

**SUMMARY OF COMMENTS RECEIVED
ON DRAFT AIR PERMITS
REGULATING THE EMISSIONS OF AIR POLLUTANTS**

(Docket No. 19-CA-PA-05)

I. OVERVIEW

Pursuant to Hawaii Administrative Rules (HAR), Chapter 11-60.1, three (3) 30-day public comment periods and a public hearing were afforded to consider significant modifications to covered source permits (CSPs) for thirteen (13) electric plants subject to greenhouse gas (GHG) emission reductions. Three forty-five (45) day review periods by the U.S. Environmental Protection Agency (EPA) for the draft permits were initiated in parallel with the three (3) public comment periods. The significant modifications amend the permits to incorporate facility-wide GHG emission caps as defined in HAR §11-60.1-202.¹ The facility-wide GHG emissions caps were established in the GHG emission reduction plans submitted with each facility's application for a significant permit modification. After the first public comment period from April 16, 2019 to May 15, 2019, a public hearing was requested. Therefore, a second public comment period was provided from August 14, 2019 to September 27, 2019 in parallel with the public hearing held on September 26, 2019 at the Momilani Elementary School. Due to significant permit revisions adjusting the GHG emission caps after the second public comment period and public hearing, a third public comment period was provided from July 14, 2020 to August 14, 2020 to consider the significant permit modifications. Partnering is proposed by the thirteen (13) affected facilities in accordance with HAR §11-60.1-204(d)(6)(A). Partnering allows the affected facilities to combine facility-wide emissions caps to leverage emission reductions in meeting their combined GHG emissions cap. The partnering facilities are:

Independent Power Producers (IPPs)

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

Hawaiian Electric Companies

- 1) Hawaiian Electric Company, Inc. (Hawaiian Electric), CSP No. 0238-01-C
- 2) Hawaiian Electric Company, Inc. (Hawaiian Electric), CSP No. 0239-01-C
- 3) Hawaiian Electric Company, Inc. (Hawaiian Electric), CSP No. 0240-01-C
- 4) Hawaiian Electric Company, Inc. (Hawaiian Electric), CSP No. 0548-01-C
- 5) Hawaii Electric Light Company, Inc. (Hawaii Electric Light), CSP No. 0007-01-C
- 6) Hawaii Electric Light Company, Inc. (Hawaii Electric Light), CSP No. 0234-01-C
- 7) Hawaii Electric Light Company, Inc. (Hawaii Electric Light), CSP No. 0235-01-C
- 8) Maui Electric Company, Ltd. (Maui Electric), CSP No. 0031-04-C
- 9) Maui Electric Company, Ltd. (Maui Electric), CSP No. 0067-01-C
- 10) Maui Electric Company, Ltd. (Maui Electric), CSP No. 0232-01-C

During the first public comment period, the Department of Health, Clean Air Branch (DOH-CAB) received comments on the draft permits from five (5) commenters. Comments and the DOH-CAB's responses are addressed below in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period). Although comments from three (3) of the commenters were received late (after May 15, 2019), the DOH-CAB considered all comments submitted. Comments were received from the following commenters:

¹ HAR §11-60.1-202. See Enclosure 1.

Commenter	Date Received
Blue Planet Foundation	Letter Postmarked May 16, 2019
Hamakua Energy, LLC	May 30, 2019 Email and Letter Postmarked May 30, 2019
Hawaiian Electric Companies	May 15, 2019 Email and Letter Postmarked May 15, 2019
Life of the Land	May 15, 2019 Email
Sierra Club of Hawaii	May 17, 2019 Email and Letter Postmarked May 17, 2019

During the second public comment period that included the public hearing, the DOH-CAB received comments on the draft permits from one hundred and eleven (111) commenters. Eighty-one (81) of the comments were identical, sixteen (16) comments were derivatives of the large number of identical comments, and an additional fourteen (14) comments were unique to all the others. Although a comment from one (1) of the commenters was received late (after September 27, 2019), the DOH-CAB considered all comments submitted. Comments and DOH-CAB's responses are addressed in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period).

At the public hearing twenty-three (23) commenters provided oral testimony. The DOH-CAB gave a presentation at the beginning of the hearing that is provided in Enclosure 2.² Comments and the DOH-CAB's responses to the testimonies are addressed in SECTION IIC, ORAL TESTIMONIES AND RESPONSES (9-26-2019 Public Hearing).

During the third public comment period, the DOH-CAB received comments on the draft permits from three (3) commenters. Comments and the DOH-CAB's responses are addressed in SECTION IID, WRITTEN COMMENTS AND RESPONSES (7-14-2020 to 8-14-2020 Comment Period). Comments were received from the following commenters:

Commenter	Date Received
AES Hawaii, LLC	Letter Postmarked August 13, 2020
Hamakua Energy, LLC	Letter Postmarked August 13, 2020
Hawaiian Electric Companies	Letter Postmarked August 13, 2020

On September 10, 2020, the DOH-CAB received comments from EPA on the draft permits through the central data exchange (CDX). Since the DOH-CAB could not access the comments through CDX, EPA emailed the comments on September 14, 2020 for DOH-CAB's review. Although the comments were received late (after August 28, 2020), the DOH-CAB considered all comments submitted. Comments and the DOH-CAB's responses are addressed in SECTION IIE, WRITTEN COMMENTS AND RESPONSES (7-14-2020 to 8-28-2020 EPA Review Period, EPA Comments Received on 9-10-2020).

A number of comments fell outside the DOH-CAB's air permitting authority. The primary requirements with respect to air permitting, partnering, and the GHG emission reduction plans are provided in HAR, Subchapter 11. The scope of DOH-CAB's permitting authority is limited to determining whether an air permit and GHG emission reduction plan have complied with all applicable requirements of the HAR. If the DOH-CAB determines that the proposed GHG emissions reduction plan submitted with the permit application will not be in compliance with all applicable requirements, the HAR requires the DOH-CAB to request the proposed plan be resubmitted or request for the submittal of additional information necessary to evaluate or take final action on the plan. Therefore, the scope of the DOH-CAB's permitting authority is limited to determining whether the draft permits and associated GHG emission reduction plan will be in compliance with all applicable requirements of the HAR. Thus, for comments out of the DOH-CAB's jurisdiction, the response notes that the issue(s) raised by the comment fall outside the scope of DOH-CAB's permitting authority.

² Public Hearing Presentation, GHG Emission Caps for Partnering Facilities, September 26, 2019. See Enclosure 2.

IIA. WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period)

A. Blue Planet Foundation Comment:

The need for greenhouse gas reductions is more urgent now than ever

In 2007, the legislature passed the Hawaii Global Warming Solutions Act (Act 234), setting a state policy to reduce Hawaii's GHG "to levels at or below the best estimations and updates of the inventory of greenhouse gas emissions estimates for 1990."

In drafting Act 234, the legislature found "that the earth's atmosphere is now warming at the fastest rate in recorded history, a trend that is projected to cause extensive damage to forests, marine ecosystems, and agriculture" and that "communities are also threatened by climate change as seas rise, storms become more intense, and episodes of drought and flooding increase." Since Act 234 passed, these findings have largely proven true.

On May 11, 2019 Mauna Loa Observatory detected 415.26 parts per million carbon dioxide (CO₂) in the atmosphere- the highest level ever recorded by the observatory, and the highest level in the history of mankind.

Hawaii's business, residents, and government have an obligation to reduce our contribution to increasing GHGs in the Earth's atmosphere. Strict adherence to the intent of Act 234 is critical to achieve our climate targets.

Response to Comment A:

HAR, Chapter 11-60.1, Air Pollution Control was amended on June 30, 2014 in accordance with Hawaii Act 234, 2007 that was enacted in Hawaii Revised Statutes (HRS) §342B-71 to 73 for regulating GHGs. The main requirements are set forth in HAR Subchapter 11, Greenhouse Gas Emissions that follows the core directives from Act 234 by proposing the following: 1) adopting the statewide GHG emission limit of 1990 levels, or lower, by 2020; 2) establishing the principle of seeking reductions that are the maximum practically and technically feasible and cost-effective; and 3) requiring the reporting and verification of statewide GHG emissions to ensure compliance. The purpose of Subchapter 11 is specified in HAR §11-60.1-201.

Enclosed is HAR §11-60.1-201 for your reference.³ HAR, Chapter 11-60.1 is available electronically at: http://health.hawaii.gov/cab/files/2014/07/HAR_11-60_1-typed.pdf.

B. Blue Planet Foundation Comment:

AES coal failed to consider all alternatives

AES coal failed to examine all GHG reduction options to achieve their facility's required 16% in GHG. AES studied a handful of reduction options, including mixing biomass or oil with the coal, upgrading turbines, improving heat rates, and other changes. They did not examine, however, simply reducing their coal use and overall power production by 16% (or by whatever amount necessary to achieve a 16% reduction in GHG emissions).

While AES is currently in a contract to sell its electricity to Hawaiian Electric (HECO), it is clear that HECO is less reliant on AES's electricity as it was in 2010. According to the Department of

³ HAR §11-60.1-201. See Enclosure 3.

Business, Economic Development, and Tourism (DBEDT) Monthly Energy Trends, electricity sales on Oahu have dropped more than 10% between 2010 (the baseline year) and 2018 and are projected to continue to decline.

AES can achieve a 16% reduction in GHG levels from 2010. Reducing the output of the AES coal power plant- and therefore the GHG emissions- is not only possible, it is desirable.

Response to Comment B:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in AES's permit amendment being issued.

On October 29, 2019, the DOH-CAB submitted a letter, on behalf of the public, that requested the partnering facilities to re-assess reduction in coal burning based on comparative review of CO₂e to MWh ratios by individual facilities.⁴ Since the proposed total combined GHG emissions cap is sixteen percent (16%) below the combined baseline, and the GHG emission reduction plans for all partnering facilities are determined to be in compliance with the HAR, this letter is outside of the DOH-CAB's permitting authority and was submitted as a courtesy request. Hawaiian Electric's response to the DOH-CAB letter is provided in Enclosure 5.⁵

In Hawaiian Electric'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. AES Hawaii, LLC's individual GHG emission's cap was reduced from 1,691,605 short tons to 1,681,605 short tons. After further negotiations, AES Hawaii, LLC and Hawaiian Electric reached an understanding that further reduced the individual GHG emissions cap for AES Hawaii, LLC by sixteen percent (16%) from its individual baseline to 1,412,548 short tons starting from calendar year 2020, as documented in May 22, 2020, and June 9, 2020, emails from Hawaiian Electric.

In addition, the Department is amending the AES permit to comply with Act 023 (September 15, 2020) (to be codified as Hawaii Revised Statutes (HRS) Section 342B-) of the 30th Hawaii State Legislature, 2020. The Department is superseding Attachment IIA, Special Condition Nos. C.1 and C.2, and adding Special Condition Nos. C.11 and E.7 to incorporate the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022.

C. Blue Planet Foundation Comment:

AES selected an arbitrary "cost effectiveness" threshold

AES claims that actions to achieve the 16% GHG reduction are not "cost effective" based on their own analysis and selection of a "cost effectiveness" threshold of \$23 per ton. AES analyzed 11 different GHG reduction options with costs between \$51 and \$1792 per ton reduction. They rejected these options based on costs exceeding the \$23 per ton threshold.

⁴ DOH-CAB Letter, Public Comments on Draft Permits to Incorporate Greenhouse Gas (GHG) Emission Cap Provisions for Thirteen (13) Partnering Facilities, Day File Log No. 19-653E CAB, October 29, 2019. See Enclosure 4.

⁵ Hawaiian Electric December 9, 2019 Response Letter to DOH-CAB Letter, Day File Log No. 19-653E CAB. See Enclosure 5.

Blue Planet Foundation believes that a \$23 per ton threshold is far too low. During the Obama Administration, the EPA set the “social cost of carbon” at \$45 per ton. The U.N. Intergovernmental Panel on Climate Change’s October 2018 “Special Report: Global Warming of 1.5 °C” estimated that the global average price to emit a ton of carbon dioxide pollution must be at least \$135 by 2030, and perhaps as great as \$5,500. Setting a threshold of \$23 per ton is simply too low giving the severe consequences of climate change.

Response to Comment C:

As specified in HAR §11-60.1-204(d)(2), if the required GHG emissions cap requiring a sixteen percent (16%) emissions reduction from the baseline year is deemed unattainable, the permittee shall conduct a GHG control assessment.⁶ AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in AES’s permit amendment being issued. Additionally, since the facility-wide GHG emissions cap (total combined GHG cap for partnering facilities) is specified in the permits to be 16% below the total combined baseline GHG emissions level by the end of 2020, the GHG reduction requirement is attainable and AES is not required to perform a GHG control assessment. Note that adjustments were made to individual and total combined GHG emission caps for the partnering facilities due to public concerns with the individual cap specified for AES and in accordance with HAR §11-60.1-204(h) as a result of the PGV shutdown due to volcanic activity. The GHG control assessment does not affect the use of partnering as the control strategy in meeting the required facility-wide GHG emissions cap.⁷

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.

D. Hamakua Energy, LLC Comment:

In commenting, Hawaiian Electric requested that DOH modify the permit conditions in each affected CSP to: 1) align with regulatory requirements regarding “applicable timeframes for compliance and enforcement”, and 2) “modify the collective partnership emissions cap for calendar year 2019” so as to account for the loss of renewable energy from Puna Geothermal Ventures (PGV).

Hamakua Energy, LLC strongly supports Hawaiian Electric’s comments.

Response to Comment D:

Please see DOH-CAB’s response to Comment G in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period) for timeframes that apply to compliance and enforcement of the GHG emissions cap.

Please see DOH-CAB’s response to Comment H in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period) for modifying the collective partnerships emissions cap for calendar year 2019 only.

⁶ HAR §11-60.1-204(d)(B)(2). See Enclosure 6.

⁷ HAR §11-60.1-204(h). See Enclosure 7.

E. Hamakua Energy, LLC Comment:

Background

Comment 1:

The Hamakua Energy Plant (HEP) is an independent power producer (IPP) which sells electrical energy to Hawaii Electric Light Company, Inc. (Hawaii Electric Light) pursuant to a power purchase agreement (PPA). By the terms of the PPA, Hawaii Electric Light has dispatch authority over HEP, i.e., Hawaii Electric Light determines when, how much, and how long the facility should generate electricity on any given day.

In terms of GHG emissions, Hamakua Energy, LLC considers the HEP to be the most efficient fossil fuel-fired electrical generation facility on Hawaii Island, i.e., its GHG emissions per unit of electrical energy generated are lower than other fossil fuel electrical generation facilities. This efficiency is an incentive for Hawaii Electric Light to dispatch HEP.

To comply with the Subchapter 11 GHG reduction rules, HEP developed a GHG control plan consisting of three elements: 1) entering the GHG emission reduction partnership, 2) using biodiesel if it becomes available on Hawaii Island in quantities sufficient for sustained power generation and the HEP facility is permitted to operate on biodiesel, or 3) restrictive operations if elements 1 and 2 do not result in the requisite reduction of GHG emissions.

A minor permit modification to burn biodiesel was submitted to DOH on December 27, 2018. To date, the minor modification has not been approved. Once the minor modification has been approved, biodiesel can be incorporated into routine operations.

Response to Comment E.1:

The minor permit modification for HEP to burn biodiesel was issued to Hamakua Energy, LLC on June 7, 2019. For firing equipment on biodiesel, biogenic CO₂ emissions are excluded from the GHG emissions cap in accordance with HAR §11-60.1-204(c). Also, please note that the footnote below the equation for calculating the minimum facility-wide emissions cap is incorrect in the HAR. Baseline emissions for the cap should include all biogenic and non-biogenic GHG emissions. The equation in HAR §11-60.1-204(c)⁸ is currently being updated to delete CO₂ in the footnote for the next rule amendments as follows (note that the deletion is shown as a strikethrough):

$$\text{Facility-wide cap} = \left(\begin{array}{l} \text{Facility} \\ \text{Total} \\ \text{Baseline} \\ \text{Emissions} \end{array} \right) - \left(\begin{array}{l} \text{Facility} \\ \text{Baseline} \\ \text{Biogenic} \\ \text{CO}_2 \text{ Emissions} \end{array} \right) \text{ (tpy CO}_2\text{e)}$$

Where:

$$\text{Facility Total Baseline Emissions (tpy CO}_2\text{e)} = \text{Baseline}[\text{Biogenic CO}_2 + \text{Non-Biogenic GHG Emissions}]$$

⁸ HAR §11-60.1-204(c). See Enclosure 8.

Comment 2:

Another possible source of system-wide GHG emission reductions on Hawaii Island is the Hu Honua generation plant that is designed to burn biomass. Biogenic GHGs (GHGs derived from the combustion or decomposition of plant matter) are not subject to control. Although, Hu Honua anticipates providing up to fourteen percent (14%) of Hawaii Island's electrical generation, the Hawaii Supreme Court recently vacated approval of Hu Honua's PPA by the Hawaii Public Utilities Commission (PUC) because the PUC had not accounted for all GHG emissions associated with the project. In view of the Supreme Court decision, Hu Honua is unlikely to operate, if at all, in 2019. Therefore, Hu Honua's output will not be available in 2019 to reduce the impact of PGV's unavailability.

Response to Comment E.2:

We agree that the PGV shutdown will result in the need to burn more fossil fuel to make up for the loss of this renewable energy source on Hawaii Island and have agreed to temporarily adjust the total combined GHG emissions cap in accordance with HAR §11-60.1-204(h). Please refer to Comment H in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

F. Hamakua Energy, LLC Comments:

Effects of Loss of PGV's Output and the Delay of Hu Honua Operations

Comment 1:

PGV's unavailability has dramatically affected Hamakua Energy. Under the GHG rules, the HEP facility-wide GHG cap was set at 153,699 tons per year. Through April 2019, Hamakua Energy's GHG emissions totaled 72,052 tons, i.e. 51.1% of its facility-wide GHG limit. At the current rate that it is being dispatched, HEP would reach its facility-wide GHG limit by sometime in August 2019. Depending on the GHG partnership's total and projected GHG emissions at that time, HEP would have to evaluate restricting operations. Given that HEP is the most efficient fossil-fuel fired facility on Hawaii Island, this could ultimately increase total GHG emissions on Hawaii Island being emitted by less efficient units.

Response to Comment F.1:

We agree that operating a more efficient plant in place of a less efficient plant is a means to reduce GHG emissions when dispatching units. As indicated in the GHG emission reduction plan for the Hawaiian Electric Companies, the partnership 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. Please note that for partnering, HEP is allowed to exceed its individual cap as long as the total combined cap among partnering facilities is met. Also, all partnering facilities agreed with inserting an alternate operating scenario in the permits to temporarily adjust for the loss of the PGV facility. Refer to Comment H in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

Comment 2:

The HEP strongly supports the HECO's proposed revised partnership GHG emission cap of 6,584,118 metric tons (7,257,747 short tons), which is a 3.334 percent increase from the originally proposed cap of 6,371,392 metric tons (7,023,258 short tons) for the year 2019.

Response to Comment F.2:

Hamakua Energy cites the following in support of Hawaiian Electric's proposed revision to the partnership's total combined GHG emissions cap:

1. By the terms of the PPA, the HEP has no control over Hawaii Electric Light's dispatch authority;
2. Due to unforeseen events beyond the control of the HEP, PGV, which is entirely a renewable energy producer, has ceased its operation and as such, the HEP is being dispatched by Hawaii Electric Light to make up for the loss of PGV; and
3. Start-up of the Hu Honua facility, which is another renewable energy producer on the island of Hawai'i, may be delayed and could extend the need for dispatching the HEP at higher than its expected operating level.

In HEP's greenhouse gas emissions reduction plan dated November 23, 2018, the following control strategies, in the order of priority for implementation, are proposed:

1. Partnering with other power producers in Hawai'i;
2. Fuel switching including biogenic fuels; and
3. Restrictive operations, absent any relief for emergencies.

As codified in HAR §11-60.1-204(d)(6)(A), a combined facility-wide GHG emissions cap may be proposed to leverage emission reductions among partnering facilities by curtailing or retiring the use of less efficient sources.⁹ The HEP is proposing to combine their cap with partnering facilities as a primary control measure and use liquid biofuels as an alternate control measure for complying with both the individual and combined GHG emission caps. As stated in Section 3.3 of HEP's greenhouse gas emission reduction plan, should partnering with other power producers in Hawai'i become unavailable, liquid biogenic fuels would become the primary control measure. Restrictive operation is the least desirable control measure since it increases operating cost and potentially could increase the combined GHG emissions.

HAR §11-60.1-204(h) subsections (4) and (5) state, the facility-wide GHG emissions cap may be re-evaluated and revised by the director if any of the following events or circumstances exists:

1. Renewable energy producers cease operations or fail to meet contractual obligations with the affected source, and there are no other reasonable alternatives; or
2. Reasonably unforeseen events beyond the control of the owner or operator of an affected source, resulting in long-term or temporary emission changes, whereby the maintenance of the GHG emissions cap would be detrimental to the health and welfare of the public.

Based on the recent events, the proposed revision to the total combined emission cap for calendar year 2019 is considered to be within the provisions of HAR §11-60.1-204(h). Please refer to Comment H in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period) for the latest update to the proposed individual and total combined GHG emission caps.

⁹ HAR §11-60.1-204(d)(6)(A). See Enclosure 9.

G. The Hawaiian Electric Companies' Comment:

The Companies request that the DOH modify the permit condition in Attachment II-GHG, Special Condition No. C.1.c.iii in each of the GHG CSPs to align with the regulatory requirements set forth in HAR §11-60.1-204(j) regarding applicable timeframes for compliance and enforcement.

The draft GHG CSPs each contain the following provision in Section II.C.1.c.iii:

- (iii) The permittee shall be in compliance with the emissions limits by the end of 2019 and each calendar year thereafter.

The companies request that DOH modify that provision in each GHG CSP to clarify the time periods for compliance and enforcement, which are set forth in HAR §11-60.1-204(j). The companies claim that, for these provisions, compliance with the annual GHG emissions cap is determined at the end of each calendar year and that calendar year 2020 is the first calendar year for which an enforcement action for non-compliance may be initiated by the DOH. The regulation provides as follows:

- (j) Should the permitted facility-wide GHG emissions cap not be met by January 1, 2020 and annually maintained thereafter, the owner or operator of the covered source shall be subject to enforcement action for each year after 2019 that the facility-wide cap is not met. Compliance with the facility-wide cap shall be determined at the end of each calendar year, or January 1 of the following year, starting with the end of 2019 or January 1, 2020.

The Companies interpret enforcement for “each year after 2019” that the cap is not met to mean that calendar year 2020 is the first compliance period and therefore request DOH to modify the permit condition as follows:

- (iii) The permittee shall be in compliance with the emissions limits by January 1, 2020 and each calendar year thereafter, with annual compliance being determined at the end of each calendar year, and may be subject to enforcement action for each year that the annual emission limit is not achieved beginning with calendar year 2020.

Response to Comment G:

We disagree with your request to revise Attachment II-GHG, Special Condition No. C.1.c.iii. In HAR §11-60.1-204(j), “each year after 2019”, means that the compliance period for the facility-wide GHG cap starts at the beginning of calendar year 2019. As stated in this HAR provision, compliance with the cap shall be determined at the end of each calendar year, starting with the end of 2019 or January 1, 2020. This means that the first compliance period is from the start of 2019 to the end of 2019. Also, as specified in HAR §11-60.1-204(c), the facility-wide GHG emissions cap must be achieved by 2020. A compliance date that starts at the end of 2020 does not meet the HAR requirements. Attachment II-GHG, Special Condition No. C.1.c.iii aligns with HAR §11-60.1-204(j) and §11-60.1-204(c), and therefore, no changes will be made to this permit condition.

H. The Hawaiian Electric Companies' Comment:

The companies request that DOH modify the collective partnership emissions cap for calendar year 2019, as stated in Attachment II-GHG, Special Condition No. C.1.b of the CIP (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 been included in the calculations in the Companies' Emissions Reduction Plan (ERP).

While the Companies are committed to doing best efforts to meet the caps established in the ERP and the draft GHG CSP, 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 emissions reduction compliance margin the Companies had anticipated and relied upon in the calculation in the ERP. PGV, the state's only geothermal power plant and a major renewable power producer for Hawaii Island, shut down in May 2018 due to the Kilauea eruption. Lava destroyed the Puna complex substation, the adjacent warehouse, and covered a few of PGV's geothermal wells, as well as cut off road access to the PGV power plant. The event was unforeseeable and beyond the control of the owner or the Companies.

Thus, the Companies request that DOH recognize the temporary loss of PGV by adding the equivalent emissions of 234,490 tons for calendar year 2019, to the collective partnership GHG emissions cap. The equivalent GHG emissions were determined by taking the difference between system generation forecast made with and without PGV in operation.

The GHG regulations at HAR §11-60.1-204(h) provide re-evaluation and revision of the GHG emissions in a number of circumstances, including significant changes in renewable energy supply. Although that provision appears to address modifications to a cap after it has been approved and implemented, the Companies reference it to demonstrate the appropriateness of its proposed modification which is being sought prior to final approval and implementation.

The Hawaiian Electric Companies provided a July 8, 2018 article from the Honolulu Star Advertiser and a revised ERP that were enclosed with their comments.

The CIP CSP (No. 0548-01-C) draft permit amendment contains the following in Section II.C.1.b:

All partnering facilities shall not emit or cause to be emitted total combined CO₂e emissions in excess of 6,371,392 metric tons (7,023,258 short tons) per calendar year.

The Companies request that DOH replace Attachment II-GHG, Special Condition No. C.1.b with the following proposed condition:

All partnering facilities shall not emit or cause to be emitted (i) total combined CO₂e emissions of 6,371,392 metric tons (7,023,258 short tons) per calendar year or (ii) for calendar year 2019, the total combined CO₂e emissions in excess of 6,584,118 metric tons (7,257,747 short tons).

On July 7, 2018, Hawaiian Electric submitted updated information for the request to incorporate a cap adjustment for calendar year 2019.¹⁰ The information included the new total combined GHG cap number and individual GHG cap adjustments that must add up to the new total combined partnering facility cap number proposed for calendar year 2019.

On June 9, 2020, Hawaiian electric company ultimately provided the final cap adjustments on behalf of all partnering facilities for 2019 and operating year 2020 and beyond in an email attachment.¹¹

¹⁰ Hawaiian Electric's July 7, 2018 updated information for request to incorporate a cap adjustment for calendar year 2019. See Enclosure 10.

¹¹ June 9, 2020 email with attachment of partnership caps proposed for 2019 and operating year 2020 and beyond. The attachment is dated June 8, 2020. See Enclosure 11.

Response to Comment H:

After reviewing Hawaiian Electric's concern received during the public comment period held from April 16, 2019, to May 15, 2019, DOH-CAB agrees with the request and will modify Attachment II – GHG, Special Condition No. C.1 to incorporate a temporary adjustment to the facility-wide GHG emissions cap for calendar year 2019 only.

After further review of Hawaiian Electric's February 14, 2020 and April 2, 2020 correspondence and the April 20, 2020 correspondence from Hamakua Energy, LLC, the DOH-CAB also agrees with including alternate operating scenario provisions in the permits to extend 2019 temporary GHG emission cap adjustments for the loss of PGV into 2020 and beyond that are adjusted on a monthly basis if there is a delay in restoring PGV to the net generating levels preceding its shutdown.

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. 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.

Attachment II – GHG, Special Condition No. C.1 in CSP Nos. 0087-02-C, 0243-01-C, 0214-01-C, and 0548-01-C was revised as follows:

1. GHG Emission Caps

- a. Each partnering facility shall not emit or cause to be emitted carbon dioxide equivalent (CO₂e) emissions in excess of the following individual caps, except as specified in Attachment II - GHG, Special Condition No. C.1.c.iv:
 - i. For calendar year 2019, each partnering facility shall not exceed the following individual GHG emission caps:

Calendar Year 2019			
Generating Station	CSP Permit No.	CO ₂ e Emission Cap ^a	
		Metric Tons per Calendar Year	Short Tons per Calendar Year
AES Hawaii, LLC Cogeneration Plant	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
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

^aMetric Tons = (0.90718474) x (Short Tons).

- ii. For calendar year 2020 and beyond, each partnering facility shall not exceed the following individual GHG emission caps, except as specified in Attachment II – GHG, Special condition No. C.3:

Calendar Year 2020 and Beyond			
Generating Station	CSP Permit No.	CO ₂ e Emission Cap ^a	
		Metric Tons per Calendar Year	Short Tons per Calendar Year
AES Hawaii, LLC Cogeneration Plant	0087-02-C	1,281,442	1,412,548
Hamakua Energy, LLC Cogeneration Plant	0243-01-C	139,443	153,699
Kalaeloa Partners, L.P. Cogeneration Plant	0214-01-C	1,056,486	1,164,577
HECO Campbell Industrial Park Generating Station	0548-01-C	112,041	123,504
HECO Honolulu Generating Station	0238-01-C	0	0
HECO Kahe Generating Station	0240-01-C	1,998,996	2,203,516
HECO Waiau Generating Station	0239-01-C	796,554	878,050
HELCO Kanoelehua-Hill Generating Station	0234-01-C	156,449	172,456
HELCO Keahole Generating Station	0007-01-C	219,727	242,208
HELCO Puna Generating Station	0235-01-C	28,800	31,747
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

^aMetric Tons = (0.90718474) x (Short Tons).

- b. All partnering facilities shall not exceed the following combined emission caps:
- i. For calendar year 2019, total combined CO₂e emissions in excess of 7,208,661 short tons (6,539,587 metric tons).
 - ii. For 2020 and beyond, CO₂e emissions in excess of 7,023,257 short tons (6,371,392 metric tons) per calendar year, except as specified in Attachment II – GHG, Special Condition No. C.3.
- c. For purposes of the CO₂e emission limits in Attachment II - GHG, Special Condition Nos. C.1.a and C.1.b of this permit:
- i. The CO₂e 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 (CO₂) emissions shall not be included when determining compliance with the emissions limits;
 - iii. The permittee shall be in compliance with the emissions 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.

The following Attachment II – GHG, Special Condition No. C.3 was incorporated into all partnering facility permits:

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 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 (MW/h) preceding its shutdown.
- NG_{PGV-R} = Net generation from the restored PGV facility (MW/h 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 per month for the facilities from January 1 of that year. Monthly adjustments to the GHG emissions 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 to the month during which the 3.a. criteria 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 per month from January 1 of that year. Monthly adjustment 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 CO₂e caps (short tons – refer to table below).
 AC = Monthly adjustment to GHG emissions caps.

Generating Station	Full Adjustment to CO ₂ e Caps (Short Tons)	2020 CO ₂ e Cap (Short Tons)	FAC/12 (Short Tons) ^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 ^a	15,450

^a Total combined CO₂e cap for all partnering facilities is 7,023,257 short tons.

^b Monthly full CO₂e 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.

I. Life of the Land Comment:

The amendments incorporate provisions for partnering between thirteen (13) electric plants to combine emissions for flexibility in achieving the GHG reductions. Three affected facilities are IPPs owned and operated by AES, Hamakua Energy, and KPLP. The remaining ten 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 cap of 7,584,991 metric tons per year. Partnering facilities used 2010 as the baseline year, except for the KCP cogeneration plant which used 2009 for its baseline year. Emissions from HECO’s Shipman Generating Station which closed at the end of 2015 were included in the baseline emissions.

Generating Station	Metric tons per calendar year
HECO Kane Generating Station	1,935,707
AES Coal-Fired Cogeneration Plant	1,534,598
Kalaeloa Partners, L.P. Cogeneration Plant	993,198
HECO Waiiau Generating Station	733,265
MECO Maalaea Generating Station	417,182
HELCO Keahole Generating Station	219,727
HELCO Kanoelehua-Hill Generating Station	156,449
MECO Kahului Generating Station	140,281
Hamakua Energy, LLC Cogenerating Plant	139,433
HECO Campbell Industrial Park Generating Station	48,752
HELCO Puna Generating Station	28,800
MECO Palaau Generating Station	26,454
HECO Honolulu Generating Station	0
Partnership Total	6,371,392

Why should the baseline include facilities no longer in operation? Doesn't that overinflate any reductions that have appeared in the past few years?

Response to Comment I:

HAR §11-60.1-204(c) requires the use of calendar year 2010 as the baseline year, unless another year or an average of other years to be more representative of normal operations is demonstrated and approved. Therefore, including GHG emissions from facilities that are currently retired or inactive but were actively engaged and operating in 2010 is representative of normal operations. Please note that when developing the rules to regulate GHGs, Shipman Generating Station was included in the baseline GHG emissions for establishing the minimum 16% facility-wide GHG emission cap requirement specified in HAR §11-60.1-204(c).

J. Life of the Land Comment:

Hawaii is part of the Paris Climate Accord. The U.N. IPCC 2018 GAP Analysis calls for a 50% reduction in GHG emissions over the next decade. Should DOH emission limits exceed this international requirement?

If so, is Hawaii truly part of the Paris Climate Accord?

K. Life of the Land Comment:

As an island archipelago, our GHG numbers conveniently exclude international aviation, international marine transportation, and embedded GHG emissions in our imports. Estimating the lifecycle emissions for each facility would increase transparency, accountability, and consumer choice.

Response to Comments J and K:

The purpose of the permit modifications is for implementing the requirements of HAR 11-60-1, Subchapter 11 pursuant to Act 234, 2007 Hawaii Session Laws by achieving the most cost-effective GHG emissions reductions at or below Hawaii's 1990 GHG emissions levels by 2020.

The requests for action from Life of the Land are beyond the legal authority delegated to the DOH-CAB by the legislature in HRS Chapter 342B, Part VI, and HAR Chapter 11-60.1, Subchapter 11. The best avenue for Life of the Land to have these issues addressed would be at the State Legislature. The DOH-CAB only has the authority to regulate stationary equipment at the facilities according to the requirements specified in the HAR. Changes to the state-wide GHG emissions limit to align with the Paris Climate Accord and life cycle emissions are outside the scope of the agency's air permitting authority, and therefore, the DOH-CAB is not considering these requests in the final decision of the permits.

L. Life of the Land Comment:

U.N. Sustainable Development Goal 12 (SDG12): Responsible Consumption and Production. While gross silo emissions may make sense for a state agency, SDG12 requires a transparent holistic approach, a metric that is usable by the public so that they can make informed choices.

Therefore, the table should include a consumer friendly metric GHGE/kWh.

Response to Comment L:

Individual and total combined GHG emission limits were established in accordance with HAR §11-60.1-204(c) which specifies the minimum facility-wide cap in units of tons of CO₂e per calendar year. We also specified the cap in metric tons of CO₂e per calendar year for purposes of comparing CO₂e emissions from affected sources to those reported in the Environmental Protection Agency's (EPA's) Facility Level Information on GreenHouse Gases Tool (FLIGHT) that reports CO₂e emissions in metric tons per year. Specifying GHG emission caps in units of GHGE/kWh would not be in accordance with HAR, Subchapter 11.

M. Sierra Club of Hawaii Comments:

I. Notice and Hearings Requested

Comment 1 (A. No notice of current comment period):

In our May 30, 2018 letter, we requested email notice for greenhouse gas emission plans and public comment periods. We did not receive notice of this public comment from the DOH. Please add the Sierra Club of Hawaii (Sierra Club) to the mailing list for notice of public comment periods.

Response to Comment M.1:

In the May 30, 2018 letter, Sierra Club requested to be placed on the mailing list and notified of GHG emission plans and public comment periods by email at Hawaii.chapter@sierraclub.org and anaboyd@sierraclub.org, Or at P.O. Box 2577, Honolulu, HI 96803. After receiving the letter, we placed Sierra Club on the mailing list for all notices. The Sierra Club should have received the newspaper notice, Docket No. 19-CA-PA-05, on the public comment period for draft permits under review for the thirteen (13) affected facilities. We confirmed that Sierra Club was put on the mailing list at the following address:

Sierra Club of Hawaii
P.O. Box 2577
Honolulu, HI 96803

DOH-CAB personnel also gave a presentation at the Carbon Offset Symposium on April 10, 2019. It was announced during this presentation that a public notice will be published in newspapers on April 16, 2019 for public comments on draft permits for the thirteen (13) partnering facilities being addressed in this response to comments.

In addition to being put on the mailing list for all notices, the DOH-CAB also emailed the Sierra Club notices that involved the initial GHG emission reduction plans and associated permitting for the thirteen (13) affected facilities being addressed in this response to comments.

Comment 2 (B. Public hearing requested):

As outlined in our May 30, 2018 letter, a public hearing on this matter is warranted. This is a complex partnership proposal that would share emission quotas across the entire state. Such a novel approach to managing greenhouse emissions warrants full public disclosure and robust discussion. A public hearing will aid the Department's staff in its consideration of this unique partnership proposal.

Response to Comment M.2:

A public hearing was held on September 26, 2016 at Momilani Elementary School to consider and solicit comments on the draft permits. A public notice for the hearing was published on August 14, 2019 at least thirty (30) days in advance of the hearing in accordance with HAR §11-60.1-206.

Comment 3 (C. Contested Case Hearing Requested):

We renew our request for a contested case hearing should the Department decide to grant this partnership proposal that does not actually reduce harmful greenhouse gas emissions from the largest and dirtiest energy producers in the Hawaiian Islands.

Response to Comment M.3:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period). Based on the number of written comments that were received concerning AES, we assume this specific comment is being directed to the use of coal as a fuel source.

With regards to partnering, this is allowed in accordance with HAR §11-60.1-204(d)(6)(A) for all affected sources in meeting the GHG reduction requirements in HAR §11-60.1-204(c). The total combined CO₂e emission cap for the thirteen (13) affected facilities, that selected partnering as a measure to meet the GHG reduction requirements, is 6,371,392 metric tons (7,023,258 short tons). This is a 16% reduction in emissions from a total combined CO₂e baseline level of 7,584,990 metric tons (8,361,021 short tons). The total combined GHG baseline level was determined in accordance with HAR §11-60.1-204(d) and includes 2010 emissions from all partnering facilities, except for the Kalaeloa Partners, L.P. cogeneration plant which used 2009 emissions for its GHG baseline.

As stated in Enclosure (2), the total combined GHG emissions allowed by existing permits are reduced from about seventeen (17) million tons per year to approximately seven (7) million tons per year with the emission caps proposed for the partnering facilities. This is an approximate 59% reduction in GHG emissions from those allowed by existing permits without the proposed caps. Upon further review of the permit applications, maximum potential emissions from all partnering facilities were found to be around eighteen (18) million tons per year. Therefore, capping GHG emissions provides an approximate 61% total combined reduction in maximum potential CO₂e emissions from that allowed by existing partnering facility permits.

