	200,000		
56-23-5	Carbon tetrachloride			90	200,000		
463-58-1	Carbonyl sulfide			90	200,000		
120-80-9	Catechol			90	200,000		
133-90-4	Chloramben			90	200,000		
57-74-9	Chlordane			90	200,000		
7782-50-5	Chlorne			90	200,000		
79-11-8	Chloroacetic acid			90	200,000		
532-27-4	2-Chloroacetophenone			90	200,000		
108-90-7	Chlorobenzene			90	200,000		
510-15-6	Chlorobenzilate			90	200,000		
67-66-3	Chloroform			90	200,000		
107-30-2	Chloromethyl methyl ether			90	200,000		
126-99-8	Chloroprene			90	200,000		
1319-77-3	Cresol/Cresylic acid (isomers and mixture)			90	200,000		
95-48-7	o-Cresol			90	200,000		
108-39-4	m-Cresol			90	200,000		
106-44-5	p-Cresol			90	200,000		
98-82-8	Cumene			90	200,000		
94-75-7	2,4-D, salts and esters			90	200,000		
72-55-9	DDE (1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)			90	200,000		
334-88-3	Diazomethane			90	200,000		
132-64-9	Dibenzofuran			90	200,000		
96-12-8	1,2-Dibromo-3-chloropropane			90	200,000		
84-74-2	Dibutyl phthalate			90	200,000		
106-46-7	1,4-Dichlorobenzene			90	200,000		
91-94-1	Dichlorobenzidine			90	200,000		
111-44-4	Dichloroethyl ether (Bis[2-chloroethyl] ether)			90	200,000		
542-75-6	1,3-Dichloropropene			90	200,000		
62-73-7	Dichlorvos			90	200,000		
111-42-2	Diethanolamine			90	200,000		
64-67-5	Diethyl sulfate			90	200,000		
119-90-4	3,3'-Dimethoxybenzidine			90	200,000		
60-11-7	4-Dimethylaminoazobenzene			90	200,000		
121-69-7	N,N-Dimethylaniline			90	200,000		
119-93-7	3,3'-Dimethylbenzidine			90	200,000		
79-44-7	Dimethylcarbamoyl chloride			90	200,000		
68-12-2	N,N-Dimethylformamide			90	200,000		
57-14-7	1,1-Dimethylhydrazine			90	200,000		
131-11-3	Dimethyl phthalate			90	200,000		
77-78-1	Dimethyl sulfate			90	200,000		
534-52-1	4,6-Dinitro-o-cresol (including salts)			90	200,000		
51-28-5	2,4-Dinitrophenol			90	200,000		
121-14-2	2,4-Dinitrotoluene			90	200,000		
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)			90	200,000		
122-66-7	1,2-Diphenylhydrazine			90	200,000		
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)			90	200,000		
106-88-7	1,2-Epoxybutane			90	200,000		
140-88-5	Ethyl acrylate			90	200,000		
100-41-4	Ethylbenzene			90	200,000		
51-79-6	Ethyl carbamate (Urethane)			90	200,000		
75-00-3	Ethyl chloride (Chloroethane)			90	200,000		
106-93-4	Ethylene dibromide (Dibromoethane)			90	200,000		

**Attachment S-1b  
Air Toxic Emissions for Boiler  
Specification Used Oils**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/1000 gal)	Hourly Usage (gal)	Annual Usage (gal)	Emissions (lb/yr)	Emissions (tpy)
107-06-2	Ethylene dichloride (1,2-Dichloroethane)			90	200,000		
107-21-1	Ethylene glycol			90	200,000		
151-56-4	Ethylenimine (Aziridine)			90	200,000		
75-21-8	Ethylene oxide			90	200,000		
96-45-7	Ethylene thiourea			90	200,000		
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)			90	200,000		
50-00-0	Formaldehyde			90	200,000		
76-44-8	Heptachlor			90	200,000		
118-74-1	Hexachlorobenzene			90	200,000		
87-68-3	Hexachlorobutadiene			90	200,000		
77-47-4	Hexachlorocyclopentadiene			90	200,000		
67-72-1	Hexachloroethane			90	200,000		
822-06-0	Hexamethylene diisocyanate			90	200,000		
680-31-9	Hexamethylphosphoramide			90	200,000		
110-54-3	Hexane			90	200,000		
302-01-2	Hydrazine			90	200,000		
7647-01-0	Hydrochloric acid (Hydrogen chloride [gas only])	AP-42, Section 1.11, Table 1.11.3	3.30E-02	90	200,000	6600	3.30E-03
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)			90	200,000		
123-31-9	Hydroquinone			90	200,000		
78-59-1	Isophorone			90	200,000		
58-89-9	Lindane (all isomers)			90	200,000		
108-31-6	Maleic anhydride			90	200,000		
67-56-1	Methanol			90	200,000		
72-43-5	Methoxychlor			90	200,000		
74-83-9	Methyl bromide (Bromomethane)			90	200,000		
74-87-3	Methyl chloride (Chloromethane)			90	200,000		
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)			90	200,000		
78-93-3	Methyl ethyl ketone (2-Butanone)(Removed 12/19/05. See 70FR75047)			90	200,000		
60-34-4	Methylhydrazine			90	200,000		
74-88-4	Methyl iodide (Iodomethane)			90	200,000		
108-10-1	Methyl isobutyl ketone(Hexone)			90	200,000		
624-83-9	Methyl isocyanate			90	200,000		
80-62-6	Methyl methacrylate			90	200,000		
1634-04-4	Methyl tert-butyl ether			90	200,000		
101-14-4	4,4'-Methylenebis(2-chloroaniline)			90	200,000		
75-09-2	Methylene chloride (Dichloromethane)			90	200,000		
101-68-8	4,4'-Methylenediphenyl diisocyanate(MDI)			90	200,000		
101-77-9	4,4'-Methylenedianiline			90	200,000		
91-20-3	Naphthalene			90	200,000		
98-95-3	Nitrobenzene			90	200,000		
92-93-3	4-Nitrobiphenyl			90	200,000		
100-02-7	4-Nitrophenol			90	200,000		
79-46-9	2-Nitropropane			90	200,000		
684-93-5	N-Nitroso-N-methylurea			90	200,000		
62-75-9	N-Nitrosodimethylamine			90	200,000		
59-89-2	N-Nitrosomorpholine			90	200,000		
56-38-2	Parathion			90	200,000		
82-68-8	Pentachloronitrobenzene (Quintobenzene)			90	200,000		
87-86-5	Pentachlorophenol			90	200,000		
108-95-2	Phenol			90	200,000		
106-50-3	p-Phenylenediamine			90	200,000		
75-44-5	Phosgene			90	200,000		
7803-51-2	Phosphine			90	200,000		
7723-14-0	Phosphorus	AP-42, Section 1.11, Table 1.11.4	ND	90	200,000	ND	ND
85-44-9	Phthalic anhydride			90	200,000		
1336-36-3	Polychlorinated biphenyls (Aroclors)			90	200,000		
1120-71-4	1,3-Propane sultone			90	200,000		
57-57-8	beta-Propiolactone			90	200,000		
123-38-6	Propionaldehyde			90	200,000		
114-26-1	Propoxur (Baygon)			90	200,000		
78-87-5	Propylene dichloride (1,2-Dichloropropane)			90	200,000		
75-56-9	Propylene oxide			90	200,000		
75-55-8	1,2-Propylenimine (2-Methylaziridine)			90	200,000		
91-22-5	Quinoline			90	200,000		
106-51-4	Quinone (p-Benzoquinone)			90	200,000		
100-42-5	Styrene			90	200,000		
96-09-3	Styrene oxide			90	200,000		
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			90	200,000		
79-34-5	1,1,2,2-Tetrachloroethane			90	200,000		
127-18-4	Tetrachloroethylene (Perchloroethylene)			90	200,000		
7550-45-0	Titanium tetrachloride			90	200,000		
108-88-3	Toluene			90	200,000		
95-80-7	Toluene-2,4-diamine			90	200,000		
584-84-9	2,4-Toluene diisocyanate			90	200,000		
95-53-4	o-Toluidine			90	200,000		
8001-35-2	Toxaphene (chlorinated camphene)			90	200,000		
120-82-1	1,2,4-Trichlorobenzene			90	200,000		
79-00-5	1,1,2-Trichloroethane			90	200,000		
79-01-6	Trichloroethylene			90	200,000		
95-95-4	2,4,5-Trichlorophenol			90	200,000		

**Attachment S-1b  
Air Toxic Emissions for Boiler  
Specification Used Oils**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/1000 gal)	Hourly Usage (gal)	Annual Usage (gal)	Emissions (lb/yr)	Emissions (tpy)
88-06-2	2,4,6-Trichlorophenol			90	200,000		
121-44-8	Triethylamine			90	200,000		
1582-09-8	Trifluralin			90	200,000		
540-84-1	2,2,4-Trimethylpentane			90	200,000		
108-05-4	Vinyl acetate			90	200,000		
593-60-2	Vinyl bromide			90	200,000		
75-01-4	Vinyl chloride			90	200,000		
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)			90	200,000		
1330-20-7	Xylene (mixed isomers)			90	200,000		
95-47-6	o-Xylene			90	200,000		
108-38-3	m-Xylene			90	200,000		
106-42-3	p-Xylene			90	200,000		
	Antimony Compounds	AP-42, Section 1.11, Table 1.11-4	ND	90	200,000	ND	ND
	Arsenic Compounds (inorganic including arsine)	AP-42, Section 1.11, Table 1.11-4	1.10E-01	90	200,000	22000	1.10E-02
	Beryllium Compounds	AP-42, Section 1.11, Table 1.11-4	ND	90	200,000	ND	ND
	Cadmium Compounds	AP-42, Section 1.11, Table 1.11-4	9.30E-03	90	200,000	1860	9.30E-04
	Chromium Compounds	AP-42, Section 1.11, Table 1.11-4	2.00E-02	90	200,000	4000	2.00E-03
	Cobalt Compounds	AP-42, Section 1.11, Table 1.11-4	2.10E-04	90	200,000	42	2.10E-05
	Coke Oven Emissions			90	200,000		
	Cyanide Compounds <sup>2</sup>			90	200,000		
	Glycol ethers <sup>3</sup>			90	200,000		
	Lead Compounds			90	200,000		
	Manganese Compounds	AP-42, Section 1.11, Table 1.11-4	6.80E-02	90	200,000	13600	6.80E-03
	Mercury Compounds			90	200,000		
	Fine mineral fibers <sup>4</sup>			90	200,000		
	Nickel Compounds	AP-42, Section 1.11, Table 1.11-4	1.10E-02	90	200,000	2200	1.10E-03
	Polycyclic Organic Matter <sup>5</sup>			90	200,000		
	Radionuclides (including radon) <sup>6</sup>			90	200,000		
	Selenium Compounds	AP-42, Section 1.11, Table 1.11-4	ND	90	200,000	ND	ND
	<b>Total</b>				<b>200,000</b>	<b>5.03E+04</b>	<b>2.52E-02</b>

\*For HCl, use weight percent chlorine in fuel and multiply emission factor by this percent to obtain final emission factor (maximum weight percent assumed is 0.05%)

ND = no data (as noted in AP-42, Table 1.11-4)

**Notes**

- For all listings above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.
- X-CN where X = H' or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
- Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol, R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where:  
 n = 1, 2, or 3  
 R = alkyl or aryl groups  
 R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OH. Polymers are excluded from the glycol category.
- Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
- Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
- A type of atom which spontaneously undergoes radioactive decay.