All individual GHG emission caps, that may be exceeded as long as the total combined GHG emission cap is met, are well below the maximum potential GHG emissions for each partnering facility. Requirements to incorporate GHG emission caps into permits for these affected facilities are from HAR, Subchapter 11 for regulating GHG emissions only.

State and federal standards for criteria air pollutants and hazardous air pollutants (HAPs) have already been addressed during the process to issue existing permits held by partnering facilities. It should be noted that the AES plant utilizes “clean coal technology” and has modern air pollution control equipment installed and operating to control pollutant emissions. Also, any criteria pollutants emitted by the partnering facilities must comply with the applicable National Ambient Air Quality Standards (NAAQS) set by the US EPA. The NAAQS were established to provide public health protection of the most sensitive persons in the population such as children, the elderly, and those with asthma. It has been demonstrated that these facilities will neither cause nor contribute to a violation of the NAAQS. Therefore, these plants will not have an adverse effect on public health or welfare in the surrounding area. Furthermore, the existing permit for AES requires continuous emissions monitoring of nitrogen oxides (NO_x) and sulfur dioxide (SO₂) emissions and stack testing the boilers to verify compliance with the air quality standards for HAPs and criteria pollutants.

N. Sierra Club of Hawaii Comments:

II. Additional concerns: AES’ plan could allow for increased emissions

Comment 1 (A. Facilities unrelated to each other should not share GHG emission quotas):

The current partnership proposal would allow energy facilities with particularly high GHG emissions, like AES and Kalaeloa Partners LP to exploit the existing 25-27% decline in emissions already experienced at unrelated facilities operated on other islands. Using the current (and comparatively lower) emissions rates at facilities on Maui would allow higher emissions rates at wholly unrelated facilities on Oahu. This arrangement does appear to actually reduce greenhouse gas emissions or improve air quality for the residents of West Oahu. What is the relationship between the 14 facilities across the four islands being considered in this partnership proposal? Sierra Club is concerned that the proposed permit as currently drafted would allow individual facilities to increase their GHG emissions because emissions may be lower at another completely unrelated facility.

Response to Comment N.1:

The relationship and common goal between partnering facilities is to comply with the total combined GHG emissions cap. If the total combined GHG emissions cap is exceeded, partnering facilities that have exceeded their individual GHG emissions cap will be subject to enforcement action. The provisions for partnering promotes the use of facilities that are more efficient in generating the same amount of power with less GHG emissions to meet power demand without exceeding the total combined cap. However, the grid network is not

interconnected between the islands in the State of Hawaii, and therefore, power generation to meet the demand of each island are independent of each other. While it is theoretically possible that the proposed partnering provisions could allow individual facilities to increase their GHG emissions because emissions may be lower at another completely unrelated facility, it is not plausible by physical limitations of the grid network and the potential impact of the facilities being subject to enforcement, if both the individual and total combined GHG emissions caps are exceeded.

With respect to the statement that the partnership would allow facilities like AES and KPLP to exploit the existing 25-27% decline in emissions, calculations based on data from the U.S. Energy Information Administration (EIA) and FLIGHT were performed for 2018 to determine relative efficiencies for the partnering facilities. Please refer to Enclosure 4. The metric tons of CO₂e emissions per mega-watt hour ratio of 0.9707 was the highest on Oahu for AES. However, when comparing electric plants statewide, there were other plants with higher ratios than AES ranging from 1.0129 - to - 1.1024 – to – 1.1083. The metric tons of CO₂e per mega-watt hour ratio of 0.69 for KPLP shows the KPLP facility was more effective in 2018 of emitting less CO₂e emissions per unit of power produced when compared to a weighted average ratio of 0.81 for the entire partnership. Contrary to the statement of allowing AES and KPLP to exploit the partnering facilities, using KPLP over less efficient facilities exemplifies where higher efficiency is being leveraged to reduce the overall emissions of the partnering facilities.

In addition, there are no provisions in HAR §11-60.1-204(d)(6)(A) that limit partnering by location or type of source. In accordance with the rules, partnering is allowed for any combination of affected sources irrespective of the type of source (e.g., oil fired source, coal fired source, refinery, etc.) or its location (e.g., location on same island, location on other islands, etc.). The map in Enclosure 2 on Page 2 of 6 shows the thirteen (13) partnering facilities and their location.

The individual caps for the thirteen (13) partnering facilities, that may be exceeded if the total combined GHG emissions cap is met, were established by the partnership for flexibility in dispatching units to meet a total combined GHG emissions cap in accordance with HAR §11-60.1-204(d)(6)(A). The DOH-CAB has no regulatory authority to determine how emissions are allocated to meet the total combined GHG emission cap for the partnering facilities. The DOH-CAB is also not responsible for dispatching units to supply electricity to the public. Numerous factors are involved in determining which power plants are dispatched on a given system or operate at a given time (e.g., cost of service, availability of renewable resources, etc.).¹²

For 2020 and beyond, the partnership establishes a total combined GHG emissions cap that results in a total combined GHG reduction of 16% below the proposed total combined GHG baseline emission level. Please refer to our response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

Comment 2 (B. AES' plan does not account for unused emissions post-2022):

As AES' proposal makes clear, this facility is not expected to operate after 2022 because its 30-year power purchase agreement with Hawaiian Electric Company will have expired. Yet, the proposed permit is not silent about what happens in 2023. AES' actual emissions in 2023 will be zero, so the GHG reduction partnership should reflect that the overall GHG emissions quota is reduced by nearly 1.7 million tpy in 2023.

¹² Page 44754 of Federal Register for Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program, Proposed Rules, August 31, 2018. See Enclosure 12.

Response to Comment N.2:

In accordance with HAR §11-60.1-204(h)(1), the facility-wide GHG emissions cap may be re-evaluated and revised by the director for consideration of new rules, updated technology, implementation of GHG reduction initiatives, significant changes with renewable energy cost and any other measure deemed necessary to facilitate the state's GHG limit.

O. Sierra Club of Hawaii Comments:

Attachment A, IV. Objections to AES's plan

Comment 1 (A. AES's plan fails to reduce emissions):

HAR §11-60.1-204(c) requires that AES reduce its emissions by 16% below the facility's baseline levels. AES has not proposed an alternative emissions cap resulting in the maximum greenhouse gas reductions. It has failed to establish a meaningful "minimum facility-wide greenhouse gas emissions cap in tons per year CO₂e, to be achieved by 2020 and maintained thereafter" as required by HAR §11-60.1-204(c). In fact, it has not proposed reducing its emissions at all.

Response to Comment O.1:

While the facility-wide emissions cap proposed by AES and other partnering facilities was established in accordance with HAR §11-60.1-204(d)(6)(A) for meeting HAR §11-60.1-204(c), AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline level starting in calendar year 2020. Please refer to our response to Comment B in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

Comment 2 (B. AES' plan fails to consider realistic alternatives):

AES has failed to consider realistic alternatives. AES' plan fails to consider restrictive operations as required by HAR §11-60.1-204(d)(3)(E). AES could simply reduce the amount of electricity it produces by 16% to allow for a reduction in emissions. At the very least, DOH should require such reduction in 2022 when AES' power purchase with HECO expires. The power purchase agreement should not be used as an excuse to avoid the clear requirements of the Greenhouse Gas Emissions Act and HAR §11-60.1-204(c).

HAR §11-60.1-204(d)(3)(B) and (D) requires that AES consider fuel switching and operational improvements. One operational improvement that AES could undertake is employing battery storage technology to capture excess electricity produced by PV systems during the day. This electricity would be available during evening and peak demand hours, thereby allowing AES to burn less coal. In fact, AES has installed a 100 MWh five-hour duration battery energy storage system on Kauai in collaboration with KIUC. AES started deploying large utility-scale storage a decade ago, making it a seasoned veteran in the new and emerging advanced energy storage world. It has announced plans to build a 100MW/400 MW-hr lithium-ion storage system in Long Beach, California.

Response to Comment O.2:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

In regards to fuel switching and operational improvements for the AES facility, such as photovoltaic (PV) with battery energy storage systems, the "PSD and Title V Permitting Guidance for Greenhouse Gases" (March 2011 edition) and EPA Permit Guidance for GHG (2011 edition) both state that a best available control technology (BACT) analysis need not necessarily include inherently lower polluting processes that would fundamentally redefine the nature of the source proposed by the facility.

For assessing whether fuel switching or design changes would fundamentally redefine a proposed source, the goals, objectives, and basic design of the AES facility were considered. The AES's facility is a coal-fired cogeneration plant that utilizes "clean coal technology" to generate steam and electricity. A fuel switch or design change to PV with a battery storage system entails a change in elements that would disrupt the basic business purpose for the facility. As stated in EPA Permit Guidance for GHG (2011 edition), the proposed changes in design elements should be inherent with the basic design of the facility and BACT should not be applied to regulate the purpose or objective for the facility.

Aside from redefining the basic design of the AES facility, its parent company, AES Corporation, is targeting the construction of three (3) solar and battery energy storage projects on the island of Oahu through AES Distributed Energy Inc. and AES West Oahu Solar, LLC subsidiaries. Please refer to Enclosure (13).¹³

Comment 3 (C. AES' partnering proposal is fundamentally flawed):

HAR §11-60.1-204(d)(6)(A) provides no explicit criteria for the department to judge whether to accept a partnering agreement or not. But guidance can be found in the law and the legislative history.

The legislature mandated that "the director shall prevent, control, and abate air pollution and the emission of air pollutants in the State" HRS §342B-3 (emphasis added). The legislature charged the director of the department of health to enact rules "[e]stablishing greenhouse gas emission limits applicable to sources or categories of sources, to be achieved by January 1, 2020, and establish emission reduction measures to achieve the maximum practically and technically feasible and cost-effective reductions in greenhouse gas emissions in furtherance of achieving the statewide greenhouse gas emissions limit." HRS §342B-72(a)(1) (emphasis added).

Sierra Club provided findings from the legislature that included:

The earth's atmosphere is now warming at the fastest rate in recorded history, a trend that is projected to cause extensive damage to forests, marine ecosystems, and agriculture.

¹³ Hawaiian Electric Renewable Project Status Board (2019-2023).

Climate change poses a serious threat to the economic well-being, public health, natural resources, and the environment of Hawaii.

The Intergovernmental Panel on Climate Change predicted temperature rises of up to eleven and a half degrees Fahrenheit by 2100 and a sea level rise of up to twenty-three inches, with an additional 7.8 inches possible if current melting of the ice sheets in Greenland and Antarctica continues.

Climate change will have detrimental effects on some of Hawaii's largest industries, including tourism, agriculture, recreational, commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for air conditioning during the hottest times of the year.

2007 Haw. Sess. Laws Act 234 §1. Article XI section 1 of the Hawaii State Constitution mandates that the Department of Health act consistently with its public trust responsibilities. Given the mandatory duties identification in HRS §§ 342B-3 and 342B-72(a)(1), the obligations imposed by the public trust doctrine, and the legislature's clearly expressed intent, it would be arbitrary and capricious for the health department to essentially absolve AES from the need to reduce emissions at all under the guise of a partnership agreement. The health department may not refrain from controlling air pollution when it has the opportunity to do so.

AES' refusal to consider other realistic alternatives is inconsistent with the requirements of HAR §11-60.1-204 and the legislative intent in enacting the Greenhouse Gas Emissions Act. If DOH were to approve the plan, its action would not only contravene HRS §§342B-3 and 342B-72(a)(1), but would breach its public trust duties.

Response to Comment O.3:

The AES Hawaii GHG Emissions Reduction Plan for establishing the facility-wide GHG emission cap using partnering as a measure to comply with the cap is in accordance with HAR, Subchapter 11. Please refer to DOH-CAB's response to Comment C in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

In addition, AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

IIB. WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period)

Responses to comments being either identical or similar to another were categorized into general themes conveyed by each individual comment provided to the DOH-CAB.

A. Comment - Oppose to AES Partnering

Representative comment – "As a resident of Oahu, I strongly oppose AES Hawaii's permit to share in emissions reductions."

Response to Comment A:

Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

B. Comment – Oppose to AES Burning Coal

Representative comment – Burning coal cannot continue throughout the Hawaiian Islands, especially in light of the climate change crisis. Coal is extremely dirty for the environment and people. It is responsible for on third of the US' carbon emissions and causes more than \$100 billion in health costs every year. It releases toxins like sulfur dioxide, nitrogen oxides, mercury, and other heavy metals which are known to cause respiratory illness and neurological and developmental damage.

Response to Comment B:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period). In regards to the environmental and health concerns on the emissions of toxins, AES has an existing air permit that addresses all applicable state and federal requirements for HAPs and criteria air pollutants. The AES plant is equipped with modern air pollution controls and utilizes "clean coal technology" to reduce air emissions to comply with air standards for burning coal and other approved alternative fuels. Please see DOH-CAB's response to Comment M.3 from SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

C. Comment – Oppose to Increasing AES Emissions

Representative comment – Please block the increase of emissions proposed for the AES plant in Waianae.

Response to Comment C:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

D. Comment – Support AES Closure by 2022 and/or Transition to Renewable

Representative comment – The power purchase agreement between AES and Hawaiian Electric Company is set to expire in 2022. AES is capable of large-scale renewable energy as they've shown with their new solar and battery systems on Oahu and Kauai. They should be scaling down their coal-burning in Kapolei and focus on clean energy.

Response to Comment D:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period). As stated in the GHG emission reduction plan for AES, the AES facility sells electricity to Hawaiian Electric under a 30-year PPA that expires on September 1, 2022. The AES facility proposed partnering in its GHG emission reduction plan to comply with requirements to cap GHGs and still meet the electric power demands of its customers.

The combined GHG emissions cap for the partnering facilities is a sixteen percent (16%) reduction from the combined baseline emissions level for calendar year 2020 and beyond, therefore, a GHG control assessment is not required. The GHG control assessment would not necessarily include consideration of solar and battery systems as part of the control strategy for a facility that is fundamentally designed to burn coal. Requiring AES to consider solar and battery systems to scale down the burning of coal is outside the scope of AES Hawaii, LLC's proposed project. However, AES's parent company, AES Corporation, is targeting the construction of three (3) solar and battery energy storage projects on the island of Oahu. Please refer to DOH-CAB's response to Comment O.2 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019).

E. Comment – Oppose Escaping the State's Deadline to Decrease Emissions

Representative comment – I understand AES is applying to escape the state's deadline to decrease carbon emissions. There is NO way this can be acceptable.

Response to Comment E:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

F. Concern with Disposal of Coal Ash:

Representative comment – AES has a long history of sending their toxic coal ash to the PVT Landfill in Nanakuli, which is as close to 750 feet from homes and schools. The presence of coal ash is putting residents and the surrounding environment at risk every day. No single community should be suffering the burden of our state's energy supply or waste management. We must make a just transition to clean energy to protect our people from being neighbors to toxic facilities.

Response to Comment F:

The PVT Landfill does not accept AES coal ash for “disposal” as this violates its solid and waste management permit. The GHG air permit modification for AES only regulates stationary equipment at the AES plant in Campbell Industrial Park and does not apply to the PVT Landfill. However, PVT holds a solid and waste management permit for the landfill issued by the DOH Solid and Hazardous Waste Branch, which allows PVT landfill to accept AES coal ash as a coal combustion residual (CCR) for “beneficial use” only as defined in Title 40 Code of Federal Regulation (CFR), Subpart D, §257.53. Therefore, PVT’s solid and waste management permit does not allow accepting AES coal ash for “disposal” as defined in 40 CFR, Subpart D, §257.53. Please refer to PVT’s “Policies and Procedures” and “Prohibited Materials” at: <https://www.pvtland.com/customer-home/open-a-landfill-account/>.

Vehicle travel and other activities in and around the PVT Landfill that may cause airborne particulate are subject to fugitive dust control requirements in HAR, §11-60.1-33. Please refer to: <https://health.hawaii.gov/cab/files/2019/04/Hawaii-Fugitive-Dust-Fact-Sheet-April-2019.pdf>.

Shredding and screening equipment at the PVT Landfill operate under an air permit issued by DOH-CAB. The permit specifies all applicable state and federal air pollution requirements, including those for fugitive dust control.

If you have fugitive dust complaints, please contact the DOH-CAB at 586-4200 or cab@doh.hawaii.gov.

Zoning issues with the PVT Landfill are outside the scope of DOH-CAB’s air permitting authority. The City and County of Honolulu Department of Planning and Permitting should be contacted at (808) 768-8000 in regard to zoning issues.

G. Oppose to Not Reducing GHG Emissions:

Representative comment – AES-HECO has failed to reduce greenhouse gas emissions. Allowing the power plant to continue to produce toxic coal ash at the same rate as before, with no lowering of emissions, continues to cause harm to the land, ocean, and people on the Waianae coast. The people matter. Having a healthy environment and living a healthy life are already difficult on the west side.

Response to Comment G:

Please refer to DOH-CAB’s response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period) for air quality issues.

Please refer to DOH-CAB’s response to Comment F in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period) regarding coal ash and the PVT Landfill.

H. City and County Comments:

Comment 1:

The City and County of Honolulu strongly supports the State of Hawaii’s program to reduce greenhouse gas emissions from the power sector as we make progress towards 100% carbon neutrality and renewable portfolio goals by 2045.

Response to Comment H.1:

As indicated, on Page 2 of 6 in Enclosure 2, the facility-wide GHG emissions cap that is specified for large stationary sources is a backstop to the renewable portfolio standards and energy efficiency portfolio standards that are already in place to reduce GHG emissions.

Comment 2:

In addition to contributing to global heating, the burning of coal is a major contributor to dangerous levels of air and water pollution in our neighboring communities. Major health concerns from coal-fired power plant pollution is linked with asthma, cancer, heart and lung ailments, neurological problems, acid rain, global warming, and other environmental and public health impacts.

Response to Comment H.2:

Please refer to DOH-CAB's Response to Comment M.3 from SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period) regarding matters involving AES and air quality.

Water quality issues are outside the scope of the air permitting process, and therefore, are not being considered in the final decision of the draft air permits. The DOH Safe Drinking Water Branch should be contacted at (808) 586-4258 for addressing matters related Hawaii's drinking water source (surface water and ground water). For issues regarding Hawaii's coastal and inland water resources please contact the DOH Clean Water Branch at (808) 586-4309.

Comment 3:

As the State approaches the RPS interim targets of 30% by 2020 and 40% by 2030, it is imperative that Hawaiian Electric and AES follow through on the commitment to replace coal-fired generation at the AES power plant with renewable, non-fossil sources of energy after the expiration of the current PPA in 2022. With 22% of electric sales coming from renewable sources in 2018, the Oahu community made impressive progress de-carbonizing its electric grid through the addition of rooftop solar PV and other distributed and grid-scale renewable. Still, Oahu's electric grid remains the most carbon-intensive in the nation at 1,675 lbs of carbon dioxide equivalent (CO₂e) per megawatt-hour (MWh) versus the national average of 1,004 lbs of CO₂e per MWh. The coal-fired AES plant is not only the single most carbon intensive power plant statewide 2,275 lbs of CO₂e per MWh, but it is also the second largest emitter of carbon pollution on a mass or absolute basis at 1,462,443 metric tons per year (versus 2,005,842 metric tons at the Kahe power plant).

Comment 4:

With Hawaiian Electric's recent Phase 2 request for proposals (RFP) for dispatchable renewable generation, the City believes it is time to eliminate coal from the energy mix on Oahu and throughout Hawaii, and that is why Mayor Caldwell joined the global Powering Past Coal Alliance that pledges to eliminate coal-fired generation globally by 2030.

Comment 5:

The City notes that the annual CSP emissions cap of 1,534,598 metric tons of CO₂e is already significantly under the cap by nearly 5 percent. During this week of inspiring calls for climate action from across the globe, we as an island community should reinforce our commitment to do our part and ensure an accelerated commitment to reducing our energy system's carbon intensity.

Response to Comments H.3, H.4, and H.5:

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period). Data for 2018 from the U.S. EIA and EPA's FLIGHT was used to determine the metric tons of CO₂e emissions per MWh ratios for all partnering facilities as documented in Enclosure 4. Our calculations show that in 2018, the AES facility was the most carbon intensive power facility on the island of Oahu, but was the fourth highest statewide with a ratio of metric tons of CO₂e per MWh of 0.9707. There were other facilities with higher metric tons of CO₂e per MWh ratios on other islands that ranged from 1.0129 – to 1.1024 – to 1.1083. It should be noted that the continuous emission monitoring systems (CEMSs) servicing boilers at the AES plant for measuring CO₂ emissions were reading bias high for 2011 through part of 2017 due to flow measurement issues. The 2018 emissions year for AES would be a more representative year of the plant's actual CO₂e emissions.

I. Young Progressives Demanding Action (YPDA) Comments (Environmental Justice Concerns):

Comment 1:

Environmental Justice Action member of the YPDA stated that their organization is in strong opposition to AES Hawaii's permit to share in emission reductions. It was indicated that when coal is burned it releases a number of airborne toxins and pollutants. They include mercury, lead, sulfur dioxide, particulates, and various other heavy metals. Health impacts can range from asthma and breathing difficulties, to brain damage, heart problems, cancer, neurological disorders, and premature death. This is a public health issue. And in the face of a climate crisis, this current model of doing business is simply not sustainable.

Response to Comment I.1:

Please refer to DOH-CAB's response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 TO 5-15-2019 Comment Period) regarding air permitting matters.

State and federal standards for criteria air pollutants and HAPs have already been addressed in the process to issue the existing air permit for AES. The engineering review for the permit includes an ambient air quality impact analysis (AAQIA) to determine compliance with the NAAQS that apply equally to all stationary sources regardless of any site-specific demographic factors. Maximum potential emissions are used for conducting the AAQIA. The existing permit for AES will ensure compliance with these air quality laws, standards, and regulations to protect

the health and environment for all residents surrounding the AES facility including those in Nanakuli.

The total combined GHG emission cap specified in permits for the partnering facilities is an approximate 61% reduction (from about eighteen (18) million tons of CO₂e per year to about seven (7) million tons per year) in the maximum combined CO₂e emissions allowed by existing permits. The permit amendments to incorporate facility-wide GHG emission caps do not increase the facility's maximum potential emissions that the AAQIA is based on. An AAQIA is not required for incorporating the facility-wide GHG emissions caps because the caps only result in limiting GHG's and all associated air pollutants to levels that are at or below the facility's maximum potential to emit. There are also no ambient air quality standards for GHGs.

Mitigating climate change is a vital part of our GHG program to address environmental justice concerns as rising temperatures and sea levels may disproportionately affect those who are socially or economically disadvantaged. The purpose of the permit modifications is for implementing the requirements of HAR 11-60-1, Subchapter 11 pursuant to Act 234, 2007 Hawaii Session Laws by achieving the most cost-effective GHG emission reductions at or below Hawaii's 1990 GHG emissions levels by 2020. The permit modifications to specify GHG emission caps for large stationary sources are important measures we are taking to combat the threat of climate change and sea level rise.

Comment 2:

While talking about clean energy and the environment, we cannot forget the social and economic justice components involved in this permit application. Toxic coal ash is being sent to the PVT Landfill in Nanakuli, joining a stockpile of other material burned by the AES Power Plant. This creates a public health crisis for both the plant workers and residents, especially considering the PVT Landfill being 750 feet from residential areas and schools. The Waianae community consists of many Native Hawaiians and Pacific Islanders, groups of people that although may have the right to suffrage by law, have for generations faced disenfranchisement in crucial areas such as economic stability, and access to natural resources. These communities must not be left behind, and their concerns for their surrounding environment should not be ignored.

Response to Comment I.2:

Please refer to DOH-CAB's response to Comment F from SECTION IIB, WRITTEN COMMENTS and RESPONSES (8-14-2019 to 9-27-2019 Comment Period) regarding the PVT Landfill.

J. Sierra Club Comment:

Requested a contested case hearing on AES's plan for sharing GHG emissions with cleaner energy facilities throughout the state.

Response to Comment J:

On October 1, 2019 counsel for the DOH-CAB advised the Hearings Officer and the Sierra Club that the contested case hearing is premature at this time because the DOH-CAB has not completed its application process and review of all the comments. Under these circumstances, the Hearings Office did not take any further action on the Sierra Club's request for a contested case hearing at that time.

On October 24, 2019, Sierra Club filed a letter with the DOH-CAB, again requesting a contested case hearing pursuant to HAR §11-60.1-206(g) for the alleged failure of the director to take action on the application for a draft GHG emission reduction plan, within the time required by HAR Chapter 11-60.1. On January 28, 2020, the DOH Hearings Officer issued a written Order denying Sierra Club's October 24, 2019 written request for a contested case hearing.

IIC. ORAL TESTIMONIES AND RESPONSES (9-26-2019 Public Hearing)

Responses to comments being similar were categorized into general themes conveyed by each individual comment provided to the DOH-CAB.

A. *Oppose to AES Partnering and increasing its GHG emissions (Commenters 1, 2, 3, 4, 6, 9, 11, 12, 14, and 20):*

- Commenter 1 feels that the permit should not be approved just for the possibility of an emergency happening where a facility would be able to take on more than another facility's share of the electric demand when other facilities exist for supplying electricity in an emergency.
- Commenter 2 stated that this permit increases their greenhouse gas emissions and continue their operations when we're at a time it's a climate crisis.
- Commenter 3 opposes AES's permit to increase the gas emissions.
- Commenter 4 feels that this is about life and death rather than just being compliant and opposes this permit despite knowing that one coal plant isn't going to change the world and save our planet. But the waves and the impact that opposing the permit does for our perception of what can be done, that can change the planet. Climate change is bringing superstorms and droughts. We know it's threatening our way of life, our civilization as we know it. So please oppose it.
- Commenter 6 stressed concerns about climate change and the effects of it that is speeding up much faster than science and scientist have predicted. Concerns included sea ice in Alaska that is completely melted for the first time in history, the Greenland ice sheet that has already melted before scientist predicted would be melted by 2070, and permafrost in Canada that has thawed out before 2090. This bait-and-switch that they are suggesting is really insulting. Let us pollute more because somebody else is going to pollute less.
- Commenter 9 states that we must work to drastically reduce carbon emissions to prevent global warming and global average temperatures from exceeding 1.5 degree Celsius by 2030 which will set up a chain reaction beyond human control that's laid out by the IPCC's October 2018 report.
- Commenter 11 states that after initially opposing legislation for the decommission of the Kapolei (AES) coal plant in 2022, they now want to increase their carbon emissions, which exacerbates climate change and blame it on other people. At the rate we're shifting to a newer energy, though, we don't need coal by 2022.
- Commenter 12 states that coal is a major contributor to our current climate crisis, which might deny our kids that very future that we seek. The commenter urged DOH-CAB not to allow AES to continue past their 2022 expiration date, when their agreement with HECO expires. The commenter said no more coal.
- Commenter 14 states to please not grant this plan. They (AES) need to reduce their energy production based on coal, by whatever percentage is necessary to meet this 16 percent reduction requirement. And to help you further in fulfilling this legal obligation, the Sierra Club formally renews its request for a contested case hearing. We would like to be able to present evidence to the Department of Health and demonstrate that AES has many other reasonable alternatives to control its coal burning and its carbon emissions than increasing it beyond what the state law allows.

- Commenter 20 indicated that AES is “gaming the rules” and believes there were no intentions in the legislative record for flexibility that allows the second largest polluter in the state to continue emitting and polluting without any change. Commenter 20 further stated that other plants are cutting back emissions to make way for AES.

Response to Comment A:

To clarify, the intent of the proposed permit modification is to impose GHG emission caps that limit GHG emissions to levels established in GHG emission reduction plans. Please refer to the DOH-CAB’s response to Comments J and K in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period)

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB’s response to Comment B in SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period). Based on the number of written comments that were received concerning AES, we assume Commenter 1 is directed to the use of coal as a fuel source.

As stated in HAR §11-60.1-204(d)(6)(A), partnering is intended to leverage emission reductions among partnering facilities to reduce the total combined GHG emissions. If the total combined GHG emissions cap is not met, affected facilities exceeding their individual caps are subject to enforcement action.

While emergent events can be mitigated to some extent through partnering, this is not the primary intent of HAR §11-60.1-204(d)(6)(A). Please note that reasonably unforeseen emergencies that are beyond the control of the facilities are handled on a case by case basis pursuant to HAR §11-60.1-204(h). Also, partnering is not a means to bait-and-trap nor is it a means to game the system. The bottom line is that a total combined GHG emissions cap is specified in the permits and the partnering facilities will need to optimize use of their resources to meet this total combined cap.

Considerations for leveraging include but are not limited to a balance of factors such as efficiency and cost of operating the facilities. The total combined emissions of the partnering facilities can be reduced by using the more efficient plants. An example of how partnering leverages GHG emission reductions is explained in DOH-CAB’s response to Comment N.1 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

Please refer to DOH-CAB’s response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period). In addition, the parent company, AES Corporation, is aware that changes are needed and have several renewable energy projects underway on Oahu. Please refer to DOH-CAB’s response to Comment D in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period).

With regards to the statement that this is about life and death rather than just being compliant, the AES cogeneration plant must comply with the terms and conditions of the air permit for meeting the applicable air emission standards. The air emission standards are measurable thresholds that were established based on science to protect the health and welfare of the

public. Please refer to DOH-CAB's response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

As for climate change that is speeding up much faster than scientist have predicted, the DOH-CAB shares your concern. However, this matter is outside of DOH-CAB's authority and must be addressed by a task force and/or scientific board to prompt legislative actions.

As indicated during DOH-CAB's presentation at the beginning of the hearing and previous responses to the comments received, partnering is allowed in accordance with HAR §11-60.1-204(d)(6)(A). Please refer to Page 6 of Enclosure 2 and response to Comment M.3 in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 TO 5-15-2019 Comment Period). The DOH-CAB also stated during the presentation, that there are no provisions in HAR §11-60.1-204(d)(6)(A) that limit partnering by location or type of source. Please refer to Page 3 of Enclosure 2. The GHG emissions cap provides a sixteen percent (16%) reduction from the total combined partnering facility baseline GHG emissions level which meets the GHG reduction requirements of HAR Subchapter 11. As indicated at the presentation on Pages 5 and 6 of Enclosure 2, maximum potential GHG emissions from the partnering facilities combined are reduced from about seventeen (17) million tons per year to approximately seven (7) million tons per year with the GHG emission cap. Further review of the permit applications found that total combined GHG emissions allowed by existing permits for the partnering facilities are about eighteen (18) million tons per year. Therefore, limiting GHGs to seven (7) million tons per year by capping emissions would result in an approximate 61% reduction in potential GHG emissions.

As noted on Page 4 in Enclosure 2, individual caps may be exceeded as long as the total combined cap is met. The GHG emission caps established for the partnering facilities provide flexibility in dispatching plants to supply electricity. Numerous factors are involved with plant dispatch (e.g., cost of service, power plant availability, renewable energy availability, etc.). This flexibility is currently needed for electric plants on the Big Island (Hawaii Island). The shutdown of PGV due to volcanic activity on the Big Island has caused the need for other power plants on the island to generate more electricity than usual to make up for the loss of renewable energy. Please refer to DOH-CAB's response to Comment F.1 in Section IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

For partnering, a permit violation occurs when facilities exceed both their individual and total combined GHG emission caps simultaneously. The GHG emissions in excess of the total combined cap for partnering facilities that have exceeded both individual and total combined caps are allocated according to the following equation:

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

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 shall be sixteen percent (16%) below the total combined baseline emission level less biogenic CO₂ 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-wide GHG emissions cap.

B. The Burning of Coal by AES is Dirty/Not Healthy (Commenters 2, 3, 4, 6, 7, 9, 11, 12, 15, 17, 18, 19, 20, 21, 22, and 23):

Commenters stated their concerns regarding the burning of coal at the AES facility that included:

- Commenter 2 wants to deny the permit and questioned whether it is justified to continue to use coal, knowing the health hazards associated with it. The commenter indicated that AES is the last coal-fired power plant in our state. We all know, globally, locally, how dirty coal is. Specifically, it contributes to respiratory illnesses, increased cancer rates, and there are examples of that across the country.
- Commenter 3 objects to a permit for more coal and wants us to deny the permit and make the more pono choice, which is about less coal and not more coal. The commenter indicated that there are a host of other toxins involved when burning coal and coal is dirty. Commenter said don't know why we'd ask our neighbors on the west side to put up with even more coal, even for the next couple of years. Commenter asked DOH-CAB to deny the permit and make the more pono choice, which is about less coal and not more coal.
- Commenter 4 stated that coal is dirty and didn't know why we'd ask our neighbors on the west side to put up with even more coal, even for the next couple of years.
- Commenter 6 stated that coal is one of the filthiest fuels that there is and they're putting poison into our atmosphere and it's destroying the entire ecosystem.
- Commenter 7 stated that as the Department of Health, it is your charge to protect the people. If you do not deny this permit, you have failed. Everybody has a responsibility in this climate crisis. We all need to do something. And we need to be the leaders, because we can be and we should be. And if they see us leading the way, then those who need help figuring out how to do it, with all our sources of renewable energy, we can show the world how to do it, and coal is absolutely not the way to do it. So I am demanding that you do your job and deny this permit.
- Commenter 9 stated that burning coal is harmful to both the environment and communities and health impacts associated with burning coal range from asthma and breathing difficulties, brain damage, heart problems, cancer, neurological problems, neurological disorders, and premature death. Commenter asked the DOH-CAB to deny the permit.
- Commenter 11 states that coal is just dirty. Even without thinking about its contributions to climate change, coal has so many health problems linked to it, that just listing all of them would take up far more time than the length of this testimony right now. I urge you to deny this permit application so the people of Hawaii can lead cleaner and better lives.
- Commenter 12 states that there's a lot of health effects that come with this issue of coal. I'm not going to go over them again, since we've already heard that.
- Commenter 15 states, This gentleman was in my class, and he talked about the burning coal. And he talked about how he lived up on the hill, and the plume, he'd watch the plume every day, go up to his hill and affect his health as well as his community. I didn't know what he was really talking about. I didn't. What he did say, though, what he wanted in those smokestacks was a filter. I would think that in 1991, that there would be already a filter in the smokestack. I don't think there is a filter in the smokestack. Talked about a wafer picking up all the toxicity levels that are read off computers. Lucy Gay showed her this. They hire our local people from Waianae to go and scrub the stacks.
- Commenter 17 indicated that it's part of the state and city's goals to move away from coal fired generation and that Mayor Caldwell has signed to join a Powering Past Coal Alliance. The commenter stated, and so, it's really important that after 2022, we follow through on our commitments that have been made and move past coal.
- Commenter 18 states to not allow clean power to enable more of the dirtiest. Do not let the sound of the death rattle of a fossil-fueled industry overwhelm the rising voice of a planet imperil and those who work to protect its and our future. Denying the permit for emissions,

partnering is a step that gets us closer to our renewable energy goals, one step in a race that is truly a run for our lives and towards a brighter future. Denying the permit rebukes the emission shell game, affirms the private investments and renewables haven't been a fool's errand, and signals that the Department of Health holds the health of Hawaii's people and environment as paramount and worth standing up for.

- Commenter 19 states that I'm not directly affected by it, but I can surely feel effects of climate change where I live at. I do have kids and would like for them to have clean air for themselves and for their kids in the future. So I would urge, as everybody else has, to deny the AES application.
- Commenter 20 thought AES was gaming the rules by proposing to cut its emissions by 0.6 percent while every other power plant is cutting back its emissions to make way for AES.
- Commenter 21 asked why does AES feel as though they can keep polluting our island, and for what?
- Commenter 22 states that I'm not going to apologize for wanting clean air. I'm not going to apologize for wanting a better future, not just for us, but for my entire generation.
- Commenter 23 asked, I want you to care about what is happening now, and all the health and illnesses that is affecting them. It's real. It's not what if, it's not science, it's not a myth. It's real, and you can see it.

Response to Comment B:

To clarify, the intent of the proposed permit modification is to impose GHG emission caps that limit GHG emissions to levels established in the GHG emission reduction plans. Please refer to the DOH-CAB's response to Comment J and K in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

AES has agreed to reduce its individual GHG emission cap by sixteen percent (16%) below its individual baseline emissions level starting in calendar year 2020 and this individual GHG emission cap has been included in the AES permit amendment being issued. The Department is also amending the AES permit to comply with Act 023 (September 15, 2020) of the 30th Hawaii State Legislature (to be codified as HRS, Section 342B-) by incorporating the provisions found in Act 023, Section 3, for the cessation of coal burning on December 31, 2022. Please refer to DOH-CAB's response to Comment B in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period). In addition, the parent company, AES Corporation, is aware that changes are needed and have several renewable energy projects underway on Oahu. Please refer to DOH's response to Comment D in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period).

The air quality standards that apply to AES are measurable thresholds established based on science to protect the health and welfare of the public. Please refer to DOH-CAB's response to Comment M.3 of SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period) regarding the AES coal-fired cogeneration plant and air permitting requirements.

C. Concerned with Disposal of Coal Ash (Commenters 2, 3, 8, 9, 11, 13, 15, 16, and 19):

Commenters stated their concerns over the disposal of coal ash which included:

- Commenter 2 stated that coal ash, which is a byproduct of burning coal, is used every day at the PVT landfill, and it's creating basically a health crisis of accumulated toxins. There's arsenic, there's mercury, heavy metals getting into the air, leaching into the soil, and none of these things were addressed in this presentation.

- Commenter 3 stated there's all the toxins that you're exposing families, too, who live next to this dump in Nanakuli, where we're dumping all the coal ash.
- Commenter 8 stated, I'm from Nanakuli. I'm saying a`ole to PVT. I used to hear my neighbors complain about the dust. And hearing about the coal, can you imagine what's coming into our household and how every day we have to clean it, and hearing more about it, how it affects us? We don't want that in Nanakuli. We don't want that for the people.
- Commenter 9 states that toxic coal ashes are being sent to PVT landfill in Nanakuli. And it is alarming, given that it's 750 feet away from residential areas and schools.
- Commenter 11 states that AES has already been putting all this toxic coal ash right next to schools where students are at.
- Commenter 13 states, we got fly ash coming from AES, actually. It's coming through our community, our homestead where I come from, passing through where are family gathered at our beaches. But the whole part about this, is, you know what? What is in store for the next generation? What the safeguards if one go down by Ka Waihona by our school?
- Commenter 15 states, what Gary Gill did was, he went to Boston and he hired researchers there to come to Nanakuli, to come to Hawaii and teach us that the most dirtiest, rottenest place in Nanakuli is right next to McDonald's where our children go. And you can stand on the highway and watch these trucks go around, and you can see all the dust fly out. This gentleman from Boston that Gary Gill got to come to Hawaii to do the research, he went on to say, he went on to say that the most dangerous part is between the ground and the tire. That is where, is the most toxic area. We need to look at what Gary Gill did, the research that went on. The people that came to Hawaii and told us we will shorten our lives, we have a short lifespan out there. We're all sick. We need to go back to Gary Gill's report. We need to go back to epidemiologists. We need to go back and get this technology, get the correct reading and get the correct wafer in there. We need to do something. I am seeing the effects among our children. I am. Many have cancer. And what do the medical field do? They tell them -- or tell the parents. You need to move out of Waianae. That's how you deal with it.
- Commenter 16 states, I came to Hawaii a year ago to retire and breathe the fresh air and drink the pure water. I'm in a condominium unit with white tiles, and you know the Swiffers? I'm Swiffing it up. I'm seeing black. And I didn't know what it was until tonight. It's that fly ash. I'm breathing that in. I didn't come here to die. I came here to be healthy and live longer. I don't know what has to be done. Hearing these stories, in Nanakuli, by McDonald's, this is nuts. We got to stop this. And whatever it takes, whatever it takes, this has to stop, completely. The ash got to stop.
- Commenter 19 states, I have heard a lot of stories, that kids born in those areas are born with respiratory illnesses, and that is just a big emotional toll on people who are dealing with it, and not to mention financial hardship, cause this is an ongoing treatment for the people that are involved.

Response to Comment C:

Please refer to DOH-CAB's response to Comment F in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period) regarding coal ash, fugitive dust control, and the PVT Landfill.

With regards to research that was initiated by Gary Gill as documented in Enclosure 14 ¹⁴, the study concluded that the dust does not pose a health concern. Tetra Tech EM, Inc. also reviewed air monitoring data provided by PVT at the fenced boundary between PVT and the abutting neighborhood to the west, which also indicated that the air quality does not pose a health concern. Based on the Tetra Tech EM, Inc. review, it was determined that the data

¹⁴ Nanakuli Dust Study, Technical Evaluation and Recommendations, Prepared by Tetra Tech EM, Inc. for the Hawaii Department of Health, December 20, 2011. See Enclosure 14.

collected is in accordance with sound scientific principles, applicable EPA methods, and professional standards of care, thus resulting in representative air quality data. This study can be found at https://health.hawaii.gov/epo/files/2013/05/nanakuli_tech_and_eval_final.pdf.

D. Encourage AES to continue with solar renewable projects (Commenters 2 and 12)

- Commenter 2 stated that we need to get away from fossil fuels and wants to encourage AES to continue with large scale solar renewable clean energy projects.
- Commenter 12 states, so if you think about it, coal, the price of coal, it's pretty much flatlined. If anything, it might increase in the future as we lose more and more coal. On the other hand, renewable, such as solar and wind, they've been dropping in price.

Response to Comment D:

Requiring AES, Hawaii, LLC to consider solar and battery systems to scale down the burning of coal is outside the scope of their project. However, the AES parent company, AES Corporation, is targeting the construction of three (3) solar and battery energy storage projects on the island of Oahu. Please refer to DOH-CAB's response to Comment O.2 from SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019).

E. Life and death and higher cases of asthma (Commenters 4 and 19)

- Commenter 4 states, we know it even here in Nanakuli, when the average age or life span is ten years younger, that's life and death. Our kids in Nanakuli have more cases of asthma than the rest of the island, that's a health issue. That's the Department of Health.
- Commenter 19 states, I have heard a lot of stories, that kids born in those areas are born with respiratory illnesses, and that is just a big emotional toll on people who are dealing with it, and not to mention financial hardship, cause this is an ongoing treatment for the people that are involved.

Response to Comment E:

The DOH-CAB, in consultation with various subject matter experts in the DOH Health Resource Administration and the Hawaii Health Data Warehouse, gathered the following information regarding respiratory illness (i.e. asthmatic condition). Asthma attacks usually begin with an exposure to a trigger (usually an external allergen or irritant) that causes the airways to react. Asthma triggers vary from person to person, but some common triggers include dust mites, pollen, strong fragrances, chemicals like household cleaning products, secondhand smoke, mold, strenuous exercise, strong emotions, stress, pets and cockroaches. Many factors influence the risk of developing asthma. The Centers for Disease Control identifies greater risk in male adolescences less than eighteen (18) years of age, native Hawaiians, people that are obese, and smokers. Source: <http://ibis.hhdw.org/ibisph-view/topic/Asthma.html>.

Asthma may also be triggered by airborne toxics such as small particulate matter (less than 2.5 micrometers), sulfur dioxide, and other air pollutants. Source: <https://health.hawaii.gov/asthma/files/2013/06/asthma2012.pdf>.

The data in Enclosure 15 shows that asthma prevalence in adolescences that are less than eighteen (18) years of age is highest in the Nanakuli/Waianae area for the island of Oahu. However, statewide data suggests other factors (such as ethnic background, exposure to secondhand smoke, obesity, etc.) may have a greater influence over the cited industrial settings. As evidenced by the sub-county of Molokai where no landfills or coal fired facilities exists, Molokai had the highest prevalence of adolescences with asthma at 23.8%, followed by

North Hawaii County at 18.6%, and Nanakuli/Waianae at 17.5% for adolescents under that age of 18 in the State. Please refer to Enclosure 15.¹⁵

Also, please refer to DOH-CAB's response to Comment M.3 of SECTION IIA, WRITTEN COMMENTS and RESPONSES (4-16-2019 to 5-15-2019 Comment Period) regarding the AES coal-fired cogeneration plant and health impacts.

Hawaii's Indicator Based Information System (IBIS) no longer compiles data specifically for the sub-county of Molokai, however, other more recent data (for 2016, 2017, and 2018) available at the Hawaii Health Data Warehouse shows that the Nanakuli and Waianae sub-counties have the largest percentage of smokers in the entire state.¹⁶ As stated earlier, exposure to secondhand smoke is one of several triggers for asthmatic symptoms. Therefore, we cannot conclude that the higher prevalence of adolescence with asthmatic symptoms in the Nanakuli and Waianae area are primarily attributable to the industries cited.

F. Hu Honua (Commenter 5)

- Commenter 5 asserted that Hu Honua is exempt from this and that this facility only wants to chop down Big Island forests and burn it for electricity putting huge amounts of greenhouse gases into the atmosphere which doesn't count because saplings will be planted.

Response to Comment F:

The Hu Honua bioenergy facility is subject to a GHG emission cap in accordance with HAR, Subchapter 11. The public comment period for the draft permit to specify a GHG emission cap for this bioenergy facility was provided from October 28, 2019 to November 26, 2019.

G. Why delay clean energy future (Commenter 10)

- Commenter 10 states, so Hawaii is already like trying to set forth a clean energy future. So I say, why procrastinate? Because this isn't some school assignment where you could just finish it the night before and still pass. No. This is a health issue. This is a social issue. This is something we all have the power to do something about, right now.

Response to Comment G:

The purpose of the permit modifications is for implementing the requirements of HAR 11-60-1, Subchapter 11 pursuant to Act 234, 2007 Hawaii Session Laws by achieving the most cost-effective GHG emissions reductions at or below Hawaii's 1990 GHG emissions levels by 2020. The permit modifications to specify GHG emission caps for large stationary sources are measures we are taking to combat the threat of climate change and sea level rise. These permit amendments will promote a clean energy future. Please refer to DOH-CAB's response to Comment I.1 in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019).

¹⁵ State of Asthma Hawaii 2009. See Enclosure 15.

¹⁶ Cigarettes – Current Smoke, Age Adjusted, 2016, 2017, and 2018.

H. Our future is not worth anything more than \$23 (Commenter 11)

- Commenter 11 states, “Looking at their (AES) report, they’re talking about feasible control options and how much they cost. And they’re saying that it’s not cost effective if it costs anything over \$23. The cost of these control options is \$51. They’re saying that by a factor of \$28, our future isn’t worth anything more than that.

Response to Comment H:

Please refer to DOH-CAB’s response to Comment C in SECTION IIA, WRITTEN COMMENTS AND RESPONSES (4-16-2019 to 5-15-2019 Comment Period).

I. General Environmental Justice Concerns

- Commenter 7 was concerned with the climate crisis and continuing coal. The commenter also raised environmental justice as another issue of concern.

Response to Comment I:

Please refer to DOH-CAB’s response to Comment I.1 in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period).

j. Commenter 14 (Director for the Sierra Club):

- Provided a renewed request for a contested case hearing.

Response to Comment j:

Please see DOH-CAB’s response to Comment J in SECTION IIB, WRITTEN COMMENTS AND RESPONSES (8-14-2019 to 9-27-2019 Comment Period).

IID. WRITTEN COMMENTS AND RESPONSES (7-14-2020 to 8-14-2020 Comment Period)

A. AES Comment:

AES Hawaii requested DOH-CAB to expressly identify (in the draft modification to covered source permit (CSP) No. 0087-02-C listed under Docket No. 20-CA-PA-06) the termination date to be five (5) years from the permit issuance date. As written, the draft modification currently identifies an expiration date of April 15, 2019 followed in parenthesis with, which will be revised upon issuance of permit renewal.

Response to Comment A:

DOH-CAB updates the CSP termination (expiration) date upon permit renewals only and retain existing expiration dates for permit modifications and amendments. Therefore, the requested change will be captured in the forthcoming permit renewal.

B. Hawaiian Electric Comments:

Hawaiian Electric provided several comments requesting administrative changes and editorial corrections that included:

1. Changing company abbreviations in the permits from HECO to Hawaiian Electric, HELCO to Hawaii Electric Light, and MECO to Maui Electric;
2. Provisions to provide GHG monitoring report forms to Hawaiian Electric with the facility emissions data to determine total combined partnering facility emissions within thirty (30) days after each semi-annual monitoring period;
3. Provisions for Hawaiian Electric to provide GHG monitoring report forms within 45 days after each semi-annual calendar period; and
4. Other minor typographic corrections.

Response to Comment B.

All requested administrative changes and editorial corrections were incorporated into the draft permit modifications.

C. *Comments to Hamakua Energy draft modification to Covered Source Permit No. 0243-01-C.*

Hamakua Energy's comments are limited to the inclusion of reporting requirements with respect to emissions from other partnering facilities and for submittal of consolidated reports for the partnership. Hamakua Energy raised specific issues on monitoring requirements for the permit.

Response to Comment C:

As an effective means of measuring progress, HAR §11-60.1-90(7) requires all monitoring and related recordkeeping and reporting requirements to assure compliance with all terms and conditions of the permits. The DOH agrees, however, that the data to be compiled for reporting the total combined GHG emissions is contingent upon Hawaiian Electric providing the collected emissions data to all partnering facilities. In addition, the sixty (60) day reporting deadline for monitoring reports after the end of each semi-annual reporting period may not be realistic due to the interaction between a large number of partnering facilities involved with compiling the GHG emissions data. As such, DOH-CAB added the following provision to Attachment II – GHG, Special Condition No. E.4 in all partnering facility permits that allows for an extension in submitting the semi-annual monitoring reports:

Upon written request by the permittee, the deadline for submitting the monitoring report form may be extended, if the Department determines that reasonable justification exists for the extension.

Pursuant to the comments from Hamakua Energy, the DOH-CAB agreed to incorporate the following additional language into the Attachment II – GHG, Special Condition E.4 of the permit for Hamakua Energy as requested:

The permittee's obligation to provide emissions data and deviation information for other partnering facilities to the Department pursuant to Attachment II – GHG Special Condition No. E.2.b and E.4.a and Monitoring Report Form Item 2 and Item 3 is contingent upon Hawaiian Electric's accurately providing such emissions data and deviation information to the permittee at least fifteen (15) days prior to the deadline for permittees providing such emissions data and deviation information to the Department.

II.E. WRITTEN COMMENTS AND RESPONSES (7-14-2020 to 8-28-2020 EPA Review Period, EPA Comments Received on 9-10-2020)

EPA Comment 1:

While reviewing the permitting applications, EPA noted that the following permits were missing the following attachments. It is important to provide all relevant documentation to allow EPA to complete our review. For example, we noted in the cover letter for CSP 0214-01 that Special Condition No. C.1.c.iii was revised to raise the threshold for fuel usage; however, the attachment containing this revision was not provided.

- a. Annual Fee Requirements (Attachment III) of CSP 0031-04-C
- b. Attachment II: Special Conditions for CSP No. 0214-01-C

Note that the GHG Special conditions already exist as the secondary attachment to this permit, so this attachment should also be renumbered.

Response to EPA Comment 1:

- 1.a. This discrepancy was previously identified during the review and comment period for the draft permits. Attachment III has been added to CSP No. 0031-01-C for the permit amendment.
- 1.b. The DOH-CAB included the revised Attachment II in its entirety for the permit amendment as requested.

With regards, to renumbering the attachment for the GHG Special Condition, the facilities suggested the existing format from a standardization and workability perspective amongst partnering facilities. From a technical perspective, the DOH-CAB does not have concerns since the suggested format does not create ambiguity between the special conditions. Therefore, the DOH-CAB will not renumber Attachment II – GHG: Special Conditions, GHG Emission Reduction Requirements.

With regards to providing all relevant documentation, DOH-CAB will submit the latest versions of all relevant documentation for each permit.

EPA Comment 2:

Furthermore, in order to provide a more complete permit review, all permits submitted for EPA review should include a copy of the Compliance Certification Form and the Standard Conditions. The only two permits which attached and submitted their Compliance Certification Forms to the EPA were those explicitly modifying these forms.

Response to EPA Comment 2:

The applicants submit Compliance Certification Forms to EPA with the applications for permit modification. The DOH-CAB verified that the permit applications included compliance certification forms.

With regards to the Standard Conditions, DOH-CAB will submit the latest issued version for each permit.

EPA Comment 3:

EPA suggests that CAB clarify that the GHG requirements are only enforceable by the state, since these requirements are not approved as part of Hawaii's State Implementation Plan and are therefore not federally enforceable. Since these GHG requirements are implemented through a separate attachment, CAB could add a statement in the attachment header. EPA suggests: "In addition to the standard conditions of the CSP, the following state-enforceable special conditions shall apply to the permitted facility."

Response to EPA Comment 3:

The DOH-CAB revised all thirteen (13) partnering facility permits to reference state-enforceable special conditions in the header of Attachment II – GHG: Special Conditions, GHG Emission Reduction Requirements.

EPA Comment 4:

EPA notes that almost all of the submitted permit revisions are for facilities where CAB has failed to issue Title V renewals for the facilities within the regulatory deadline of 18 months after the receipt of application. EPA is requesting that CAB prioritize the following permit renewals as expeditiously as possible:

- a. CSP No. 0067-01-C for Maalaea Generating Station (expired 07/27/2009)
- b. CSP No. 0234-01-C for Kanoelehua-Hill Generating Station (expired 01/17/2010)
- c. CSP No. 0214-01-C for Kalaeloa Partners, L.P. (expired 05/15/2013)
- d. CSP No. 0007-01-C for Keahole Generating Station (expired 08/06/2013)
- e. CSP No. 0243-01-C for Hamakua Energy Plant (expired 08/02/2014)
- f. CSP No. 0232-01-C for Kahului Generating Station (expired 12/22/2014)
- g. CSP No. 0240-01-C for Kahe Generating Station (expired 01/17/2018)
- h. CSP No. 0239-01-C for Waiiau Generating Station (expired 04/16/2018)
- i. CSP No. 0238-01-C for Honolulu Generating Station (expired 07/23/2018)

Response to EPA Comment 4:

The CAB recognizes and acknowledges EPA's comment requesting that we prioritize renewing the referenced permits as expeditiously as possible. The CAB will prioritize issuing the renewal permits for the referenced permits, with a focus on issuing the permits with the oldest expiration dates first.

EPA Comment 5:

CSP No. 0243-01-C contains language that considers the potential termination or unavailability of the partnership between the thirteen facilities. This language can be found in Attachment II sections C.1.c, C.1.d.iv, and E.2.b. EPA suggests including this language into the GHG Reduction Requirements of the other twelve permits to ensure the sources and the public is aware of these provisions regardless of which of the 13 permits are being reviewed.

Response to EPA Comment 5:

The language in Attachment II sections C.1.c, C.1.d.iv, and E.2.b is specific to Hamakua Energy, LLC because purchase of this independent power producer was made through a subsidiary of Hawaiian Electric Industries (HEI) that is not regulated by the Hawaii Public Utility Commission (PUC). This purchase was announced soon after the PUC denied a request to purchase the Hamakua Plant directly, as documented in the Decision and Order No. 34536 under Docket No. 2016-0033. The PUC denied this purchase based on the determination that

customer benefits are not sufficiently demonstrated to justify the purchase. All partnering facilities are aware of this situation since the partnering facilities submitted for the PUC's approval to partner as documented in the PUC Docket No. 2018-0090. DOH-CAB disagrees with inserting this language into the remaining permits since the PUC's concern is specific to Hamakua Energy, LLC being owned by HEI. Inserting this language into other permits will add ambiguity to the GHG emission limits and may jeopardize and unfairly penalize more efficient facilities that may be used more extensively to leverage reductions in GHG emissions.

EPA Comment 6:

EPA found a discrepancy between the stated issuance and expiration dates listed on CSP No. 0239-01-C and CSP No. 0067-01-C. It appears both permits list a significant revision date as the issuance date. Please review these dates and update as necessary to clarify the correct issuance date, modification dates and expiration date.

Response to EPA Comment 6:

Clarifications were made to differentiate between the issuance or amended date and the expiration date of the aforementioned permits.

EPA Comment 7:

For completeness, the permit review application for the following permits should specify the respective facility's individual, facility-wide GHG cap for both 2019 and 2020.

- a. CSP No. 0031-04-C (page 3 of 30)
- b. CSP No. 0067-01-C (page 3 of 33)
- c. CSP No. 0232-01-C (page 3 of 30)

Response to EPA Comment 7:

The DOH-CAB respectfully points out that individual caps are specified in the permit application review for all partnering facilities for calendar year 2019 and calendar years 2020 and beyond. Since the individual GHG emission caps are the same for calendar year 2019 and calendar years 2020 and beyond, the requested revision to the permit application reviews is not necessary.

EPA Comment 8:

Under section 3.a. of proposed amendments for CSP No. 0031-04-C for Palauu Generating Station (page 3 of the submitted permit file), "with CSP" should be "with this CSP".

Response to EPA Comment 8:

Corrections were made in paragraph 3) a) for the superseded condition in Attachment I, Standard Condition No. 28.

EPA Comment 9:

On the cover page of the submitted permit file for CSP No. 0232-01-C for Kahului Generating Station, "Campbell Industrial Park (CIP) Generation Station" should say "Campbell Industrial Park (CIP) Generating Station".

Response to EPA Comment 9:

The correction has been made to the aforementioned permit as requested.

EPA Comment 10:

In Attachment II section C.1.c.ii. of CSP No. 0243-01-C for Hamakua Energy, LLC (page 6 of the submitted permit file), “Attachment IIC – GHG” should say “Attachment II – GHG”.

Response to EPA Comment 10:

The correction has been made to the aforementioned permit as requested.

EPA Comment 11:

We note that the permit review application for CSP 0067-01-C contains an error and suggest it be corrected for the record. Condition No. 1 of the Significant Permit Conditions converts 417,182 metric tons to 460,864 short tons. The correct value is 459,864 short tons.

Response to EPA Comment 11:

The correction has been made to the aforementioned permit application review as requested.

gas emission levels. Greenhouse gas emissions from airplanes shall not be included. [Eff and comp 6/30/14] (Auth: HRS §§342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416) (Imp: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416)

§11-60.1-202 Definitions. As used in this subchapter:

“Carbon sink or carbon dioxide sink” means a carbon reservoir that removes a greenhouse gas or a precursor of a greenhouse gas or aerosol from the atmosphere, and is the opposite of a carbon source. The main sinks are the oceans and growing vegetation that absorb CO₂.

“Facility-wide GHG emissions cap” means a permit emissions limitation, applicable to a covered source, limiting the entire source’s annual non-biogenic greenhouse gas, and biogenic nitrous oxide and methane emissions. A facility-wide GHG emissions cap may also be defined in multiple covered source permits to identify partnering facilities with an approved combined GHG emissions cap as described in subparagraph 11-60.1-204(d)(6)(A).

“Municipal waste combustion operations” means a permitted covered source that combusts solid, liquid, or gasified household, commercial/retail, and/or institutional waste.

“On-the-Book” means control measures or operational practices affecting GHG emissions that the owner or operator of a facility plans, or is undertaking to implement because of regulatory or legal obligations; or as demonstrated through financial and resource commitments. Examples include required controls or practices mandated by a state or federal law; or budgeted and contracted/funded projects or resources.

“Permitted covered source” means a stationary source or facility issued or required to hold a covered source permit pursuant to this chapter, and

GHG Emission Caps for Partnering Facilities

September 26, 2019

Clean Air Branch



Healthy Communities, Healthy Islands, Healthy People

Public Hearing to Comment on Draft Air Permits for Partnering Facilities

Introduction

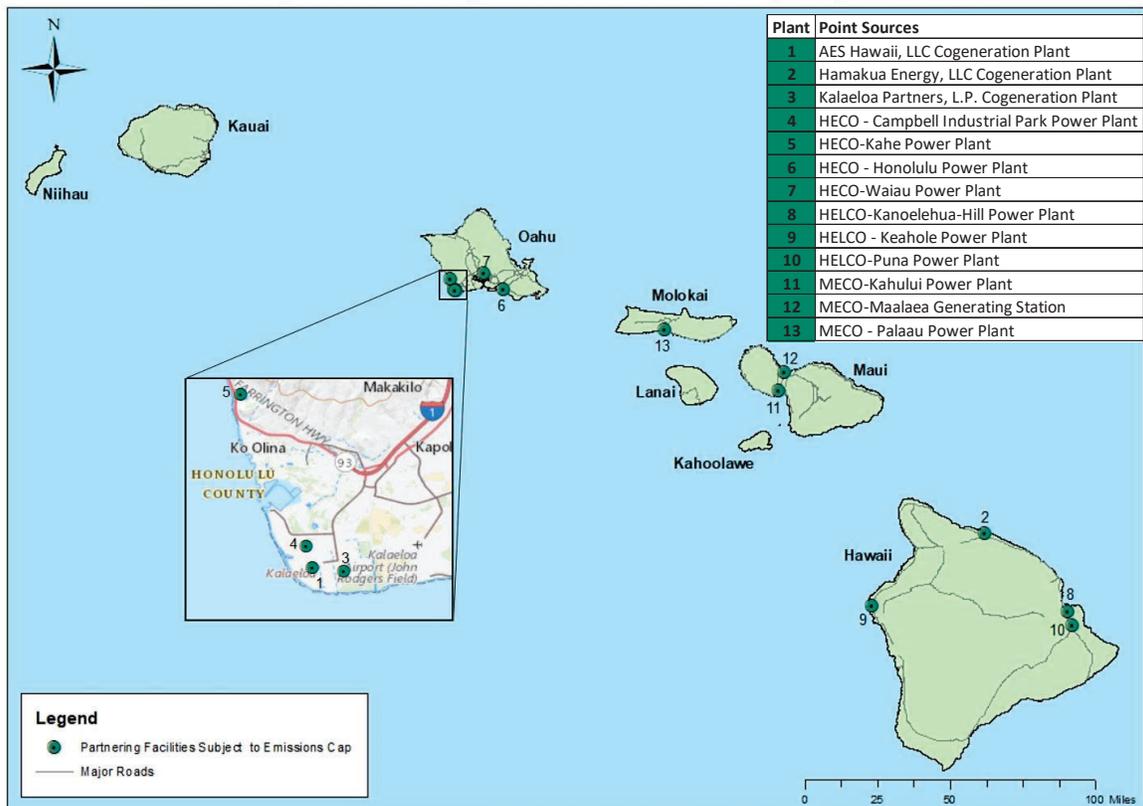
Public Hearing/Comment Period

- ❖ Hearing purpose is to consider and solicit comments on draft air permits for thirteen (13) partnering electric plants.
- ❖ This hearing is being held as requested due to concerns with AES and its use of partnering as a measurer to meet the GHG reductions.
- ❖ An initial public comment period provided from 4-16-2019 to 5-15-2019 for written comments.
- ❖ Another public comment period provided from 8-14-2019 to 9-27-2019 for written comments in parallel with public hearing notice.
- ❖ All public comments received from this hearing and public comment periods will be considered prior to the Department of Health taking action on the permits.



Partnering Facilities

Partnering Facilities Subject to Greenhouse Gas (GHG) Reductions

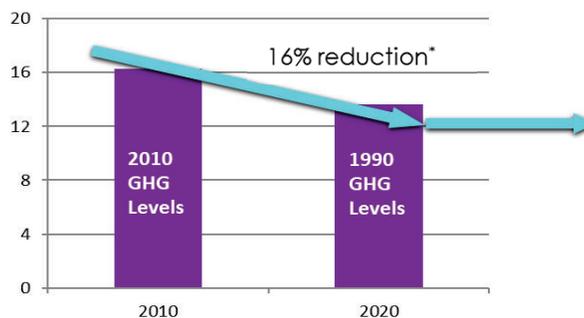


Service Layer Credits: USGS The National Map, National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census

GHG Rules

- ❖ Hawaii Act 234, 2007 – GHG Rules.
- ❖ GHG Rules set a statewide greenhouse gas emissions limit to equal or below 1990 levels by 2020 (CO₂e emission limit excludes aviation and international bunker fuel emissions and includes carbon sinks).
- ❖ To help meet goal - GHG emission facility-wide cap is specified for large stationary sources as backstop to State Energy Office – Renewable Portfolio Standards (RPS) and Energy Efficiency Portfolio Standards (EEPS).
- ❖ Potential CO₂e threshold of 100,000 short tons per year.

Statewide Stationary Source GHG Emission Levels



* 13.2% + Factor of Safety = 16% Reduction

Facility-Wide GHG Cap Definition HAR §11-60.1-202



- ❖ Means a permit emissions limitation, limiting the entire source's annual GHG emissions.
- ❖ May also be defined in multiple permits to identify partnering facilities with a combined GHG emissions cap as described in HAR §11-60.1-204(d)(6)(A).



Partnering

Partnering HAR §11-60.1-204(d)(6)(A)

- ❖ The thirteen (13) electric plants propose a total combined GHG cap of 7,023,258 short tons (6,371,392 metric tons).
- ❖ The cap is 16% reduction from a total combined baseline emissions level of 8,361,021 short tons (7,584,990 metric tons) to comply with HAR §11-60.1-204(c).
- ❖ Baseline level was determined from 2010 emission levels, except for Kalaheo Plant which used 2009 emissions in accordance with HAR §11-60.1-204(d).
- ❖ There are no provisions in HAR §11-60.1-204(d)(6)(A) that limit partnering by location or type of source.



Individual and Combined GHG Emission Caps HAR § 11-60.1-204(d)(6)(A)

- ❖ Partnering facilities established individual caps to meet a total combined 16% GHG emissions reduction in accordance with HAR § 11-60.1-204(c).
- ❖ Individual caps may be exceeded as long as the total combined cap is met.
- ❖ The established caps provide flexibility in dispatching plants to supply electricity to the public.
- ❖ Numerous factors involved with plant dispatch (e.g., cost of service, power plant availability, renewable energy availability, etc.).



GHG Control Assessment HAR § 11-60.1-204(d)(3) through (d)(5)

- ❖ A GHG control assessment is not required because the facility-wide GHG cap proposed by partnering facilities is at least 16% below baseline emissions level.
- ❖ A GHG control assessment was provided by all partnering facilities.
- ❖ The GHG control assessment does not affect the use of partnering to meet facility-wide GHG emissions cap.



Facility-wide GHG Cap

Individual and Total Combined GHG Caps HAR § 11-60.1-204(d)(6)(A)

Plant	CSP Permit	Emissions (short tons)				% Reduction ^c
		Baseline CO ₂ e	Baseline Biogenic CO ₂ e	Baseline CO ₂ e Less Biogenic CO ₂	Proposed CO ₂ e Cap	
AES	0087-02-C	1,681,605	0	1,681,605	1,691,605	-0.60%
Hamakua Energy	0243-01-C	182,975	0	182,975	153,699	16.00%
Kalaeloa Partners	0214-01-C	1,094,813	0	1,094,813	1,094,813	0%
HECO CIP	0548-01-C	19,179	4,233	14,946	53,740	-259.6%
HECO Honolulu ^a	0238-01-C	133,609		133,609	0	100%
HECO Kahe	0240-01-C	2,776,073	0	2,776,073	2,133,752	23.10%
HECO Waiau	0239-01-C	1,074,359	0	1,074,359	808,286	24.80%
HELCO Hill	0234-01-C	222,784	0	222,784	172,456	22.60%
HELCO Keahole	0007-01-C	191,387	0	191,387	242,208	-26.60%
HELCO Puna	0235-01-C	99,691	0	99,691	31,747	68.20%
HELCO Shipman ^b	0236-01-C	10,192	0	10,192	0	100% Plant Closed
MECO Kahului	0232-01-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 Palaau	0031-01-C	28,236	0	28,236	26,454	6.3%
Combined---->		8,366,396	5,375	8,361,021	7,023,257 ^d	16.0%

a: The HECO Honolulu Generating Station is currently deactivated (not operating but could restart if necessary).

b: Shipman Generating Station permanently shutdown. Permit was closed for Shipman plant on December 31, 2015.

c: % reduction = (baseline less biogenic CO₂e minus CO₂e cap proposed) divided by baseline CO₂e less biogenic CO₂ times 100%.

d: Total combined partnering facility proposed GHG cap is 7,023,258 short tons. Totals may not sum due to independent rounding.

Facility-wide GHG Cap

Potential to Emit, GHG Caps, and Actual Emissions

Plant	Maximum Potential GHGs (short tons) ^a	Proposed GHG Caps (short tons)	% Reduction in Potential GHGs ^b	Actual 2017 GHGs (short tons) ^c
AES	2,190,308	1,691,605	22.8%	1,624,593
Hamakua	364,422	153,699	57.8%	98,962
Kalaeloa	1,334,751	1,094,813	18.0%	951,122
HECO CIP	1,062,882	53,740	94.9%	108
HECO Honolulu	888,071	0	100.0%	0
HECO Kahe	4,658,955	2,133,752	54.2%	2,211,062
HECO Waiau	4,094,864	808,286	80.3%	896,607
HELCO Hill	531,678	172,456	67.6%	193,103
HELCO Keahole	576,305	242,208	58.0%	243,346
HELCO Puna	378,397	31,747	91.6%	26,399
MECO Kahului	393,648	154,633	60.7%	198,025
MECO Maalaea	633,722	459,864	27.4%	525,546
MECO Palaau	56,649	26,454	53.3%	25,720
Combined----->	17,164,652	7,023,257 ^d	59%	6,994,593

a: GHG emission estimates from permit application reviews based on existing permit conditions.

b: % Reduction = (max. potential to emit minus CO₂e individual/combined GHG cap) divided by max. potential to emit times 100%.

c: Based on data from EPA's Facility Level Information on GreenHouse gases Tool (FLIGHT).

d: Total combined partnering facility proposed GHG cap is 7,023,258 short tons. Totals may not sum due to independent rounding.

Conclusions

- ❖ Maximum combined GHG emissions for the partnering facilities without the caps are about 17 million tons per year.
- ❖ Maximum combined GHG emissions for the partnering facilities with the proposed caps are about 7 million tons per year.
- ❖ It is our preliminary conclusion that the partnering facilities, subject to the conditions of the draft permits, will be in compliance with all applicable state regulations for greenhouse gases.

<http://health.hawaii.gov/cab/>

Thank You

- ❖ Mike Madsen
- ❖ Clean Air Branch
- ❖ 586-4200
- ❖ 2827 Waimano Home Road, #130
Pearl City, HI 96782
- ❖ michael.madsen@doh.hawaii.gov



- (1) waive the person's right to a contested case hearing pursuant to chapter 91, HRS;
- (2) waive any challenge to the citation;
- (3) pay the penalty assessed;
- (4) correct the violation; and
- (5) enter into the settlement agreement.

(c) The settlement agreement is not effective until it is signed by both the person to whom the citation was issued and by the director. Approval by the director shall be at the director's sole discretion.

(d) The director may withdraw the citation if the person to whom it is issued declines to accept the director's offer to settle or fails to satisfactorily meet any of the conditions set forth in §11-60.1-193(b), in which case the director may bring a formal administrative action under HRS, §342B-42 and pursue any remedies available under this chapter, HRS, chapter 342B, or any other law. [Eff and comp 9/15/01; comp 11/14/03; comp 1/13/12; comp 6/30/14] (Auth: HRS §342B-42)

§11-60.1-194 Form of citation. A field citation issued pursuant to this section shall be in the form prescribed by the department. [Eff and comp 9/15/01; comp 11/14/03; comp 1/13/12; comp 6/30/14] (Auth: HRS §342B-42)

SUBCHAPTER 11

GREENHOUSE GAS EMISSIONS

§11-60.1-201 Purpose. The purpose of this subchapter is to further implement the goals of Act 234, 2007 Hawaii Session Laws. A statewide greenhouse gas emission (GHG) limit, to be achieved by 2020, is set to equal or below the 1990 statewide greenhouse

gas emission levels. Greenhouse gas emissions from airplanes shall not be included. [Eff and comp 6/30/14] (Auth: HRS §§342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416) (Imp: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416)

§11-60.1-202 Definitions. As used in this subchapter:

“Carbon sink or carbon dioxide sink” means a carbon reservoir that removes a greenhouse gas or a precursor of a greenhouse gas or aerosol from the atmosphere, and is the opposite of a carbon source. The main sinks are the oceans and growing vegetation that absorb CO₂.

“Facility-wide GHG emissions cap” means a permit emissions limitation, applicable to a covered source, limiting the entire source’s annual non-biogenic greenhouse gas, and biogenic nitrous oxide and methane emissions. A facility-wide GHG emissions cap may also be defined in multiple covered source permits to identify partnering facilities with an approved combined GHG emissions cap as described in subparagraph 11-60.1-204(d)(6)(A).

“Municipal waste combustion operations” means a permitted covered source that combusts solid, liquid, or gasified household, commercial/retail, and/or institutional waste.

“On-the-Book” means control measures or operational practices affecting GHG emissions that the owner or operator of a facility plans, or is undertaking to implement because of regulatory or legal obligations; or as demonstrated through financial and resource commitments. Examples include required controls or practices mandated by a state or federal law; or budgeted and contracted/funded projects or resources.

“Permitted covered source” means a stationary source or facility issued or required to hold a covered source permit pursuant to this chapter, and

DAVID Y. IGE
GOVERNOR OF HAWAII



FILE COPY

BRUCE S. ANDERSON, Ph.D.
DIRECTOR OF HEALTH

Initials DA
Mailed Out OCT 29 2019

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:

19-653E CAB
File No. 0548

October 29, 2019

Ms. Karin Kimura
Director, Environmental Division
Hawaiian Electric
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Ms. Kimura:

SUBJECT: Public Comments on Draft Permits to Incorporate Greenhouse Gas (GHG) Emission Cap Provisions for Thirteen (13) Partnering Facilities

The Department of Health, Clean Air Branch (CAB) is responding to public comments received on the subject draft permits during two (2) public comment periods and a public hearing. The first public comment period for receiving written comments was from April 16, 2019 to May 15, 2019. A second comment period for additional written comments was provided from August 14, 2019 to September 27, 2019 in parallel with a public hearing held on September 26, 2019 at Momilani Elementary School.

The hearing was held, as requested, due to concerns with AES Hawaii, LLC (AES) and its use of partnering as a measure to meet GHG reduction requirements. Provisions for partnering were incorporated into the draft permits as proposed in GHG emission reduction plans to meet Hawaii Administrative Rules (HAR), Subchapter 11 requirements to cap GHG emissions.

Due to the comments received, the CAB is requesting additional information from the partnering facilities. Please refer to Attachment I for the requested information.

Please provide the requested information within **thirty (30) days** from the date of this letter.

If you have any questions, please contact Mr. Dale Hamamoto of my staff at (808) 586-4200.

Sincerely,

Handwritten signature of Marianne Rossio in cursive.

MARIANNE ROSSIO, P.E.
Manager, Clean Air Branch

DH:rkb
Attachment

c: Steven Barnoski, Plant Manager, AES Hawaii, LLC,
91-086 Kaomi Loop, Kapolei, Hawaii 96707-1883
Jeffrey Walsh, General Manager, Kalaeloa Partners, L.P.,
91-111 Kalaeloa Boulevard, Kapolei, Hawaii 96707
Kevin Monahan, Asset Manager, Hamakua Energy, LLC
34759 Lencioni Avenue, Bakersfield, California 93308

ATTACHMENT I

The CAB received comments on the subject draft permits from over one hundred (100) commenters. Many of the commenters were opposed to the AES facility showing an increase in emissions from its 1990 baseline level in the establishment of a total combined GHG emissions cap. The partnering facilities and emission caps established to meet a combined sixteen percent (16%) GHG reduction from a total combined baseline emissions level are provided in Enclosure 1. In addition, commenters expressed the need for AES to scale down the burning of coal in light of the climate change crisis and focus on clean energy such as battery storage and solar. The public is well aware that the power purchase agreement between AES and Hawaiian Electric Company is set to expire in 2022, which is reflected in a number of recently published articles.

In response to the comments, the CAB performed calculations using data available from the U.S. Energy Information Administration (EIA) and Environmental Protection Agency's (EPA's) Facility Level Information on Greenhouse gases Tool (FLIGHT). Ratios of metric-tons (MT) of carbon dioxide equivalent (CO₂e) emissions to power output in mega-watt hours (MWhr) were calculated for each partnering facility and are provided for comparison in Enclosure 2.