**Attachment S-1b  
Air Toxic Emissions for CT-3**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
75-07-0	Acetaldehyde	AP-42, Section 3.4 Table 3.4-3	2.52E-05	275.0	6.93E-03	3.04E-02
60-35-5	Acetamide			275.0		
75-05-8	Acetonitrile			275.0		
98-86-2	Acetophenone			275.0		
53-96-3	2-Acetylaminofluorene			275.0		
107-02-8	Acrolein	AP-42, Section 3.4 Table 3.4-3	7.88E-06	275.0	2.17E-03	9.49E-03
79-06-1	Acrylamide			275.0		
79-10-7	Acrylic acid			275.0		
107-13-1	Acrylonitrile			275.0		
107-05-1	Allyl chloride			275.0		
92-67-1	4-Aminobiphenyl			275.0		
62-53-3	Aniline			275.0		
90-04-0	o-Anisidine			275.0		
1332-21-4	Asbestos			275.0		
71-43-2	Benzene (including benzene from gasoline)	AP-42, Section 3.1, Table 3.1-4	5.50E-05	275.0	1.51E-02	6.62E-02
92-87-5	Benzidine			275.0		
98-07-7	Benzotrichloride			275.0		
100-44-7	Benzyl chloride			275.0		
92-52-4	Biphenyl			275.0		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)			275.0		
542-88-1	Bis(chloromethyl) ether			275.0		
75-25-2	Bromoform			275.0		
106-99-0	1,3-Butadiene	AP-42, Section 3.1, Table 3.1-4	1.60E-05	275.0	4.40E-03	1.93E-02
156-62-7	Calcium cyanamide			275.0		
105-60-2	Caprolactam (Removed 06/18/96. See 61FR30816)			275.0		
133-06-2	Captan			275.0		
63-25-2	Carbaryl			275.0		
75-15-0	Carbon disulfide			275.0		
56-23-5	Carbon tetrachloride			275.0		
463-58-1	Carbonyl sulfide			275.0		
120-80-9	Catechol			275.0		
133-90-4	Chloramben			275.0		
57-74-9	Chlordane			275.0		
7782-50-5	Chlone			275.0		
79-11-8	Chloroacetic acid			275.0		
532-27-4	2-Chloroacetophenone			275.0		
108-90-7	Chlorobenzene			275.0		
510-15-6	Chlorobenzilate			275.0		
67-66-3	Chloroform			275.0		
107-30-2	Chloromethyl methyl ether			275.0		
126-99-8	Chloroprene			275.0		
1319-77-3	Cresol/Cresylic acid (mixed isomers)			275.0		
95-48-7	o-Cresol			275.0		
108-39-4	m-Cresol			275.0		
106-44-5	p-Cresol			275.0		
98-82-8	Cumene			275.0		
94-75-7	2,4-D, salts and esters			275.0		
72-55-9	DDE(1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)			275.0		
334-88-3	Diazomethane			275.0		
132-64-9	Dibenzofuran			275.0		
96-12-8	1,2-Dibromo-3-chloropropane			275.0		
84-74-2	Dibutyl phthalate			275.0		
106-46-7	1,4-Dichlorobenzene			275.0		
91-94-1	Dichlorobenzidine			275.0		
111-44-4	Dichloroethyl ether(Bis[2-chloroethyl]ether)			275.0		
542-75-6	1,3-Dichloropropene			275.0		
62-73-7	Dichlorvos			275.0		
111-42-2	Diethanolamine			275.0		
64-67-5	Diethyl sulfate			275.0		
119-90-4	3,3'-Dimethoxybenzidine			275.0		
60-11-7	4-Dimethylaminoazobenzene			275.0		
121-69-7	N,N-Dimethylaniline			275.0		
119-93-7	3,3'-Dimethylbenzidine			275.0		
79-44-7	Dimethylcarbamoyl chloride			275.0		
68-12-2	N,N-Dimethylformamide			275.0		
57-14-7	1,1-Dimethylhydrazine			275.0		
131-11-3	Dimethyl phthalate			275.0		
77-78-1	Dimethyl sulfate			275.0		
	4,6-Dinitro-o-cresol (including salts)			275.0		
51-28-5	2,4-Dinitrophenol			275.0		
121-14-2	2,4-Dinitrotoluene			275.0		
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)			275.0		
122-66-7	1,2-Diphenylhydrazine			275.0		
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)			275.0		
106-88-7	1,2-Epoxybutane			275.0		
140-88-5	Ethyl acrylate			275.0		
100-41-4	Ethylbenzene			275.0		
51-79-6	Ethyl carbamate (Urethane)			275.0		
75-00-3	Ethyl chloride (Chloroethane)			275.0		
106-93-4	Ethylene dibromide (Dibromoethane)			275.0		
107-06-2	Ethylene dichloride (1,2-Dichloroethane)			275.0		

**Attachment S-1b  
Air Toxic Emissions for CT-3**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
107-21-1	Ethylene glycol			275.0		
151-56-4	Ethylenimine (Aziridine)			275.0		
75-21-8	Ethylene oxide			275.0		
96-45-7	Ethylene thiourea			275.0		
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)			275.0		
50-00-0	Formaldehyde	AP-42, Section 3.1, Table 3.1-4	2.80E-04	275.0	7.70E-02	3.37E-01
76-44-8	Heptachlor			275.0		
118-74-1	Hexachlorobenzene			275.0		
87-68-3	Hexachlorobutadiene			275.0		
77-47-4	Hexachlorocyclopentadiene			275.0		
67-72-1	Hexachloroethane			275.0		
822-06-0	Hexamethylene diisocyanate			275.0		
680-31-9	Hexamethylphosphoramide			275.0		
110-54-3	Hexane			275.0		
302-01-2	Hydrazine			275.0		
7647-01-0	Hydrochloric acid (Hydrogen chloride (gas only))			275.0		
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)			275.0		
123-31-9	Hydroquinone			275.0		
78-59-1	Isophorone			275.0		
58-89-9	Lindane (all isomers)			275.0		
108-31-6	Maleic anhydride			275.0		
67-56-1	Methanol			275.0		
72-43-5	Methoxychlor			275.0		
74-83-9	Methyl bromide (Bromomethane)			275.0		
74-87-3	Methyl chloride (Chloromethane)			275.0		
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)			275.0		
78-93-3	Methyl ethyl ketone (2-Butanone) (Removed 12/19/05. See 70FR75047)			275.0		
60-34-4	Methylhydrazine			275.0		
74-88-4	Methyl iodide (Iodomethane)			275.0		
108-10-1	Methyl isobutyl ketone (Hexone)			275.0		
624-83-9	Methyl isocyanate			275.0		
80-62-6	Methyl methacrylate			275.0		
1634-04-4	Methyl tert-butyl ether			275.0		
101-14-4	4,4'-Methylenebis(2-chloroaniline)			275.0		
75-09-2	Methylene chloride (Dichloromethane)			275.0		
101-68-8	4,4'-Methylenediphenyl diisocyanate (MDI)			275.0		
101-77-9	4,4'-Methylenedianiline			275.0		
91-20-3	Naphthalene	AP-42, Section 3.1, Table 3.1-4	3.50E-05	275.0	9.63E-03	4.22E-02
98-95-3	Nitrobenzene			275.0		
92-93-3	4-Nitrophenyl			275.0		
100-02-7	4-Nitrophenol			275.0		
79-46-9	2-Nitropropane			275.0		
684-93-5	N-Nitroso-N-methylurea			275.0		
62-75-9	N-Nitrosodimethylamine			275.0		
59-89-2	N-Nitrosomorpholine			275.0		
56-38-2	Parathion			275.0		
82-68-8	Pentachloronitrobenzene (Quintobenzene)			275.0		
87-86-5	Pentachlorophenol			275.0		
108-95-2	Phenol			275.0		
106-50-3	p-Phenylenediamine			275.0		
75-44-5	Phosgene			275.0		
7803-51-2	Phosphine			275.0		
7723-14-0	Phosphorus			275.0		
85-44-9	Phthalic anhydride			275.0		
1336-36-3	Polychlorinated biphenyls (Aroclors)			275.0		
1120-71-4	1,3-Propane sultone			275.0		
57-57-8	beta-Propiolactone			275.0		
123-38-6	Propionaldehyde			275.0		
114-26-1	Propoxur (Baygon)			275.0		
78-87-5	Propylene dichloride (1,2-Dichloropropane)			275.0		
75-56-9	Propylene oxide			275.0		
75-55-8	1,2-Propylenimine (2-Methylaziridine)			275.0		
91-22-5	Quindline			275.0		
106-51-4	Quinone (p-Benzoquinone)			275.0		
100-42-5	Styrene			275.0		
96-09-3	Styrene oxide			275.0		
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			275.0		
79-34-5	1,1,2,2-Tetrachloroethane			275.0		
127-18-4	Tetrachloroethylene (Perchloroethylene)			275.0		
7550-45-0	Titanium tetrachloride			275.0		
108-88-3	Toluene	AP-42, Section 3.4, Table 3.4-3	2.81E-04	275.0	7.73E-02	3.38E-01
95-80-7	Toluene-2,4-diamine			275.0		
584-84-9	2,4-Toluene diisocyanate			275.0		
95-53-4	o-Toluidine			275.0		
8001-35-2	Toxaphene (chlorinated camphene)			275.0		
120-82-1	1,2,4-Trichlorobenzene			275.0		
79-00-5	1,1,2-Trichloroethane			275.0		
79-01-6	Trichloroethylene			275.0		
95-95-4	2,4,5-Trichlorophenol			275.0		
88-06-2	2,4,6-Trichlorophenol			275.0		

**Attachment S-1b  
Air Toxic Emissions for CT-3**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
121-44-8	Triethylamine			275.0		
1582-09-8	Trifluralin			275.0		
540-84-1	2,2,4-Trimethylpentane			275.0		
108-05-4	Vinyl acetate			275.0		
593-60-2	Vinyl bromide			275.0		
75-01-4	Vinyl chloride			275.0		
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)			275.0		
1330-20-7	Xylene (mixed isomers)	AP-42, Section 3.4, Table 3.4.3	1.93E-04	275.0	5.31E-02	2.32E-01
95-47-6	o-Xylene			275.0		
108-38-3	m-Xylene			275.0		
106-42-3	p-Xylene			275.0		
	Antimony Compounds			275.0		
	Arsenic Compounds (inorganic including arsine)	AP-42, Section 3.1, Table 3.1.5	1.10E-05	275.0	3.03E-03	1.32E-02
	Beryllium Compounds	AP-42, Section 3.1, Table 3.1.5	3.10E-07	275.0	8.53E-05	3.73E-04
	Cadmium Compounds	AP-42, Section 3.1, Table 3.1.5	4.80E-06	275.0	1.32E-03	5.78E-03
	Chromium Compounds	AP-42, Section 3.1, Table 3.1.5	1.10E-05	275.0	3.03E-03	1.32E-02
	Cobalt Compounds			275.0		
	Coke Oven Emissions			275.0		
	Cyanide Compounds <sup>2</sup>			275.0		
	Glycol ethers <sup>3</sup>			275.0		
	Lead Compounds	AP-42, Section 3.1, Table 3.1.5	1.40E-05	275.0	3.85E-03	1.69E-02
	Manganese Compounds	AP-42, Section 3.1, Table 3.1.5	7.90E-04	275.0	2.17E-01	9.52E-01
	Mercury Compounds	AP-42, Section 3.1, Table 3.1.5	1.20E-06	275.0	3.30E-04	1.45E-03
	Fine mineral fibers <sup>4</sup>			275.0		
	Nickel Compounds	AP-42, Section 3.1, Table 3.1.5	4.60E-06	275.0	1.27E-03	5.54E-03
	Polycyclic Organic Matter <sup>5</sup>	AP-42, Section 3.1, Table 3.1.4	4.00E-05	275.0	1.10E-02	4.82E-02
	Radionuclides (including radon) <sup>6</sup>			275.0		
	Selenium Compounds	AP-42, Section 3.1, Table 3.1.5	2.50E-05	275.0	6.88E-03	3.01E-02
	<b>Total</b>				<b>0.49</b>	<b>2.16</b>

**Notes:**

- For all listings above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e. antimony, arsenic, etc.) as part of that chemical's infrastructure.
- X<sup>n</sup>CN where X = H<sup>+</sup> or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
- Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol, R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where n = 1, 2, or 3  
R = alkyl or aryl groups  
R' = R, H, or groups which, when removed, yield glycol ethers with the structure R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OH. Polymers are excluded from the glycol category.
- Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
- Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
- A type of atom which spontaneously undergoes radioactive decay.