Enclosure 1 shows that individual GHG emission caps for three (3) partnering facilities (Campbell Industrial Park Generating Station, Keahole Generating Station, and the AES Cogeneration Plant) are higher than their respective baseline emissions level. For calendar year 2018, Enclosure 2 shows that the Campbell Industrial Park and Keahole Generating Stations have MTCO₂e/MWhr ratios of 0.6262 and 0.6932, respectively, which are much lower than that for the AES facility with a ratio of 0.9707. Enclosure 1 also shows that the emissions cap for Hamakua Energy is reduced by sixteen percent (16%) from its GHG baseline, however, its MTCO₂e/MWhr ratio of 0.5890 is even lower than those for facilities with individual caps above the baseline level. As shown in Enclosure 3, the AES facility has the highest GHG emissions per mega-watt hour ratio among all partnering facilities on Oahu. And yet the individual GHG cap, that may be exceeded if meeting the total cap, is above this plant's baseline GHG emissions level.

The CAB realizes that individual GHG emission caps for the partnering facilities were not established solely on plant efficiency, but also predicated on other considerations, such as cost and plant availability. In addition, HAR §11-60.1-204 does not impose restrictions on how partnering facilities establish individual facility GHG emission caps for meeting a total combined cap.

In view of the comments received and data provided in Enclosures 1, 2, and 3, the CAB requests the following information for the thirteen (13) partnering facilities:

1. Confirm the accuracy of the data and calculations in Enclosures 2 and 3 and reassess the need to revise the individual facility GHG emission cap(s);
2. Explain the factors used in determining each facility's individual GHG emissions cap;
3. Revise individual GHG emission cap(s), as applicable, for addressing concerns raised by the commenters; and
4. Provide information on the AES facility:
 - a) Address comments received on the need for AES to scale down the burning of coal and focus on clean energy such as battery storage and solar.
 - b) Include a discussion on AES's plans following 2022 towards alignment with the State's 2045 renewable energy goal.
 - c) If the partnership were to propose limiting the permit period to 2022, would it be easier or more difficult to achieve existing state and local objectives for GHG reductions? Please explain the basis for your answer.

Enclosure 1

Table A-1: ERP Partnership Baseline CO₂e Emissions and Proposed CSP Limits (1)

Company	Covered Source	Baseline CO ₂ e Emissions		CSP Limits CO ₂ e Reduction		CO ₂ e Limit
		(metric tpy)	(tpy)	(%)	(tpy)	(tpy)
Hawaiian Electric (HE)	Kahe	2,518,411	2,778,073	23.1%	642,321	2,133,752
	Waiau	974,642	1,074,359	24.8%	266,074	808,280
	Honolulu	121,208	133,609	100.0%	133,609	0
	CIPGS	13,559	14,946	-259.6%	-38,794	53,740
HESubtotal		3,627,821	3,998,988	25.1%	1,003,210	2,995,778
Maui Electric (ME)	Kahuku	209,414	230,839	33.0%	76,206	154,833
	Maalaea	562,012	619,512	25.8%	159,649	459,864
	Palaau	25,615	28,236	6.3%	1,782	26,454
ME Subtotal		797,041	878,587	27.0%	237,636	640,951
Hawaiian Electric Light (HEL)	Kanoelehua Hill	202,106	222,784	22.6%	50,328	172,456
	Keahole	173,823	191,387	-26.6%	-50,821	242,208
	Puna	90,438	99,691	68.2%	67,944	31,747
	Shapman	9,246	10,192	100.0%	10,192	0
HEL Subtotal		475,413	524,053	14.8%	77,642	446,411
Hawaiian Electric Companies		4,900,275	5,401,629	24.4%	1,318,488	4,083,141
AES Hawai'i		1,525,526	1,681,605	-0.6%	-10,000	1,691,605
Hamakua Energy Power		165,992	182,975	16.0%	29,276	153,699
Kalaheo Partners, LP		993,198	1,094,813	0.0%	0	1,094,813
Partnership Total		7,584,991	8,361,022	16.00%	1,337,764	7,023,258

Notes:

- (1) Excludes biogenic CO₂ emissions
- (2) Selections of facility emissions baselines are described in the individual GHG Emission Reduction Plans for the Hawaiian Electric Companies, AES Hawai'i, Kalaheo 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

Enclosure 2
MT CO₂e to MWhr Ratios of the Thirteen (13) Partnering Facilities

a	Facility	2010	2011	2012	2013	2014	2015	2016	2017	2018
HE	KAHE	0.7965	0.8748	0.8000	0.7943	0.8066	0.8096	0.8005	0.8070	0.8156
	WAI AU	0.8567	0.8561	0.8284	0.8320	0.8450	0.8510	0.8745	0.8917	0.8630
	HONOLULU	1.0568	1.0713	1.1134	1.1390	1.3005	b	b	b	b
	CIPGS	0.0000	0.0019	0.0018	0.0017	0.0023	0.0018	0.0016	0.0018	0.6262
ME	KAHULUI	1.0903	1.0828	1.0655	1.1066	1.1062	1.1280	1.1285	1.1156	1.1083
	MAALAEA	0.6828	0.6641	0.6722	0.6775	0.6808	0.6793	0.6782	0.6873	0.6881
	PALAAU	0.7415	0.7456	0.7445	0.7524	0.7551	0.7478	0.7527	0.7506	0.7575
HEL	KANOELEHUA HILL	0.9818	0.9864	0.9941	0.9943	1.0007	1.0092	1.0054	1.0136	1.0129
	PUNA	1.2060	1.0779	1.0935	1.0694	1.1166	0.9774	1.2277	1.2413	1.1024
	KEAHOLE	0.8906	0.8982	0.7383	0.7164	0.6983	0.7124	0.7051	0.6921	0.6932
IPP	AES HAWAII INC	1.0128	c	c	c	c	c	c	1.0561	0.9707
	KALAELOA COGENERATION PLANT	0.6629	0.6864	0.6900	0.6799	0.6990	0.6961	0.6532	0.6488	0.6903
	HAMAKUA ENERGY PARTNERS	0.5800	0.5880	0.6047	0.5628	0.5791	0.5907	0.6606	0.6188	0.5890
	Weighted Average	0.8187	c	c	c	c	c	c	0.8220	0.8134

a: HE-Hawaiian Electric, ME-Maui Electric, HEL-Hawaii Electric Light, and IPP-Independent Power Producer.

b: The Honolulu Generating Station is currently deactivated (not operating but could start if necessary).

c: No ratios reported. AES emissions for determining ratios were bias high due to issues with flow measurements from continuous emissions monitoring system.

Enclosure 3
Comparison of Data for Partnering Facilities Located on Oahu

Facility	2010	2017	2018	CO ₂ e Baseline	CO ₂ e Cap	CO ₂ e Reduction or (Increase)
	MT CO ₂ e /MWhr			tpy		
HE KAHE GENERATING STATION	0.7965	0.8070	0.8156	2,776,073	2,133,752	642,321
HE - WAI AU GENERATING STATION	0.8567	0.8917	0.8630	1,074,359	808,286	266,074
HE-HONOLULU GENERATING STATION	1.0568	NA	NA	133,609	0	133,609
HE CIPGS	NA	0.0018	0.6262	14,946	53,740	(38,794)
AES HAWAII INC	1.0128	1.0561	0.9707	1,681,605	1,691,605	(10,000)
KALAELOA COGENERATION PLANT	0.6629	0.6488	0.6903	1,094,813	1,094,813	0

Comparison of Data for Partnering Facilities with MT CO₂e/MWhr Greater than 1.0

Facility	2010	2017	2018	CO ₂ e Baseline	CO ₂ e Cap	CO ₂ e Reduction or (Increase)
	MT CO ₂ e /MWhr			tpy		
AES HAWAII INC	1.0128	1.0561	0.9707	1,681,605	1,691,605	(10,000)
HE-HONOLULU GENERATING STATION	1.0568	NA	NA	133,609	0	133,609
ME KAHALUI	1.0903	1.1156	1.1083	230,839	154,633	76,206
HEL KANOELEHUA HILL	0.9818	1.0136	1.0129	222,784	172,456	50,328
HEL - PUNA	1.2060	1.2413	1.1024	99,691	31,747	67,944



KARIN KIMURA
Director
Environmental Division

December 9, 2019

SENT VIA EMAIL (marianne.rossio@doh.hawaii.gov)
USPS CERTIFIED MAIL NO. 7017 2620 0000 6979 5894
RETURN RECEIPT REQUESTED

Marianne Rossio, P.E.
Manager, Clean Air Branch
State of Hawai'i
Department of Health
P.O. Box 3378
Honolulu, Hawai'i 96801

Dear Ms. Rossio:

Subject: Public Comments on Draft Permits to Incorporate Greenhouse Gas (GHG) Emission Cap Provisions to Thirteen (13) Partnering Facilities

On behalf of Hawaiian Electric Company, Inc. ("Hawaiian Electric") this letter responds to your correspondence of October 29, 2019, which contains requests for information regarding the facilities that are partnering under a Green House Gas ("GHG") Emissions Reduction Plan ("ERP"). We appreciate the extension of time to December 9, 2019 to provide the response to your letter. This letter was prepared by Hawaiian Electric with the assistance of AES Hawai'i ("AES"), Hamakua Energy, LLC ("HE"), and Kalaeloa Partners, L.P. ("KPLP") as several of the questions relate directly to their operations.

We note that the most recent ERP, which is attached hereto, was submitted in July 2019. The 2019 ERP was submitted along with a request that the Partnership be given credit for the loss of the Puna Geothermal Venture's ("PGV") plant. This request was also contained in the Hawaiian Electric comments that were submitted in May of 2019, a copy of which is attached as well.

As a preliminary matter, your letter states, in reference to the tables that were part of your letter, that the "partnering facilities and emission caps established to meet a combined sixteen percent (16%) GHG reduction from a total combined baseline emissions level are provided in Enclosure 1." We note that Enclosure 1 is Table A-1 from the October 18, 2018 ERP. As noted above, the current version of Table A-1 is dated May 15, 2019 and can be found in the attached July 26, 2019 update to the ERP. Our discussion below is not affected by which Plan was reviewed; however, we are requesting that the Clean Air Branch as part of its consideration of modifications to the current permits uses the most recent ERP, which includes an allowance for the loss of the PGV plant.

We further understand that the Clean Air Branch performed certain calculations using data from the U.S. Energy Information Administration ("EIA") and Facility Level Information on

Greenhouse Gases Tool ("FLIGHT") as shown in Enclosures 2 and 3 to your letter. Thank you for recently providing that source data so that we can more easily respond to your requests.

1. Confirm the accuracy of the data and calculations in Enclosures 2 and 3 and reassess the need to revise the individual facility GHG emission cap(s).

First, we would point out that this request consists of two separate questions: first, a question as to the accuracy of the data compiled by the Clean Air Branch; and second, whether there is a need to "revise the individual facility GHG emission cap(s)."

As a preliminary matter, we believe that the data that was submitted by Hawaiian Electric coincided with the Clean Air Branch data was accurate except as discussed below and that the additional calculations by the Clean Air Branch were not required. Further, Hawaiian Electric confirmed with AES that AES they believes the data submitted by AES was also accurate with respect to Clean Air Branch's data except as discussed below. Nonetheless, the data in Enclosures 2 and 3 accurately represent the data actually in the EIA and EPA Flight source documents. That said, a few of the EIA MWh data points differ from Hawaiian Electric's records. For instance, the EIA MWh figures for Keahole Generating Station in 2010 and 2011 are approximately 25% lower than Hawaiian Electric's figures and, according to AES, EIA's figure for AES in 2015 was about 9% lower than their records indicate. AES agrees that for years other than 2015, the MWh difference is less than 1%. Those differences do not significantly affect the conclusions that can be drawn from Enclosures 2 and 3, but adjusting for them does clear up some inconsistencies between the calculations that were identified in the Enclosure 2 results.

Enclosure 3 points out that the ERP emissions reductions on Oahu come from Hawaiian Electric's Kahe, Waiau, and Honolulu Power Plants. Meanwhile, the caps for Campbell Industrial Park Generating Station ("CIPGS"), AES, and KPLP are the same or higher than their baselines. The reasons for AES and KPLP caps are discussed in the response to Clean Air Branch's Request 2. CIPGS's GHG emissions increased because biodiesel was replaced by diesel fuel in 2018 and going forward so that biodiesel can be used at the new Schofield Generating Station.

Enclosure 3 also appears to suggest that overall GHG emissions could be reduced by relying more on Hawaiian Electric's Kahe, Waiau, and CIPGS generating stations and KPLP instead of AES. We note that the low MT CO₂e/MWhr emission factors shown for CIPGS (0.0018 and 0.6262) are not representative of its operation on diesel fuel. CIPGS GHG emissions will be higher going forward due to operation on diesel fuel. Allowing both AES and KPLP to continue to operate as they have in the past means that their combined GHG emissions will be similar to the combined GHG emissions of the Hawaiian Electric units that would be needed to replace the output of AES and KPLP. Thus, the ultimate effect is that overall GHG emissions in the ERP are nearly the same as they would be if all partnering facilities had 16% reductions.

With regard to the second part of DOH's request, Hawai'i Administrative Rules ("HAR") § 11-60.1-201 does not impose any restrictions on how partnering facilities establish individual facility GHG emission caps for meeting a total combined cap. The Clean Air Branch does not have discretion to require changes to a partnership allocation among its members as long as the 16% cap is met. However, there is discretion for the Clean Air Branch to increase the amount of the cap in the event that there is a loss of renewable resources in the partnership. See HAR § 11-

60.1-204(4) and discussion below. The partnership was forced to face what could be described as the perfect storm in 2019. Not only did the PGV plant go down, but some of the additional renewable assets that were included in the original calculations did not come online as anticipated. In addition, the State had a record year for heat, which substantially increased air conditioning demand.

As your letter acknowledges, the individual GHG emission caps for the partnering facilities were not established based solely on plant efficiency, but rather are based on other considerations. An explanation of the considerations can be found in the GHG ERP for the Hawaiian Electric Companies. As explained in the section entitled "GHG Reduction Partnership," the power generating facilities on each of the islands are highly interdependent. If one or more facilities cannot produce their scheduled power output, the other facilities on the island must produce more power to meet the shortfall. Scheduled and unscheduled outages can significantly shift GHG emissions from one facility to another. For this reason, assigning firm GHG emissions caps to individual facilities does not provide the flexibility needed to accommodate upsets that are a natural part of the system. It is this operational flexibility that allows the companies to meet the 16% reduction. The Power Supply Improvement Plan ("PSIP") for the Hawaiian Electric Companies that was accepted by the Public Utilities Commission on July 14, 2017 is the blueprint for how the reduction will be accomplished.

With this in mind, the partnering facilities respond as set forth below to your request concerning the accuracy of the data and calculations. However, the partnering facilities do not believe there is a need to revise the individual facility GHG emission cap(s) based on the calculations in Enclosures 2 and 3.

AES confirms the data submitted by AES was accurate except as discussed above.

HE confirms the accuracy of the data and calculations in Enclosure 2. Enclosure 3 deals with partnering facilities on Oahu and with MT CO₂e/MWhr greater than 1.0, neither of which applies to HE.

With respect to the Kalaeloa Cogeneration Plant ("KCP"), KPLP notes that the numbers used by the Clean Air Branch in calculating the MT CO₂e to MWhr Ratios in Enclosure 2 for KCP, as shown in the calculations provided, are actually the gross generation MWhr and not the net generation MWhr. Two of those ratio numbers are also used for KCP in Enclosure 3. However, calculations using net generation MWhr do not significantly change the ratio numbers.

2. Explain the factors used in determining each facility's individual GHG emissions cap.

The Partnership GHG ERP was submitted to DOH on February 28, 2018. The starting point for establishing site-specific GHG emission caps was Hawaiian Electric's December 2016 Power Supply Improvement Plan, which was accepted by the PUC on July 14, 2017. GHG emissions were calculated for each of the partnering facilities based on their forecast fuel consumption in 2019. The excess compliance margin was then distributed among the partnering facilities based on other considerations, including the risk of exceeding their individual caps.

Hawaiian Electric's mission is to provide energy to customers safely and at the lowest cost while complying with all applicable laws and regulations. Accordingly, the partners arranged the caps so that the facilities that are preferentially dispatched because they are the lowest cost

generators would have higher caps. AES is by far the lowest cost generator on Oahu and KPLP is next. They were given caps that were essentially the same as their baseline emissions because there is no economic reason why they should be dispatched less than in the past, at least through 2019. The alternative is to run Hawaiian Electric's boilers more than planned, which would lower overall GHG emissions slightly but increase customer cost. Since HAR §11-60.1-204 does not restrict how partnering facilities establish individual facility GHG emission caps as long as the total combined cap satisfies the 16% reduction requirement, this approach best suited Hawaiian Electric's mission.

HE, on the other hand, is not usually the low-cost generator on Hawai'i Island and its output had trended downward in recent years as PGV output increased. However, since PGV went offline because of volcanic activity, HE has operated at near full capacity. The loss of PGV and the resultant impact on HE generation is addressed in the 2019 ERP submitted to the Clean Air Branch.¹

3. Revise individual GHG emissions cap(s), as applicable, for addressing concerns raised by the commenters.

AES Hawaii agrees to reduce its individual GHG emissions cap by 10,000 short tons per year.

Hawaiian Electric asks that the Clean Air Branch review and approve the revisions set forth in its recent amendment to address the ongoing loss of power from PGV, as well as approve the reduction in AES's individual GHG emissions cap by 10,000 short tons per year, which will be distributed amongst the other facilities. As noted above, PGV stopped generating energy in early 2018 as a result of volcanic activity. This removed a substantial amount of renewable energy from the system and significantly increased the amount of GHG emissions from Hawai'i Electric Light Company, Inc. and HE that were needed to offset that lost capacity. Loss of PGV qualifies as a reason 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 the loss of 38 Megawatts of firm PGV capacity.

With respect to the KCP, no comments were raised concerning KCP, and there is no reason to alter KCP's emissions cap.

4a. Provide information on the AES facility: a) address comments received on the need for AES to scale down the burning of coal and focus on clean energy such as battery storage and solar.

Pursuant to the Power Purchase Agreement and related amendments with Hawaiian Electric, the AES facility provides power as needed and required by Hawaiian Electric's customers. As noted above, AES is by far the lowest cost generator on Oahu, and it provides power at all times as requested by Hawaiian Electric.

¹ See, in particular, Table A-2 to the July 26, 2019 Update to the Greenhouse Gas Emissions Reduction Plan for the Hawaiian Electric Companies.

4b. Provide information on the AES facility: b) Include a discussion of AES's plans following 2022 toward alignment with the State's 2045 renewal energy goal.

AES has represented to Hawaiian Electric that AES is committed to honoring the terms under the existing Power Purchase Agreement between Hawaiian Electric and AES.

4c. Provide information on the AES facility: c) If the partnership were to propose limiting the permit period to 2022, would it be easier or more difficult to achieve the existing state and local objectives for GHG reductions? Please explain the basis for our answer.

The participating facilities do not propose limiting the permit period to 2022. The participating facilities have requested modifications to the Covered Source Permits. It is our understanding that the term of a new or modified covered source permit is five years by rule.

Sincerely,



Enclosure: Update to the Greenhouse Gas Emissions Reduction Plan for the Hawaiian Electric Companies dated July 26, 2019

Ec (w/Encl): Dale Hamamoto, DOH Clean Air Branch (dale.hamamoto@doh.hawaii.gov)
Mr. Barnowski, AES Hawaii
Mr. Monahan, Hamakua Energy
Mr. Walsh, Kalaeloa Partners

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

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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 CO₂e (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.¹ 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.²

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 CO₂e 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 CO₂e 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.

¹ HAR 11-60.1-204(c)

² HAR 11-60.1-204(d)(6)(A)

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 Regulations³ 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, 2017⁴ 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.

³ HAR 11-60.1-204(d)(6)(A).

⁴ *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 CO₂e).** *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....⁵*

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

⁵ 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.*⁶

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;*

⁶ HAR 60.1-204(d)(2)

- (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.⁷*

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.

⁷ HAR 11-60.1-204(d)(3)

TABLE 1 - EVALUATION OF GHG EMISSIONS CONTROL OPTIONS

GHG Control Option	Feasibility and Benefit
(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.

(F)	Planned upgrades, overhaul, or retirement of equipment	<p>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:</p> <ul style="list-style-type: none"> • Shipman S3 and S4. Permanently decommissioned and CSP closed December 31, 2015. • Honolulu H8 and H9. Deactivated January 2014.
(G)	Outstanding regulatory mandates, emission standards, and binding agreements	<p>Hawai'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.</p> <p>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.</p>
(H)	<p>Other GHG emissions reduction initiatives:</p> <p>Renewable Energy (RE) Projects: Wind, Solar, and Battery Energy Storage Systems (BESS)</p> <p>Deployment of new flexible, rapid response generation to enable more integration of renewable energy sources.</p>	<p>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.</p> <p>The December 2016 PSIP includes additional utility scale RE coming online between 2017 and 2019:</p> <p>Hawaiian Electric - 206.2 MW of new utility scale RE + 70MW BESS Maui Electric - 8.74 MW of new RE + 9MW BESS Hawai'i Electric Light - 3 MW of new RE.</p> <p>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.</p>

- (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.⁸

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 CO₂e, pounds CO₂e/kilowatt-hour);
 - (C) Expected emission reduction (tons per year CO₂e);
 - (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 CO₂e 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,

⁸ HAR 11-60.1-204(d)(4)

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

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 CO₂e 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 CO₂ 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.¹⁰*

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, 2017.¹¹ 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

⁹ HAR 11-60.1-204(d)(5)

¹⁰ HAR 11-60.1-204(d)(6)

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

generation was from renewable sources,¹² well ahead of the RPS goal of 15% by 2015.¹³ 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.

¹² 2017-2018 Corporate Sustainability Report. Hawaiian Electric Companies. Page 4.

¹³ 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 CO₂e Emissions and Proposed CSP Limits (1)

Company	Covered Source	Baseline		CSP Limits		CO ₂ e Limit (tpy)
		CO ₂ e Emissions		CO ₂ e Reduction		
		(metric tpy)	(tpy)	(%)	(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
HESubtotal		3,627,821	3,998,988	25.1%	1,003,210	2,995,778
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
ME Subtotal		797,041	878,587	27.0%	237,636	640,951
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
HEL Subtotal		475,413	524,053	14.8%	77,642	446,411
Hawaiian Electric Companies		4,900,275	5,401,629	24.4%	1,318,488	4,083,141
AES Hawai'i		1,525,526	1,681,605	-0.6%	-10,000	1,691,605
Hamakua Energy Power		165,992	182,975	16.0%	29,276	153,699
Kalaeloa Partners, LP		993,198	1,094,813	0.0%	0	1,094,813
Partnership Total		7,584,991	8,361,022	16.00%	1,337,764	7,023,258

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.

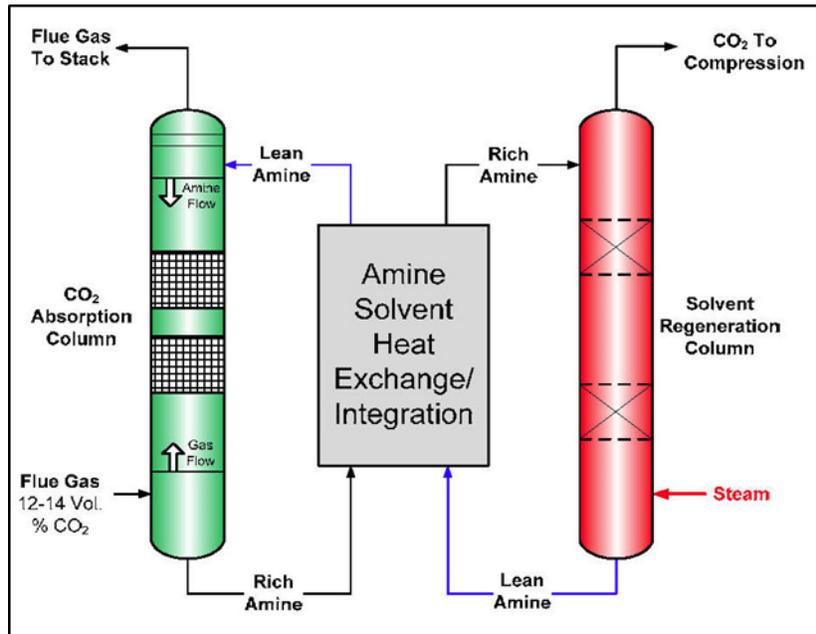
Table A-2: Substitute 2019 GHG Limits for PGV Outage

Company	Covered Source	PGV 100% Operation	Calendar Year 2019 GHG Limits	
		CO2e Emissions Limit	GHG Limit Adjustment	CO2e Emissions Limit
		(tpy)	(tpy)	(tpy)
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
HE Subtotal		2,995,778	0	2,995,778
MECO	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
HELCO	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
HEL 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

Carbon Capture and Storage

Carbon Capture and Storage (CCS) is composed of two major functions; CO₂ capture and CO₂ storage. A number of methods may potentially be used for separating the CO₂ 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 CO₂ capture options, the use of an amine solvent such as monoethanolamine (MEA) it 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 CO₂ CAPTURE PROCESS



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

EPA generally considers post-combustion CO₂ 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 CO₂ 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 CO₂ concentration in the flue gas is

lower than 6 percent. That concentration is much lower than other types of power plants, such as coal fired power plants, where the CO₂ 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 CO₂ 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-CO₂ concentration flue gases from combustion turbines and reciprocating engines.

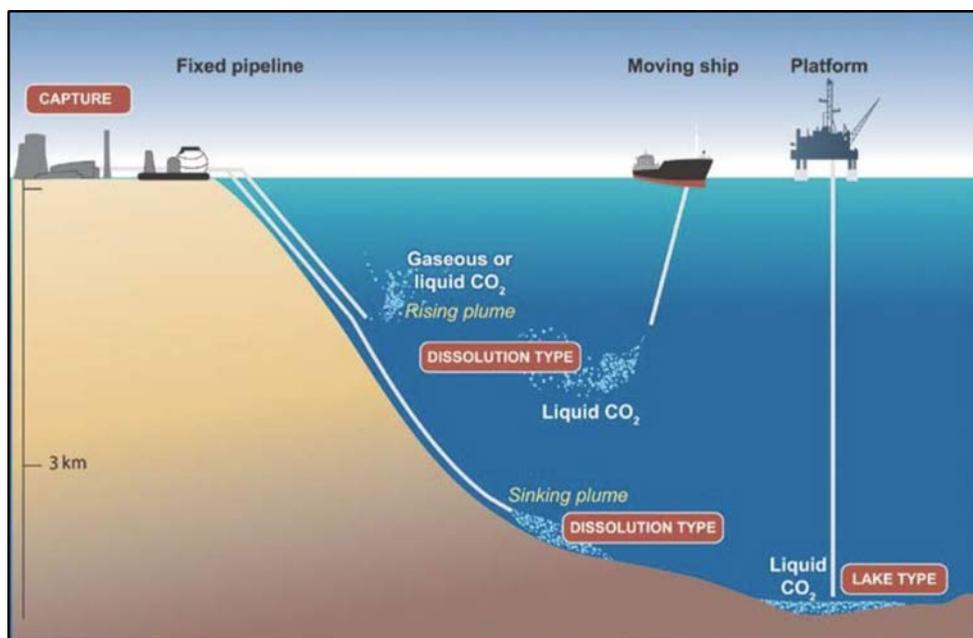
Hawai'i's remote location imposes many additional challenges implementing CO₂ storage that are not present for continental U.S. sources. Hawaiian Electric is not aware of any proven CO₂ geological storage sites on Hawai'i. Therefore, ocean storage, i.e., direct CO₂ release into the ocean water column or onto the deep seafloor, appears to be the most readily available CO₂ storage option.

As shown in Figure B-2, CO₂ ocean storage potentially could be implemented in two ways:

- By injecting and dissolving CO₂ into the water column (typically below 1,000 meters) via a fixed pipeline or a moving ship, or
- By depositing CO₂ via a fixed pipeline or an offshore platform onto the sea floor at depths below 3,000 m, where CO₂ is denser than water and is expected to form a "lake" that would delay dissolution of CO₂ 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

The first step to costing CCS is calculating CO₂ emission rates. CO₂ 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 CO₂ 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 CO₂ 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)¹⁴.

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.

¹⁴ 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.

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

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

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 CO₂ 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 CO₂ 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.

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

Unit Type	Typical Heat Rate (Btu/kWh)	Fuel Type	Total Annual Cost (\$/MMBtu)	CO ₂ 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.

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- 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 CO₂ 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 NextEra¹⁵ 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 CO₂ EMISSIONS REDUCTION CALCULATION

Fuel	GHG Pollutant ¹	Emission Factor ² (kg/MMBtu)	Global Warming Potential ³	Total GHG Emissions as CO ₂ e (lb/MMBtu)
No. 6 Fuel Oil	CO ₂	75.10	1	165.6
	N ₂ O	6.0E-04	298	0.3942
	CH ₄	3.0E-03	25	0.1653
			Total CO₂e =	166.2
No. 2 Fuel Oil	CO ₂	73.96	1	163.1
	N ₂ O	6.0E-04	298	0.3942
	CH ₄	3.0E-03	25	0.1653
			Total CO₂e =	163.7
Natural Gas	CO ₂	53.06	1	117.0
	N ₂ O	1.0E-04	298	0.0657
	CH ₄	1.0E-03	25	0.0551
			Total CO₂e =	117.1
No. 6 Fuel Oil to Natural Gas Reduction = 29.5%				
No. 2 Fuel Oil to Natural Gas Reduction = 28.4%				

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).

¹⁵ 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.

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.

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*.¹⁶ 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.¹⁷

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

¹⁶ 79 Fed. Reg. 34830, June 18, 2014.

¹⁷ Ibid. p. 34877.

Institute (EPRI).¹⁸ 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.¹⁹ 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.

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

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

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.²⁰ 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

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

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 CO₂e 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.²¹ 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.²² 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 costs²³ 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.

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

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

²³ *Ibid*, Table F-5.

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.

Hawai'i Island Fossil Fuel GHG Emissions		
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
GHG Adjustment for PGV		185,404

**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_x emissions are controlled by water injection. SO₂ emissions are controlled by limiting the biodiesel fuel sulfur content to 50 ppm. Emissions of PM, PM₁₀, PM_{2.5}, 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.

Maximum Design Fuel Use per Unit			
Unit ID	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_x, PM, PM₁₀, 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_x burners to control NO_x 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
Waiiau 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_x, PM, PM₁₀, 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_x, PM, PM₁₀, 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 Kanoelehua-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 PM₁₀, 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 O₂. 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_x 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_x emissions to 42 ppmvd at 15 percent O₂, 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_x emissions to 15 ppmvd at 15 percent O₂, 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 O₂. Water injection is used on CT-2 reduce NO_x emissions to 47 ppmvd at 15 percent O₂, with a fuel-bound nitrogen content of 0.015 percent or less. SO₂ 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, PM₁₀, 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% O₂. 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_x emissions to 42 ppmv at 15 percent O₂, 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 PBSD1 and 2.0% by weight for the boiler. Emissions of PM, PM₁₀, 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 PBSD1, 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_x, PM, PM₁₀, 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 O₂, 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 O₂. 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 Palaaou 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_x emissions from Units CUM3 through CUM6, CAT1, and CAT2 are controlled by fuel injection timing retard (FITR). NO_x emissions from Units CAT7 through CAT9 are controlled by FITR and intake air cooling. Emissions of PM/PM₁₀, CO, and VOC are controlled by combustion design. SO₂ 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% O₂. 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. 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.**

(d) The GHG emission reduction plan required of affected sources shall at a minimum include:

(1) The facility-wide baseline annual emission rate (tpy CO₂e). 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 for the director's approval, as follows:

(A) The owner or operator shall clearly document why calendar year 2010 is not representative of normal operations and why the proposed alternate year or period is more suitable based on trends, existing equipment and controls, scheduled maintenance, operational practices, and any other relevant information. Acceptable methods for determining alternate facility-wide baseline annual emissions include:

- (i) the facility-wide GHG emissions (less biogenic CO₂) based on the most recent representative year during the five-year period ending 2010;
- (ii) average facility-wide GHG emissions (less biogenic CO₂) over any consecutive two-year period

- during the five-year period ending in 2010;
- (iii) average facility-wide GHG emissions (less biogenic CO₂) for the five-year period ending in 2010; or
 - (iv) comparable methods as approved by the director. The director will not consider the use of periods greater than five years from 2010, except for extreme cases such as where an affected source may not have been fully operational for an extended period of time.

(B) For newly permitted covered sources without a 2010 operating history, the owner or operator shall make the best estimate of normal operations based on contract agreements, available operational records, required scheduled maintenance, market forecast, or any other information for projecting the affected source emissions. Potential emissions shall not be used, unless the owner or operator can clearly demonstrate that the facility will be continually operating at the maximum capacity for each and every year.

The owner or operator shall provide all supporting documentation for the proposed alternate baseline emission rate. The director, based on available information, may reject and modify the baseline emission rate in establishing the final facility-wide GHG emissions cap.

- (2) The 2020 facility-wide GHG emissions cap. 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, as part of the reduction plan:

- (A) The justification and supporting documentation of why the required emissions cap cannot be met; and
- (B) A proposal, for the director's approval, of an alternate emissions cap resulting in the maximum achievable GHG reductions.

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 guidelines for GHG Best Available Control Technology analysis, and GHG control measures by source type shall be used as applicable for this assessment.

- (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;
 - (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.

- (4) The 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.
- (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 CO₂e, pounds CO₂e/kilowatt-hour);
 - (C) Expected emission reduction (tons per year CO₂e);
 - (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 CO₂e 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, assumptions, vendor quotes, sample calculations, etc.) to substantiate the control analysis and alternate GHG emissions cap.

- (6) The 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 CO₂e emission reductions (tpy) for the entire facility. Owners or operators shall also consider the following:

cap cannot be mutually agreed upon, the director reserves the right to establish, and incorporate into the applicable covered source permit, a facility-wide GHG emissions cap as required or the lowest cap deemed achievable by the affected source based on the intent of this subchapter.

(g) Once a facility-wide GHG emissions cap is established and placed into the covered source permit, the GHG emission reduction plan shall become a part of the covered source permit application process for renewals and any required modifications pursuant to subchapter 5. With each subsequent GHG emission reduction plan submittal, the owner or operator of the affected source shall report:

- (1) The GHG emission reduction status;
- (2) Factors contributing to the emission changes;
- (3) Any control measure updates; and
- (4) Any new developments or changes that would affect the basis of the facility-wide GHG emissions cap.

(h) The facility-wide GHG emissions cap may be re-evaluated and revised by the director if any of the following events or circumstances exists:

- (1) Consideration for new rules, updated technology, implementation of GHG reduction initiatives, significant changes with renewable energy cost and supply, and any other measures deemed necessary by the director to facilitate the state's GHG limit;
- (2) The basis for establishing the facility-wide GHG emissions cap is found to be incorrect;
- (3) The methodology for calculating GHG emissions is updated or modified;
- (4) Renewable energy producers cease operations or fail to meet contractual obligations with the affected source, and there are no other reasonable alternatives; or
- (5) Reasonably unforeseen events beyond the control of the owner or operator of an affected source, resulting in long-term or

temporary emission changes, whereby the maintenance of the GHG emissions cap would be detrimental to the health and welfare of the public.

Any revision to a facility-wide GHG emissions cap is considered a significant modification subject to the application and review requirements of section 11-60.1-104. The owner or operator of an affected source seeking a GHG emissions cap change has the burden of proof to substantiate any requested change for the director's approval. Upon approving any GHG emissions cap revision, the director may impose additional emission limits or requirements on the affected source, or limit the time-frame allowed for the revised GHG emissions cap.

(i) Municipal solid waste landfills required by 40 CFR Part 60, Subpart Cc or 40 CFR Part 60, Subpart WWW to use gas collection and control systems are conditionally exempt from the GHG emission reduction requirements of Subsection 11-60.1-204(c).

(j) Should the permitted facility-wide GHG emissions cap not be met by January 1, 2020 and annually maintained thereafter, the owner or operator of the covered source shall be subject to enforcement action for each year after 2019 that the facility-wide cap is not met. Compliance with the facility-wide cap shall be determined at the end of each calendar year, or January 1 of the following year, starting with the end of 2019 or January 1, 2020. Each CO₂e ton over the cap shall constitute a separate offense and violation.

(k) The director shall conduct an evaluation in 2016, and annually thereafter, to determine the progress of achieving and if applicable, ongoing maintenance of the statewide GHG emissions limit specified in HRS, Chapter 342B-71 and section 11-60.1-203. The evaluation of the statewide GHG emission limit shall be conducted in a manner consistent with the procedures used to prepare the 1990 emission estimates under Act 234, 2007 Hawaii Session Laws. The director shall produce and make public annual progress reports listing GHG emissions levels for each affected facility and the statewide progress relative

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has begun construction or operation by the effective date of this subchapter. [Eff and comp 6/30/14] (Auth: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416) (Imp: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416)

§11-60.1-203 Greenhouse gas emission limit.

The statewide GHG emission limit to be achieved by 2020, is equal to or below 13.66 million metric tons (or 15.06 million tons) per year of CO₂e, based on Hawaii's 1990 GHG emission estimates prepared under Act 234, 2007 Hawaii Session Laws. The GHG limit excludes aviation and international bunker fuel emissions, and includes carbon sinks. The director may update the numerical GHG emission limit should improved methodologies and data become available for estimating emissions. The limit serves as an indicator to measure progress of the state's GHG reduction measures and to determine the achievement and maintenance of the state's GHG limit by 2020.

[Eff and comp 6/30/14] (Auth: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416) (Imp: HRS §§ 342B-3, 342B-12, 342B-71, 342B-72, 342B-73; 42 U.S.C. §§7407, 7416)

§11-60.1-204 Greenhouse gas emission reduction plan.

(a) This section applies to an owner or operator of a permitted covered source, except for municipal waste combustion operations, with the potential to emit GHG emissions (biogenic plus non-biogenic) equal to or above 100,000 tons per year CO₂e. Each owner or operator of an affected source shall submit a GHG emission reduction plan for the director's approval within twelve (12) months of the effective date of this section. An owner or operator may submit a written request for an extension 30 days prior to the deadline.

(b) The GHG emission reduction plan will be used to evaluate and establish an annual facility-wide GHG

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emissions cap for the affected source in support of achieving and maintaining the statewide GHG limit. The approved facility-wide GHG emissions cap and the associated provisions will be made a part of the covered source permit, and may be revised through the permit process to respond to new rules, updated technology, GHG reduction initiatives, and any other circumstances deemed necessary by the director to facilitate the state's GHG limit.

(c) Unless substantiated by the owner or operator of an affected source and approved by the director to be unattainable pursuant to the GHG control assessment described in subsection 11-60.1-204(d), each GHG emission reduction plan shall establish a minimum facility-wide GHG emissions cap in tons per year CO₂e, to be achieved by 2020 and maintained thereafter. The minimum facility-wide GHG emissions cap shall be sixteen percent (16%) below the facility's total baseline GHG emission levels less biogenic CO₂ emissions, as follows:

$$\text{Facility-wide cap} = (1 - 0.16) \times \left[\text{Facility Total Baseline Emissions} - \text{Facility Baseline Biogenic CO}_2 \text{ Emissions} \right]$$

(tpy CO₂e)

Where:

$$\text{Facility Total Baseline Emissions (tpy CO}_2\text{e)} = \text{Baseline [Biogenic CO}_2 \text{ + Non-Biogenic GHG Emissions]}$$

Calendar year 2010 shall be used as the baseline year, unless the owner or operator can provide records for the director's approval demonstrating another year or an average of other years to be more representative of normal operations. Newly permitted sources without an operating history, shall estimate normal operations for the director's approval in establishing the facility-wide GHG emissions cap.

(d) The GHG emission reduction plan required of affected sources shall at a minimum include:

(1) The facility-wide baseline annual emission rate (tpy CO₂e). 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 for the director's approval, as follows:

(A) The owner or operator shall clearly document why calendar year 2010 is not representative of normal operations and why the proposed alternate year or period is more suitable based on trends, existing equipment and controls, scheduled maintenance, operational practices, and any other relevant information. Acceptable methods for determining alternate facility-wide baseline annual emissions include:

- (i) the facility-wide GHG emissions (less biogenic CO₂) based on the most recent representative year during the five-year period ending 2010;
- (ii) average facility-wide GHG emissions (less biogenic CO₂) over any consecutive two-year period

- during the five-year period ending in 2010;
 - (iii) average facility-wide GHG emissions (less biogenic CO₂) for the five-year period ending in 2010; or
 - (iv) comparable methods as approved by the director. The director will not consider the use of periods greater than five years from 2010, except for extreme cases such as where an affected source may not have been fully operational for an extended period of time.
- (B) For newly permitted covered sources without a 2010 operating history, the owner or operator shall make the best estimate of normal operations based on contract agreements, available operational records, required scheduled maintenance, market forecast, or any other information for projecting the affected source emissions. Potential emissions shall not be used, unless the owner or operator can clearly demonstrate that the facility will be continually operating at the maximum capacity for each and every year.

The owner or operator shall provide all supporting documentation for the proposed alternate baseline emission rate. The director, based on available information, may reject and modify the baseline emission rate in establishing the final facility-wide GHG emissions cap.
- (2) The 2020 facility-wide GHG emissions cap. 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, as part of the reduction plan:

- (A) The justification and supporting documentation of why the required emissions cap cannot be met; and
- (B) A proposal, for the director's approval, of an alternate emissions cap resulting in the maximum achievable GHG reductions.

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 guidelines for GHG Best Available Control Technology analysis, and GHG control measures by source type shall be used as applicable for this assessment.

- (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;
 - (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.

- (4) The 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.
- (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 CO₂e, pounds CO₂e/kilowatt-hour);
 - (C) Expected emission reduction (tons per year CO₂e);
 - (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 CO₂e 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, assumptions, vendor quotes, sample calculations, etc.) to substantiate the control analysis and alternate GHG emissions cap.

- (6) The 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 CO₂e 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 CO₂ 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.

(e) Failure to submit an adequate GHG emission reduction plan, or failure to submit relevant facts or correct information upon becoming aware of such failure, constitutes a violation of this chapter. The owner or operator of an affected source has the same duty to certify the GHG emission reduction plan in accordance with section 11-60.1-4, and supplement or correct the GHG emission reduction plan, similar to the provisions in section 11-60.1-84 for covered source permit applications. During the processing of a GHG emission reduction plan, if the director determines that a re-submittal of the plan is required, or submittal of additional information is necessary to evaluate or take final action on the plan, the director may make the request in writing and set a reasonable deadline for the response.

(f) If the owner or operator of an affected source fails to submit an adequate GHG emission reduction plan, or if a facility-wide GHG emissions

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)
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
HE Subtotal		2,995,778	0	2,995,778
MECO	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
HELCO	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
HEL Subtotal		446,411	87,880	544,114
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

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)
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
HE Subtotal		2,995,778	0	2,995,778
MECO	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
HELCO	Kanoelehua-Hill	172,456	31,845	204,301
	Keahole	242,208	37,620	279,828
	Puna	31,747	28,238	59,985
	Shipman	0	0	0
HEL Subtotal		446,411	97,703	544,114
Hawaiian Electric Companies		4,083,140	97,703	4,180,843
AES Hawai'i		1,691,605	0	1,691,605
Hamakua Energy Power		153,699	136,787	290,486
Kalaeloa Partners, LP		1,094,813	0	1,094,813
Partnership Total		7,023,257	234,490	7,257,747

ERP Partnership Baseline CO₂e Emissions

Company	Covered Source	CO ₂ e Emissions ^(1,2)		CSP Limits With AES Reductions ⁽⁴⁾		
		(metric tpy)	(tpy)	CO ₂ e Reduction (%)	CO ₂ e Reduction (tpy)	CO ₂ 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 ⁽³⁾	13,559	14,946	-726.3%	-108,558	123,504
HE Subtotal		3,627,821	3,998,988	19.9%	793,917	3,205,071
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
ME Subtotal		797,041	878,587	27.0%	237,636	640,951
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
HL Subtotal		475,413	524,053	14.8%	77,642	446,411
Hawaiian Electric Companies		4,900,275	5,401,629	20.5%	1,109,195	4,292,433
AES Hawai'i		1,525,526	1,681,605	16.0%	269,057	1,412,548
Hamakua Energy Power		165,992	182,975	16.0%	29,276	153,699
Kalaeloa Partners, LP		993,198	1,094,813	-6.4%	-69,764	1,164,577
Partnership Total		7,584,991	8,361,022	16.00%	1,337,764	7,023,257⁽⁵⁾

Notes:

(1) Excludes biogenic CO₂ 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 ₂ e Emissions ^(1,2)	CO ₂ e Limit Adjustment	CO ₂ e Limit ⁽⁴⁾
		(tpy)	(tpy)	(tpy)
Hawaiian Electric (HE)	Kahe	2,133,752	0	2,133,752
	Waiau	808,286	0	808,286
	Honolulu	0	0	0
	CIPGS ⁽³⁾	53,740	0	53,740
HE Subtotal		2,995,778	0	2,995,778
Maui Electric (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
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
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 ⁽⁶⁾
Kalaeloa Partners, LP		1,094,813	0	1,094,813
Partnership Total		7,023,257	185,404	7,208,661 ⁽⁵⁾

Notes:

(1) Excludes biogenic CO₂ 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.

federal level and public utility commissions are the experts at the state and local level. Numerous factors might be considered in determining which power plants dispatch on a given system or operate at any given time (e.g., cost of service, voltage support, electricity demand, availability of renewable resources, etc.). Moreover, numerous factors are relevant in determining how much new/replacement generation capacity is needed and what types of generating resources best satisfy that need. EPA has no express legal authority and no particular expertise in any of these areas. This is particularly relevant because, as noted below, there are already significant changes taking place within the power sector that are resulting in shifts away from coal-fired generation to new technologies such as renewables. This shift is creating tremendous strain on the power infrastructure even without the added pressures of an EPA mandate to further shift away from additional coal-fired generation. Many experts have expressed concern that these pressures could create reliability problems. As DOE noted in a 2017 report on electricity markets and reliability, "Ultimately, the continued closure of traditional baseload power plants calls for a comprehensive strategy for long-term reliability and resilience. States and regions are accepting increased risks that could affect the future reliability and resilience of electricity delivery for consumers in their regions. Hydropower, nuclear, coal, and natural gas power plants provide essential reliability services and fuel assurance critical to system resilience. A continual comprehensive regional and national review is needed to determine how a portfolio of domestic energy resources can be developed to ensure grid reliability and resilience."¹² Because EPA believes it is not appropriate to further challenge the nation's electricity system while these important technical and policy issues are being addressed, EPA believes that it is reasonable to focus on a "BSER" limited to consideration of emission control measures that can be applied at or to coal-fired units, ensuring that regardless of how much coal-fired generation remains, that generation is operated to minimize CO₂ emissions.

Also, the proposed interpretive scope of the BSER is reasonable considering the several important economic, policy

and technology shifts occurring in the power sector. The first change is being driven by low natural gas prices that make lower carbon-emitting NGCC units more competitive as compared to higher carbon-emitting coal plants. Another important change is driven by both technology changes and by state and national energy policy decisions that have made renewable energy (e.g., solar and wind energy) more competitive compared to coal and natural gas. The third notable change is driven by aging coal plants, which considering the economic competitive pressures driven by natural gas and renewable generation, are leading companies to conclude that a significant number of coal plants are reaching the end of their useful economic life or are no longer economic to operate.

These trends have driven down GHG emissions from power plants, which were also key components to the BSER as defined in the CPP. In fact, the analysis that EPA has done for ACE (see RIA), as well as analysis by many others (including EIA), show that these trends have already well outpaced the projections that went into the CPP for many states. For this reason, establishing a BSER on assumptions for generation by various sources that accounts for the continuation of these trends into the future would create significant work for both states and sources that may or may not result in emission reductions from ACE if the actual trends once again prove to be stronger than projected.

While some might suggest that this argues that the BSER in ACE should still follow the same approach as the CPP, adjusting this proposal to be even more stringent ignores the fact that the uncertainties that have resulted in faster than projected emission reductions are also uncertain in the opposite direction. From 2005 to 2008, gas prices experienced several unexpected peaks that were not anticipated. If this were to happen in the future, it would make any rule based on CPP-type assumptions significantly more expensive. Similarly, while the recent past has shown continued advances in renewable cost and performance, it is not certain that those trends will be sustained. It should be noted that federal tax subsidies that have been key to this trend are set to expire over the next several years which may play a role in the future.

Because of these significant uncertainties that can have large impacts on electric reliability and the cost of electricity to consumers, EPA believes that this further supports the unreasonableness of basing the BSER on generation-shifting measures. Regardless

of the path that the power sector takes, coal-fired power plants are likely to be an important part of the generation mix for the foreseeable future, therefore EPA believes it is reasonable to ensure that the remaining coal-fired generation (which is also the most CO₂ intensive portion of the power sector) focuses on reducing that CO₂ emission intensity to the extent technically feasible considering cost.

EPA believes that a BSER focused on making these plants as efficient as possible is the best way to ensure GHG emission reductions regardless of other factors such as technology changes for other types of generation, changes in fuel price, changes in electricity demand or changes in energy policy that neither environmental regulators nor power companies have the power to control.

IV. Affected Sources

EPA is proposing that an affected EGU subject to regulation upon finalization of ACE is any fossil fuel-fired electric utility steam generating unit (i.e., utility boilers) that is not an integrated gasification combined cycle (IGCC) unit (i.e., utility boilers, but not IGCC units) that was in operation or had commenced construction as of August 31, 2018,¹³ and that meets the following criteria.¹⁴ To be an affected EGU, a fossil fuel-fired electric utility steam generating unit must serve a generator capable of selling greater than 25 MW to a utility power distribution system and have a base load rating greater than 260 GJ/h (250 MMBtu/h) heat input of fossil fuel (either alone or in combination with any other fuel).

EPA is proposing different applicability criteria than in the CPP to reflect EPA's determination of the BSER for only fossil fuel-fired electric utility steam generating units. In ACE, EPA does not identify a BSER for stationary combustion turbines and IGCC units and, thus, such units are not affected EGUs for purposes of this action (see discussion below in Section V.B). It should be noted, in the CPP's identification of the BSER, no HRIs were identified as the BSER for stationary combustion turbines and IGCC units. Nevertheless, EPA solicits comment on systems of emission reduction that might be the BSER for these types of

¹³ Under section 111(a) of the CAA, determination of affected sources is based on the date that EPA proposes action on such sources. January 8, 2014 is the date the proposed GHG standards of performance for new fossil fuel-fired EGUs were published in the *Federal Register* (79 FR 1430).

¹⁴ To be clear, this definition of an affected EGU does not, at this time, include stationary combustion turbines for reasons discussed later in this document.

¹² U.S. DOE, *Staff Report to the Secretary on Electricity Markets and Reliability* (August 2017) at 14, available at https://www.energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf.

Hawaiian Electric Renewable Project Status Board

Stage 2 RFP Final Award Group Projects Contracts Under Negotiation						
Name	Island	Developer	Tech	Size	Estimated Completion	RPS % Points Contribution
Kapolei Energy Storage	O'ahu (Barbers Point Harbor)	Energy Storage Resources LLC	BESS	185 MW, 565 MWh	2022	N/A
Keahole Battery Energy Storage	Hawai'i Island (Kailua-Kona)	Hawaiian Electric Company	BESS	12 MW, 12 MWh	2022	N/A
Kupehau Solar	O'ahu (Kunia)	Hanwha Energy USA Holdings Corp. (174 Power Global)	Solar + BESS	60 MW, 240 MWh (BESS)	2022	1.2
Kūpono Solar	O'ahu ('Ewa Beach)	Bright Canyon Energy	Solar + BESS	42 MW, 168 MWh (BESS)	2022	1.0
Barbers Point Solar	O'ahu (Kapolei)	Innergex	Solar + BESS	15 MW, 60 MWh (BESS)	2023	0.4
Kahana Solar	Maui (Napili - Honokowai)	Innergex	Solar + BESS	20 MW, 80 MWh (BESS)	2023	0.7
Kamaole Solar	Maui (Kihei)	Pacific Green Ikehu LLC	Solar + BESS	40 MW, 160 MWh (BESS)	2023	1.3
Mahi Solar	O'ahu (Kunia)	Longroad Development Company, LLC	Solar + BESS	120 MW, 480 MWh (BESS)	2023	3.0
Mountain View Solar	O'ahu (Wai'anae)	AES Distributed Energy Inc.	Solar + BESS	7 MW, 35 MWh (BESS)	2023	0.3
Puakō Solar PV + Battery Storage	Hawai'i Island (Puakō, South Kohala)	ENGIE Development, LLC	Solar + BESS	60 MW, 240 MWh (BESS)	2023	1.8
Pulehu Solar	Maui (Pulehu)	Longroad Development Company, LLC	Solar + BESS	40 MW, 160 MWh (BESS)	2023	1.1
Waena BESS	Maui (Kahului)	Hawaiian Electric Company	BESS	40 MW, 160 MWh	2023	N/A
Waiawa Phase 2 Solar	O'ahu (Waiawa)	AES Distributed Energy Inc.	Solar + BESS	30 MW, 240 MWh (BESS)	2023	1.2
Waikoloa Village Solar + Storage	Hawai'i Island (Waikoloa)	EDF Renewables Development, Inc.	Solar + BESS	60 MW, 240 MWh (BESS)	2023	1.8

2019-2020 COMPLETED PROJECTS						
Name	Island	Developer	Tech	Size	Commercial Operation	RPS % Points Contribution
Aloha Solar Energy Fund II	O'ahu (Kalaeloa)	Aloha Solar Energy Fund II, LLC (Altus Power America)	Solar	5 MW	4/2/2020	0.1
West Loch Solar	O'ahu (Ewa Beach)	Hawaiian Electric	Solar	20 MW	11/25/2019	0.5
Kawailoa Solar, LLC	O'ahu (North Shore)	Kawailoa Solar, LLC (Clearway)	Solar	49 MW	11/20/2019	1.0
Lanikuhana Solar, LLC	O'ahu (Mililani)	Lanikuhana Solar, LLC	Solar	14.7 MW	9/19/2019	0.3
Waipio PV, LLC	O'ahu (Waipio)	Waipio PV, LLC (Clearway)	Solar	45.9 MW	9/19/2019	1.0

UNDER CONSTRUCTION						
Name	Island	Developer	Tech	Size	Estimated Completion	RPS % Points Contribution
Mauka FIT 1	O'ahu (North Shore)	Mauka FIT One LLC (SPI)	Solar	3.5 MW	2020	0.1
Na Pua Makani Wind Project	O'ahu (North Shore)	Na Pua Makani Power Partners, LLC (AES)	Wind	24 MW	2020	1.0

APPROVED BY REGULATORS						
Name	Island	Developer	Tech	Size	Estimated Completion	RPS % Points Contribution
AES Kuihelani	Maui (Central Maui)	AES Kuihelani Solar, LLC	Solar + BESS	60 MW 240 MWh (BESS)	2021	1.9
AES Waikoloa Solar, LLC	Hawai'i Island (Waikoloa)	AES Waikoloa Solar, LLC	Solar + BESS	30 MW 120 MWh (BESS)	2021	0.8
AES West Oahu Solar, LLC	O'ahu (West O'ahu)	AES West Oahu Solar, LLC	Solar + BESS	12.5 MW 50 MWh (BESS)	2021	0.4
Ho'ohana Solar 1, LLC	O'ahu (Kunia)	Hanwha Energy USA Holdings Corp (174 Power Global)	Solar + BESS	52 MW 208 MWh (BESS)	2021	1.4
Mililani I Solar, LLC	O'ahu (Mililani)	Mililani I Solar, LLC (Clearway)	Solar + BESS	39 MW 156 MWh (BESS)	2021	1.2
Waiawa Solar Power LLC	O'ahu (Waiawa)	Waiawa Solar Power LLC (Clearway)	Solar + BESS	36 MW 144 MWh (BESS)	2021	1.2
Hale Kuawehi Solar LLC	Hawai'i Island (Waimea)	Hale Kuawehi Solar LLC (Innergex)	Solar + BESS	30 MW 120 MWh (BESS)	2022	0.8

PROPOSED, AWAITING APPROVALS						
Name	Island	Developer	Tech	Size	Estimated Completion	RPS % Points Contribution
Honua Ola (Hu Honua)	Hawai'i Island (Pepe'ekeo)	Hu Honua	Biomass	21.5 MW	TBD*	1.6
Paeahu Solar LLC	Maui (Wailea)	Paeahu Solar LLC (Innergex)	Solar + BESS	15 MW 60 MWh (BESS)	2022	0.5
Puna Geothermal Venture	Hawai'i Island (Puna)	Ormat Technologies Inc.	Geothermal	46 MW	2022	~4.0

**On 7/9/20, the Public Utilities Commission denied an application for a waiver from competitive bidding and an amended power purchase agreement, creating significant uncertainty about the project's future.*

OUT OF SERVICE					
Name	Island	Owner	Tech	Size	Estimated Return to Service
Waiiau Hydro	Hawai'i Island (Hilo)	Hawaiian Electric	Hydro	1 MW	TBD



NANAKULI DUST STUDY

TECHNICAL EVALUATION AND RECOMMENDATIONS

Prepared for:



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Appendix A: Photographic Log

Appendix B: DOH Summary Sheet and Maps of Dust Survey Questionnaire Responses

Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	Micrograms per cubic meter
C&D	Construction and demolition
CUP	Conditional use permit
DOH	Hawaii Department of Health, Environmental Protection Division
EPA	U.S. Environmental Protection Agency
HECO	Hawaii Electric Company
MDL	Method detection limit
$\text{PM}_{2.5}$	Particulate matter less than 2.5 microns
PM_{10}	Particulate matter less than 10 microns
ppb	Part per billion
PVT	PVT Land Company
RCRA	Resource Conservation and Recovery Act
Tetra Tech	Tetra Tech Inc.
TSP	Total Suspended Particulate
USNETI	U.S. National Emissions Trends Inventory
WOA	West Oahu Aggregate

1.0 INTRODUCTION

On behalf of the State of Hawaii Department of Health (DOH), Solid and Hazardous Waste Branch, Tetra Tech EM Inc. (Tetra Tech) completed a dust study and evaluation of potential dust sources that may affect the Nanakuli community and surrounding areas. The study was focused on identifying potential sources of dust and providing recommendations regarding feasible and realistic alternatives to reduce the dust.

The Nanakuli area is located on the leeward side of Oahu and is prone to arid conditions, especially during the dry season. Historically, the area is home to a number of large-scale industrial facilities, including an electric generation facility, two landfills, a Navy base, service and retail businesses, restaurants, and several developed residential subdivisions. The weather and wind are significant factors in the formation and transport of fugitive dust. Furthermore, the complex terrain adds to the complexity of dust movement throughout the area.

As part of this study, Tetra Tech completed a comprehensive review of all available sources of air quality data and performed other field-related and research-oriented tasks in an effort to: identify and evaluate the level of dust in the area; evaluate potential health concerns related to dust; and, to compare dust concentrations with other areas on Oahu.

This study has specific limitations that must be identified and discussed. Dust on the leeward side of Oahu cannot be avoided altogether. Depending on the time of year and uncontrollable weather conditions, exposed areas of surface soil will result in airborne dust. As a result, the potential sources of dust that have been identified in this report focus on human activity that can be identified and addressed.

The scope of this study was specifically focused on reviewing existing air quality and meteorological data and other existing available information to provide conclusions. Collection of additional air quality or meteorological data was not within the scope of this study.

Background information related to this issue and a discussion of permitted facilities is presented in Section 2; a list of the technical documents reviewed for this study is provided in Section 3; air quality and meteorological data are presented in Section 4; a description of the on-site reconnaissance is provided in Section 5; homeowner interviews appear in Section 6; and a list of conclusions and recommendations is presented in Section 8.

2.0 BACKGROUND

The purpose of this section is to provide a general background, and the general scope of the Nanakuli dust study.

2.1 General Regional Background

The issue of dust on the Nanakuli coast has been an ongoing concern for many years. The area is located on the leeward side of Oahu and is prone to arid conditions during the dry season. This dust study is focused on the area generally bounded by Hakimo Road, Lualuailei Road, and Farrington Highway. Refer to Figure 1 – DOH Dust Assessment Area Map for a generalized location map. The neighborhoods are bordered on the east by the PVT Land Company, LTD, construction and demolition (C&D) landfill (PVT Landfill), beyond which is West Oahu Aggregate (WOA), which operates a stone and gravel crushing and processing operation. Both facilities operate under existing permits from DOH. The PVT Landfill has been in operation since July 1985, and WOA has been in operation since 2002. Refer to Figure 2-Nanakuli Dust Study Location Map for a more detailed illustration presenting the various neighborhoods and larger commercial/industrial facilities.

On May 5, 2011, DOH issued a Solid Waste Management Permit Modification and Renewal (Permit No. LF-0152-09) to PVT. The permit modification allowed PVT to begin mining and recycling of existing and incoming waste. The permit also allows PVT to continue to accept up to 2,000 tons of C&D waste per day, and up to 500 tons of asbestos-contaminated waste per week. No limits were imposed on the number of incoming trucks per day or week. The facility is prohibited from accepting municipal solid waste, commercial and industrial waste (excluding C&D waste from commercial/industrial generators), regulated hazardous waste, and Toxic Substances Control Act (TSCA)-regulated polychlorinated biphenyls (PCB)-contaminated materials.

The area has undergone significant growth and development over the last 20 years, which is evidenced by the volume of vehicle traffic on Farrington Highway. The area can be described as residential, surrounded by commercial business and light and heavy industrial facilities.

The weather and wind patterns affect the transport and deposition of windblown dust in the area. The daily onshore and offshore winds contribute to this transport. In addition, the arid climate in this region facilitates growth of low shrubs and dry grasses that do not provide complete ground cover on undisturbed ground surfaces.

As additional background, Tetra Tech notes that in September 2010, DOH conducted a public meeting to allow for comments related to a permit modification for the PVT Landfill. More than 100 residents attended the meeting. Several community members offered oral testimony, with concerns regarding levels of dust in their neighborhoods, with many suggesting that the origin of the dust affecting their neighborhoods was the PVT Landfill operation. Many of those offering testimony requested that action be taken to resolve the dust issue in the community. In addition, many residents who have lived in the neighborhood for many years described how the dust problem had steadily increased over the years. DOH acknowledged these concerns and began the process of working to address this issue.

The September 2010 testimony at this public meeting was effectively the impetus for DOH to request an objective dust study to evaluate potential sources of dust that may be affecting the surrounding Nanakuli neighborhoods.

On August 28, 2011, DOH again conducted a public meeting to inform the residents about the upcoming dust study. At this meeting, many residents reiterated the same concerns about the dust and air quality issues.

In response to the residents' concerns, and an ongoing dialogue with DOH regarding the dust issues, PVT Attorney Lisa Woods-Munger submitted a letter to DOH on August 23, 2011, listing specific steps PVT had completed over the last 10 years to address and reduce dust emissions from the PVT site. Ms. Woods-Munger indicated in her letter that these steps appear to have helped with the dust issues, stating that PVT did not receive any dust complaints during 2011. DOH has noted that their office has since received two additional dust complaints, on September 7, 2011 and November 4, 2011. Both complaints were investigated by DOH, but were not found to be a result of dust violations from any nearby facilities.

2.2 Scope of Dust Study

Tetra Tech initiated the dust study in November 2010. At that time, Tetra Tech and DOH identified key tasks that would be completed in an effort to evaluate the presence of dust in Nanakuli, which would result in identification of potential specific actions that could be taken to reduce the impact of dust to the neighborhood.

The tasks completed by Tetra Tech to date to evaluate dust concerns in Nanakuli include the following:

- Reviewed all existing pertinent air quality data that has been collected near the Nanakuli area and the greater Oahu Island.
- Completed on-site reconnaissance of the neighborhood and areas with potential for dust emissions, including PVT WOA, Lualualei Road, and Farrington Highway.
- Worked with DOH to develop a questionnaire that would allow residents the opportunity to describe how they are affected by dust and their thoughts regarding the origin of the dust.
- Based on responses from the questionnaire, completed follow-up interviews with homeowners to hear their concerns and answer specific questions.
- Reviewed permits for nearby commercial/industrial sources to evaluate whether they are in compliance with applicable permits rules and requirements.
- Based on the information collected, provided recommendations to reduce dust impacts to the residents of the Nanakuli area.

Figure 2 contains a detailed aerial photo showing the project location, surrounding neighborhoods, surrounding facilities (including PVT and WOA), the locations of PVT and Hawaii Electric Company (HECO) air monitoring stations, and other areas of interest.

3.0 REVIEW OF TECHNICAL DOCUMENTS

As part of this dust study Tetra Tech reviewed numerous technical documents that may pertain to dust issues in the Nanakuli area. These documents included: state, city, and county permits, air quality monitoring data, human health risk assessments, and technical and regulatory correspondence between PVT and the City and County of Honolulu and DOH staff.

In addition, other technical documents were reviewed as necessary to gain insights to the nature of dust issues on Oahu and related to the PVT Landfill operations. The air quality data consisted of data collected by DOH, HECO, and PVT.

This list serves to document the level of review that was required for this study. A review of air quality data is presented in the following section.

Documents Reviewed by Tetra Tech

- State of Hawaii Department of Health Solid Waste Permit No LF-0152-09 PVT Integrated Solid Waste Management Facility, Including Landfill, Recycling, and Materials Recovery, Solidification Operations, Waianae, Oahu, Hawaii.
- Hawaii Department of Health Response to Comments PVT Land Company Integrated Solid Waste Management Facility Draft Solid Waste Management Permit, dated December 14, 2010.
- Letter from Stuart Yamada, P.E. Chief, Environmental Management Division, to the Honorable Dwight Takamine, Director, Department of Labor and Industrial Relations et al. RE: September 2, 2010, Public hearing and public comment period PVT Land Company Integrated Solid Waste Management Facility Draft Solid Waste Management Permit.
- State of Hawaii Department of Health Solid Waste Management Permit No RY-0029-10 Uncontaminated Concrete/Asphalt Recycling West Oahu Aggregate Company, Inc.
- State of Hawaii Department of Health Clean Air Branch 2009 Hawaii Air Quality Data Book.
- URS Traffic Impact Study, Nanakuli area on Farrington Highway and adjoining streets, dated July 20, 2007.
- Hawaii Department of Transportation Highways Division Highways Planning Survey Section Vehicle Classification Data Summary 2009; Farrington Highway.
- Air Monitoring PVT Land Company, LTD. Nanakuli, HI, Summary Report (monthly reports from November 2009 through November 2010).
- Limited Human Health Risk Assessment Construction Debris Recycling, PVT Landfill dated July 2010; prepared and submitted by AMEC Earth and Environmental, Inc.
- Letter from David Tanoue, Director Department of Planning and Permitting, City and County of Honolulu, dated March 24, 2011 RE: Minor Modification approval notice to PVT Land Company.

- Correspondence letter from attorney Lisa Woods Munger to Gary Gill, Deputy Director of DOH Environmental Health Administration, dated August 23, 2011, RE: dust control measure implemented b PVT Land Company from 2001 to 2011.
- Human Health Risk Assessment of Fugitive Dust and Surface Soils, PVT Landfill, dated June 2005; prepared and submitted by AMEC Earth and Environmental, Inc.
- PVT Landfill, Human Health Risk Assessment of AES Conditional Ash, dated February 2010; prepared and submitted by AMEC Earth and Environmental, Inc.
- Baseline Air Monitoring, PVT Land Company, Airborne Metals Analysis, October – November 2010 and May – June 2011.
- HECO ambient air quality data collected at the Waianae and Nanakuli monitoring stations from July 1, 2010, through June 30, 2011.

4.0 AIR QUALITY DATA

Tetra Tech completed a technical review of all available air quality and meteorological data to assess short- and long-term air quality trends. The air quality review was focused on particulate matter less than 10 microns (PM₁₀) and total suspended particulate (TSP) data from PVT, HECO, and DOH. It is noted that the PVT and HECO are the only entities which actively perform air monitoring in the immediate area surrounding the Nanakuli neighborhoods.

4.1 General Overview of Dust, EPA Regulations, and Air Monitoring Methods

Dust typically originates from large exposed earth surfaces that have low moisture content under conditions of elevated wind (typically in excess of 15 miles per hour). The wind blows across the surface and entrains the small and light fractions of soil particles. The dust that becomes airborne is commonly referred to as *fugitive dust*. Airborne dust originating from geologic material is typically deposited less than 1 mile from the source (EPA).

Dust particles from geologic sources typically range in size from 5 to 40 microns. Smaller particles can be formed from burning, fossil fuel combustion, and industrial sources. These particles can range in size from 0.1 to 10 microns. Additionally, combustion gases, such as nitrogen oxides and sulfur oxides, can undergo secondary reactions in the atmosphere that condense these gases, forming fine particulate matter that can range in size from 0.01 to 2.5 microns. A size distribution chart of typical particles that can become airborne is presented in Table 1.

Table 1: Particle Size Range for Various Materials that can become Airborne

Particle	Particle Size (microns)
dot (.)	615
Beach Sand	100 - 10000
Fertilizer	10 - 1000
Pollens	10 - 1000
Textile Fibers	10 - 1000
Atmospheric Dust	5 - 40
Fiberglass Insulation	1 - 1000
Dust Mites	100 - 300
Saw Dust	30 - 600
Ground Limestone	10 - 1000
Cement Dust	3 - 100
Combustion-related - motor vehicles, wood burning, open burning, industrial processes	0.1 to 2.5
Fly Ash	1 - 1000
Coal Dust	1 - 100
Asbestos	0.7 - 90
Metallurgical Dust	0.1 - 1000
Carbon Black Dust	0.2 - 10
Burning Wood	0.2 - 3

Particle	Particle Size (microns)
Tobacco Smoke	0.01 - 4

The U.S. Environmental Protection Agency (EPA) promulgated regulations in 1971 to address public health risks from airborne dust. EPA created a federal air quality standard for dust that was named TSP. Based on research and health-based studies, EPA created a daily 24-hour and annual weight-based standard for TSP. These standards were based on a mass measurement of TSP that would be collected on a substrate (a filter) that would be weighed by a standardized laboratory process.

Part of the creation of this standard included development of air monitoring methods and associated equipment that would be used to collect samples and compare the results with the standards. In 1987, EPA further promulgated regulations that focused on particles that were less than 10 microns in diameter, referred to as PM₁₀. EPA determined that the smaller size particles presented a more significant health concern. Larger dust particles typically are filtered in the nose, whereas smaller particles less than 10 microns can be carried and deposited into the throat and lungs.

With implementation of the federal PM₁₀ standards, EPA phased out the TSP standards. The TSP data collected by EPA, states, and regulated industrial sources helped to characterize particulate concentrations in cities and rural areas. In 1997, EPA created new 24-hour and annual federal standards for fine particulate matter less than 2.5 microns in diameter. This standard is referred to as PM_{2.5}.

Over the last 30 years, Hawaii DOH has collected TSP, PM₁₀, and PM_{2.5} data at sites across the state.

4.2 PVT Air Quality Data

On March 24, 2011, the City and County of Honolulu issued a Minor Modification of Conditional Use Permit (CUP) Number 85/CUP-6 to PVT. In May 2011, DOH issued Operating Permit Number LF-0152-09 to PVT, which is in effect from May 5, 2011, through May 4, 2016. This permit will allow “mining” and shredding of recyclable wood materials, which can be used as feedstock for energy production.

In an effort to characterize their dust mitigation measures, PVT voluntarily initiated a TSP sampling program in November 2009, which focused on collecting TSP samples at three sites along the fence line that abuts the Nanakuli neighborhood which is generally bounded by Mohihi Street, on the western boundary of the landfill. Refer to Figure 2 (inset) for the air monitoring station locations. The sample program was designed to collect 24-hour TSP samples at each of the three sites along the fence line, with each of the sample collection systems affixed near the top of the fence. The samples were collected on a frequency of once every 6 days (referred to as 1-in-6), from midnight to midnight, based on the EPA Monitoring Schedule (<http://www.epa.gov/ttnamti1/files/ambient/pm25/CALENDAR2009.pdf> and <http://www.epa.gov/ttnamti1/files/ambient/pm25/CALENDAR2010.pdf>).

Referring to Figure 2, PVT air monitoring Station #1 is located near the PVT entrance, immediately adjacent to Lualualei Road; Station #2 is located in the central portion of the fence boundary between PVT and the abutting the neighborhood, near Auyong Homestead Road;

and, Station #3 is located near the western boundary of fenced boundary between PVT, abutting the neighborhood near Mohihi Street.

The sampling program was continued through November 2010 as a result of negotiations with DOH. PVT also agreed to additional air monitoring requirements, as specified in the current permit.

The TSP sampling program that was stipulated in PVT's current permit was separated into two (2) phases, as follows:

- 1. One year of TSP sampling from November 2009 through October 2010 (Section C, Part 16, Subsection a, Subpart i).
- 2. One year of TSP sampling after landfill mining begins (Section C, Part 16, Subsection a, Subpart ii).

In addition to analyzing the samples for TSP, additional air samples were required to be analyzed for seven metal compounds that are contained in the Resource Conservation and Recovery Act (RCRA), consisting of arsenic, barium, cadmium, chromium, lead, mercury, and selenium.

The RCRA 7 Metals Sampling Program, as stipulated in PVT's current permit, was separated into four phases as follows:

- 1. Prior to landfill mining in Phase I, and secondary shredding, collect at least two multi-day samples covering at least 10 24-hour periods; completed October – November 2010, and May – June 2011 (Permit Section C, Part 16, Subsection b, Subpart i).
- 2. At or near the start of landfilling mining in Phase I, collect at least two multi-day samples covering at least 10 24-hour periods when landfill mining is occurring (Permit Section C, Part 16, Subsection b, Subpart ii).
- 3. After the start of secondary shredded feedstock production, collect at least two multi-day samples covering at least 10 24-hour periods when landfill mining is occurring (Permit Section C, Part 16, Subsection b, Subpart iii).
- 4. At the end of the first year of landfilling mining in Phase I, collect at least two multi-day samples, covering at least 10 24-hour periods when landfill mining is occurring (Permit Section C, Part 16, Subsection b, Subpart iv).

As of the date of this report, PVT has completed the following sampling requirements:

- Phase 1 of TSP sampling (Permit Section C, Part 16, Subsection a, Subpart i); and,
- Phase 1 of the RCRA 7 Metals Sampling Program (Permit Section C, Part 16, Subsection b, Subpart i).

A brief summary of each of phase of the air sampling program is presented below.

4.2.1 PVT TSP Data

As discussed above, PVT completed TSP sampling on a 1-in-6 frequency from November 2009 through November 2010. The data were presented to DOH in monthly data reports, with statistical analysis and a description of wind patterns.

Tetra Tech reviewed 13 monthly reports and compiled a summary of results that is presented in Table 2.

Table 2: Summary of PVT TSP Data, 24-Hour Samples November 2009 through November 2010

PVT Station No.	Number of samples	Minimum Concentration ($\mu\text{g}/\text{m}^3$)	Maximum Concentration ($\mu\text{g}/\text{m}^3$)	Average Concentration ($\mu\text{g}/\text{m}^3$)
1 [nearest Lualualei Road and PVT entrance]	63	16.6	88.9	34.1
2 [central portion of fenced boundary between PVT and neighborhood]	63	9	55.4	24.8
3 [westernmost station]	63	7.3	42.7	19.1

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter (parts per billion [ppb] equivalent)

The data presented in Table 2 demonstrate that TSP concentrations over the 1-year monitoring period were well below the health-based 24-hour and annual standards for PM_{10} (a subset of TSP) of $150 \mu\text{g}/\text{m}^3$ and $50 \mu\text{g}/\text{m}^3$. However, it must be noted that these samples were collected over a 24-hour continuous period. PVT operates from 7:30 a.m. to 5:00 p.m.; therefore, any emissions from the facility, as a result of active facility operations, are not occurring between the following times during each sample event: midnight to 7:30 a.m. and 5:00 p.m. to midnight.

During a review of the TSP data, it was observed that TSP concentrations at Site #1 (monitoring station nearest Lualualei Road) were consistently higher than Sites #2 and #3. On average, Site #1 TSP concentrations were approximately 38 percent higher than at Site #2, and approximately 78 percent higher than Site #3 (monitoring station furthest from Lualualei Road). It is suspected that this increase in TSP concentrations is caused by impacts from trucks entering and exiting the PVT facility, and road dust from Lualualei Road.

The results from the TSP sampling before landfill mining demonstrate that TSP concentrations are well below any health-based standards, and do not pose a health concern for residents of the Nanakuli area.