**Attachment S-1b  
Air Toxic Emissions for PBSG1**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
75-07-0	Acetaldehyde	AP-42, Section 3.4, Table 3.4.3	2.52E-05	6.34	1.60E-04	2.40E-05
60-35-5	Acetamide			6.34		
75-05-8	Acetonitrile			6.34		
98-86-2	Acetophenone			6.34		
53-96-3	2-Acetylaminofluorene			6.34		
107-02-8	Acrolein	AP-42, Section 3.4, Table 3.4.3	7.88E-06	6.34	5.00E-05	7.49E-06
79-06-1	Acrylamide			6.34		
79-10-7	Acrylic acid			6.34		
107-13-1	Acrylonitrile			6.34		
107-05-1	Allyl chloride			6.34		
92-67-1	4-Aminobiphenyl			6.34		
62-53-3	Aniline			6.34		
90-04-0	o-Anisidine			6.34		
1332-21-4	Asbestos			6.34		
71-43-2	Benzene (including benzene from gasoline)	AP-42, Section 3.4, Table 3.4.3	7.76E-04	6.34	4.92E-03	7.38E-04
92-87-5	Benzidine			6.34		
98-07-7	Benzotrithione			6.34		
100-44-7	Benzyl chloride			6.34		
92-52-4	Biphenyl			6.34		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)			6.34		
542-88-1	Bis(chloromethyl) ether			6.34		
75-25-2	Bromoform			6.34		
106-99-0	1,3-Butadiene	AP-42, Section 3.1, Table 3.1.4	1.60E-05	6.34	1.01E-04	1.52E-05
156-62-7	Calcium cyanamide			6.34		
105-60-2	Caprolactam (Removed 06/18/96. See 61FR30816)			6.34		
133-08-2	Captan			6.34		
63-25-2	Carbaryl			6.34		
75-15-0	Carbon disulfide			6.34		
56-23-5	Carbon tetrachloride			6.34		
463-58-1	Carbonyl sulfide			6.34		
120-80-9	Catechol			6.34		
133-90-4	Chloramben			6.34		
57-74-9	Chlordane			6.34		
7782-50-5	Chlone			6.34		
79-11-8	Chloroacetic acid			6.34		
532-27-4	2-Chloroacetophenone			6.34		
108-90-7	Chlorobenzene			6.34		
510-15-6	Chlorobenzilate			6.34		
67-66-3	Chloroform			6.34		
107-30-2	Chloromethyl methyl ether			6.34		
126-99-8	Chloroprene			6.34		
1319-77-3	Cresol/Cresylic acid(mixed isomers)			6.34		
95-48-7	o-Cresol			6.34		
108-39-4	m-Cresol			6.34		
106-44-5	p-Cresol			6.34		
98-82-8	Cumene			6.34		
94-75-7	2,4-D, salts and esters			6.34		
72-55-9	DDE(1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)			6.34		
334-88-3	Diazomethane			6.34		
132-64-9	Dibenzofuran			6.34		
96-12-8	1,2-Dibromo-3-chloropropane			6.34		
84-74-2	Dibutyl phthalate			6.34		
106-46-7	1,4-Dichlorobenzene			6.34		
91-94-1	Dichlorobenzidine			6.34		
111-44-4	Dichloroethyl ether(Bis[2-chloroethyl]ether)			6.34		
542-75-6	1,3-Dichloropropene			6.34		
62-73-7	Dichlorvos			6.34		
111-42-2	Diethanolamine			6.34		
64-67-5	Diethyl sulfate			6.34		
119-90-4	3,3'-Dimethoxybenzidine			6.34		
60-11-7	4-Dimethylaminoazobenzene			6.34		
121-69-7	N,N-Dimethylaniline			6.34		
119-93-7	3,3'-Dimethylbenzidine			6.34		
79-44-7	Dimethylcarbamoyl chloride			6.34		
68-12-2	N,N-Dimethylformamide			6.34		
57-14-7	1,1-Dimethylhydrazine			6.34		
131-11-3	Dimethyl phthalate			6.34		
77-78-1	Dimethyl sulfate			6.34		
534-52-1	4,6-Dinitro-o-cresol (including salts)			6.34		
51-28-5	2,4-Dinitrophenol			6.34		
121-14-2	2,4-Dinitrotoluene			6.34		
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)			6.34		
122-86-7	1,2-Diphenylhydrazine			6.34		
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)			6.34		
106-88-7	1,2-Epoxybutane			6.34		
140-88-5	Ethyl acrylate			6.34		
100-41-4	Ethylbenzene			6.34		
51-79-6	Ethyl carbamate (Urethane)			6.34		
75-00-3	Ethyl chloride (Chloroethane)			6.34		
106-93-4	Ethylene dibromide (Dibromoethane)			6.34		
107-06-2	Ethylene dichloride (1,2-Dichloroethane)			6.34		

**Attachment S-1b  
Air Toxic Emissions for PBSG1**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
107-21-1	Ethylene glycol			6.34		
151-56-4	Ethyleneimine (Aziridine)			6.34		
75-21-8	Ethylene oxide			6.34		
96-45-7	Ethylene thiourea			6.34		
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)			6.34		
50-00-0	Formaldehyde	AP-42, Section 3.4 Table 3.4-3	7.89E-05	6.34	5.00E-04	7.50E-05
76-44-8	Heptachlor			6.34		
118-74-1	Hexachlorobenzene			6.34		
87-68-3	Hexachlorobutadiene			6.34		
77-47-4	Hexachlorocyclopentadiene			6.34		
67-72-1	Hexachloroethane			6.34		
822-06-0	Hexamethylene diisocyanate			6.34		
680-31-9	Hexamethylphosphoramide			6.34		
110-54-3	Hexane			6.34		
302-01-2	Hydrazine			6.34		
7647-01-0	Hydrochloric acid (Hydrogen chloride (gas only))			6.34		
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)			6.34		
123-31-9	Hydroquinone			6.34		
78-59-1	isophorone			6.34		
58-89-9	Lindane (all isomers)			6.34		
108-31-6	Maleic anhydride			6.34		
67-56-1	Methanol			6.34		
72-43-5	Methoxychlor			6.34		
74-83-9	Methyl bromide (Bromomethane)			6.34		
74-87-3	Methyl chloride (Chloromethane)			6.34		
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)			6.34		
78-93-3	Methyl ethyl ketone (2-Butanone)(Removed 12/19/05. See 70FR75047)			6.34		
60-34-4	Methylhydrazine			6.34		
74-88-4	Methyl iodide (Iodomethane)			6.34		
108-10-1	Methyl isobutyl ketone(Hexone)			6.34		
624-83-9	Methyl isocyanate			6.34		
80-62-6	Methyl methacrylate			6.34		
1634-04-4	Methyl tert-butyl ether			6.34		
101-14-4	4,4'-Methylenebis(2-chloroaniline)			6.34		
75-09-2	Methylene chloride(Dichloromethane)			6.34		
101-68-8	4,4'-Methylenediphenyl diisocyanate(MDI)			6.34		
101-77-9	4,4'-Methylenedianiline			6.34		
91-20-3	Naphthalene	AP-42, Section 3.4 Table 3.4-4	1.30E-04	6.34	8.24E-04	1.24E-04
98-95-3	Nitrobenzene			6.34		
92-93-3	4-Nitrobiphenyl			6.34		
100-02-7	4-Nitrophenol			6.34		
79-46-9	2-Nitropropane			6.34		
684-93-5	N-Nitroso-N-methylurea			6.34		
62-75-9	N-Nitrosodimethylamine			6.34		
59-89-2	N-Nitrosomorpholine			6.34		
56-38-2	Parathion			6.34		
82-68-8	Pentachloronitrobenzene(Quinobenzene)			6.34		
87-86-5	Pentachlorophenol			6.34		
108-95-2	Phenol			6.34		
106-50-3	p-Phenylenediamine			6.34		
75-44-5	Phosgene			6.34		
7803-51-2	Phosphine			6.34		
7723-14-0	Phosphorus			6.34		
85-44-9	Phthalic anhydride			6.34		
1336-36-3	Polychlorinated biphenyls(Aroclors)			6.34		
1120-71-4	1,3-Propane sulfone			6.34		
57-57-8	beta-Propiolactone			6.34		
123-38-6	Propionaldehyde			6.34		
114-26-1	Propoxur (Baygon)			6.34		
78-87-5	Propylene dichloride (1,2-Dichloropropane)			6.34		
75-56-9	Propylene oxide			6.34		
75-55-8	1,2-Propylenimine (2-Methylaziridine)			6.34		
91-22-5	Quinoline			6.34		
106-51-4	Quinone(p-Benzoquinone)			6.34		
100-42-5	Styrene			6.34		
96-09-3	Styrene oxide			6.34		
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin			6.34		
79-34-5	1,1,2,2-Tetrachloroethane			6.34		
127-18-4	Tetrachloroethylene(Perchloroethylene)			6.34		
7550-45-0	Titanium tetrachloride			6.34		
108-88-3	Toluene	AP-42, Section 3.4 Table 3.4-3	2.81E-04	6.34	1.78E-03	2.67E-04
95-80-7	Toluene-2,4-diamine			6.34		
584-84-9	2,4-Toluene diisocyanate			6.34		
95-53-4	o-Toluidine			6.34		
8001-35-2	Toxaphene (chlorinated camphene)			6.34		
120-82-1	1,2,4-Trichlorobenzene			6.34		
79-00-5	1,1,2-Trichloroethane			6.34		
79-01-6	Trichloroethylene			6.34		
95-95-4	2,4,5-Trichlorophenol			6.34		
88-06-2	2,4,6-Trichlorophenol			6.34		
121-44-8	Trethylamine			6.34		

**Attachment S-1b  
Air Toxic Emissions for PBSG1**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Source of Emission Factor	Emission Factor (lb/MMBtu)	Heat Input (MMBtu/hr)	Emissions (lb/hr)	Emissions (tpy)
1582-09-8	Trifluralin			6.34		
540-84-1	2,2,4-Trimethylpentane			6.34		
108-05-4	Vinyl acetate			6.34		
593-60-2	Vinyl bromide			6.34		
75-01-4	Vinyl chloride			6.34		
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)			6.34		
1330-20-7	Xylene (mixed isomers)	AP-42, Section 3.4, Table 3.4.3	1.93E-04	6.34	1.22E-03	1.84E-04
95-47-6	o-Xylene			6.34		
108-38-3	m-Xylene			6.34		
106-42-3	p-Xylene			6.34		
	Antimony Compounds			6.34		
	Arsenic Compounds (inorganic including arsine)	AP-42, Section 3.1, Table 3.1.5	1.10E-05	6.34	6.97E-05	1.05E-05
	Beryllium Compounds	AP-42, Section 3.1, Table 3.1.5	3.10E-07	6.34	1.97E-06	2.95E-07
	Cadmium Compounds	AP-42, Section 3.1, Table 3.1.5	4.80E-06	6.34	3.04E-05	4.56E-06
	Chromium Compounds	AP-42, Section 3.1, Table 3.1.5	1.10E-05	6.34	6.97E-05	1.05E-05
	Cobalt Compounds			6.34		
	Coke Oven Emissions			6.34		
	Cyanide Compounds <sup>2</sup>			6.34		
	Glycol ethers <sup>3</sup>			6.34		
	Lead Compounds	AP-42, Section 3.1, Table 3.1.5	1.40E-05	6.34	8.88E-05	1.33E-05
	Manganese Compounds	AP-42, Section 3.1, Table 3.1.5	7.90E-04	6.34	5.01E-03	7.51E-04
	Mercury Compounds	AP-42, Section 3.1, Table 3.1.5	1.20E-06	6.34	7.61E-06	1.14E-06
	Fine mineral fibers <sup>4</sup>			6.34		
	Nickel Compounds	AP-42, Section 3.1, Table 3.1.5	4.60E-06	6.34	2.92E-05	4.37E-06
	Polycyclic Organic Matter <sup>5</sup>	AP-42, Section 3.4, Table 3.4.4	2.12E-04	6.34	1.34E-03	2.02E-04
	Radionuclides (including radon) <sup>6</sup>			6.34		
	Selenium Compounds	AP-42, Section 3.1, Table 3.1.5	2.50E-05	6.34	1.59E-04	2.38E-05
	<b>Total</b>				<b>1.64E-02</b>	<b>2.46E-03</b>

**Notes:**

- For all listings above which contain the word "compounds" and for glycol ethers, the following applies. Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.
- X<sup>n</sup>CN where X = H<sup>+</sup> or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
- Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol, R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where n = 1, 2, or 3; R = alkyl or aryl groups; R' = R, H, or groups which, when removed, yield glycol ethers with the structure R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OH. Polymers are excluded from the glycol category.
- Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 μm.
- Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
- A type of atom which spontaneously undergoes radioactive decay.

**Attachment S-1b  
Total Air Toxic Emissions**

SECTION 112 HAZARDOUS AIR POLLUTANTS

CAS Number	Pollutant	Boiler (tpy)	CT-3 (tpy)	PBSG1 (tpy)	Spec Used Oil (tpy)	HAP Totals (tpy)
75-07-0	Acetaldehyde	2.38E-03	3.04E-02	2.40E-05		3.28E-02
60-35-5	Acetamide					
75-05-8	Acetonitrile					
98-86-2	Acetophenone					
53-96-3	2-Acetylaminofluorene					
107-02-8	Acrolein		9.49E-03	7.49E-06		9.50E-03
79-06-1	Acrylamide					
79-10-7	Acrylic acid					
107-13-1	Acrylonitrile					
107-05-1	Allyl chloride					
92-67-1	4-Aminobiphenyl					
62-53-3	Aniline					
90-04-0	o-Anisidine					
1332-21-4	Asbestos					
71-43-2	Benzene (including benzene from gasoline)	3.34E-03	6.62E-02	7.38E-04		7.03E-02
92-87-5	Benzidine					
98-07-7	Benzotrichloride					
100-44-7	Benzyl chloride					
92-52-4	Biphenyl					
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)					
542-88-1	Bis(chloromethyl) ether					
75-25-2	Bromoform					
106-99-0	1,3-Butadiene		1.93E-02	1.52E-05		1.93E-02
156-62-7	Calcium cyanamide					
105-60-2	Caprolactam (Removed 06/18/96. See 61FR30816)					
133-06-2	Captan					
63-25-2	Carbaryl					
75-15-0	Carbon disulfide					
56-23-5	Carbon tetrachloride					
463-58-1	Carbonyl sulfide					
120-80-9	Catechol					
133-90-4	Chloramben					
57-74-9	Chlordane					
7782-50-5	Chlorine					
79-11-8	Chloroacetic acid					
532-27-4	2-Chloroacetophenone					
108-90-7	Chlorobenzene					
510-15-6	Chlorobenzilate					
67-66-3	Chloroform					
107-30-2	Chloromethyl methyl ether					
126-99-8	Chloroprene					
1319-77-3	Cresol/Cresylic acid(mixed isomers)					
95-48-7	o-Cresol					
108-39-4	m-Cresol					
106-44-5	p-Cresol					
98-82-8	Cumene					
94-75-7	2,4-D, salts and esters					
72-55-9	DDE(1,1-dichloro-2,2-bis(p-chlorophenyl) ethylene)					
334-88-3	Diazomethane					
132-64-9	Dibenzofuran					
96-12-8	1,2-Dibromo-3-chloropropane					
84-74-2	Dibutyl phthalate					
106-46-7	1,4-Dichlorobenzene					
91-94-1	Dichlorobenzidine					
111-44-4	Dichloroethyl ether(Bis[2-chloroethyl]ether)					
542-75-6	1,3-Dichloropropene					
62-73-7	Dichlorvos					
111-42-2	Diethanolamine					
64-67-5	Diethyl sulfate					
119-90-4	3,3'-Dimethoxybenzidine					
60-11-7	4-Dimethylaminoazobenzene					
121-69-7	N,N-Dimethylaniline					
119-93-7	3,3'-Dimethylbenzidine					
79-44-7	Dimethylcarbamoyl chloride					
68-12-2	N,N-Dimethylformamide					
57-14-7	1,1-Dimethylhydrazine					
131-11-3	Dimethyl phthalate					
77-78-1	Dimethyl sulfate					
534-52-1	4,6-Dinitro-o-cresol (including salts)					
51-28-5	2,4-Dinitrophenol					
121-14-2	2,4-Dinitrotoluene					
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)					
122-66-7	1,2-Diphenylhydrazine					
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)					

**Attachment S-1b  
Total Air Toxic Emissions**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Boiler (tpy)	CT-3 (tpy)	PBSG1 (tpy)	Spec Used Oil (tpy)	HAP Totals (tpy)
106-88-7	1,2-Epoxybutane					
140-88-5	Ethyl acrylate					
100-41-4	Ethylbenzene					
51-79-6	Ethyl carbamate (Urethane)					
75-00-3	Ethyl chloride (Chloroethane)					
106-93-4	Ethylene dibromide (Dibromoethane)					
107-06-2	Ethylene dichloride (1,2-Dichloroethane)					
107-21-1	Ethylene glycol					
151-56-4	Ethyleneimine (Aziridine)					
75-21-8	Ethylene oxide					
96-45-7	Ethylene thiourea					
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)					
50-00-0	Formaldehyde	4.52E-03	3.37E-01	7.50E-05		3.42E-01
76-44-8	Heptachlor					
118-74-1	Hexachlorobenzene					
87-68-3	Hexachlorobutadiene					
77-47-4	Hexachlorocyclopentadiene					
67-72-1	Hexachloroethane					
822-06-0	Hexamethylene diisocyanate					
680-31-9	Hexamethylphosphoramide					
110-54-3	Hexane					
302-01-2	Hydrazine					
7647-01-0	Hydrochloric acid (Hydrogen chloride [gas only])				3.30E-03	3.30E-03
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)					
123-31-9	Hydroquinone					
78-59-1	Isophorone					
58-89-9	Lindane (all isomers)					
108-31-6	Maleic anhydride					
67-56-1	Methanol					
72-43-5	Methoxychlor					
74-83-9	Methyl bromide (Bromomethane)					
74-87-3	Methyl chloride (Chloromethane)					
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)					
78-93-3	Methyl ethyl ketone (2-Butanone) (Removed 12/19/05, S					
60-34-4	Methylhydrazine					
74-88-4	Methyl iodide (Iodomethane)					
108-10-1	Methyl isobutyl ketone (Hexone)					
624-83-9	Methyl isocyanate					
80-62-6	Methyl methacrylate					
1634-04-4	Methyl tert-butyl ether					
101-14-4	4,4'-Methylenedi(2-chloroaniline)					
75-09-2	Methylene chloride (Dichloromethane)					
101-68-8	4,4'-Methylenediphenyl diisocyanate (MDI)					
101-77-9	4,4'-Methylenedianiline					
91-20-3	Naphthalene		4.22E-02	1.24E-04		4.23E-02
98-95-3	Nitrobenzene					
92-93-3	4-Nitrobiphenyl					
100-02-7	4-Nitrophenol					
79-46-9	2-Nitropropane					
684-93-5	N-Nitroso-N-methylurea					
62-75-9	N-Nitrosodimethylamine					
59-89-2	N-Nitrosomorpholine					
56-38-2	Parathion					
82-69-8	Pentachloronitrobenzene (Quintobenzene)					
87-86-5	Pentachlorophenol					
108-95-2	Phenol					
106-50-3	p-Phenylenediamine					
75-44-5	Phosgene					
7803-51-2	Phosphine					
7723-14-0	Phosphorus	2.90E-03			ND	2.90E-03
85-44-9	Phthalic anhydride					
1336-36-3	Polychlorinated biphenyls (Aroclors)					
1120-71-4	1,3-Propane sultone					
57-57-8	beta-Propiolactone					
123-38-6	Propionaldehyde					
114-26-1	Propoxur (Baygon)					
78-87-5	Propylene dichloride (1,2-Dichloropropane)					
75-56-9	Propylene oxide					
75-55-8	1,2-Propylenimine (2-Methylaziridine)					
91-22-5	Quinoline					
106-51-4	Quinone (p-Benzoquinone)					
100-42-5	Styrene					
96-09-3	Styrene oxide					
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin					

**Attachment S-1b  
Total Air Toxic Emissions**

**SECTION 112 HAZARDOUS AIR POLLUTANTS**

CAS Number	Pollutant	Boiler (tpy)	CT-3 (tpy)	PBSG1 (tpy)	Spec Used Oil (tpy)	HAP Totals (tpy)
79-34-5	1,1,2,2-Tetrachloroethane					
127-18-4	Tetrachloroethylene(Perchloroethylene)					
7550-45-0	Titanium tetrachloride					
108-88-3	Toluene	6.70E-03	3.38E-01	2.67E-04		3.45E-01
95-80-7	Toluene-2,4-diamine					
584-84-9	2,4-Toluene diisocyanate					
95-53-4	o-Toluidine					
8001-35-2	Toxaphene (chlorinated camphene)					
120-82-1	1,2,4-Trichlorobenzene					
79-00-5	1,1,2-Trichloroethane					
79-01-6	Trichloroethylene					
95-95-4	2,4,5-Trichlorophenol					
88-06-2	2,4,6-Trichlorophenol					
121-44-8	Triethylamine					
1582-09-8	Trifluralin					
540-84-1	2,2,4-Trimethylpentane					
108-05-4	Vinyl acetate					
593-60-2	Vinyl bromide					
75-01-4	Vinyl chloride					
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)					
1330-20-7	Xylene (mixed isomers)		2.32E-01	1.84E-04		2.33E-01
95-47-6	o-Xylene					
108-38-3	m-Xylene					
106-42-3	p-Xylene					
	Antimony Compounds	5.18E-03			ND	5.18E-03
	Arsenic Compounds (inorganic including arsine)	3.69E-03	1.32E-02	1.05E-05	1.10E-02	2.79E-02
	Beryllium Compounds	1.39E-04	3.73E-04	2.95E-07	ND	5.12E-04
	Cadmium Compounds	2.46E-03	5.78E-03	4.56E-06	9.30E-04	9.18E-03
	Chromium Compounds	4.44E-04	1.32E-02	1.05E-05	2.00E-03	1.57E-02
	Cobalt Compounds	2.36E-02			2.10E-05	2.36E-02
	Coke Oven Emissions					
	Cyanide Compounds <sup>2</sup>					
	Glycol ethers <sup>3</sup>					
	Lead Compounds	5.76E-03	1.69E-02	1.33E-05		2.26E-02
	Manganese Compounds	2.55E-02	9.52E-01	7.51E-04	6.80E-03	9.85E-01
	Mercury Compounds	5.43E-03	1.45E-03	1.14E-06		6.88E-03
	Fine mineral fibers <sup>3</sup>					
	Nickel Compounds	1.42E+00	5.54E-03	4.37E-06	1.10E-03	1.42E+00
	Polycyclic Organic Matter <sup>4</sup>	3.93E-03	4.82E-02	2.02E-04		5.23E-02
	Radionuclides (including radon) <sup>5</sup>					
	Selenium Compounds	1.96E-03	3.01E-02	2.38E-05	ND	3.21E-02
	<b>Total</b>	<b>1.52</b>	<b>2.16</b>	<b>0.002</b>	<b>0.03</b>	<b>3.71</b>

**Notes**

- For all listings above which contain the word "compounds" and for glycol ethers, the following applies. Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e. antimony, arsenic, etc.) as part of that chemical's infrastructure.
- X'CN where X = H' or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
- Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol, R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OR' where:
  - n = 1, 2, or 3
  - R = alkyl or aryl groups
  - R' = R, H, or groups which, when removed, yield glycol ethers with the structure R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>-OH. Polymers are excluded from the glycol category.
- Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
- Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
- A type of atom which spontaneously undergoes radioactive decay.

**Attachment S-1c  
Other Regulated Pollutants**

<b>Emissions for Boiler</b>		
	<b>Emissions (lb/hr)</b>	<b>Emissions (tpy)</b>
Beryllium	See Attachment S-1b	
Mercury	See Attachment S-1b	
Asbestos	Not Expected	
Hydrogen Sulfide	Not Expected	
Halons	Not Expected	
MWC Acid Gases	Not Expected	
MWC Metals	Not Expected	
MWC Organics	Not Expected	

**Notes:**

For Beryllium & Mercury emission rates, See Attachment S-1b.  
 Others from the August 1990 HELCO PSD Permit Application for Puna (HI 90-04).  
 MWC = Municipal Waste Combustor  
 'tpy' values assume 8,760 hrs/yr of operation.

<b>Emissions for CT-3</b>		
	<b>Emissions (lb/hr)</b>	<b>Emissions (tpy)</b>
Beryllium	See Attachment S-1b	
Mercury	See Attachment S-1b	
Asbestos	Not Expected	
Hydrogen Sulfide	Not Expected	
Halons	Not Expected	
MWC Acid Gases	Not Expected	
MWC Metals	Not Expected	
MWC Organics	Not Expected	

**Notes:**

For Beryllium & Mercury emission rates, See Attachment S-1b.  
 Others from the August 1990 HELCO PSD Permit Application for Puna (HI 90-04).  
 MWC = Municipal Waste Combustor  
 'tpy' values assume 8,760 hrs/yr of operation.

<b>Emissions for PBSG1</b>		
	<b>Emissions (lb/hr)</b>	<b>Emissions (tpy)</b>
Beryllium	See Attachment S-1b	
Mercury	See Attachment S-1b	
Asbestos	Not Expected	
Hydrogen Sulfide	Not Expected	
Halons	Not Expected	
MWC Acid Gases	Not Expected	
MWC Metals	Not Expected	
MWC Organics	Not Expected	

**Notes:**

For Beryllium & Mercury emission rates, See See Attachment S-1b.  
 Others from the August 1990 HELCO PSD Permit Application for Puna (HI 90-04).  
 MWC = Municipal Waste Combustor.  
 PBSG1 is limited to 300 hrs/yr operation.

**Attachment S1-d  
Pollutant Emission Rate Calculations**

**Sulfur Dioxide (SO<sub>2</sub>)**

Unit	AP-42 Emission	AP-42 Emission	CSP Application	Heat Input (MMBtu/hr)	CSP Application
	Factor <sup>1,4</sup> (lb/10 <sup>3</sup> gal)	Factor <sup>2,4,5</sup> (lb/MMBtu)	Emission Factor <sup>3,4</sup> (lb/MMBtu)		Emission Rate (lb/hr)
Boiler	314	2.09	2.20	249	548.4
CT-3 (Peak Load)	Not Applicable		0.40	275	110.0
PBSG1	-	0.40	0.40	6.34	2.56

1. For Boiler Unit, AP-42 Emission Factors from Section 1.3, Table 1.3-1, Supplement E, dated September 1999, corrected May 2010, using a sulfur content of 2.0%.
2. For Boiler Unit, to convert emission factors to an energy basis (lb/MMBtu), divide by a heating value of 150 MMBtu/10<sup>3</sup> gal for No. 6 fuel oil per AP-42 Section 1.3 (p. 1.3 - 8).
3. For Boiler Unit, CSP emission factor calculated by sulfur balance based on 2.0% sulfur, No. 6 fuel oil heat content of 18,161 Btu/lb, and all sulfur converted to SO<sub>2</sub>.
4. CT-3 permitted emission factor established by PSD HI 90-04. Therefore, AP-42 emission factor not needed.
5. The PBSG1 AP-42 Emission Factors from Section 3.4, Table 3.4-1, Supplement B, dated October 1996.

**Nitrogen Oxides (NO<sub>x</sub>)**

Unit	AP-42 Emission	AP-42 Emission	CSP Application	Heat Input (MMBtu/hr)	CSP Application
	Factor <sup>1,3</sup> (lb/10 <sup>3</sup> gal)	Factor <sup>2,3,4</sup> (lb/MMBtu)	Emission Factor <sup>3,4</sup> (lb/MMBtu)		Emission Rate (lb/hr)
Boiler	47	0.313	0.767	249	191.0
CT-3 (Peak Load)	Not Applicable		0.154	275	42.3
PBSG1	-	3.200	3.200	6.34	20.3

1. For Boiler Unit, AP-42 Emission Factors from Section 1.3, Table 1.3-1, Supplement E, dated September 1999, corrected May 2010.
2. For Boiler Unit, to convert emission factors to an energy basis (lb/MMBtu), divide by a heating value of 150 MMBtu/10<sup>3</sup> gal for No. 6 fuel oil per AP-42 Section 1.3 (p. 1.3 - 8).
3. CT-3 permitted emission factor established by PSD HI 90-04. Therefore, AP-42 emission factor not needed.
4. The PBSG1 AP-42 Emission Factors from Section 3.4, Table 3.4-1, Supplement B, dated October 1996.