4.2.2 PVT Metals Data

In November 2010 through December 2010, and again in May 2011 through June 2011, PVT completed particulate metals sampling. This sampling program was designed to collect air samples that would be analyzed for TSP, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, before landfill mining.

Samples were collected over a 5-day continuous period to accumulate enough particles on the filters to achieve a meaningful sample. In total, four samples were collected from each of the three air sample sites along the fence line. The samples were analyzed using standardized EPA methods, and results were reported in $\mu\text{g}/\text{m}^3$. The results from the sampling demonstrate that particulate metal emissions from PVT before landfilling are well below any health-based standards and do not pose a health concern for residents of the Nanakuli area.

In fact, the results from the May to June 2011 sampling event show that only chromium and lead were detected in measureable concentrations, marginally above the minimum laboratory method detection limit (MDL). The remaining five metals (arsenic, barium, cadmium, mercury, and selenium) were not detected on any samples.

The technical approach for the October to November 2010 sampling events appears to be somewhat different, but shows similar results to the May to June 2011 event. The sample event consisted of five 24-hour sample events, whereas the later event consisted of collecting one 5-day (or 120-hour) event. These results also show that arsenic and mercury were not detected in any samples and the remaining metals (chromium, selenium, cadmium, barium, and lead) were all detected at concentrations marginally above the MDL, well below any health-based standards, and do not pose a health concern for the residents of the Nanakuli area.

The metals concentrations recorded from PVT are similar to metals concentrations at air monitoring stations operated by the DOH. Figure 2 shows the location of the PVT TSP and metals air sampling locations.

4.2.3 Future Air Sampling

As previously discussed, PVT will be required to complete several additional phases of air monitoring after landfill mining and secondary shredded feedstock production begin. Each of these phases of air sampling is designed to evaluate resultant emissions from each of these phases of PVT's operations.

Based on correspondence with PVT's contractor (Dr. Jim Morrow, DrPH), Tetra Tech was provided the following schedule:

- TSP Sampling, Phase 2 (Section 16,a, ii): 1 year of TSP sampling at or near the beginning of landfill mining in Phase I – expected to begin in early 2012.
- RCRA 7 Metals Sampling, Phase 2 (Section 16,b, ii): Collect multi-day samples for metals at or near the start of landfill mining in Phase I – expected to begin in early 2012.
- RCRA 7 Metals Sampling, Phase 3 (Section 16,b, iii): Collect multi-day samples for metals at or near the start of secondary shredded feedstock operations – no timeframe established, but will be completed after landfill mining starts.
- RCRA 7 Metals Sampling, Phase 4 (Section 16,b, iv): Collect multi-day samples for metals at the end of the first year of landfill mining in Phase I – no timeframe established, but will be completed after one year of landfill mining has been completed

As these different phases of the air sampling program begin, it is expected that PVT will notify DOH. At the conclusion of each phase, PVT will provide data to DOH for review and comment. DOH will thoroughly review and assess the data.

4.3 HECO Air Quality Data

Tetra Tech was provided with data from the HECO Lualualei and Waianae air quality and meteorological monitoring stations. For reference, the Lualualei meteorological station is located approximately 2.9 miles south of the dust study area, and the Waianae meteorological station is located approximately 6.5 miles north of the dust study area. The meteorological station locations are indicated on the inset provided in Figure 2. Both datasets included data for PM₁₀, wind speed, wind direction, temperature, and precipitation from July 1, 2010, through June 30, 2011.

The monitoring system used to collect PM₁₀ data at both HECO sites measures data continuously using EPA-approved monitoring systems. Therefore, a PM₁₀ concentration is measured each hour and reported in µg/m³ and also averaged over a 24-hour period for comparison to air quality standards.

The PM₁₀ data from the Lualualei and Waianae air quality and meteorological stations help to establish the existing PM₁₀ concentrations that are present in the Nanakuli area, and evaluate whether emissions from other industrial sources demonstrated an increase in PM₁₀. A statistical analysis was completed on this dataset and is summarized in Table 3, below.

Table 3: HECO Lualualei Station PM₁₀ 24-Hour Data July 1, 2010 – June 30, 2011

Number of Valid hours	Minimum Concentration (µg/m ³)	Maximum Concentration (µg/m ³)	Average Concentration (µg/m ³)
7,560	6.00	62.05	21.36

The data presented in Table 3 show that no state or federal air quality standards were violated at the Lualualei meteorological station and that the overall concentration of PM₁₀ is similar to other air monitoring sites on Oahu.

The PM₁₀ data from the Waianae meteorological station help to establish the existing PM₁₀ concentrations at a site which is not in the immediate vicinity of Nanakuli and evaluate whether emissions from other industrial sources demonstrate an increase in PM₁₀. A statistical analysis was completed on this dataset and is summarized in Table 4, below.

Table 4: HECO Waianae Station PM₁₀ 24-Hour Data July 1, 2010 – June 30, 2011

Number of Valid hours	Minimum Concentration (µg/m ³)	Maximum Concentration (µg/m ³)	Average Concentration (µg/m ³)
8,638	4.75	47.96	12.38

The data presented in Table 4 show that the no state or federal air quality standards were violated at the Waianae meteorological station and that the overall concentration of PM₁₀ is

similar to other air monitoring sites on Oahu. Figure 2 (inset) shows the location of the two HECO sites in relationship to the dust study area.

5.0 METEOROLOGICAL DATA

Tetra Tech also reviewed meteorological data from the HECO Lualualei meteorological station and PVT to evaluate how wind patterns in the area may affect dust transport and deposition. Tetra Tech generated two wind rose plots from the HECO Lualualei and Waianae meteorological stations, which are provided in Figure 3 and Figure 4, respectively.

The wind rose from the Lualualei station illustrates that the predominant wind direction in the area near the station is from the south and west, with little wind coming from the north and east. This wind pattern appears to be directly affected by the complex terrain (adjacent steep mountain slope) in the immediate vicinity of this location.

The wind rose from the Waianae station illustrates that the predominant wind direction in the area near this station is from the east and west, with little or no wind coming from the north and south. This pattern is consistent with the more traditional fluctuating Hawaii offshore-onshore winds that are frequent in the leeward side of Oahu.

Please note that the meteorological data that were initially provided for the PVT site were contained in tables presented with the monthly TSP report. However, that format did not allow for direct comparison with the HECO dataset; therefore, Tetra Tech was not able to compare the data from the HECO meteorological stations to the PVT stations in this report.

Tetra Tech submitted a request to PVT's contractor (Dr. Jim Morrow, DrPH) for an electronic file containing the meteorological data, and on November 29, 2011, Dr. Morrow provided an electronic version of the PVT meteorological data collected between 2006 and 2011. This data, which requires significant formatting and manipulation to allow for evaluation and generation of a wind rose, will be reviewed by DOH to better understand wind patterns in the dust study area.

It is unclear how the exact dynamics of the wind in the Nanakuli area affect transport and deposition of dust. However, based on the HECO Waianae wind rose and discussions with residents, it appears that the majority of intense winds are from the east. If these patterns prevail near the community, it may help to explain how potential dust emissions from PVT, WOA, Lualualei Road, or other sources are transported to the neighborhood. However, additional wind data in the immediate area would be required to accurately confirm the manner in which the wind patterns facilitate dust transport.

6.0 ON-SITE RECONNAISSANCE

A key component of the dust study included a site visit to Nanakuli to evaluate the area and collect information for this evaluation. Tetra Tech completed reconnaissance of PVT, WAO, and the surrounding neighborhoods. Each of these site visits and observations is presented below. Figure 2 provides the locations of the areas discussed below.

6.1 PVT Land Company

On Tuesday, August 28, 2011, Tetra Tech accompanied DOH on a site visit and tour of the PVT Landfill. Tetra Tech met with Stephen Joseph (Vice President/General Manager) and Albert Shigemura (President) at the PVT office and discussed the nature of the site visit, reviewed aerial photos of the site, and discussed the PVT air monitoring program. Tetra Tech and DOH accompanied Mr. Joseph in his vehicle for a site tour. The tour began by driving along the access road adjacent to the facility's western fence line, which abuts the residential neighborhood. The PVT representatives showed the location of the three air monitoring stations and recent site improvements in this area.

The group then traveled up the newly paved access road to the active portion of the landfill. At the time of the site visit, crews were installing a white liner in a new cell near the easternmost portion of the landfill. The group was shown the materials recycling area and observed the various piles of sorted material and the sorting system itself. The tour then proceeded to the waste-receiving area. Mr. Joseph informed the group that the waste was be received and stored prior to sorting. Several trucks were observed offloading waste. While the trucks were unloading, PVT personnel were applying a large volume of water spray to the incoming waste, and a track-mounted compactor was re-working the waste. Several additional water trucks were driving slowly around the site applying water from mounted spray guns. The waste that Tetra Tech observed being unloaded appeared to consist of general C&D waste with metal, wood, and insulation.

The tour then proceeded up and over the top of the compacted and capped section of the landfill to an area where PVT accepts asbestos waste. Tetra Tech was informed that PVT accepts asbestos waste only on specific days of week; however, no asbestos waste was delivered on the day of the visit. Tetra Tech did not observe open or exposed areas containing asbestos waste. Tetra Tech observed the concrete crushing area, truck wheel wash station, and the scale area where trucks are weighed when they enter and exit the facility.

During the site visit, the site appeared to be well watered, and there was no visible dust coming from the roads or the waste debris. There is a 5 mile per hour speed limit on the facility, and trucks passing through the facility were observed to be adhering to slow speed restrictions. PVT reportedly uses a radar gun on site to maintain speed controls. Minimal dust was observed to be generated from vehicles passing through the facility during Tetra Tech's site inspection. Several clouds of visible fugitive dust were observed to be emanating from the eastern-facing slope of the capped sections of the landfill. The dust was not extreme, but was visible, and was being picked up by fairly low wind speeds.

The PVT site visit concluded with a follow-up meeting at the office. Tetra Tech met with Dr. Morrow, DrPH (Doctor of Public Health), an independent environmental management consultant who coordinates collection of air samples for PVT, maintains and calibrates the sampling equipment, and prepares the data analytical reports. Dr. Morrow discussed the technical aspects of the air monitoring program, and demonstrated the equipment programming and

operation. He also discussed sample handling procedures used for collecting the particulate and metals samples. Based on Dr. Morrow's presentation, it is Tetra Tech's opinion that Dr. Morrow follows sound scientific methods, in accordance with the professional standards of care that would provide representative air quality data.

Furthermore, the PVT samples were analyzed by Desert Research Institute (Reno, Nevada), which is a nationally recognized and certified laboratory for analysis of air samples.

6.2 West Oahu Aggregate

On Thursday, August 30, 2011, Tetra Tech accompanied DOH on a site visit and tour of WOA. Tetra Tech met with Shelby Alvaro at the WAO front office who was managing the entrance area. Ms. Alvaro agreed to accompany Tetra Tech and DOH on a walking tour of the site. However, it was lunchtime, so no active crushing or loading and unloading operations were occurring during the site visit. Tetra Tech inspected the crushing operations and observed the various piles of crushed and sorted material. The access roads were still wet from a recent watering. The group then returned to the entrance and departed.

After Tetra Tech departed the site, Tetra Tech proceeded north, toward the entrance to the Lualualei naval base entrance, to observe conditions at the entrance. There was no visible dust along the road between the entrance to WOA and the base entrance. Tetra Tech then proceeded back down Lualualei road, toward WOA. When Tetra Tech approached the side fence of WOA, the crusher was observed to be in operation. Tetra Tech stopped along the fence line and observed that there was no visible dust emanating from the crusher or material piles. Several photos were taken from the vehicle to document the conditions. Shortly thereafter, Tetra Tech proceeded farther south on Lualualei Road, and just after the entrance to WOA, observed a water truck spraying Lualualei Road. The truck entered WOA; therefore, it was assumed the truck was operated by WOA.

Tetra Tech was informed that on a subsequent visit to WOA, DOH observed visible dust emissions coming from the site. It was unclear exactly where the dust was emanating from but appeared to be from materials handling or crushing within the facility.

6.3 Lualualei Naval Road and Dirt Shoulder

The Lualualei Naval Road serves as a key access point to the PVT Landfill, WOA, and the Lualualei Navy Base. Traffic consists of heavy trucks containing C&D waste or other material headed to and from PVT or WOA, as well as vehicles that access the base. URS Inc. (URS) completed a traffic study in July 2007, and estimated that the average daily traffic volume is 8,950 vehicles per day on Lualualei Road. This is a two-lane road, with large unpaved areas (berms) on either side that extend from just east of Farrington Highway to the entrance of PVT. Vehicle access to and from Lualualei Road is from Farrington Highway. Beyond the entrance to the PVT Landfill and extending generally northerly, up to the Navy base entrance, the road berms have grass ground cover on either side of the road. This ground cover appears to help minimize dust and also helps to prevent vehicles from pulling off the road. As of the date of this report, Tetra Tech was unable to confirm who completed these improvements or maintains the roadway or shoulder.

The unpaved areas along either side of Lualualei Road between the entrance to PVT and Farrington Highway are commonly used for temporary parking, as evidenced by vehicle tracks up and down the either side of the road, and the lack of vegetation. This area appears to pose the potential for significant dust emissions based on the composition of the exposed soil (fine

grain silt and sand), the amount of vehicle tracks observed on the dirt, and volume of vehicles and trucks that access this Lualualei Road. Based on numerous site reconnaissance visits completed by Tetra Tech and DOH, as well as homeowner interviews, a significant volume of traffic along Lualualei Road between the PVT entrance and the strip mall near the intersection with Farrington Highway is heavy trucks.

Tetra Tech was not able to obtain information from PVT or WOA on the actual number of trucks that travel to the facilities on a daily basis; however, the estimates would likely be in the hundreds. The volume of traffic, combined with the dynamics of the road, appear to contribute significantly to fugitive dust emissions. The unpaved road shoulder is commonly used as temporary parking for commercial trucks and other vehicles for various reasons.

There is evidence that when vehicles pull off of Lualualei Road, they may kick up dust immediately, or they carry dirt onto the road as they pull back onto the paved roadway. This dirt is further crushed and carried on vehicle tires and eventually kicked into the air as road dust.

Refer to the photographs provided in Appendix A for documentation regarding the berm conditions and evidence of mud tracking within Lualualei Road.

The posted speed limit on Lualualei Road is 25 miles per hour (mph). However, Tetra Tech observed numerous trucks and vehicles that appeared to be traveling well above the speed limit. In addition, DOH has observed trucks and vehicles which appear to be exceeding the speed limit on numerous occasions. It is suspected that that Lualualei Road is a source of road dust, and EPA AP-42 emission factor data shows that vehicle speeds are proportional to the rate of road dust emissions.

6.4 Nanakuli Neighborhoods to the West and North of PVT

During the period of August 28 to 30, 2011, Tetra Tech completed a reconnaissance of the neighborhoods west and north of PVT. An initial visit to the neighborhood west and immediately adjacent to PVT, generally bounded by Mohihi Street, was completed to obtain a visual perspective on the location of the neighborhood with respect PVT and to view the PVT Landfill from within the neighborhood (identified on Figure 2 as "Primary Neighborhood of Concern"). This neighborhood is subdivided with curb, gutter, and sidewalk construction. The homes primarily consisted of single-family dwellings with street access. Additional visits were conducted on August 29 and 30 while homeowners were interviewed. During the site visit, Tetra Tech observed a number of homes with bare ground yards (no grass or ground cover) that may serve as a potential source of fugitive dust.

A site visit to the neighborhood to the north of PVT (identified on Figure 2 as "Area of Mixed Use"), along Hakimo Road, was conducted on August 30. This is an area of mixed residential, commercial, and agricultural uses. The homes in this neighborhood were not part of a subdivision, and varied greatly in size and structure. Many homes appeared to be in varying states of disrepair, and may have some forms of commercial and non-commercial activities ongoing, such as livestock operations (pig and chicken farms), commercial agriculture, and materials storage, with much of the yard area on many properties consisting of bare ground (no grass or groundcover; notably the areas with livestock).

Several homes appeared to have large stockpiles of what appear to be junk or discarded materials and equipment. Tetra Tech notes that the area along Hakimo Road could also be a source of fugitive dust in the area, given the mixed commercial and agricultural uses, and significant unvegetated areas.

7.0 COMMUNITY OUTREACH

The scope of work for this project included assisting the DOH with development and distribution of a survey questionnaire that was mailed to residents in the Nanakuli focus study area. One of the survey questions asked if residents would be interested in participating in an interview with DOH and their consultant. Therefore, following the survey distribution, 10 respondents participated in an interview. This section also presents the results of the resident interviews.

7.1 Dust Survey and Summary of Results

DOH developed and mailed out 1,100 copies of a dust survey to residents living in the neighborhoods bounded by Lualualei Road, Hakimo Road, and Farrington Highway. DOH received 72 total responses (out of the 1,100 mailed), and the majority of respondents were from the two neighborhoods immediately west of PVT, with limited responses from the area of mixed use (see Figure 2). The survey questionnaire presented questions to residents in an effort to obtain information regarding the dust issue, and the responses were plotted on a figure showing the location of the respondent. The following nine (9) questions were presented with 4 possible answers for each question:

1. How long have you lived here?
2. Describe the amount of dust.
3. (has the dust) changed over time?
4. Side (of neighborhood) with more dust?
5. Time of day with more dust?
6. Wind direction?
7. See dust blowing onto property?
8. Interested in a visit?
9. Want updates?

A summary of the survey results is presented below. A summary sheet and series of eight (8) maps that detail the respondent survey results is provided in Appendix B.

Summary of Dust Survey Results

- 78% of respondents lived at site for more than 10 years.
- 44% describe their situation as a lot of dust, while 40% describe it as a greater than average amount of dust.
- 53% report that the amount of dust has increased over time.
- 44% report that the dust is from the Mauka side, while 46% report it is the same all over.
- 38% report that the dust is the same at all times of day, while 31% are not sure.
- 53% report that dust is worst with trade winds, while 36% are not sure.
- 60% report that dust can be seen blowing onto their property, and 38% report a source.
- 30 of the respondents were interested in a visit.
- 35 requested updates.

In addition to providing the dust survey questionnaire to residents, DOH also solicited a request for residents to participate in a photo brigade whereas any photos showing dust would be provided to DOH. It is noted that to date, one neighborhood resident has submitted photos to the DOH. These photos are also included in Appendix A.

7.2 Homeowner Interviews

DOH identified and confirmed 10 homeowners who agreed to meet, and discuss their concerns regarding dust issues and on August 29 and 30, 2011, Tetra Tech and DOH conducted these visits. Tetra Tech was unable to make contact with one homeowner; therefore, a total of nine interviews were conducted.

The length of time these residents lived in the neighborhood varied from just a few years to more than 40 years. The names of the individuals and their addresses will be kept confidential; however, information obtained from the site visits has been summarized below. The homes were all located in the neighborhood generally bounded by Hakimo Street, Lualualei Road, Farrington Highway, and the southwest boundary of the PVT Landfill.

Several generalized questions were presented to each of the homeowners, such as:

- Has the dust problem gotten worse, better, or remained unchanged over the past 10 (or so) years?
- Where is the dust coming from?
- Is dust worse at certain times of day?
- Is dust worse at certain times of the year?
- Any other concerns or questions?
- The responses and concerns provided by residents are presented below.

Resident #1

- Length of time at this address – over 40 years.
- Described dust as coming from east side of house, and believes it is from truck traffic along Lualualei Road.
- Did not see any differences in dust during different times of the year.
- Described how dust was always getting into the carpet, so resident had it removed.

Resident #2

- Length of time at this address – 37 years.
- Described always having dust in Nanakuli, and that it comes from the east side of the house from the direction of the PVT Landfill.
- Called a state agency 3 years ago to seek assistance cleaning house because of the overwhelming amount of dust. (Refer to Photo No.1, in Appendix A.)
- Described that dust seemed to have decreased some over “the last year or so”.
- Dust problem worse during daytime, when activity at PVT is occurring.

- Described traffic as not dramatically increased over the last few years, but there always seem to be a considerable number of trucks.
- Described how daughter has asthma and has difficulty breathing when dust is bad.

Resident #3

- Length of time at this address – 20 years.
- Described that dust comes from trucks traveling on Lualualei Road, and is worse during PVT Landfill business hours.
- Dust problem has gotten worse over last 10 years.
- Every Sunday has to wash vehicles because there is so much dust on them.
- Described how son has asthma and wondered if it was caused by the dust.
- Expressed concern as to whether the dust particles are harmful.

Resident #4

- Not at home.

Resident #5

- Length of time at this address – 41 years.
- Described that the dust comes from trucks along Lualualei Road, and is worse during morning hours.
- Dust is “bad”, not better or worse.

Resident #6

- Length of time at this address – more than 1 year.
- Described that dust comes from trucks traveling on Lualualei Road, and can see dust as the trucks enter and leave the PVT site (resident has a view of PVT from her property).
- Described how the red dust clogged the street drains.
- Described that when wind is blowing dust is bad in the afternoon; she can see dust coming from the trucks.
- Said neighbors always complain about how they have always had a problem with the dust.

Resident #7

- Length of time at this address – 2 years.
- Described that dust is all over the house.

- Dust problem has gotten worse over the years.
- Does not know where dust is coming from because he cannot see PVT from his house.
- Described how wife was getting regular nose bleeds and eye irritation; wondered if it was from the dust.
- Expressed concern if the dust particles are harmful.

Resident #8

- Length of time at this address – 19 years.
- Dust problem has gotten worse over the years.
- Described that dust is coming from PVT Landfill in varying intensities depending on activities and wind.
- Described how dust is everywhere inside his home.

Resident #9

- Length of time at this address – 15 years; previously lived at other location in neighborhood for 32 years.
- Described how dust problem is getting worse.
- Dust blows from the east.
- Described that dust comes from trucks traveling on Lualualei Road, and within the PVT Landfill, and is worse during business hours.
- Described how Lualualei Road was watered in the past, but is not watered anymore (note: resident's property abuts Lualualei Road; therefore, has direct view of street).
- Believes that the trucks are a major source of dust and debris (blowout out of trucks).

Resident #10

- Length of time at this address – 16 years.
- Described how dust problem has gotten worse over last 10 years.
- Described how dust accumulates over time.
- Described how windows on east side of house (the side toward Lualualei Road) get a lot of dust accumulation.
- Concerned about what is in the dust and if it is harmful; grandson has asthma and wonders if dust is making it worse.

General Summary of Homeowner Interviews

It was apparent from these interviews that the residents of the neighborhood feel that the dust is coming from the PVT Landfill and the trucks as they enter and exit the site, and as they travel along Lualualei Road. The opinions expressed by the residents could not be verified or confirmed. In addition, no medical records were provided to support any health-related claims.

Many of the residents are concerned because they do not know if the dust is harmful and have not been provided any information to support an argument as to whether the dust is or is not a potential health concern.

A summary of the primary concerns that were expressed by most residents includes the following:

- Dust appears to be worse during business hours, and has generally become worse over the past several years.
- Dust appears to be coming from the general direction of the PVT Landfill, and can be seen coming from trucks entering and exiting the site.
- Trucks traveling to and from the PVT Landfill, along Lualualei Road are a source of dust.
- Concern: Is the dust harmful?
- Concern: Several residents reported knowing someone who is sick, and are concerned whether the dust may be affecting their health.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The section below presents Tetra Tech's conclusions and recommendations, resulting from the Nanakuli Dust Study.

8.1 Conclusions

Tetra Tech completed the tasks presented above in an effort to identify the potential sources of dust in the Nanakuli area and offer specific recommendations to reduce dust. Air quality data from the immediate and surrounding areas were reviewed to compare with EPA standards. A comprehensive document review was completed in an effort to understand the context and basis for this issue. Site visits and reconnaissance were completed in an effort to observe and document on-site conditions that may lead to the formation and transport of dust. A questionnaire and homeowner interviews were conducted so that residents had the opportunity to express their concerns, ask questions, and discuss this issue.

The study has identified the following potential sources of dust:

- Commercial and industrial sources, located along Lualualei Road, including PVT and WOA;
- Roadway sources, predominantly along Lualualei Road, between Farrington Highway and PVT Landfill;
- Residential yards which are unvegetated (bare dirt), including the focus neighborhood.
- Other commercial, agricultural, and residential areas with unvegetated properties in the mixed use area along Hakimo Road.

As a result of these tasks and a review of the air quality data provided, Tetra Tech offers the following conclusions:

- Dust presents a nuisance for the residents of Nanakuli when wind conditions facilitate transport and deposition from potential dust sources. However, based upon a review of all available data, and a review of the on-site conditions, the dust does not pose a health concern.
- Some of the dust appears to be tied directly or indirectly to emissions from Lualualei Road, PVT, WOA, and commercial agriculture. Site visits performed during this study, including PVT and WOA, indicated that there are dust emissions as a result of these operations.
- As indicated in this report, air monitoring data provided by PVT indicates that dust in the vicinity of the fenced boundary between PVT and the abutting neighborhood to the west does not pose a health concern. Further, a review of the data and methods indicates that the data is collected in accordance with sound scientific principles, applicable EPA methods, and professional standards of care, resulting in representative air quality data.
- The current operations at PVT are focused on C&D waste disposal and recycling. However, in the near future, PVT plans to begin landfill mining and secondary shredding feedstock operations. The permit issued by DOH requires additional air monitoring at

the start of these operations to confirm that PVT's increased activities do not result in an increase in air pollution and emissions.

8.2 Recommendations

The recommendations presented below are not directly tied to any permitting requirements, nor are they legally binding in any way. They are offered as steps to help reduce potential fugitive dust emissions, and allow the DOH to work closely with the Nanakuli community to begin addressing this issue through regular community outreach programs and ongoing technical input.

Recommendation #1 – Lualualei Naval Road Improvements and Maintenance

Tetra Tech recommends that DOH work closely with the community in conjunction with PVT and the Navy base to initiate a plan to address the bare dirt pullout sections (berm) on either side of Lualualei Road. This area could be addressed by planting ground cover and installing obstructions, such as a curb or guardrail that will prevent trucks and cars from pulling off the road.

Based on the site visit and homeowner interviews, this area may be a significant source of dust resulting from trucks traveling to and from the PVT site along Lualualei Road. Trucks and vehicles may be directly emitting dust and debris from their vehicles as they drive onto and off the shoulder. In addition, the dirt may be tracked and deposited onto the roadway, where it they can then be emitted as road dust.

Homeowners stated that they observe dust coming from the trucks, and also on numerous occasions have seen trucks pulled over on the side of the road. All of these activities, combined with low soil moisture and high winds blowing from the east and southeast, may contribute to dust that is transported to the neighborhoods.

In addition, regular maintenance, such as street sweeping and cleaning of the road, will help to further reduce dust emissions.

Recommendation #2 – Enforcement of Speed Limit on Lualualei Naval Road

Tetra Tech recommends that the Navy enforce the 25 mph speed limit. Based on a site visit and a review of the URS traffic study, on average more than 8,000 vehicles travel this road on a daily basis. EPA has developed emission factor data (AP-42) for road dust emissions, and numerous air quality studies have been completed on the rate of dust that is emitted from vehicles traveling on paved roads that contain varying amount of dirt. The U.S. National Emissions Trends Inventory (USNETI) for 1997 estimated that nearly two-thirds of all fugitive dust results from road dust (USNETI 1997).

The dynamics and formation of road dust result from small dirt particles that are deposited on public roadways. Vehicles traveling on the road further crush and entrain these dirt particles onto tires and kick them up into the air. Because of the small size fraction, these particles are easily transported with even low wind speeds. This problem is further exacerbated by large trucks with multiple-wheel axles and industrial-size tires.

Enforcing the speed limit on this stretch of roadway, along with reduced dirt tracking onto the roadway (from the shoulder), will help to reduce road dust.

This issue and hypothesis is supported by the 1 year of monitoring data collected by PVT at Station #1, which is located near the entrance to PVT, along Lualualei Road. On average, Station #1 TSP concentrations were 38 percent than at Station #2, and 78 percent higher than Station #3. It is suspected that this increase in TSP concentrations is the result of impacts from trucks entering and exiting the site, and road dust from Lualualei Road.

Recommendation #3 – Reduce Emissions at Entrance to PVT

Tetra Tech recommends that PVT evaluate alternatives to better control dust emissions from vehicles near the site entrance.

Numerous residents described how they observed trucks and vehicles entering and exiting the PVT facility, and that these trucks were generating visible dust. This may be a result of trucks and vehicles traveling on the shoulder or other unpaved (or underpaved) sections of roadways near the entrance to PVT. Tetra Tech recommends that DOH work with PVT to identify if there are areas near the entrance that may have the potential for dust emissions and address this issue.

It is recommended that PVT take the following actions, including, but not limited to: prohibiting vehicles from driving on dirt shoulders; determine if unpaved areas can be paved; and, applying water to exposed areas on a routine basis which results in dust reduction.

Recommendation #4 – Reduce Emissions on Capped Landfill Sections at PVT

Tetra Tech recommends that PVT evaluate alternatives to reduce dust emissions from the capped sections of the landfill, using either ground cover or a geo-membrane on the semi-permanent slopes. During the site visit, Tetra Tech and DOH observed that access roads and incoming waste were well watered.

However, several of the inactive and semi-permanent slopes were barren of any groundcover, and dust was observed blowing off the slope and becoming airborne. Clean Air Branch rules require reasonable dust control measure on visible dust. In addition, the PVT Permit Section A, Part 11, and Section B, Parts 23 and 43 require that PVT adequately address dust and erosion control on slopes and exposed areas of the landfill.

Dust control measures must be continually implemented PVT, and Tetra Tech recommends that DOH work closely with the facility to ensure that adequate measures are being taken on a daily basis to minimize dust emissions.

Recommendation #5 – Evaluate Reasonable Dust Controls on Other Surrounding Industrial, Commercial, and Agricultural Areas

Tetra Tech recommends that the DOH work with the remaining surrounding commercial, industrial, and agricultural areas, to evaluate whether “reasonable controls” are in place with regard to fugitive dust emissions. This includes the WOA facility, as well as the mixed use area along Hakimo Road.

During a DOH site reconnaissance of WOA, dust emissions were observed to be coming from the facility. WOA’s permits with the Solid and Hazardous Waste Branch and Clean Air Branch require dust control measures. Dust control measures to address crushing

operations and fugitive dust from site operations must be continually implemented at the WOA facility, and Tetra Tech recommends that DOH work closely with the facility to ensure that adequate measures are being taken on a daily basis to minimize dust emissions.

Similarly, periodic DOH area reconnaissance is recommended for the area along Hakimo Road, to evaluate whether commercial and agricultural activities in that area are implementing “reasonable controls” to minimize dust emissions from their operations, which could be impacting surrounding neighborhoods. This would also include follow-up to any activities identified by neighborhood community members via reports of nuisance dust, or photo-brigade reports showing activities generating visible dust.

Recommendation #6 – DOH Community Involvement

Tetra Tech recommends that DOH continue to provide the Nanakuli residents with updates and new information on this issue through e-mail notices and flyer mailings. Based on resident interviews and attendance at the public meeting, it is clear that many homeowners do not understand the permitting process and available air quality data. Community outreach could include providing information on how to obtain available and relevant air monitoring and permit data, and guidance on understanding interpretation of available data and related information.

Recommendation #7 – Review Recently Obtained Electronic Meteorological Data Provided

On November 29, 2011, Dr. Morrow provided the PVT meteorological data in electronic format. Tetra Tech recommends that this data be reviewed and formatted to generate a wind rose for the area specific to PVT, to better understand the immediate local wind patterns.

The data that were obtained from the HECO Lualualei and Waianae meteorological stations present potentially conflicting data regarding the wind patterns in the immediate vicinity of the Nanakuli dust study area. The terrain at the HECO Waianae station is more consistent with the terrain at the dust study area, and appears to more closely reflect wind conditions at that location.

A detailed review of wind data from PVT will help DOH to assess the wind patterns and further assess dust transport and deposition.

Recommendation #8 – Neighborhood Awareness and Improvement Plan

Tetra Tech recommends that DOH and the local Nanakuli neighborhood evaluate whether a neighborhood awareness and improvement plan could be developed to help residents understand the importance of keeping their lots watered and maintained.

During the site reconnaissance, Tetra Tech observed a number of homes with bare dirt lots and no landscaping whatsoever. During the dry season or drought conditions, this lack of vegetation may contribute to fugitive dust within the immediate neighborhood.

In addition, a number of homes on the northwest end of Hakimo Road were observed having potentially unpermitted commercial activities that may be contributing to dust

emissions in the area. Tetra Tech recommends that DOH investigate this area to confirm whether any unpermitted activity is occurring that may contribute fugitive dust in the area.

9.0 BIBLIOGRAPHY

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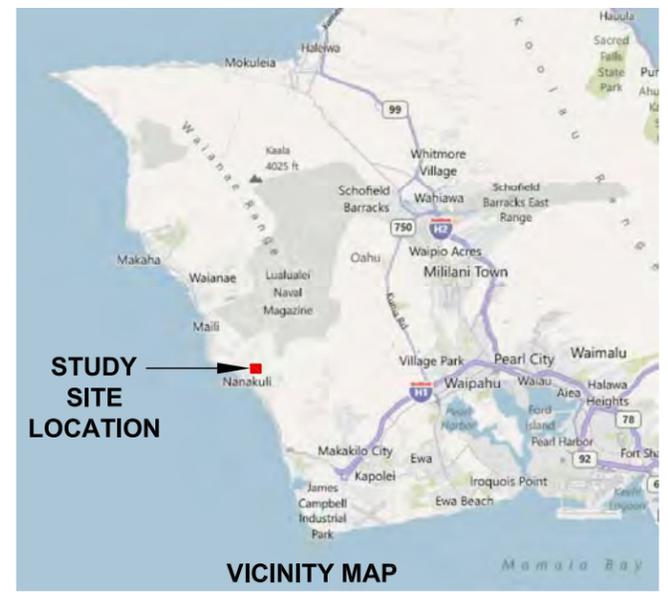
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U.S. Environmental Protection Agency. U.S. National Emissions Trends Inventory. December 1997.

FIGURES

R:\Clients\Nanakuli, HI\ Figure 2 Nanakuli Dust Study Location.dwg 12/08/2011 deborah.ford DN



HECO AIR QUALITY MONITORING STATIONS

State of Hawaii Department of Health
Solid and Hazardous Waste Branch

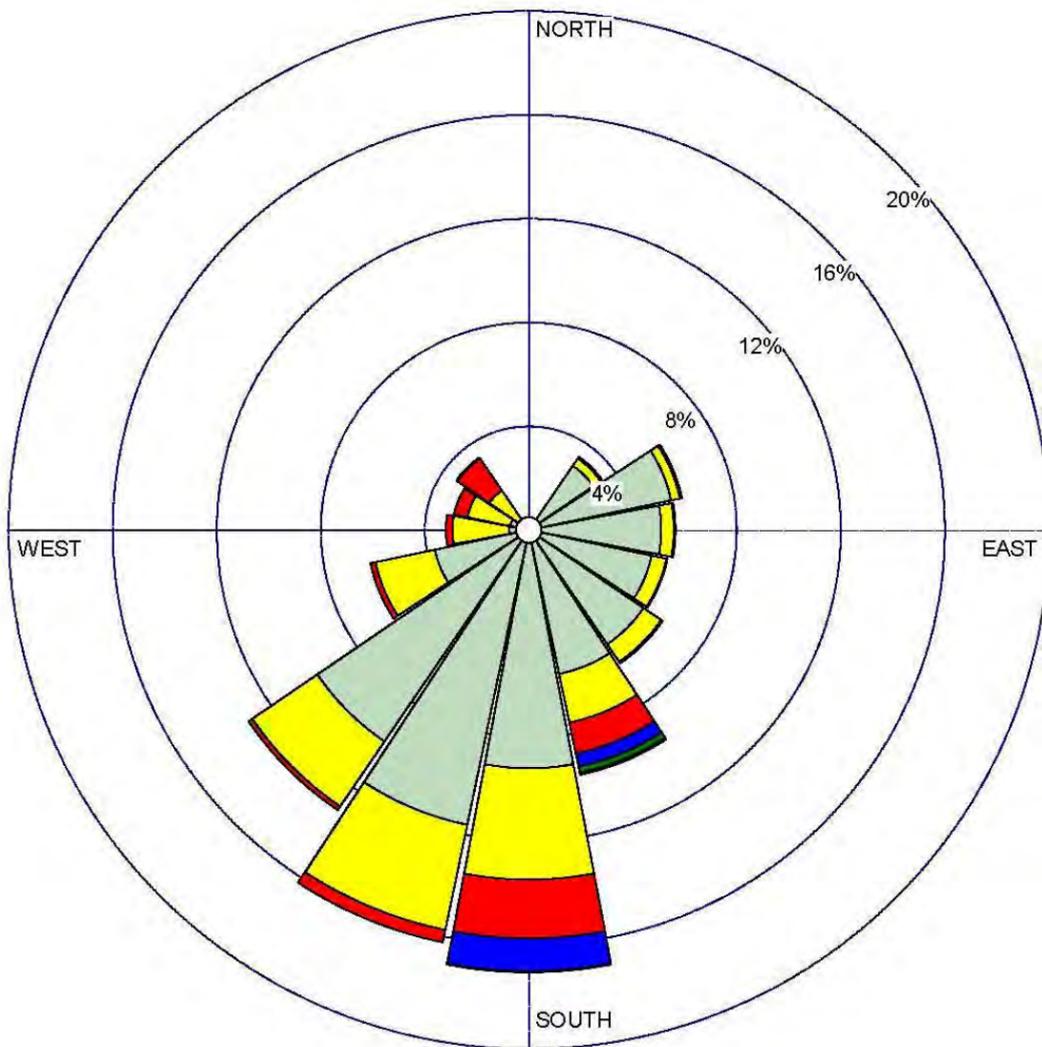
**FIGURE 2
NANAKULI DUST STUDY
LOCATION MAP**

WIND ROSE PLOT:

FIGURE 3 - HECO Lualualei Met Station Wind Rose Plot
July 1, 2010 Through June 30, 2011

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.1
 - 8.8 - 11.1
 - 5.7 - 8.8
 - 3.6 - 5.7
 - 2.1 - 3.6
 - 0.5 - 2.1
- Calms: 0.92%

COMMENTS:

COMPANY NAME:

Tetra Tech

MODELER:

D. Herlocker

CALM WINDS:

0.92%

TOTAL COUNT:

7582 hrs.