**Carbon Monoxide (CO)**

Unit	AP-42 Emission	AP-42 Emission	CSP Application	Heat Input (MMBtu/hr)	CSP Application
	Factor <sup>1,3</sup> (lb/10 <sup>3</sup> gal)	Factor <sup>2,3,4</sup> (lb/MMBtu)	Emission Factor <sup>3,4</sup> (lb/MMBtu)		Emission Rate (lb/hr)
Boiler	5	0.033	0.066	249	16.5
CT-3 (Peak Load)	Not Applicable		0.097	275	26.8
PBSG1	-	0.850	0.850	6.34	5.39

1. For Boiler Unit, AP-42 Emission Factors from Section 1.3, Table 1.3-1, Supplement E, dated September 1999, corrected May 2010.
2. For Boiler Unit, to convert emission factors to an energy basis (lb/MMBtu), divide by a heating value of 150 MMBtu/10<sup>3</sup> gal for No. 6 fuel oil per AP-42 Section 1.3 (p. 1.3 - 8).
3. CT-3 permitted emission factor established by PSD HI 90-04. Therefore, AP-42 emission factor not needed.
4. The PBSG1 AP-42 Emission Factors from Section 3.4, Table 3.4-1, Supplement B, dated October 1996.



**Form S-1d (continued)  
Pollutant Emission Rate Calculations**

**Particulate Matter (PM/PM10)**

Unit	AP-42 Emission Factor <sup>1,3</sup> (lb/10 <sup>3</sup> gal)	AP-42 Emission Factor <sup>2,3,4</sup> (lb/MMBtu)	CSP Application Emission Factor <sup>3,4</sup> (lb/MMBtu)	Heat Input (MMBtu/hr)	CSP Application Emission Rate (lb/hr)
Boiler	21.6	0.144	0.287	249	71.6
CT-3 (Peak Load)	Not Applicable		0.072	275	19.7
PBSG1	-	0.0697	0.0697	6.34	0.44

1. For Boiler Unit, AP-42 Emission Factors from Section 1.3, Table 1.3-1, Supplement E, dated September 1999, corrected May 2010, using a sulfur content of 2.0%.
2. For Boiler Unit, to convert emission factors to an energy basis (lb/MMBtu), divide by a heating value of 150 MMBtu/10<sup>3</sup> gal for No. 6 fuel oil per AP-42 Section 1.3 (p. 1.3 - 8).
3. CT-3 permitted emission factor established by PSD HI 90-04. Therefore, AP-42 emission factor not needed.
4. The PBSG1 AP-42 and CSP Emission Factors from Section 3.4, Table 3.4-2, Supplement B, dated October 1996.

**Volatile Organic Compounds (VOC)**

Unit	AP-42 Emission Factor <sup>1,3</sup> (lb/10 <sup>3</sup> gal)	AP-42 Emission Factor <sup>2,3,4</sup> (lb/MMBtu)	CSP Application Emission Factor <sup>3,4</sup> (lb/MMBtu)	Heat Input (MMBtu/hr)	CSP Application Emission Rate (lb/hr)
Boiler	0.76	0.005	0.010	249	2.51
CT-3 (Peak Load)	Not Applicable		0.003	275	0.80
PBSG1	-	0.082	0.082	6.34	0.52

1. For Boiler Unit, AP-42 Emission Factors from Section 1.3, Supplement E, Table 1.3-3 dated September 1999, corrected May 2010.
2. For Boiler Unit, to convert emission factors to an energy basis (lb/MMBtu), divide by a heating value of 150 MMBtu/10<sup>3</sup> gal for No. 6 fuel oil per AP-42 Section 1.3 (p. 1.3 - 8).
3. CT-3 permitted emission factor established by PSD HI 90-04. Therefore, AP-42 emission factor not needed.
4. The PBSG1 AP-42 and CSP Emission Factors are based on the nonmethane fraction (91%) of TOC listed in Section 3.4, Table 3.4-1, Supplement B, dated October 1996.

## Attachment S-1e GHG Emissions

Unit	Heat Input (MMBtu/hr)	Operating Hours (hrs/yr)	Annual Heat Input (MMBtu/yr)	GHG Pollutant <sup>1</sup> (kg/MMBtu)	Emission Factor <sup>2</sup> (kg/MMBtu)	Maximum			Global Warming Potential <sup>3</sup> (lb/hr)	Total GHG Emissions CO <sub>2</sub> e (metric tpy)
						Hourly Emissions (kg/hr)	Annual Emissions (metric tpy)	Hourly Emissions (lb/hr)		
Boiler	249.0	8,760	2,181,240	CO <sub>2</sub>	75.1	18,700	163,811	1	41,226	163,811
				N <sub>2</sub> O	6.0E-04	0.149	1.3E+00	298	98	390
				CH <sub>4</sub>	3.0E-03	0.75	6.5E+00	25	41.2	164
<b>Total CO<sub>2</sub>e = 41,366</b>									<b>164,365</b>	<b>181,181</b>
CT-3	275.0	8,760	2,409,000	CO <sub>2</sub>	73.96	20,339	178,170	1	44,840	178,170
				N <sub>2</sub> O	6.0E-04	0.165	1.4E+00	298	108	431
				CH <sub>4</sub>	3.0E-03	0.83	7.2E+00	25	45.5	181
<b>Total CO<sub>2</sub>e = 44,994</b>									<b>178,781</b>	<b>197,072</b>
PBG1	6.3	300	1,902	CO <sub>2</sub>	73.96	469	141	1	1,034	141
				N <sub>2</sub> O	6.0E-04	0.004	1.1E-03	298	2.5	0
				CH <sub>4</sub>	3.0E-03	0.02	5.7E-03	25	1.0	0
<b>Total CO<sub>2</sub>e = 1,037</b>									<b>141</b>	<b>156</b>
<b>Facility Total CO<sub>2</sub>e =</b>									<b>343,287</b>	<b>378,409</b>

**Notes:**

1. Greenhouse Gas (GHG) pollutants from the Mandatory Greenhouse Gas Reporting rule (40 CFR §98.32).
2. Emission factors from the Mandatory Greenhouse Gas Reporting rule (40 CFR Part 98 Subpart C, Tables C-1 and C-2).
3. Global Warming Potentials from the Mandatory Greenhouse Gas Reporting rule (40 CFR Part 98 Subpart A, Table A-1).
4. Unit PBG1 is limited to 300 hours per rolling twelve (12) month period.

## S-6: Application for a Significant Modification to a Covered Source

In providing the required information, reference the corresponding letters and numbers listed below.

Provide a minimum of two (2) sets (1 original and 1 copy) of all application materials to the Hawaii Department of Health. Also, mail one (1) set directly to EPA at the following address:

Chief (Attention: AIR-3)  
Permits Office, Air Division  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

I. In accordance with Hawaii Administrative Rules (HAR) §11-60.1-104, the following information is required:

A. Equipment Specifications:

1. Maximum design capacity. Refer to the table below.
2. Fuel type. CT-3 and PBSG1 burn No. 2 diesel fuel with a 0.4% maximum sulfur content. The boiler burns No. 2 and No. 6 fuel oil with a 2.0% maximum sulfur content. In addition the boiler burns a maximum of 200,000 gal/yr of specification used oil. On November 22, 2017, the DOH approved consumption of specification used oil from Hawaii Petroleum.
3. Fuel use. Refer to the table below.

Maximum Design Fuel Use per Unit		
Unit ID	Nominal Capacity	Heat Input (MMBtu/hr)
Boiler	15.5 MW	249
CT-3	20 MW	275
PBSG1	600 kW	6.34

4. Production capacity. Does not apply.
  5. Production rates. Does not apply.
  6. Raw materials. Does not apply.
  7. Provide any manufacturer's literature. This application does not change any of Puna's equipment's manufacturer's specifications.
- B. Provide detailed descriptions of all processes and products defined by Standard Industrial Classification Code (SICC). Also, provide any reasonably anticipated alternative operating scenarios, associated processes, and products, by SICC.

Electrical power generation (SIC code 4911) is the only product or process.

Several types of alternative operating scenarios apply to the plant. The first includes the use of a temporary replacement unit in the event of a failure or major overhaul of CT-3 or the boiler. In the event that the projected downtime increases the likelihood of an interruption in electrical service, CT-3 or the boiler would be temporarily replaced. Emissions from the replacement unit will comply with the original unit's operating restrictions and emission limits.

The second alternative operating scenario is unit operation during start-up, shut-down, maintenance, and testing of all units. Boiler start-up operations may range up to 8 hours. Maintenance activities include soot blowing. The time period of this maintenance operation

will not exceed 1-hour in duration two times per day. These maintenance activities are required to maximize generation efficiency and minimize fuel usage.

A third alternate scenario is the ability to switch fuels. Should cheaper fuels become available, or the supply of No. 2 or No. 6 fuel oil becomes limited, Hawai'i Electric Light proposes an alternate scenario that would allow the fuel switch provided that all emission limits and regulatory requirements are met.

A fourth alternative scenario occurs during emergency load conditions. Certain equipment malfunctions (such as sudden loss of a unit) may necessitate the operation of CT-3 at loads as high as 110% of peak load. The time period of this operation will be limited to no more than 30 minutes in duration. This operation will not result in a 3-hr average emission rate that exceeds the maximum emission limits.

A fifth alternative scenario occurs during unpredictable periods of equipment failure, upsets, or emergency conditions. During any emergency condition, Hawai'i Electric Light will operate the subject equipment in such a manner as to minimize emissions. Hawai'i Electric Light will comply with the Emergency Provisions (§11-60.1-16.5).

A sixth alternative scenario involves the burning of a maximum total of 200,000 gal/yr, 90 gal/hr, of specification (spec) used oil. The spec used oil consists of collected used oil, such as waste oil, lubricating oil, and waste diesel oil, crankcase oil, transformer oil (dielectric fluid), solvents and kerosene obtained from the equipment operating at the Hawai'i Electric Light facilities.

A seventh alternative scenario involves the use of fuel additives to reduce corrosion, control biological growth, enhance combustion, or other reasons. Additives used during this scenario shall not affect emission estimates.

Hawai'i Electric Light requested to operate the CT-3 below minimum load to address system disturbances and frequency issues in a minor modification application dated October 16, 2015.

No additional changes to operating scenarios are proposed with this application.

1. Identify and describe in detail all air pollution control equipment and compliance monitoring devices or activities planned by the owner or operator, and to the extent of available information, an estimate of emissions before and after controls. Provide all calculations and assumptions.

Water injection is used on CT-3 to reduce NO<sub>x</sub> emissions to 42 ppmv at 15 percent O<sub>2</sub>, dry with a fuel-bound nitrogen content of 0.015 percent or less. Fuel sulfur content is limited to 0.4 percent by weight for CT-3 and PBSG1 and 2.0% by weight for the boiler. Emissions of PM, PM<sub>10</sub>, CO, and VOC are controlled by combustion design and good combustion practices. Emissions of any hazardous air pollutants are controlled by the use of No. 2 fuel oil for CT-3 and PBSG1, by the use of No. 6 fuel oil for the boiler, and combustion system design. Compliance monitoring devices and activities are discussed in form C-2.

2. List all *new insignificant* activities in accordance with §11-60.1-82.

No additional changes/additions to insignificant activities are proposed with this application.

- C. Maximum Operating Schedule (to the extent needed to determine or regulate emissions):
1. Total hours per day, per week, and/or per month. Depending on future power dispatch requirements, some units may cycle off-line daily, or operate at reduced loads. However, there may be times when a unit must be run continuously for extended periods of time. Thus, this application does not propose any annual operating limits. Units PMSG1 is limited to an annual operating hour limit of 300 hours.
  2. Total hours per year. Up to 8,760 hours per year each for CT-3 and the boiler. Units PMSG1 is limited to an annual operating hour limit of 300 hours.
  3. If operation is seasonal or irregular, describe. Refer to I.C.1 above.
- D. Cite and describe all applicable requirements as defined in HAR §11-60.1-81, including the following:
1. Description of or reference to any applicable test methods for determining compliance with each applicable requirement. See Form C-2.
  2. Explanation of all proposed exemptions from any applicable requirements. See Forms C-1 and C-2.
- E. Identify and describe current operational limitations or work practices the source plans to implement that affect emissions of any regulated or hazardous air pollutant. Provide all calculations and assumptions.
- See item I.B.1. above for current work practices that affect emissions of any regulated or hazardous air pollutant.
- Hawai'i Electric Light requested incorporation of the Regional Haze Plan Provisions of 40 CFR Part 52, Subpart M into the CSP for Puna Boiler in a correspondence to the DOH dated December 29, 2017.
- With this application, Hawai'i Electric Light requests incorporation of the Greenhouse Gas Emissions Limitations into the Covered Source Permit CSP No. 0235-01-C, consistent with the Greenhouse Gas Emissions Reduction Plan submitted to the DOH on February 28, 2018. Refer to Attachment S-6a for the proposed emissions limitations, monitoring, recordkeeping, and reporting requirements for Hawai'i Electric Light's Greenhouse Gas Emission Reduction Plan.
- F. Provide a detailed schedule for construction or modification of the proposed source, including any major milestones, if applicable. Not applicable.
- G. Provide detailed information to define permit terms and conditions for any proposed **emissions trading** within the facility in accordance with HAR §11-60.1-96. No emissions trading is proposed.
- H. For **significant** modifications which increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted, an assessment of the ambient air quality impact of the covered source or significant modification, with the inclusion of any available background air quality data. The assessment shall include all supporting data, calculations and assumptions, and a comparison with the National Ambient Air Quality Standards and State Ambient Air Quality Standards. Do not apply. The proposed modification will not increase the emissions of any air pollutant or result in the emission of any air pollutant not previously emitted.