AVG. WIND SPEED:

1.93 m/s

DATE:

11/22/2011

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

State of Hawaii Department of Health
Solid and Hazardous Waste Branch

FIGURE 3
NANAKULI DUST STUDY
HECO LUALUALEI MET STATION
WIND ROSE



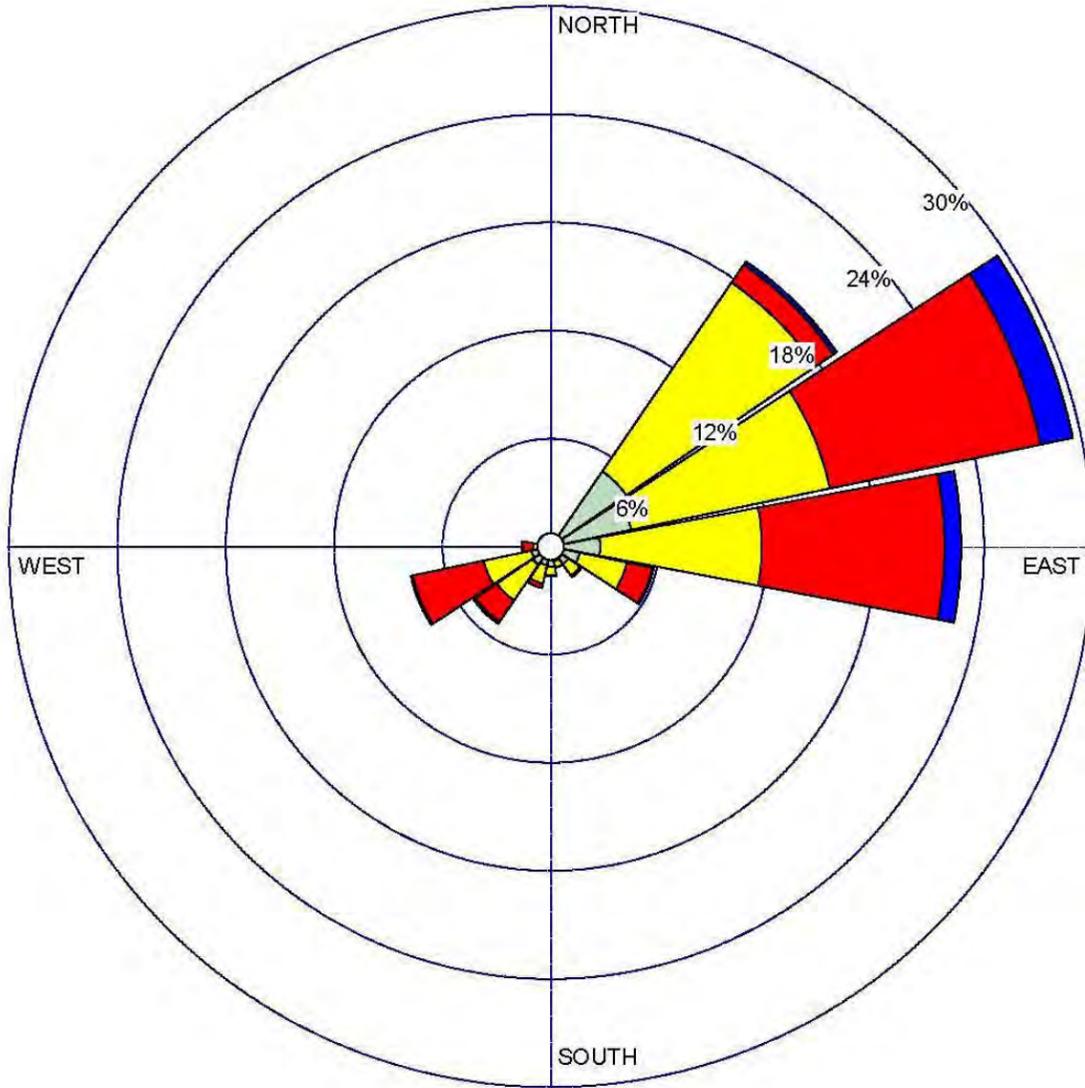
Enclosure 14

WIND ROSE PLOT:

FIGURE 4 - HECO Waianae Met Station Wind Rose Plot
July 1, 2010 Through June 30, 2011

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.1
 - 8.8 - 11.1
 - 5.7 - 8.8
 - 3.6 - 5.7
 - 2.1 - 3.6
 - 0.5 - 2.1
- Calms: 0.05%

COMMENTS:

COMPANY NAME:

Tetra Tech

MODELER:

D. Herlocker

CALM WINDS:

0.05%

TOTAL COUNT:

8663 hrs.

AVG. WIND SPEED:

3.11 m/s

DATE:

11/22/2011

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

State of Hawaii Department of Health
Solid and Hazardous Waste Branch

FIGURE 4
NANAKULI DUST STUDY
HECO WAIANAE MET STATION WIND
ROSE



Enclosure 14

**APPENDIX A
PHOTOGRAPHIC LOG**

Photo No. 1.	 A photograph showing the east side of a house with light-colored horizontal siding. There is visible dust staining on the siding. A black cable runs diagonally across the frame. A blue container and a black trash bin are visible in the foreground.
Date: August 29, 2011	
Description: East side of house in Nanakuli neighborhood showing evident of dust staining on siding.	

Photo No. 2.	 A side view of the West Oahu Aggregate Facility. The image shows a paved road in the foreground, a fence, and several large piles of aggregate material. A wooden structure is visible in the background under a blue sky with white clouds. The side mirror of a vehicle is visible in the bottom right corner.
Date: August 30, 2011	
Description: Side view of West Oahu Aggregate Facility facing north.	



Photo No. 5.

Date: October 31, 2011

Description: View of dirt shoulder along Lualualei Road looking west; evidence of vehicle tracks and dirt being carried onto roadway.



Photo No. 6.

Date: October 31, 2011

Description: View of dirt shoulder along Lualualei Road looking east; evidence of vehicle tracks and dirt being carried onto roadway.



Photo No. 7.

Date: October 31, 2011

Description: View of dirt shoulder along Lualualei Road looking east; evidence of vehicle tracks and dirt being carried onto roadway.



Photo No. 8.

Date: October 31, 2011

Description: View of grass shoulder along Lualualei Road east of entrance to PVT, facing east.



Photo No. 9.

Date: October 31, 2011

Description: View of dirt shoulder along Lualualei Road looking east adjacent to West Oahu Aggregate; evidence of dust emissions blowing off-site.



Photo No. 10.

Date: October, 2011

Description: View of dirt shoulder along Lualualei Road facing west; evidence of vehicle tracking dirt onto roadway



Photographs on following 2 pages were provided by a Nanakuli resident living in the neighborhood adjacent to PVT. Photos were taken on August 8, 2011.



Aug 8th 2011
8:30 AM



Aug 8th 2011
8:20 AM

**APPENDIX B
DOH SUMMARY SHEET AND MAPS OF DUST SURVEY
QUESTIONNAIRE RESPONSES**

ADDRESS	Response Date	Mail Returned	1. How long have you lived here?				2. Describe the amount of dust				3. Changed over time?							4. Side with more dust						5. Time of day with more dust?					6. Wind direction?				7. See dust blowing onto property?			8. Interested in a visit?				8. Want updates? Email addresses			
			<1 yr	1-5 yrs	5-10 yrs	> 10 yrs	A lot	> Average	Average	Little	Yes	No	Increase	Decrease	Within yr	1-5 yrs	5-10 yrs	> 10 yrs	Not sure	Mauka	Makai	Ewa	Dhead	Same	None	Morning	Afternoon	Night	All the time	Not sure	None	Trades	Kona	Not sure	No	Yes	No	From where	Yes		No	Contact name	Phone
TOTAL RESPONSES	72	157	0	6	10	56	32	29	8	2	46	17	38	3	9	10	7	6	11	32	6	6	7	33	1	10	19	2	27	22	1	38	11	26	1	43	27	27	30	1	30	31	35
% TOTAL RESPONSES	7.63%		0.0%	8.3%	13.9%	77.8%	44.4%	40.3%	11.1%	2.8%	63.9%	23.6%	52.8%	4.2%	12.5%	13.9%	9.7%	8.3%	15.3%	44.4%	8.3%	8.3%	9.7%	45.8%	1.4%	13.9%	26.4%	2.8%	37.5%	30.6%	1.4%	52.8%	15.3%	36.1%	1.4%	59.7%	37.5%	37.5%	41.7%	1.4%	41.7%	43.1%	48.6%

Summary:

DOH mailed out 1,100 surveys in July 2011

1. Surveys were due July 31, 2011
2. 157 were undeliverable by the post office
3. 72 responses, 7.63% response rate

Results

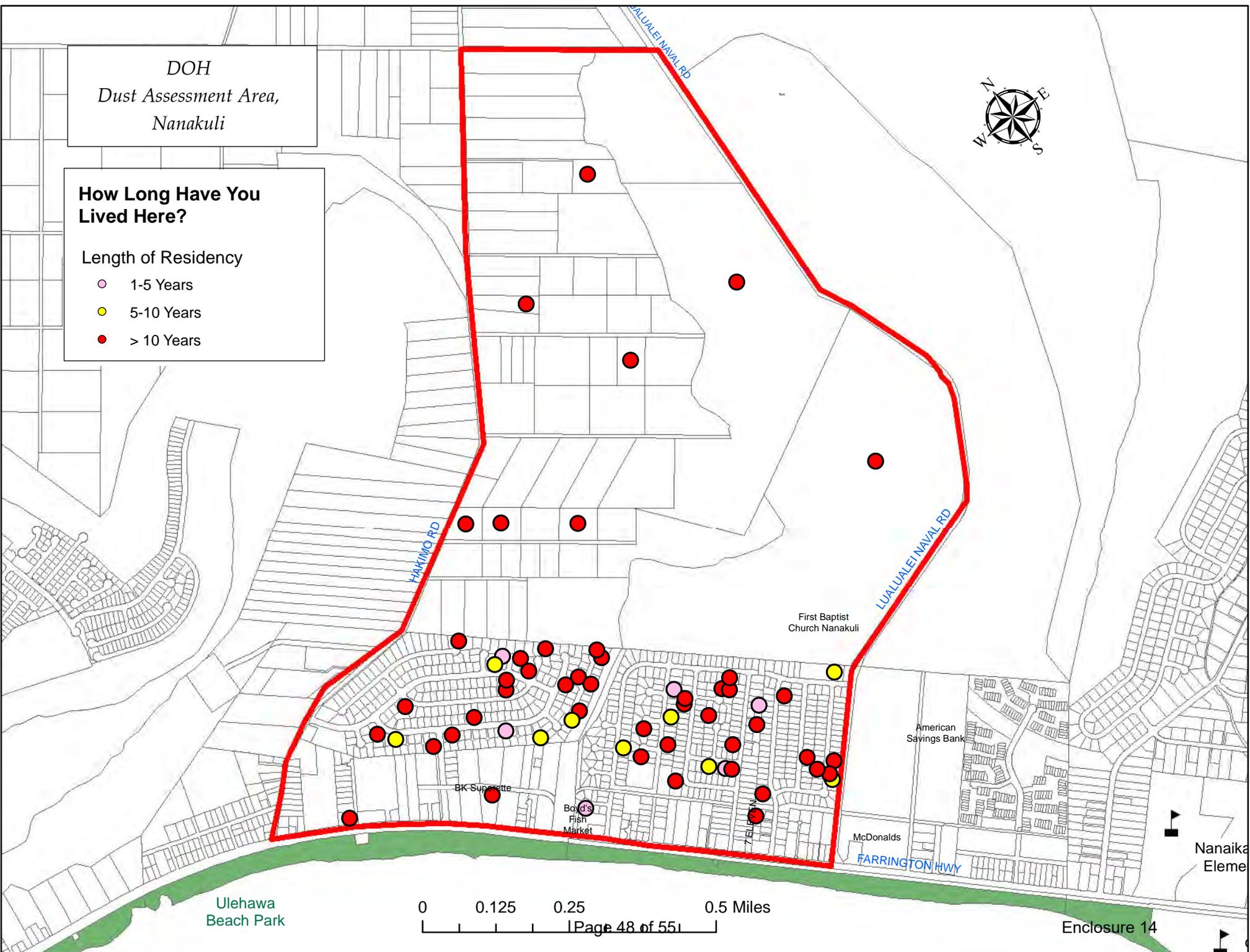
1. 78% of respondents lived at site for more than 10 years
2. 44% describe their situation as a lot of dust, while 40% describe it as a greater than average amount of dust
3. 53% report that the amount of dust has increased over time
4. 44% report that the dust is from the Mauka side, while 46% report it is the same all over
5. 38% report that the dust is the same at all times of day, while 31% are not sure
6. 53% report that dust is worst with tradewinds, while 36% are not sure
7. 60% report that dust can be seen blowing onto their property, and 38% report a source
8. 30 of the respondents were interested in a visit
9. 35 requested updates.

DOH
Dust Assessment Area,
Nanakuli

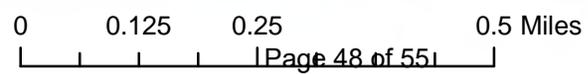
How Long Have You Lived Here?

Length of Residency

- 1-5 Years
- 5-10 Years
- > 10 Years



Ulehawa
Beach Park

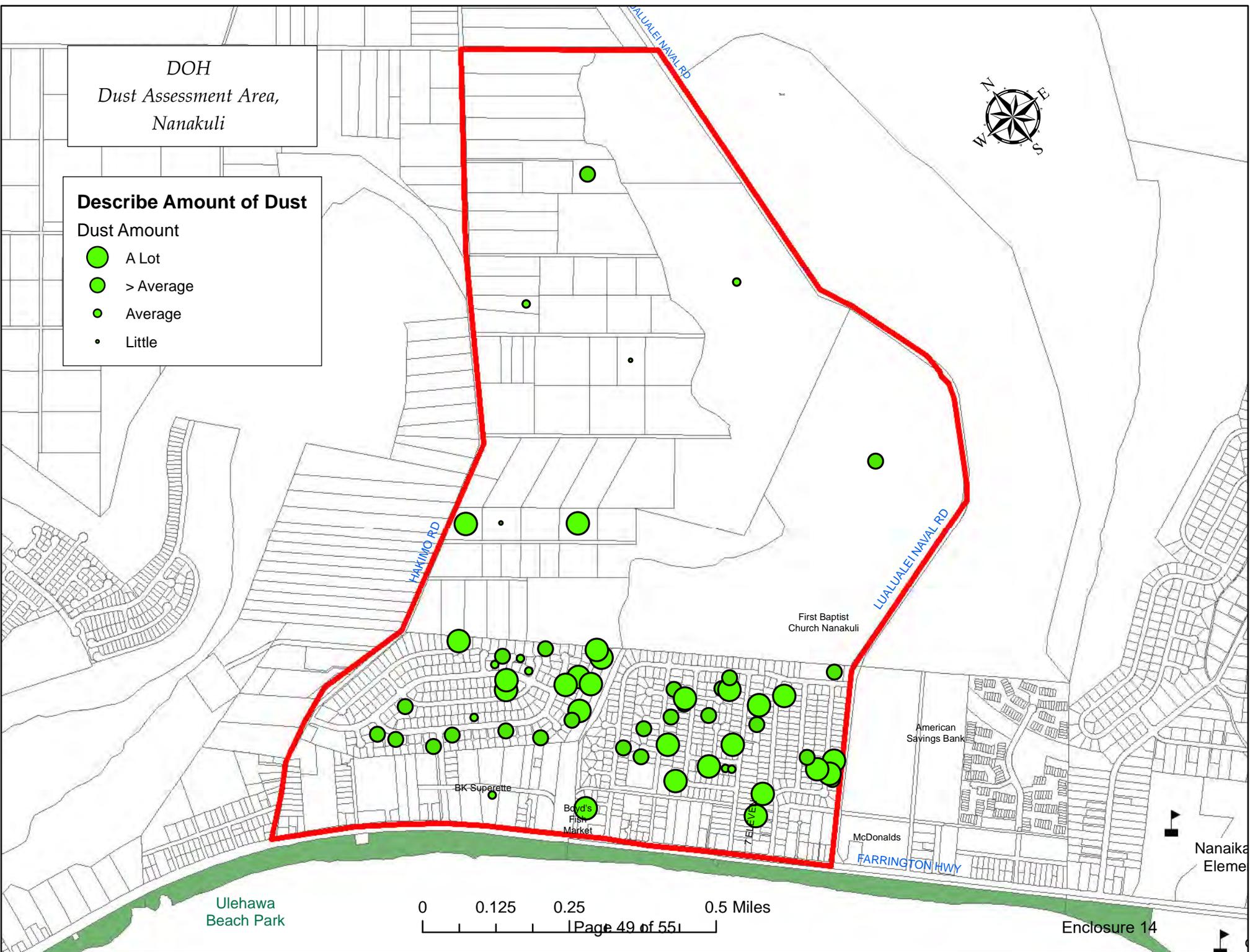


DOH
Dust Assessment Area,
Nanakuli

Describe Amount of Dust

Dust Amount

- A Lot
- > Average
- Average
- Little



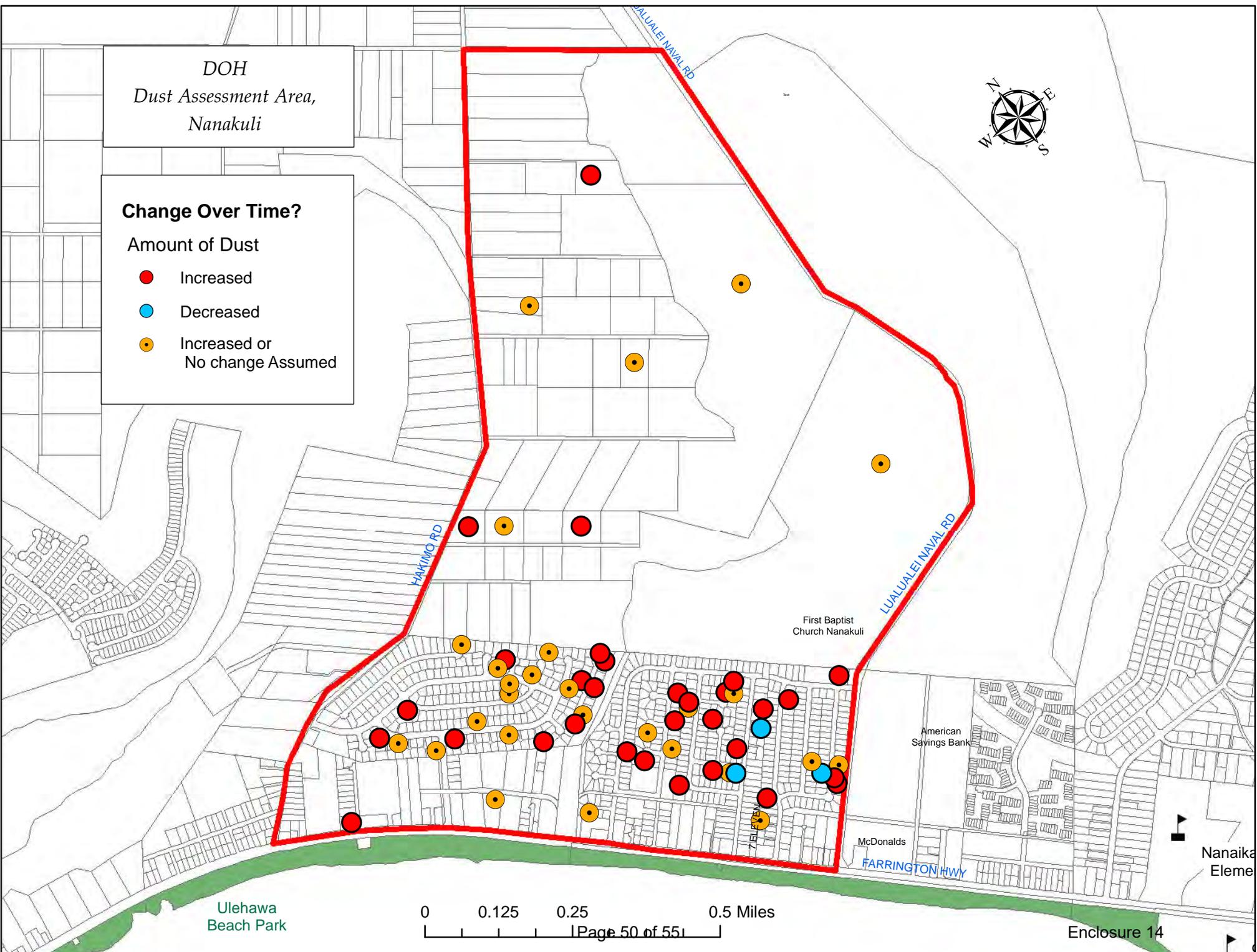
0 0.125 0.25 0.5 Miles
| Page 49 of 55 |

DOH
Dust Assessment Area,
Nanakuli

Change Over Time?

Amount of Dust

- Increased
- Decreased
- Increased or No change Assumed



Ulehawa
Beach Park

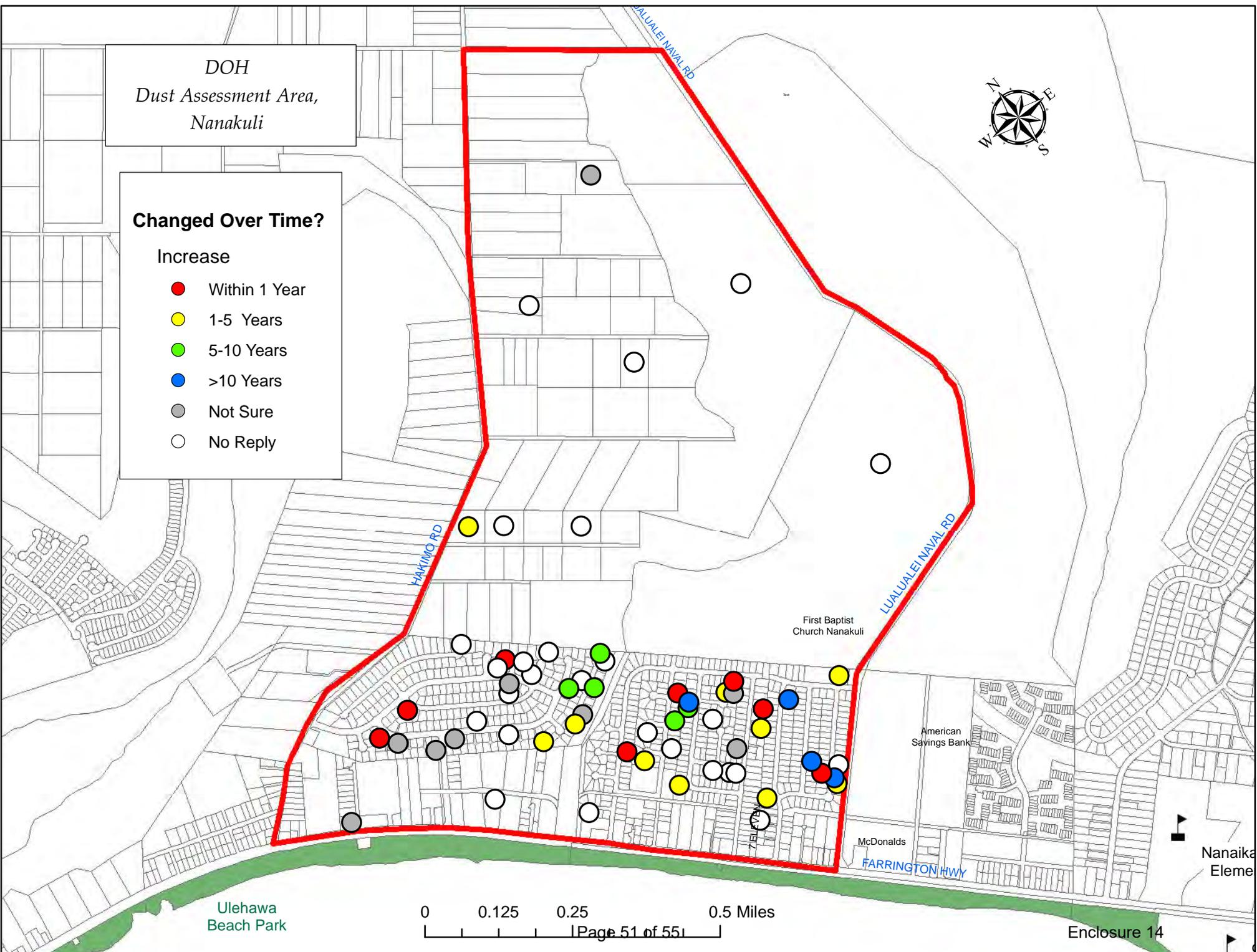
0 0.125 0.25 0.5 Miles

DOH
Dust Assessment Area,
Nanakuli

Changed Over Time?

Increase

- Within 1 Year
- 1-5 Years
- 5-10 Years
- >10 Years
- Not Sure
- No Reply



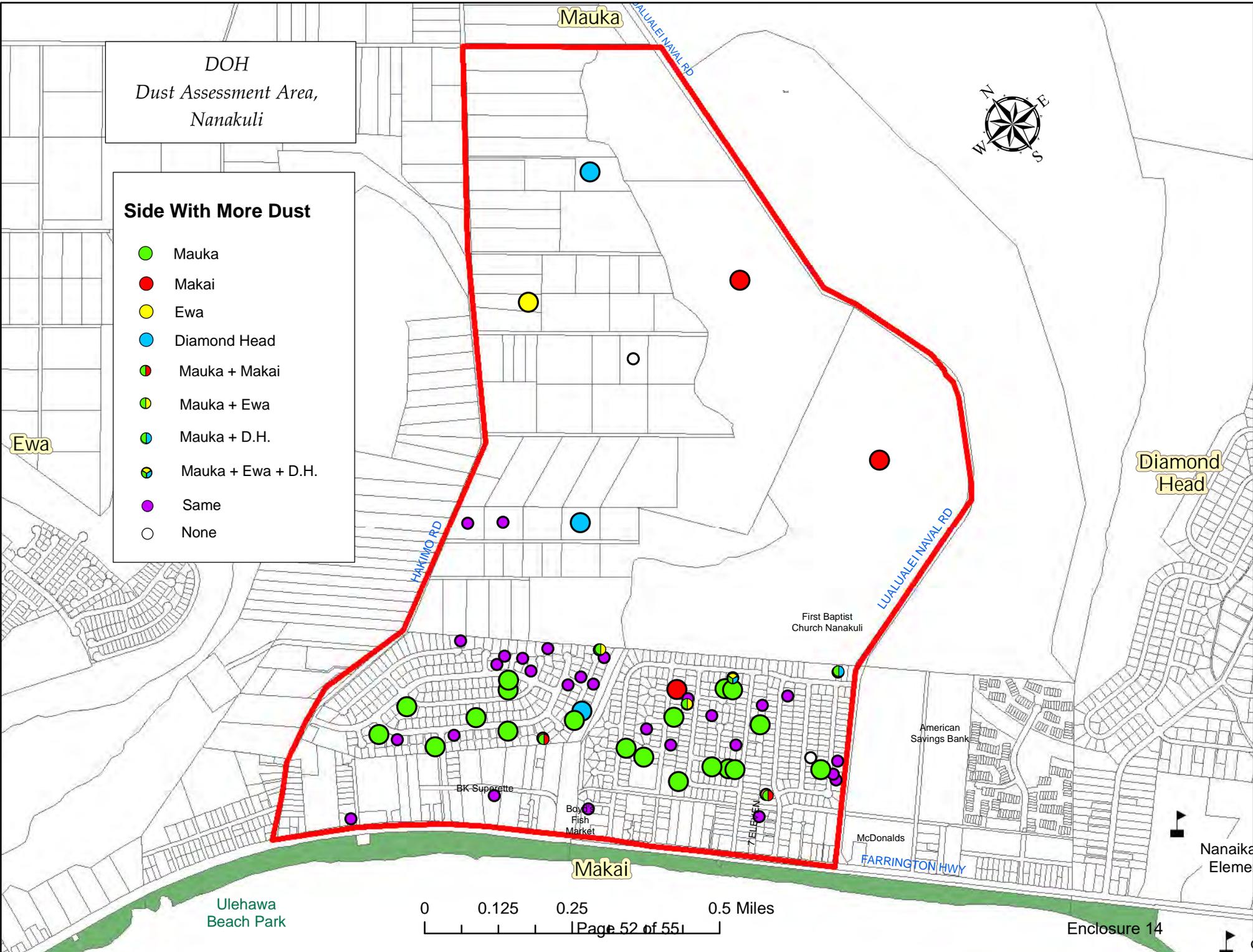
Ulehawa
Beach Park

0 0.125 0.25 0.5 Miles

DOH
Dust Assessment Area,
Nanakuli

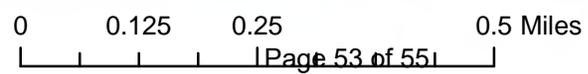
Side With More Dust

- Mauka
- Makai
- Ewa
- Diamond Head
- Mauka + Makai
- Mauka + Ewa
- Mauka + D.H.
- Mauka + Ewa + D.H.
- Same
- None



DOH
Dust Assessment Area,
Nanakuli

- Time of Day with More Dust?**
- Morning
 - Morning + Afternoon
 - Afternoon
 - Night
 - All the Time
 - Not Sure
 - None

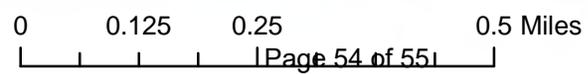
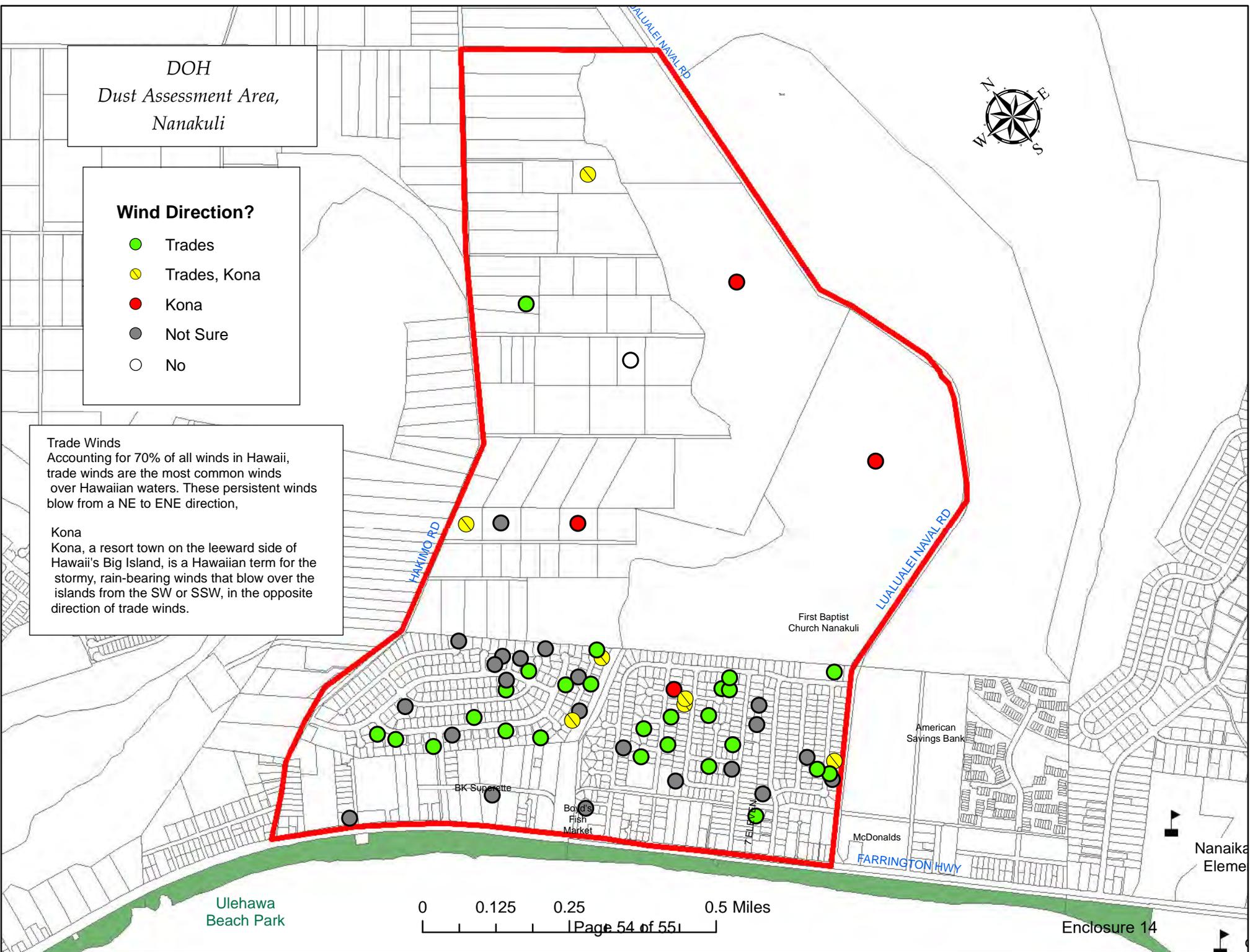


DOH
Dust Assessment Area,
Nanakuli

- Wind Direction?**
- Trades
 - Trades, Kona
 - Kona
 - Not Sure
 - No

Trade Winds
Accounting for 70% of all winds in Hawaii, trade winds are the most common winds over Hawaiian waters. These persistent winds blow from a NE to ENE direction,

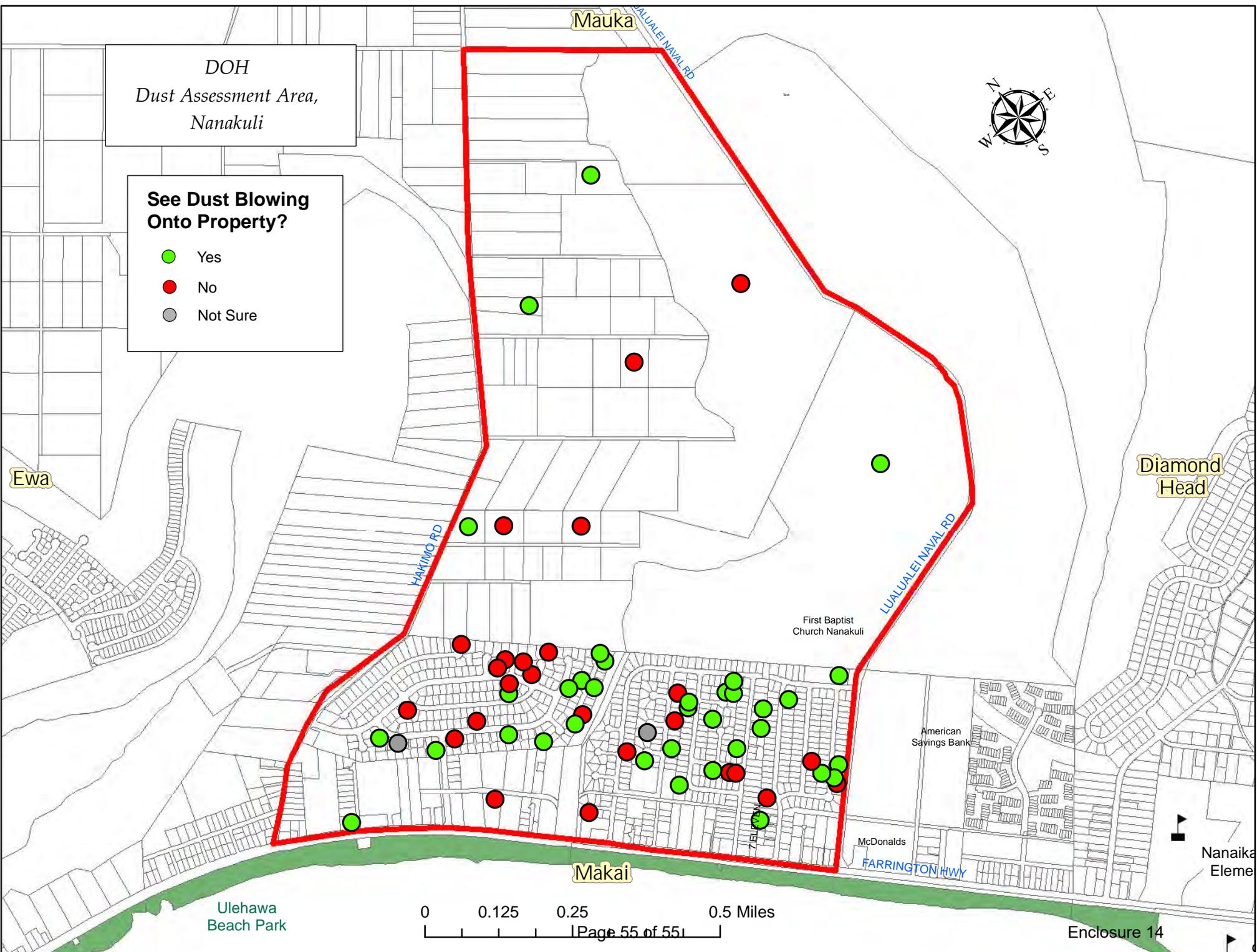
Kona
Kona, a resort town on the leeward side of Hawaii's Big Island, is a Hawaiian term for the stormy, rain-bearing winds that blow over the islands from the SW or SSW, in the opposite direction of trade winds.



DOH
Dust Assessment Area,
Nanakuli

See Dust Blowing
Onto Property?

- Yes
- No
- Not Sure



0 0.125 0.25 0.5 Miles

State of Asthma Hawaii 2009



Hawaii Asthma Initiative



Acknowledgements

The Hawaii State Department of Health (DOH), Community Health Division, Chronic Disease Management and Control Branch, Asthma Control Program would like to acknowledge the following organizations and entities who contributed to the *State of Asthma – Hawaii 2009*.

- Hawaii Health Information Corporation
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Suggested Citation:

Krupitsky, D., Reyes-Salvail, F., Baker, Kromer K., and Pobutsky, A. (2009) *State of Asthma, Hawaii 2009*. Hawaii State Department of Health, Honolulu, HI



A Message from the Director of Health

Aloha kakou,

The Hawaii State Department of Health is pleased to present the publication of the *State of Asthma – Hawaii 2009*. The report, produced under the direction of the Department's Asthma Control Program, compiles surveillance information and other data sources into a comprehensive document.