- I. For *new* covered sources or *significant* modifications subject to the requirements of subchapter 7 of HAR Chapter 11-60.1, all analyses, assessments, monitoring, and other application requirements of subchapter 7. Do not apply. The proposed modification is not subject to Subchapter 7 of HAR Chapter 11-60.1.
- J. Provide the following for Compliance purposes:
  1. A compliance plan, Form C-1.
  2. A compliance certification, Form C-2.
- II. **Submit an application fee according to the Application Fees Schedule in the Instructions for Applying for an Air Pollution Control Permit.**
- III. **Provide other information as follows:**
  - A. As required by any applicable requirement or as requested and deemed necessary by the director to make a decision on the application.
  - B. As may be necessary to implement and enforce other applicable requirements of the Clean Air Act or of HAR Chapter 11-60.1 or to determine the applicability of such requirements.
- IV. **The Director reserves the right to request the following information:**
  - A. A risk assessment of the air quality related impacts caused by the covered source or significant modification to the surrounding environment.
  - B. Results of source emissions testing, ambient air quality monitoring, or both.
  - C. Information on other available control technologies.
- V. **An application shall be determined to be complete only when all of the following have been complied with:**
  - A. All information required or requested in numbers I, III, and IV has been submitted.
  - B. All documents requiring certification have been certified pursuant to HAR §11-60.1-4.
  - C. All applicable fees have been submitted.
  - D. The director has certified that the application is complete.
- VI. **The Director shall not continue to act upon or consider an incomplete application.**
  - A. The applicant shall be notified in writing whether the application is complete:
    1. For the requirements of subchapter 7, thirty days after receipt of the application.
    2. For the requirements of HAR subchapter 5, sixty days after receipt of the application. For purposes of this paragraph, the date of receipt of an application for a new covered source or significant modification subject to the requirements of subchapter 7 shall be the date the application is determined to be complete for the requirements of subchapter 7.
    3. Unless the Director requests additional information or notifies the applicant of incompleteness within sixty days after receipt of an application pursuant to VI.A.2 above, the application shall be deemed complete for the requirements of subchapter 5.
  - B. During the processing of an application that has been determined or deemed complete, if additional information is necessary to evaluate or take final action on the application, the Director may request such information in writing and set a reasonable deadline for a response.

- VII. After receipt of a complete application, the Director, in writing, shall approve, conditionally approve, or deny an application within eighteen months, except as provided in HAR §11-60.1-88 and (A) and (B) below.**
- A. Upon program approval, within nine months for an application containing an early reduction demonstration pursuant to section 112(i)(5) of the Clean Air Act.**
  - B. Within twelve months for a new covered source or significant modification subject to the requirements of subchapter 7.**
- VIII. The Director shall provide reasonable procedures and resources to complete the review of the majority of the applications for a significant modification within nine months after receipt of a complete application. An application for significant modification shall be approved only if the Director determines that the significant modification will be in compliance with all applicable requirements.**
- IX. The Director shall provide for public notice, including the method by which a public hearing can be requested, and an opportunity for public comment on the draft significant modification to the covered source in accordance with HAR §11-60.1-99.**
- X. The Director shall provide a statement that sets forth the legal and factual bases for the draft permit conditions (including references to the applicable statutory or regulatory provisions) to EPA and any other person requesting it.**
- XI. Each application for a significant modification, and the proposed Covered Source Permit reflecting the significant modification shall be subject to EPA oversight in accordance with HAR §11-60.1-95.**

**Attachment S-6a**  
**Proposed Attachment II-GHG: Special Conditions**  
**Puna Generating Station**  
**CSP No. 0235-01-C**



**ATTACHMENT II - GHG: SPECIAL CONDITIONS  
GHG REDUCTION REQUIREMENTS  
COVERED SOURCE PERMIT NO. 0235-01-C**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration date to be revised upon permit renewal)

In addition to the standard conditions of the Covered Source Permit, the following special conditions shall apply to the permitted facility:

**Section A. Equipment Description**

1. Attachment II-GHG of this permit encompasses the following equipment and associated appurtenances:

<u>Unit</u>	<u>Description</u>
CT-3	20 MW Nominal (24.66 MW Peak Load) General Electric Combustion Turbine, Model No. LM 2500, Serial No. 481-651, 275 MMBtu/hr
Boiler	15.5 MW Combustion Engineering Boiler, Model No. VU-40, 249 MMBtu/hr
DC	Barron Base III multi-cyclone dust collector, duct from boiler exhaust, Model No. 120-14, manufactured in November 1980
PBSG1	600 kW Black Start Diesel Engine Generator Unit, Model No. PBSG1, Serial No. 5A9885R

(Auth.: HAR §11-60.1-3)

2. The equipment is subject to the GHG emission reduction requirements of HAR, Title 11 Chapter 60.1 Subchapter 11 and associated permit conditions established from review of the GHG emission reduction plan submitted by the facility and permit application for significant modification. The GHG emission reduction plan shall become a part of the covered source permit application process for renewals and any required modifications pursuant to HAR Title 11 Chapter 60.1 Subchapter 5. With each subsequent GHG reduction plan submittal, the permittee shall report:
- The GHG emission reduction status;
  - Factors contributing to the emission changes;
  - Any control measure updates; and
  - Any new developments or changes that would affect the basis of the facility GHG emissions cap.

(Auth.: HAR §11-60.1-5, §11-60.1-204(g))

**Section B. GHG Permit Conditions**

Puna Generating Station  
Application for a Significant Modification to a Covered Source

March 2018

**Amended Date:**

**Expiration Date: November 14, 2007**

(Expiration date to be revised upon permit renewal)

1. Permit conditions specified in Attachment II - GHG, including provisions to limit GHG emissions, are state-only requirements which are not federally enforceable under the federal Clean Air Act.  
(Auth.: HAR §11-60.1-3, §11-60.1-90, 11-60.1-161; 40 CFR §70.6)<sup>1</sup>
2. The permittee shall comply with all applicable provisions of these conditions, including all emission limits, notification, testing, monitoring, and reporting requirements. The major requirements of these provisions are detailed in the special conditions of this attachment.  
(Auth.: HAR §11-60.1-3, §11-60.1-90, 11-60.1-161)<sup>1</sup>

**Section C. GHG Emission Limitations**

**1. GHG Emission Caps**

- a. The Puna Generating Station shall not emit or cause to be emitted carbon dioxide equivalent (CO<sub>2</sub>e) emissions in excess of its individual cap specified in Attachment II - GHG, Special Condition No. C.1.a of CSP No. 0548-01-C for Campbell Industrial Park Generating Station, except as specified in Attachment II - GHG, Special Condition No. C.1.c.iv of this CSP.
- b. The Puna Generating Station combined with all partnering facilities shall not emit or cause to be emitted total combined CO<sub>2</sub>e emissions in excess of the combined limit specified in Attachment II - GHG, Special Condition No. C.1.b of CSP No. 0548-01-C for Campbell Industrial Park Generating Station.
- c. For purposes of the CO<sub>2</sub>e emission limits in Attachment II - GHG, Special Condition Nos. C.1.a and C.1.b:
  - i. The CO<sub>2</sub>e emissions shall have the same meaning as that specified in HAR §11-60.1-1;
  - ii. In accordance with HAR §11-60.1-204(d)(6)(B), biogenic CO<sub>2</sub> emissions shall not be included when determining compliance with the emissions limit;
  - iii. The permittee shall be in compliance with the emissions limits by the end of 2019 and each calendar year thereafter;
  - iv. The Puna Generating Station may exceed the emissions cap specified in Attachment II - GHG, Special Condition No. C.1.a, if the GHG emissions limit specified in Attachment II - GHG, Special Condition No. C.1.b, is met; and
  - v. At no time shall the Puna Generating Station exceed Attachment II - GHG, Special Condition Nos. C.1.a and C.1.b, simultaneously over a calendar year. For incidences when Attachment II - GHG, Special Condition Nos. C.1.a and C.1.b are

**CSP No. 0235-01-C**

**Attachment II - GHG**

**Page 3 of 6**

**Amended Date:**

**Expiration Date: November 14, 2007**

(Expiration date to be revised upon permit renewal)

exceeded simultaneously, emissions in excess of the total combined cap shall be allocated according to the following equation for compliance purposes:

$$X = XG \frac{(A - C)}{\sum_{A_i > C_i} (A_i - C_i)}$$

Where:

X = Adjusted portion in metric tons or tons of GHG emissions that are in excess of total combined cap specified in Special Condition No. C.1.b of CSP No. 0548-01-C for Campbell Industrial Park Generating Station. The equation applies to all affected facilities that do not meet the individual and total combined GHG emission caps specified in Special Condition Nos. C.1.a and C.1.b, respectively of CSP No. 0548-01-C for Campbell Industrial Park Generating Station

XG = Total combined actual GHG emissions from affected facilities minus total combined GHG emissions cap. Total combined emissions cap shall be sixteen percent (16%) below the total combined baseline emission level less biogenic CO<sub>2</sub> emissions.

A = Actual GHG emissions from the affected facility

C = GHG emissions cap for the affected facility

$\sum_{A_i > C_i} (A_i - C_i)$  = The sum of the difference between the actual emissions and cap emissions for all facilities that did not achieve the individual facility GHG emissions cap

(Auth.: HAR §11-60.1-3, §11-60.1-90, §11-60.1-204)

## 2. GHG Emission Cap Revisions

- a. The facility GHG emissions cap may be re-evaluated and revised by the Department in accordance with HAR §11-60.1-204(h).
- b. Any revision to the GHG emissions caps shall be considered a significant modification subject to the application and review requirements of HAR §11-60.1-104. For each GHG emission cap revision, the Department may impose additional emission limits or requirements, or limit the time-frame allowed for the revised GHG emissions cap.

(Auth.: HAR §11-60.1-3, §11-60.1-90, §11-60.1-204)

## Section D. Monitoring and Record Keeping Requirements

### 1. GHG Emissions

For calculating CO<sub>2</sub>e emissions to assess fees and for determining compliance with the GHG emission caps, the permittee shall:

Amended Date:

Expiration Date: November 14, 2007

(Expiration date to be revised upon permit renewal)

- a. Monitor mass emissions data for the stationary source combustion units listed in attachment II - GHG, Special Condition No. A.1 with the appropriate methods specified in 40 CFR §98.34;
- b. Estimate missing data in accordance with the applicable procedures in 40 CFR §98.35;
- c. Determine the metric tons of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) in accordance with the appropriate calculation methodology in 40 CFR §98.33 based on company records of the fuel combusted as defined in 40 CFR §98.6;
- d. Calculate the GHG emissions, expressed in metric tons of CO<sub>2</sub>e, using Equation A-1 of 40 CFR §98.2;
- e. Convert the metric tons of CO<sub>2</sub>e emissions to tons (also referred to as short tons) for monitoring and annual emissions reporting as applicable. For the conversion, one metric ton is equal to 1.10231 tons; and
- f. Obtain CO<sub>2</sub>e emissions data from all other partnering facilities to report the total combined CO<sub>2</sub>e emissions in accordance with Attachment II - GHG Special Condition No. E.4.

(Auth.: HAR §11-60.1-3, §11-60.1-90; 40 CFR §98.2, §98.33, §98.34, §98.35, §98.6)

## 2. Records

All records, including support information, shall be maintained for at least five (5) years from the date of the monitoring sample, measurement, test, report, or applications. Support information includes all maintenance, inspection, and repair records, and copies of all reports required by this permit. These records shall be true, accurate, and maintained in a permanent form suitable for inspection and be made available to the Department or authorized representative(s) upon request.

(Auth.: HAR §11-60.1-3, §11-60.1-11, §11-60.1-90)

## Section E. Notification and Reporting Requirements

### 1. Standard Condition Reporting

Notification and reporting pertaining to the following events shall be done in accordance with Attachment I, Standard Condition Nos. 17 and 25, respectively:

- a. Emissions of air pollutants in violation of HAR, Chapter 11-60.1 or this permit (excluding technology-based emission exceedances due to emergencies); and
- b. Permanent discontinuance of construction, modification, relocation, or operation of the facility covered by this permit.

(Auth.: HAR §11-60.1-8, §11-60.1-15, §11-60.1-16, §11-60.1-90; SIP §11-60-10, SIP §11-60-16)<sup>2</sup>

## 2. Deviations

The permittee shall report in writing any CO<sub>2</sub>e emissions exceeding the GHG Emission Cap specified in Attachment II-GHG Section C.1 to the Department of Health annually. The report shall include the magnitude of excess emissions using the equation specified in Attachment II-GHG, Special Condition No. C.1.c.v, probable cause of such deviations, and any corrective actions or preventive measures taken. Corrective actions may include a requirement for testing, or more frequent monitoring, or could trigger implementation of a corrective action plan. Reports shall be submitted within sixty (60) days following the end of each calendar period.

Except for deviation from the GHG Emission Cap, the permittee shall report in writing within five (5) working days any other deviations from permit requirements, the probable cause of such deviations, and any corrective actions or preventive measures taken. Corrective actions may include a requirement for testing, or more frequent monitoring, or could trigger implementation of a corrective action plan.

(Auth.: HAR §11-60.1-3, §11-60.1-15, §11-60.1-16, §11-60.1-90)

## 3. Compliance Certification

- a. During the permit term, the permittee shall submit at least annually to the Department and U.S. EPA, Region 9, the attached **Compliance Certification Form** pursuant to HAR, Subsection 11-60.1-86. The permittee shall indicate whether or not compliance is being met with each term or condition of this permit. The compliance certification shall include, at a minimum, the following information:
  - i. The identification of each term or condition of the permit that is the basis of the certification;
  - ii. The compliance status;
  - iii. Whether compliance was continuous or intermittent;
  - iv. The methods used for determining the compliance status of the source currently and over the reporting period;
  - v. Any additional information indicating the source's compliance status with any applicable enhanced monitoring and compliance certification, including the requirements of Section 114(a)(3) of the Clean Air Act or any applicable monitoring and analysis provisions of Section 504(b) of the Clean Air Act;

Puna Generating Station  
Application for a Significant Modification to a Covered Source

March 2018

**Comment [HECO1]:** Hawai'i Electric Light requests annual deviation reporting requirement for any deviation from the GHG Emission Caps. Per Attachment II-GHG Section C.1.a, the caps are based on calendar year. In addition, per GHG Section C.1.c.iv, individual cap may be exceeded if total emission cap in Section C.1.b is met. Based on these two conditions, deviation from GHG emissions caps cannot be determined until after all partnering facilities share their calendar year emissions at the end of January each year.

Amended Date:

Expiration Date: November 14, 2007

(Expiration date to be revised upon permit renewal)

- vi. Brief description of any deviations including identifying as possible exceptions to compliance any periods during which compliance is required and which the excursion or exceedances as defined in 40 CFR 64 occurred; and
  - vii. Any additional information as required by the Department, including information to determine compliance.
- b. The compliance certification shall be submitted within ninety (90) days after the end of each calendar year and shall be signed and dated by a responsible official.
  - c. Upon the written request of the permittee, the deadline for submitting the compliance certification may be extended, if the Department determines that reasonable justification exists for the extension.
- (Auth.: HAR §11-60.1-4, §11-60.1-86, §11-60.1-90)
4. By August 29, 2019, and within sixty (60) days following the end of each semi-annual calendar period (January 1 – June 30 and July 1 – December 31) thereafter, the permittee shall report semi-annually to the Department, the tons of CO<sub>2</sub>e emitted by all partnering facilities, except that biogenic CO<sub>2</sub> shall be excluded from the total CO<sub>2</sub>e emissions. The report shall be signed and dated by a responsible official. The following enclosed form, or equivalent form, shall be used for reporting and shall be signed and dated by a responsible official:

**Monitoring Report Form: GHG Emissions**

(Auth.: HAR §11-60.1-3, §11-60.1-5, §11-60.1-90)

**Section F. Agency Notification**

Any document (including reports) required to be submitted by this permit shall be done in accordance with Attachment I, Standard Condition No. 30.

(Auth.: HAR §11-60.1-4, §11-60.1-90)

<sup>1</sup> The citations to the CFR identified under a particular condition, indicate that the permit condition complies with the specified provision(s) of the CFR. Due to the integration of the preconstruction and operating permit requirements, permit conditions may incorporate more stringent requirements than those set forth in the CFR.

<sup>2</sup> The citations to the State Implementation Plan (SIP) identified under a particular condition, indicate that the permit condition complies with the specified provision(s) of the SIP.

**MONITORING REPORT FORM  
GHG EMISSIONS  
COVERED SOURCE PERMIT NO. 0235-01-C  
(Page 1 of 2)**

**Amended Date:** \_\_\_\_\_

**Expiration Date: November 14, 2007**  
(Expiration date to be revised upon permit renewal)

In accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, the permittee shall report to the Department of Health the following information semi-annually:

(Make Copies for Future Use)

For Period: \_\_\_\_\_ Date: \_\_\_\_\_

Facility Name: \_\_\_\_\_

Location: \_\_\_\_\_

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Responsible Official (Print): \_\_\_\_\_

Title: \_\_\_\_\_

Responsible Official (Signature): \_\_\_\_\_

1. Report the CO<sub>2</sub>e emitted by Puna Generating Station during each reporting period for purposes of the facility's individual GHG emissions cap:
2. Submit the following information or equivalent to each partnering facility to report the CO<sub>2</sub>e emitted by Puna Generating Station during each reporting period for purposes of calculating the total combined GHG emissions:

Emission Year Reporting For _____					
Reporting Period	Puna Generating Station Emissions (Metric Tons of CO <sub>2</sub> e)			Puna Generating Station Emissions (Total CO <sub>2</sub> e)	
	CO <sub>2</sub> (Non-biogenic)	CH <sub>4</sub>	N <sub>2</sub> O	Metric Tons	Tons
January 1 – June 30 (1 <sup>st</sup> Semi-annual Period)					
July 1 – December 31 (2 <sup>nd</sup> Semi-annual Period)					
Total Emissions →					



**MONITORING REPORT FORM  
GHG EMISSIONS  
COVERED SOURCE PERMIT NO. 0235-01-C  
(CONTINUED, Page 2 of 2)**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration date to be revised upon permit renewal)

In accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, the permittee shall report to the Department of Health the following information semi-annually:

(Reproduce this sheet as needed for each partnering facility)

3. Report the total combined CO<sub>2</sub>e emitted by all partnering facilities during each reporting period for purposes of the total combined GHG emissions cap for these facilities:

Emission Year Reporting For _____					
Reporting Period	Total Combined Emissions from all partnering facilities (Metric Tons of CO <sub>2</sub> e)			Total CO <sub>2</sub> e Emissions	
	CO <sub>2</sub> (Non-biogenic)	CH <sub>4</sub>	N <sub>2</sub> O	Metric-tons	Tons
January 1 – June 30 (1 <sup>st</sup> Semi-annual Period)					
July 1 – December 31 (2 <sup>nd</sup> Semi-annual Period)					
Total Emissions →					

4. For incidences when the individual cap for Puna Generating Power Station and total combined cap for all partnering facilities is exceeded, report the emissions in excess of the total combined cap using the following equation:

$$X = XG \frac{(A-C)}{\sum_{A_i > C_i} (A_i - C_i)} = \underline{\hspace{2cm}}$$

Where

- X = Adjusted portion in metric tons of GHG emissions that are in excess of total combined cap specified in Attachment II - GHG Special Condition No C 1 b of CSP No. 0548-01-C for Campbell Industrial Park Generating Station. The equation applies to all affected facilities that do not meet the individual and total combined GHG emission caps specified in Attachment II- GHG Special Condition Nos. C.1.a and C.1.b, respectively, of CSP No. 0548-01-C for Campbell Industrial Park Generating Station.
- XG = Total combined actual GHG emissions from affected facilities minus total combined GHG emissions cap. Total combined emissions cap shall be sixteen percent (16%) below the total combined baseline emission level less biogenic CO<sub>2</sub> emissions
- A = Actual GHG emissions from the affected facility
- C = GHG emissions cap for the affected facility
- $\sum_{A_i > C_i} (A_i - C_i)$  = The sum of the difference between the actual emissions and cap emissions for all facilities that did not achieve the individual facility GHG emissions cap.



**ATTACHMENT III: ANNUAL FEE REQUIREMENTS  
COVERED SOURCE PERMIT NO. 0235-01-C**

**Amended Date:**

**Expiration Date: November 14, 2007**

(Expiration Date will be revised upon permit renewal)

The following requirements for the submittal of annual fees are established pursuant to Hawaii Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control. Should HAR, Chapter 60.1 be revised such that the following requirements are in conflict with the provisions of HAR, Chapter 60.1, the permittee shall comply with the provisions of HAR, Chapter 60.1:

1. Annual fees shall be paid in full:
  - a. Within one hundred and twenty (120) days after the end of each calendar year; and
  - b. Within thirty (30) days after the permanent discontinuance of the covered source.
2. The annual fees shall be determined and submitted in accordance with Hawaii Administrative Rules, Chapter 11-60.1, Subchapter 6.
3. The annual emissions data for which the annual fees are based shall accompany the submittal of any annual fees and submitted on forms furnished by the Department.
4. The annual fees and the emission data shall be mailed to:

**Clean Air Branch  
Environmental Management Division  
Hawaii Department of Health  
2827 Waimano Home Road  
Hale Ola Building, Room 130  
Pearl City, HI 96782**

**COMPLIANCE CERTIFICATION FORM  
COVERED SOURCE PERMIT NO. 0235-01-C  
(PAGE 1 OF \_\_\_)**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration Date will be revised upon permit renewal)

In accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, the permittee shall report to the Department of Health the following certification at least annually, or more frequently as requested by the Department.

(Make Copies of the Compliance Certification Form for Future Use)

For  
Period: \_\_\_\_\_ Date: \_\_\_\_\_  
Company/Facility  
Name \_\_\_\_\_  
Responsible Official  
(Print): \_\_\_\_\_  
Title: \_\_\_\_\_

Responsible Official  
(Signature): \_\_\_\_\_

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

**COMPLIANCE CERTIFICATION FORM  
COVERED SOURCE PERMIT NO. 0235-01-C  
(CONTINUED, PAGE 2 OF \_\_\_)**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration Date will be Revised Upon Permit Renewal)

The purpose of this form is to evaluate whether or not the facility was in compliance with the permit terms and conditions during the covered period. If there were any deviations to the permit terms and conditions during the covered period, the deviation(s) shall be certified as *intermittent compliance* for the particular permit term(s) or condition(s). Deviations include failure to monitor, record, report, or collect the minimum data required by the permit to show compliance. In the absence of any deviation, the particular permit term(s) or condition(s) may be certified as *continuous compliance*.

**Instructions:**

Please certify Sections A, B, and C below for continuous or intermittent compliance. Sections A and B are to be certified as a group of permit conditions. Section C shall be certified individually for each operational and emissions limit condition as listed in the Special Conditions section of the permit (list all applicable equipment for each condition). Any deviations shall also be listed individually and described in Section D. The facility may substitute its own generated form in verbatim for Sections C and D.

**A. Attachment 1, Standard Conditions**

<u>Permit term/condition</u>	<u>Equipment</u>	<u>Compliance</u>
All standard conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**B. Special Conditions - Monitoring, Recordkeeping, Reporting, Testing, and INSIG**

<u>Permit term/condition</u>	<u>Equipment</u>	<u>Compliance</u>
All monitoring conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
All recordkeeping conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
All reporting conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
All testing conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
All INSIG conditions	All Equipment listed in the permit	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**COMPLIANCE CERTIFICATION FORM  
COVERED SOURCE PERMIT NO. 0235-01-C  
(CONTINUED, PAGE 2 OF \_\_\_)**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration Date will be Revised Upon Permit Renewal)

**C. Special Conditions - Operational and Emissions Limitations**

Each permit term/condition shall be identified in chronological order using attachment and section numbers (e.g., Attachment II, B.1, Attachment IIA, Special Condition No. B.1.f, etc.). Each piece of equipment shall be identified using the description stated in Section A of the Special Conditions (e.g., unit no., model no., serial no., etc.). Check all methods (as required by permit) used to determine the compliance status of the respective permit term/condition.

Permit term/condition	Equipment	Method	Compliance
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
		<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**(Make Additional Copies if Needed)**

**COMPLIANCE CERTIFICATION FORM  
COVERED SOURCE PERMIT NO. 0235-01-C  
(CONTINUED, PAGE 2 OF \_\_\_\_)**

**Amended Date:**

**Expiration Date: November 14, 2007**  
(Expiration Date will be Revised Upon Permit Renewal)

**D. Deviations**

<u>Permit Term/Condition</u>	<u>Equipment / Brief Summary of Deviation</u>	<u>Deviation Period time (am/pm) &amp; date (mo/day/yr)</u>	<u>Date of Written Deviation Report to DOH (mo/day/yr)</u>
		Beginning: Ending:	
		Beginning: Ending:	
		Beginning: Ending:	
		Beginning: Ending:	
		Beginning: Ending:	
		Beginning: Ending:	
		Beginning: Ending:	

\*Identify as possible exceptions to compliance any periods during which compliance is required and in which an excursion or exceedance as defined under 40 CFR 64 occurred.  
**(Make Additional Copies if Needed)**

**C-1: Compliance Plan**

The Responsible Official shall submit a Compliance Plan as indicated in the Instructions for Applying for an Air Pollution Control Permit and at such other times as requested by the Director of Health (hereafter, Director).

Use separate sheets if necessary.

1. Compliance status with respect to all Applicable Requirements:

Will your facility be in compliance, or is your facility in compliance, with all applicable requirements in effect at the time of your permit application submittal?

YES { If YES, Complete items a and c below}

NO { If NO, complete items a-c below}

a. Identify all applicable requirement(s) for which compliance is achieved:

- Refer to CSP No. 0235-01-C issued on November 15, 2002 and the June 23, 2009 Administrative Amendment.

- The National Ambient Air Quality Standards (NAAQS) and State Ambient Air Quality Standards (SAAQS) are "Applicable requirement[s]" as defined in HAR 11-60.1-81.<sup>1</sup>

- Puna boiler is subject to 40 CFR Part 63, NESHAP for Source Categories, Subpart JJJJJJ NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources.

Provide a statement that the source is in compliance and will continue to comply with all such requirements.

The facility is in compliance and will continue to comply with the applicable requirements identified in CSP No. 0235-01-C issued on November 15, 2002, the June 23, 2009 Administrative Amendment, and applicable Area Sources Boiler NESHAP Subpart JJJJJJ. The NAAQS and SAAQS are "Applicable requirement[s]" as defined in HAR 11-60.1-81.<sup>1</sup>

b. Identify all applicable requirement(s) for which compliance is NOT achieved:

Not applicable.

Provide a detailed Schedule of Compliance and a description of how the source will achieve compliance with all such applicable requirements. Use separate sheets of paper, if necessary.

<u>Description of Remedial Action</u>	<u>Expected Date of Completion</u>
Not applicable.	

<sup>1</sup> Based on information currently available, the Puna Generating is not causing or contributing to an exceedance of the NAAQS.

- c. Identify any other applicable requirement(s) with a future date that your source is subject to. These applicable requirements may be in effect AFTER permit issuance:

<u>Applicable Requirement</u>	<u>Effective Date</u>	<u>Currently in Compliance?</u>
40 CFR Part 52, Subpart M – Regional Haze	November 8, 2012 Compliance Date: December 31, 2018	Yes
HAR Title 11 Chapter 60.1 Subchapter 11 – Greenhouse Gas Emissions	June 19, 2014 Compliance Date: December 31, 2019	Yes

If the source is not currently in compliance, submit a Schedule of Compliance and a description of how the source will achieve compliance with all such requirements:

<u>Description of Proposed Action/Steps to Achieve Compliance</u>	<u>Expected Date of Achieving Compliance</u>
Not applicable.	

Provide a statement that the source on a timely basis will meet all these applicable requirements.  
The source will meet any future applicable requirements on a timely basis.

---



---



---

If the expected date of achieving compliance will NOT meet the applicable requirement's effective date, provide a more detailed description of all remedial actions and the expected dates of completion.

<u>Description of Remedial Action and Explanation</u>	<u>Expected Date of Completion</u>
Not applicable.	

2. Compliance Progress Reports:

- a. If a compliance plan is being submitted to remedy a violation, complete the following information:

Frequency of Submittal: \_\_\_\_\_ Beginning Date: \_\_\_\_\_  
(less than or equal to 6 months)

b. Date(s) that the Action described in (1)(b) was achieved:

<u>Remedial Action</u>	<u>Date Achieved</u>
<u>Not applicable.</u>	

c. Narrative description of why any date(s) in (1) (b) was not met, and any preventive or corrective measures taken in the interim:

<u>Not applicable.</u>
------------------------

**RESPONSIBLE OFFICIAL** (as defined in HAR §11-60.1-1)

Name (Last): Uchida (First): Norman (MI): M.

Title: Manager, Production Department Phone: (808) 969-0422

Mailing Address: P.O. Box 1027

City: Hilo State: HI Zip Code: 96721-1027

**Certification by Responsible Official** (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

Name (Print/Type): Norman M. Uchida, PE

(Signature): *Norman Uchida* Date: 3/22/18

Facility Name: Puna Generating Station

Location: Puna Mill Road, Keeau, HI 96749

Permit Number: CSP No. 0235-01-C

<b>FOR AGENCY USE ONLY</b>	
File/Application No.:	_____
Island:	_____
Date Received:	_____



File No.: \_\_\_\_\_

**C-2: Compliance Certification**

The Responsible Official shall submit a Compliance Certification as indicated in the Instructions for Applying for an Air Pollution Control Permit and at such other times as requested by the Director of Health (hereafter, Director).

Complete as many copies of this form as necessary. Use separate sheets of paper if necessary.

**RESPONSIBLE OFFICIAL** (as defined in HAR §11-60.1-1)

Name (Last): Uchida (First): Norman (MI): M.

Title: Manager, Production Department Phone: (808) 969-0422

Mailing Address: P.O. Box 1027

City: Hilo State: HI Zip Code: 96721-1027

**Certification by Responsible Official** (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules, Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

Name (Print/Type): Norman M. Uchida, PE

(Signature): *Norman Uchida* Date: 3/22/18

Facility Name: Puna Generating Station

Location: Puna Mill Road, Keeau, HI 96749

Permit Number: CSP No. 0235-01-C

<b>FOR AGENCY USE ONLY</b>	
File/Application No.:	_____
Island:	_____
Date Received:	_____

Complete the following information for *each* applicable requirement that applies to *each* emissions unit at the source. Also include any additional information as required by the Director. The compliance certification may reference information contained in a previous compliance certification submittal to the director, provided such referenced information is certified as being current and still applicable.

1. Schedule for submission of Compliance Certifications during the term of the permit:

Frequency of Submittal: In accordance with §11-60.1-86.

Beginning Date: In accordance with §11-60.1-86.

2. Emissions Unit No./Description:

Unit ID	Manufacturer	Model No.	Capacity (Nominal)
Boiler	Combustion Engineering	VU-40	15.5 MW
CT-3	General Electric	LM2500	20 MW
PBSG1	Detroit Diesel	12V92	600 kW

3. Identify the applicable requirement(s) that is/are the basis of this certification:

See Attachment C-2a.

---



---



---



---

4. Compliance status:

a. Will the emissions unit be in compliance with the identified applicable requirement(s)?

YES  NO

b. If YES, will compliance be continuous or intermittent?

Continuous  Intermittent

c. If NO, explain.

---



---



---



---

5. Describe the methods to be used in determining compliance of the emissions unit with the applicable requirement(s), including any monitoring, recordkeeping, reporting requirements, and/or test methods:

See Attachment C-2a.

---

---

---

---

---

---

---

Provide a detailed description of the methods used to determine compliance: (e. g. monitoring device type and location, test method description, or parameter being recorded, frequency of recordkeeping, etc.)

See Attachment C-2a.

---

---

---

---

---

---

---

6. Statement of Compliance with Enhanced Monitoring and Compliance Certification Requirements.

- a. Will the emissions unit identified in this application be in compliance with applicable enhanced monitoring and compliance certification requirements?

YES

NO

- b. If YES, identify the requirements and the provisions being taken to achieve compliance:

The final Enhanced Monitoring Rule was published in the Federal Register on  
October 22, 1997 (62 FR 54900). According to that final rule, the Enhanced Monitoring  
Rules do not apply to the Kanoelehua-Hill Generating Station. The compliance certification  
requirement is established by 40 CFR 70 and HAR 11-60.1.

- c. If NO, describe below which requirements will not be met:

---

---

---

---

---

---

---

**Attachment C-2a  
Compliance Status  
Puna Generating Station  
CSP No. 0235-01-C  
Issued November 15, 2002  
Amended June 23, 2009**

**Attachment C-2a  
Compliance Status  
Puna Generating Station - CSP No. 0235-01-C  
Issuance Date: November 15, 2002 and Amended June 23, 2009**

**A. Attachment I, Standard Conditions**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
<u>Permit term/condition</u> All standard conditions	All Equipment(s) listed in the permit	<input checked="" type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**B. Special Conditions - Monitoring, Recordkeeping, Reporting, Testing, and INSIG**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
<u>Permit term/condition</u> All monitoring conditions	All Equipment(s) listed in the permit	<input checked="" type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
<u>Permit term/condition</u> All recordkeeping conditions	All Equipment(s) listed in the permit	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
<u>Permit term/condition</u> All reporting conditions	All Equipment(s) listed in the permit	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
<u>Permit term/condition</u> All testing conditions	All Equipment(s) listed in the permit	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
<u>Permit term/condition</u> All INSIG conditions	All Equipment(s) listed in the permit	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<u>Compliance</u> <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**C. Special Conditions - Operational and Emissions Limitations**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
40 CFR Part 60 Subpart GG (NOx limit)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.1 (Units shall be well maintained)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine <u>PBSG1</u> 600 kW black start diesel engine generator	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.2 (Fuel specifications and fuel sulfur limit)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine <u>PBSG1</u> 600 kW black start diesel engine generator	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.3 (Maximum rolling 12-month operating hours limit)	<u>PBSG1</u> 600 kW black start diesel engine generator	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.4 (Minimum operational load)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.5.a (Start-up limits)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.5.b (Shut-down limits)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.6 (Water injection operation and minimum water-to-fuel ratios)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.7 (NOx, SO2, PM10, CO, and VOC maximum emissions limits)	<u>CT-3</u> 20 MW General Electric LM 2500 combustion turbine	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**C. Special Conditions - Operational and Emissions Limitations (Continued)**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
Attachment IIA, Special Condition C.8 a (Opacity monitoring)	<u>CT-3 20 MW General Electric LM 2500 combustion turbine</u>	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.8b (Opacity limits)	<u>CT-3 20 MW General Electric LM 2500 combustion turbine</u>	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.a (Alt. operating scenario – temporary unit replacement)	<u>CT-3 20 MW General Electric LM 2500 combustion turbine</u>	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.b (Alt. operating scenario – emergency load conditions)	<u>CT-3 20 MW General Electric LM 2500 combustion turbine</u>	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.c (Alt. operating scenario – fuel switching)	<u>CT-3 20 MW General Electric LM 2500 combustion turbine</u> <u>PBSG1 600 kW black start diesel engine generator</u>	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.d (Alt. operating scenario – fuel additives)	CT-3 20 MW General Electric LM 2500 combustion turbine PBSG1 600 kW black start diesel engine generator	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.e (Alt. operating scenario log)	CT-3 20 MW General Electric LM 2500 combustion turbine PBSG1 600 kW black start diesel engine generator	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.9.f (Alt. operating scenario must meet permit requirements)	CT-3 20 MW General Electric LM 2500 combustion turbine PBSG1 600 kW black start diesel engine generator	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.10.a (Space for SCR must be designated)	CT-3 20 MW General Electric LM 2500 combustion turbine	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIA, Special Condition C.10.b (Alternative control technologies demonstration project must be conducted)	CT-3 20 MW General Electric LM 2500 combustion turbine	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**C. Special Conditions - Operational and Emissions Limitations (Continued)**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
Attachment IIA, Special Condition C.10.c (DoH may require the use of alternative control technologies)	CT-3 20 MW General Electric LM 2500 combustion turbine	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.1.a (Fuel specifications and fuel sulfur limit)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.1.b (Fuel meter or tank strapping)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.1.c (Spec used oil rolling 12-month fuel limit)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.1.d (Biomass and coal burning requires DoH approval)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.2 (Multicyclone dust collector must be operational)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.a (DoH may revise spec used oil permit conditions)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.b (Spec used oil handling, transporting, storing, and burning)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.c (Spec used oil sources)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent



**C. Special Conditions - Operational and Emissions Limitations (Continued)**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
Attachment IIB, Special Condition B.3.d (Spec used oil sampling)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.e (Spec used oil analysis)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.f (Hazardous waste not authorized)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.g (Spec used oil constituent/property limits)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input checked="" type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.3.h (Isolation of hazardous waste)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.4 (Opacity limits)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input checked="" type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.5.a (Inspection of fugitive emissions from fuel oil transfer system)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input checked="" type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.5.b (Fuel oil transfer system inspection log)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.6.a (Alt. operating scenario – fuel switching)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input checked="" type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent

**C. Special Conditions - Operational and Emissions Limitations (Continued)**

<u>Permit term/condition</u>	<u>Equipment(s)</u>	<u>Method</u>	<u>Compliance</u>
Attachment IIB, Special Condition B.6.b (Alt. operating scenario log)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input checked="" type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent
Attachment IIB, Special Condition B.6.c (Alt. operating scenario must meet permit requirements)	Boiler – 15.5 MW Combustion Engineering VU-40 boiler	<input type="checkbox"/> monitoring <input type="checkbox"/> recordkeeping <input type="checkbox"/> reporting <input type="checkbox"/> testing <input checked="" type="checkbox"/> none of the above	<input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Intermittent