Asthma is a complex disease that is increasing in prevalence in the United States. Data from the 2005 - 2006 Hawaii Behavioral Risk Factor Surveillance System (BRFSS) survey show that approximately 12% or 36,000 children and 8% or 76,000 adults currently have asthma in Hawaii.

Healthcare costs associated with asthma are staggering. According to the Hawaii Health Information Corporation, total charges associated with hospitalizations due to a primary diagnosis of asthma amounted to more than \$18.2 million per year. This does not include healthcare costs associated with asthma-related outpatient and emergency department visits or prescription medications.

It is clear that the burden of asthma on Hawaii's population is significant. The public health response to this increasing burden of asthma has several key components, surveillance being the first. Surveillance allows us to quantify the extent of asthma in the population, how severe it is, how well it is being controlled and how much it costs. Sound data will allow us to better direct resources when developing asthma programs.

The *State of Asthma – Hawaii 2009* report is a compilation of surveillance data specific to Hawaii's population. This report is intended to provide decision makers, programs, agencies, organizations and anyone interested in asthma with relevant information necessary for asthma-related program planning and policy development.

Asthma is a serious, complex and costly disease, but by working together, we can create a healthier Hawaii. I invite you to join us in that effort.

Kuikahi kakou i ka puuwai,

Let us all work together from the heart,

Chiyome Leinaala Fukino, M.D.

Director

Hawaii State Department of Health

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Introduction

Public health surveillance is the ongoing, systematic collection, analysis, interpretation and dissemination of data regarding health-related events for use by communities to reduce morbidity and mortality and to improve health. Data from a public health surveillance system can be used for immediate public health action, program planning and evaluation, formulating research hypotheses and to:

- Measure the burden of a disease (or other health-related event), including changes in related factors, the identification of populations at high risk and the identification of new or emerging health concerns;
- Monitor trends in the burden of a disease (or other health-related event), including the detection of epidemics (outbreaks) and pandemics;
- Guide the planning, implementation and evaluation of programs to prevent and control disease, injury, or adverse exposure;
- Evaluate public policy;
- Detect changes in health practices and the effects of these changes;
- Prioritize the allocation of health resources;
- Describe the clinical course of disease; and
- Provide a basis for epidemiologic research.

The existence of an asthma surveillance system is vital for efficient planning, evaluation and program action. As such, the Hawaii State Asthma Control Program is currently engaged in the construction of Hawaii's Comprehensive State Asthma Surveillance System (CSASS) that will be designed to measure and track asthma burden through four key indicators: (1) asthma prevalence, (2) asthma severity, (3) asthma management and (4) asthma cost. Although Hawaii's CSASS is continually growing, meaningful asthma surveillance data is currently available for public dissemination. It is hoped that the information contained in this report will help guide and focus asthma program planning throughout Hawaii.

The information presented in this report is based on the following data sources: (1) Hawaii Behavioral Risk Factor Surveillance System (BRFSS) data for 2005-2006, (2) Hawaii Health Survey data for 1998-2007, (3) asthma hospitalization data for the years 1996 to 2005 and asthma emergency department visits for years 2000 to 2005 from the Hawaii Health Information Corporation, and (4) mortality data from Hawaii vital statistics records for the years 1995 to 2004.

Health Surveys

State of Hawaii has two ongoing telephone surveys BRFSS and Hawaii Health Survey, which provide estimates of many chronic diseases and their risk factors. These two surveys have different methods for data collection; findings of one survey are not necessarily more precise than the other. Examining data from both surveys provides better comprehensive understanding of the burden of asthma in our state.





Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is the largest continuously conducted landline telephone health survey in the world. The state of Hawaii has been an active participant in BRFSS since 1986. BRFSS enables the Centers for Disease Control and Prevention (CDC), state health departments and other health and education agencies to monitor risk behaviors related to chronic diseases, injuries and death. State health departments use BRFSS data to create annual and periodic reports, fact sheets, press releases, or other publications, which are used to educate the public, the professional health community and policy makers about the prevalence of modifiable behavioral risk factors and of preventive health screening practices and their associations with chronic conditions and diseases. Data collected through the BRFSS is routinely used to capture health information on demographically defined subgroups (gender, ethnicity, age, educational level, income level, geographic location).

The Hawaii BRFSS is a collaboration between the State Department of Health and the CDC. The Hawaii BRFSS follows all the protocols and guidelines of the CDC. The survey uses a complex random sample design. The adult participant is selected randomly when the number of adults in the randomly sampled telephoned household is more than one. In an effort to have a statewide population estimate of asthma prevalence among children age 17 or younger, two questions on childhood asthma were asked as state added questions in 2001. For more information, refer to the appendix and websites <http://hawaii.gov/health/statistics/brfss/index.html>.

Hawaii Health Survey

The Hawaii Health Survey (HHS) was first conducted in 1968 as an "in person" household survey modeled after the National Health Interview Survey. Starting in 1996 the survey information was collected using Computer Assisted Telephone Interviewing (CATI). The HHS provides information for demographic, socio-economic and specific health characteristics, e.g., island, zip code, gender, age, income/poverty, ethnicity, education, household size, insurance status, general physical and mental health status and selected chronic conditions including asthma. Calculated variables are created from detailed questions pertaining to the specific topic (e.g. insurance status is coded from 17 possible questions). Asthma prevalence information from the CATI mode has been collected since 1996, and in recent years, current asthma has been gathered.

The HHS differs from the BRFSS in that a knowledgeable adult member (respondent aged 18 years or older) of the household is asked questions relating to the household and each household member. Thus, data can be reported for the household, population, children and/or adult population. Sample size for respondents is approximately 6,000 per year with a total of 15,000 household members including children. Data are weighted to estimate the households, adult population, or total population of Hawaii. In addition, data are adjusted as households without telephones, group quarters, homeless and the island of Niihau are not sampled.¹ For more information, refer to the appendix and websites <http://hawaii.gov/health/statistics/hhs/index.html>.

¹ *Hawaii Health Survey 2002, Procedure Manual. 2005. SMS Research & Marketing Services, Inc. and Hawaii Department of Health, Office of Health Status Monitoring.*

Highlights

State Prevalence

- It is estimated that 11.6% of children (<18 years) and 7.8% of adults (≥18 years) in Hawaii currently have asthma (Hawaii BRFSS, 2005-2006). This corresponds to 36,000 children and 76,000 adults (112,000 people with asthma).
- The prevalence of asthma in Hawaii's population has increased between 1998 and 2007.

Local Geographic Area Prevalence

- The Nanakuli/Waianae sub-area in Honolulu County and the island of Molokai in Maui County have the highest childhood asthma prevalence compared to the rest of the state.
- The current asthma prevalence among children is highest in Hawaii County but is not statistically different from the other counties.
- Honolulu County overall, along with the Nanakuli/Waianae in Honolulu County sub-area, have the highest overall asthma ED visit and hospitalization rates per 10,000 population.
- The Kona sub-area in Hawaii County has the highest rates of ED visits among children with asthma; on average, 1 in 7 children with asthma visited the ED in the past 12 months.

Basic Demographic Characteristics – Age, Gender and Ethnicity

- Boys have a higher current asthma prevalence than girls (14.2% vs. 8.9%) which increases the overall childhood asthma prevalence to nearly 12%.
- Women (females 18 years or older) are nearly twice as likely to have current asthma as men (10.2% vs. 5.3%).
- White adults reported the greatest number with asthma in comparison to other ethnic groups.
- Native Hawaiian adults have the highest current adult asthma prevalence (13.4%); their asthma prevalence is significantly higher than in other ethnic groups.
- Adults and children who are Native Hawaiian have the greatest asthma burden, as defined by: 1) asthma prevalence, 2) emergency department visit rates, and 3) hospitalization rate.
- Native Hawaiian children and adults have the highest ED visit and hospitalization rates compared to other ethnic groups
- The majority of asthma ED visits are by children under the age of five.
- The majority of asthma related hospitalizations occur among children 14 years and younger and adults 50 years and older, with the highest proportions at the very young and very old.





Socio-economic Characteristics – Employment and Household Income

- Asthma is more prevalent among adults who are unable to work or unemployed than adults that are employed.
- Asthma prevalence among those “living below the poverty level (<100%)” is significantly higher than those at the upper end of the poverty measurement (>199%) for both children and adults.²
- People of lower socio-economic status are not only more likely to have asthma, but more than half of the cost of ED visits and hospitalizations are paid by government programs (Medicare and Medicaid). Children with current asthma are more likely to live in lower socio-economic status households.

Health Care Access

- Asthma is more prevalent among adults who are uninsured compared to adults who are insured.
- Adults with current asthma are less likely to report not having a personal doctor or health care provider compared to adults without current asthma, but it is not significantly different.

Tobacco Exposure and Asthma

- Adults and youth who smoke have a higher prevalence of asthma than adults who do not smoke.
- More than one-third of children who have asthma live with individual(s) who smoke.
- In addition, children who smoke or who live with a smoker have a higher prevalence of asthma when compared to those children who do not smoke or live with a smoker.

Health Status and Health Related Quality of Life

- Adults with asthma are more likely to have other health conditions than adults without asthma (arthritis, diabetes, high blood pressure and high blood cholesterol).

Mental and Physical Health

- Depressive and anxiety symptoms are higher among adults with current asthma when compared to adults without current asthma.
- Adults with asthma have more days of poor physical or mental health compared to those without asthma.
- Nearly one in four people with asthma reported that their health is either fair or poor.
- Nearly one in four people with asthma reported that their activities were limited due to poor health.

² Poverty status takes into account family size and family income (refer to appendix for detailed descriptions of poverty status), based on guidelines published annually by the U.S. Department of Health and Human Services. Below Poverty-Poor <100% is defined as household income for the families below poverty level.

Obesity and Asthma

- Adults with current asthma have a significantly higher prevalence of obesity compared to adults without current asthma.
- Overweight and obese adults are more likely to have current asthma.

Vaccination

- Flu shot and pneumococcal pneumonia vaccine rates are higher among adults with current asthma when compared to adults without current asthma; however, the rates are still below Healthy People 2010 Objectives.
- During the cooler season (December-January) when flu is more prevalent, ED visit and hospitalization rates are the highest.

Asthma Severity

- Statewide pediatric hospitalization rates for asthma may be slightly decreasing (1996-2005), whereas asthma ED visits have been increasing (2000-2005).
- Statewide asthma mortality trends (asthma as an underlying cause of death) may be decreasing (1995-2004).
- 36% of asthma hospitalizations are of moderate severity, and 12% of asthma hospitalizations are of major or extreme severity.
- 15% of asthma hospitalizations have moderate risk for mortality, while 5% of asthma hospitalizations have major or extreme mortality risks

Cost

- The total annual asthma ED costs for the state of Hawaii is \$4.2 million and asthma hospitalization is \$14 million per year.
- Private insurance paid 45% of the asthma total hospitalization costs for children and 31% for adults, private insurance paid 41% of ED asthma claims for children and 36% for adults.
- Almost half of the ED visits for both children and adults are paid by government programs (Medicaid and Medicare), whereas two thirds of asthma hospitalizations are paid by these programs.

Mortality

- The underlining cause of mortality rate for asthma seems to be decreasing from 1995 to 2004; whereas, the non-underlying cause of mortality rate for asthma is slightly increasing from 1999 to 2005.
- During the 1995 to 2004 time period, on average 30 people per year died due to their asthma complications and another 48 died with asthma as non-underlying cause; most of these deaths occurred in elders.



Asthma Prevalence

During the 2001-2007 time period, the lifetime³ adult asthma prevalence in Hawaii (13.2%) was higher than the nation (12%); however, the current adult asthma prevalence in Hawaii (7.2%) was similar to the nation (7.8%). Both lifetime and current childhood⁴ asthma prevalence in Hawaii were higher than the nation.

State Prevalence

Figure 1. Prevalence of asthma for the population of Hawaii by year, BRFSS 2001-2007 (excluding 2004⁵).

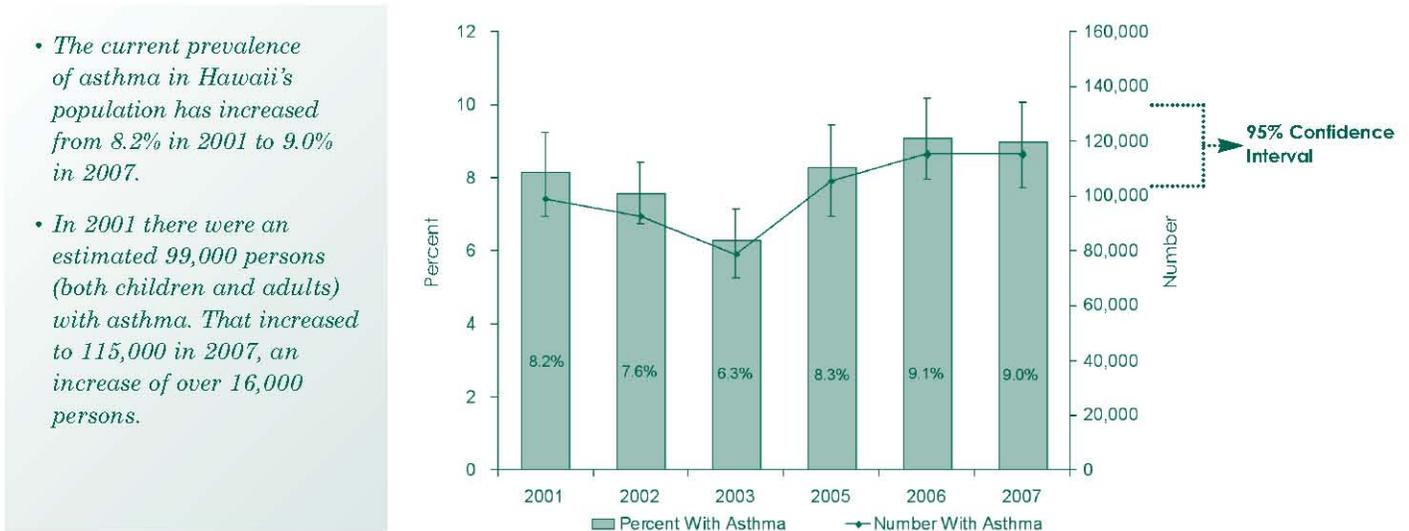
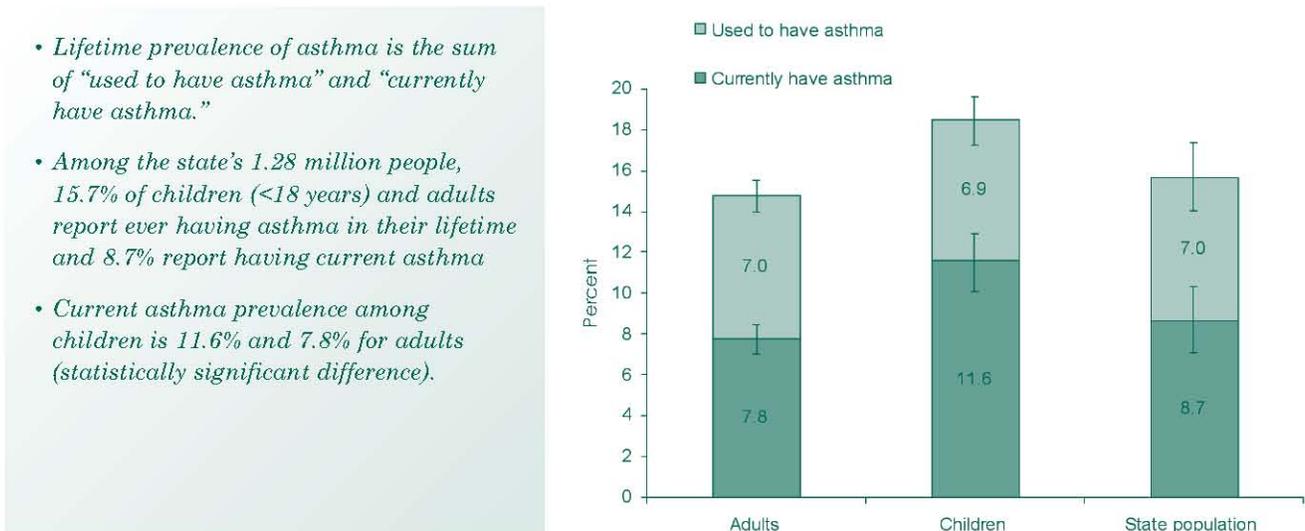


Figure 2. Lifetime and current prevalence of asthma in Hawaii, BRFSS 2005-2006.



³ The BRFSS core has two asthma related questions. These questions are: (1) "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?" – lifetime prevalence (2) if the respondent answered "yes" to the lifetime question, a second question asked, "Do you still have asthma?" – current asthma prevalence

⁴ Nationwide data on asthma prevalence limited to selected states (less than 37) since child asthma prevalence data are produced from the responses to two asthma questions on the BRFSS Childhood Asthma Optional Module.

⁵ 2004 was excluded because data were only collected for 2.5 months; Page 12 of 48 the Hawaii BRFSS data for that year.

Asthma Prevalence

Local Geographic Area Prevalence

Figure 3. Current asthma prevalence among adults and children by county, BRFSS 2005-2006.

- Each county has higher current asthma prevalence among children than among adults.
- There is a statistically significant difference in current asthma prevalence between adults and children in Hawaii County (14.6% for children and 8.9% for adults) and Honolulu County (11.4% for children and 7.4% for adults).
- While Hawaii County has the highest total current asthma prevalence, the difference compared to other counties is not statistically significant.

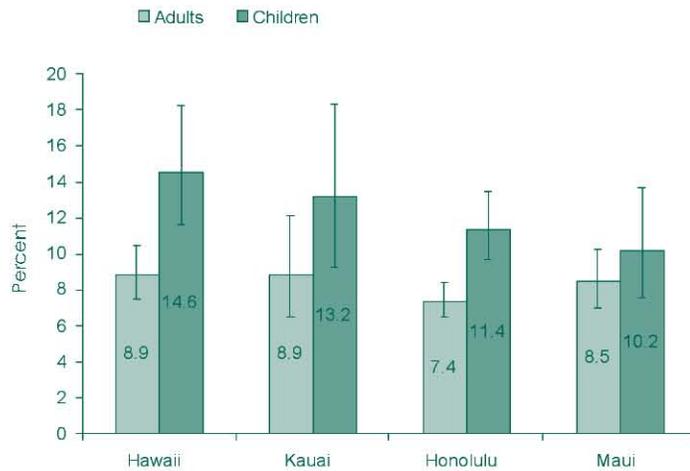


Figure 4. Children asthma prevalence by geographic area, BRFSS 2005-2006.

- On average, Hawaii County has the highest asthma prevalence among children compared with other counties and the state average.
- At the sub-county level, children residing in Nanakuli/Waianae, Molokai, North Hawaii and Puna/Kau have higher asthma prevalence than other sub-counties.

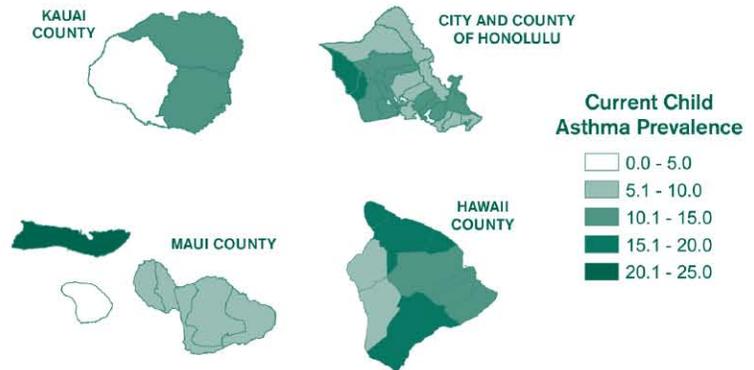
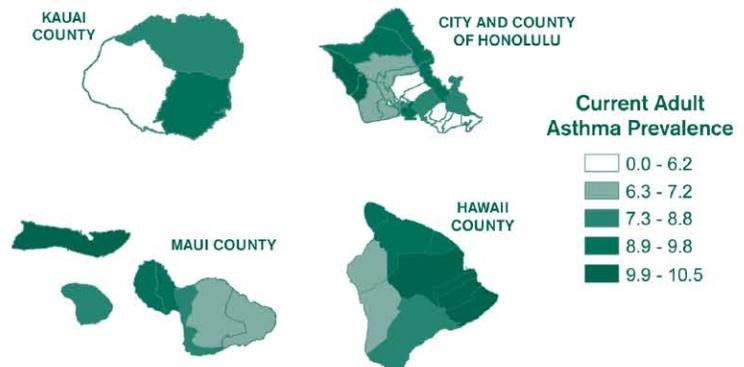


Figure 5. Adult asthma prevalence by geographic area, BRFSS 2005-2006.

- On average, Hawaii County has the highest asthma prevalence among adults compared with other counties and the state average.
- At the sub-county level, adults residing in Nanakuli/Waianae, Molokai and Hilo have higher asthma prevalence than other sub-counties.



Asthma Prevalence

Table 1. Current asthma prevalence by sub-areas, BRFSS 2005-2006.

Child (<18)	Estimated Number of People with Asthma	Current Asthma Prevalence		
		Current Asthma %	Lower 95% limit	Upper 95% limit
HONOLULU COUNTY				
Aiea/Pearl City	1472	7.6	3.9	14.5
Ala Moana ⁶	-	-	-	-
Kaawa/Kahaluu/Kaneohe	1054	8.6	4.2	16.8
Kailua/Waimanalo	1738	11.5	5.7	21.8
Kaimuki/Palolo/Waikiki	827	6.9	3.2	14.1
Manoa/Upper Makiki	1082	11.8	5.6	23.1
Millani/Wahiawa	3773	14.2	9.5	20.5
Nanakuli/Waianae	2704	17.5	10	29
North Shore/Laie	651	7.1	3	15.9
Nuuanu/Kalihi/Moanalua	2483	12.5	7.4	20.4
Salt Lake/Foster Village	1519	8	4.3	14.4
Wailae/Kahala/Hawaii Kai	825	8.1	3.5	17.8
Waipahu/Kapolei/Ewa	5176	12.8	8.8	18.2
HAWAII COUNTY				
Kona	574	7.3	3.5	14.6
Hilo	1486	12.8	7.9	20
Puna/Kau	1945	16.2	10.5	24.1
North Hawaii	2113	18.6	12.7	26.6
KAUAI COUNTY				
Hanalei/Kapaa	811	11.5	6.6	19.4
Lihue/Waimea	1227	13.9	8.8	21.2
MAUI COUNTY				
Kahului	1004	8.8	4.7	16.1
Lahaina/Wailuku	959	9.5	5.7	15.2
Lanai	34	4	1.7	8.9
Molokai	491	23.8	15.1	35.5
Upcountry/Hana	968	9.6	5	17.6

⁶ The sample size is less than 50 thus not shown.

Asthma Prevalence

Adult (≥18)	Estimated Number of People with Asthma	Current Asthma Prevalence		
		Current Asthma %	Lower 95% limit	Upper 95% limit
HONOLULU COUNTY				
Aiea/Pearl City	4254	6.2	4	9.5
Ala Moana	2984	8.9	5.6	13.7
Kaawa/Kahaluu/Kaneohe	4692	9.8	6.5	14.5
Kailua/Waimanalo	4052	8.5	5.5	13
Kaimuki/Palolo/Waikiki	3036	4.9	3.2	7.5
Manoa/Upper Makiki	2594	5.7	3.4	9.4
Mililani/Wahiawa	4679	7.2	4.9	10.5
Nanakuli/Waianae	3163	10.1	6	16.2
North Shore/Laie	2187	9.8	5.2	17.7
Nuuanu/Kalihi/Moanalua	5956	8	5.2	12.1
Salt Lake/Foster Village	3087	9	5	15.6
Wailae/Kahala/Hawaii Kai	2180	5.1	2.9	8.9
Waipahu/Kapolei/Ewa	8650	7.1	5.2	9.7
HAWAII COUNTY				
Hilo	3607	10.5	7.8	13.9
Kona	1959	6.9	4.6	10.3
North Hawaii	2848	9.7	6.8	13.5
Puna/Kau	2529	8.2	5.8	11.4
KAUAI COUNTY				
Hanalei/Kapaa	1523	7.6	4.9	11.6
Lihue/Waimea	2727	9.8	6.4	14.7
MAUI COUNTY				
Kahului	3042	8.8	6.1	12.5
Lahaina/Wailuku	3130	9.7	6.9	13.5
Lanai	178	7.3	4.5	11.5
Molokai	596	9.9	6.6	14.4
Upcountry/Hana	2071	6.7	4.3	10.3

Table 1 presents asthma prevalence among adults and children at the sub-county level. Analysis indicates that the asthma prevalence among adults as well as among children varies from area to area but the differences in prevalence in many of the areas are not statistically different from each other as can be seen in the overlapping confidence intervals. It should be noted that although Molokai has the highest current asthma prevalence among children (23.8%), the 95% confidence interval is also widest (15.1%-35.5%) and should be interpreted with caution. North Hawaii (Hawaii County) has the second highest asthma prevalence among children (18.6%).

Asthma Prevalence

Basic Demographic Characteristics - Age, Gender and Ethnicity

Figure 6. Current asthma prevalence among children and adults, by gender, BRFSS 2005-2006.

- Among adults, females are more likely to have current asthma than males (10.2% vs. 5.3%).
- Among children, boys are more likely to have current asthma than girls (14.2% vs. 8.9%).

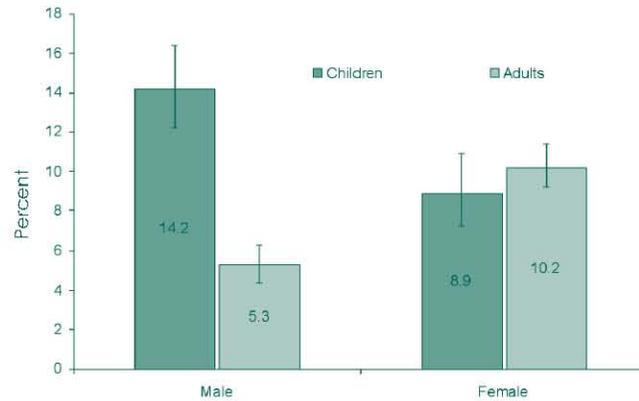


Figure 7. Current asthma prevalence by age group, BRFSS 2005-2006.

- Current reported asthma is lowest among those aged 0-4 years and aged 65 years or older. The prevalence among the younger ages 0-4 is higher than among those 65 years or older (8.4% vs. 5.4%).
- In the younger age groups, there is a significant rise in asthma prevalence from ages 0-4 to ages 5-9 (8.4% vs. 15.1%) and then prevalence drops among those aged 10-14 and 15-17.

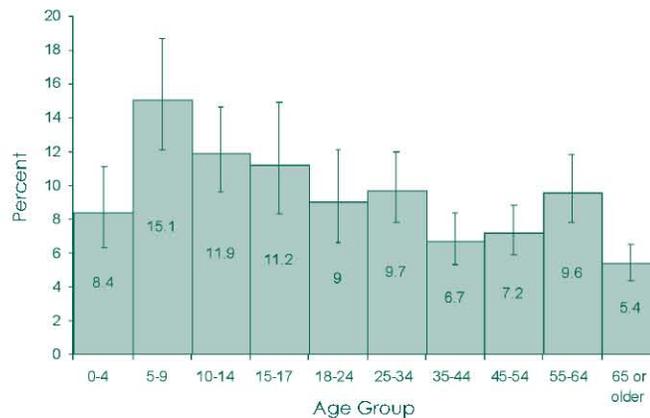
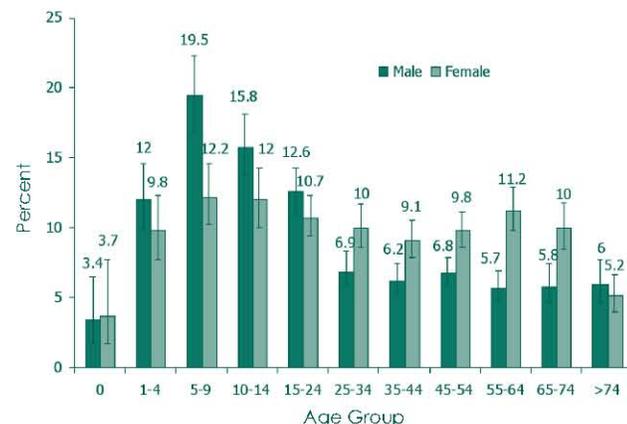


Figure 8. Prevalence of current asthma by gender and age, HHS 2003-2005.

- The pattern of asthma by age and gender indicates that prevalence is highest among male children (statistically significant).
- Among adults, asthma prevalence is highest among women and is statistically significant.



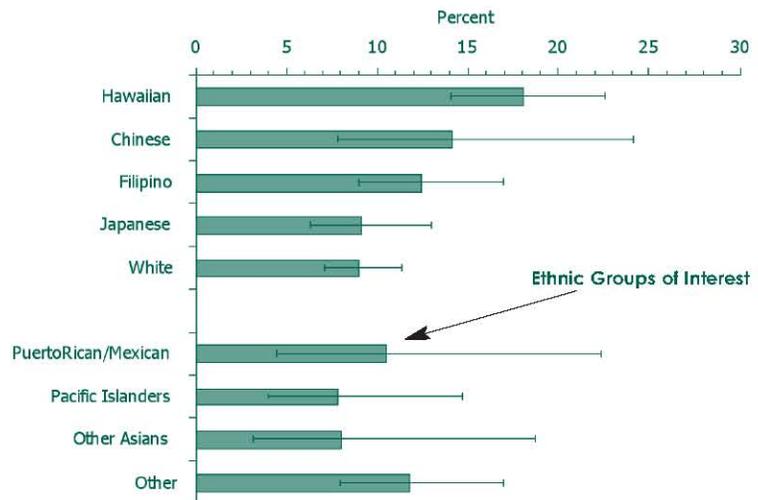
Asthma Prevalence

Both BRFSS 2005-2006 and HHS 2003-2005 consistently found that asthma prevalence is the highest among children between 5 and 9 years old. Asthma prevalence decreases and levels off with increased age, except for a slight rise at among those 55-64 years in age.

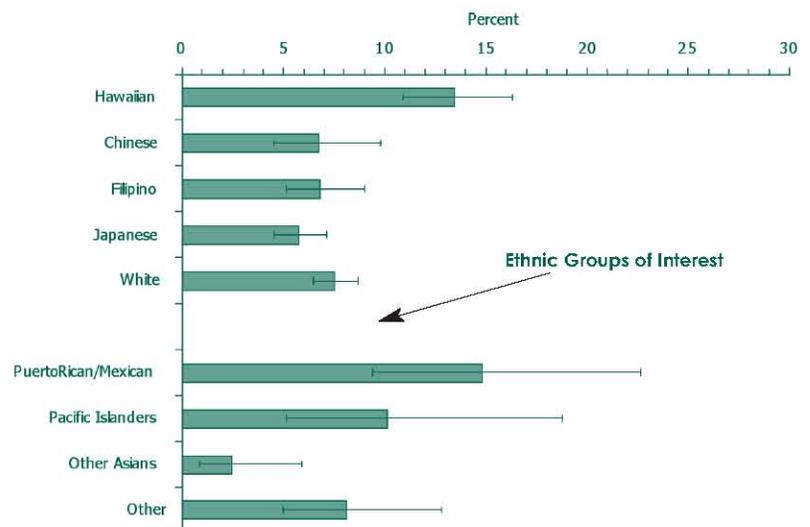
Figure 9. Current asthma prevalence among children and adults by ethnic group, BRFSS 2005-2006.

- *Native Hawaiians have significantly higher current asthma prevalence among both children (18.0%) and adults (13.4%) compared to Whites (9.0% children and 7.5% adults) and Japanese (9.1% children and 5.7% adults).*
- *Among adults, Puerto Ricans and Mexicans⁷ have the highest prevalence of asthma (14.8%) but this is not significantly higher than that of Native Hawaiians (13.4%) or Other Pacific Islanders (10.1%).⁸*
- *Yet, asthma prevalence among adult Native Hawaiians (13.4%) and among adult Puerto Rican and Mexicans (14.8%) is statistically significantly higher than Chinese (6.7%) and Filipino adults (6.8%).*
- *Asthma prevalence among Filipino children (12.4%) is significantly higher than that among Filipino adults (6.8%).*
- *The remaining children in the 'Others'* ethnic group (11.8%) have an asthma prevalence that is higher than that of the 'Others' adult ethnic group (8.1%), but not statistically significantly higher.*

Children



Adults



⁷ The ethnic groups such as Puerto Ricans/Mexicans, Other Pacific Islanders and "Others" all together represent a population of less than 10%. Correspondingly their respective sample size is also smaller. The sample size for these groups range from 124 to 317, thus their respective confidence intervals are wide and should be interpreted with caution. However, so as not to overlook the health of any ethnic group, the prevalence among these groups are also reported when possible.

⁸ Ethnic groups of interest constitute those other ethnic populations in Hawaii with smaller proportions in the state population, but with presumed or known disproportionate risk for chronic diseases such as asthma. Such groups deserve examining in Hawaii for known risk for asthma elsewhere in the United States (e.g. Puerto Ricans) or for factors that are associated with asthma such as poverty or poor housing (Pacific Islanders such as Micronesians). Such groups deserve attention since they may constitute a small proportion of the overall population but may disproportionately need services or interventions. Ensuring such groups are included in surveillance efforts can better assist in determining this.

Asthma Prevalence

Socio-economic Characteristics – Employment and Household Income among Adults

Figure 10. Employment by adult asthma status, BRFSS 2005-2006.

- Adults with current asthma are more likely to be unemployed, unable to work, homemakers or students compared to adults who report not currently having asthma.
- Among those who are unable to work, there is a statistical difference between those who have and don't have asthma.

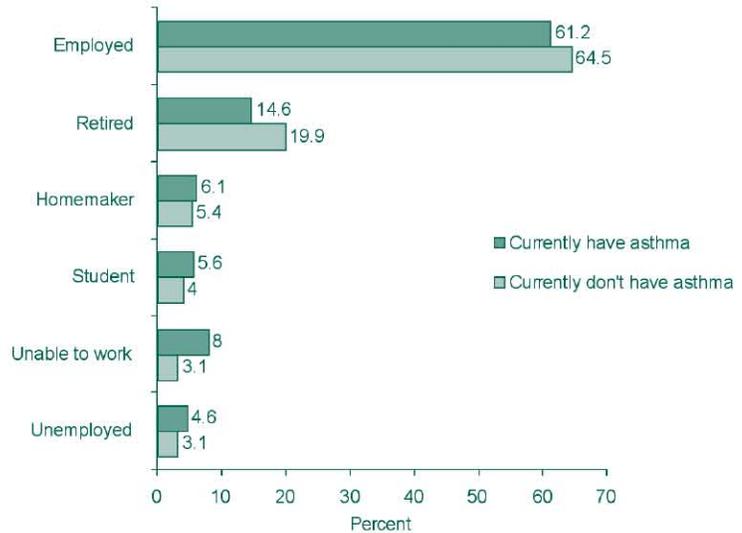
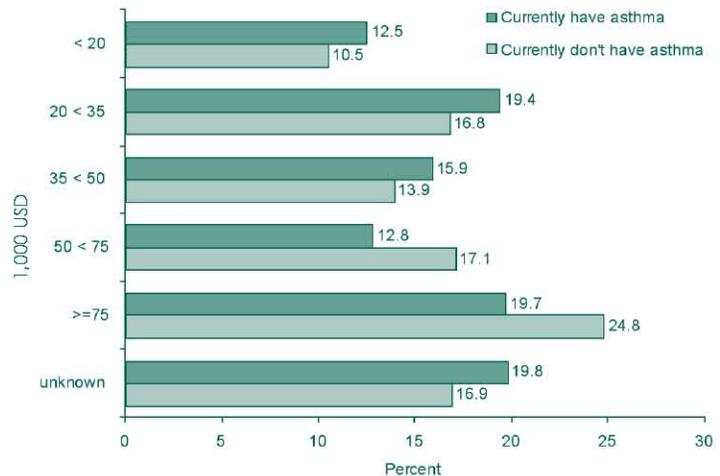


Figure 11. Annual household income by adult asthma status, BRFSS 2005-2006.

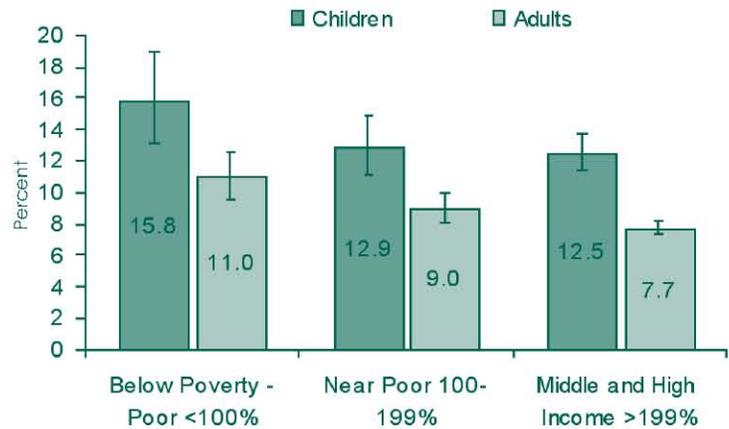
- Adults with current asthma are more likely to report living in households with an annual income below \$50,000 (47.8%) compared to adults without asthma (41.1%; statistically significant).
- Only 32.4% of adults with asthma live in households with an annual income of \$50,000 or higher which is lower than that among adults without asthma, 41.8% (statistically significant).
- Note: Children with current asthma are also more likely to be in lower income households (below \$50,000 annually) than children without asthma (49.0% versus 42.2%; statistically significant). Chart not shown.



Asthma Prevalence

Figure 12. Prevalence of asthma by poverty status⁹ among children and adults, HHS 2003-2005.

- Children (15.8%) and adults (11.0%) living below the poverty level have the highest prevalence of asthma compared to those that are near poor or those that are >199% of the poverty level (middle and high income).
- For all three poverty levels children have the highest prevalence of asthma.
- Adults at the highest level of middle and high income >199% have the lowest prevalence of asthma (statistically significant).

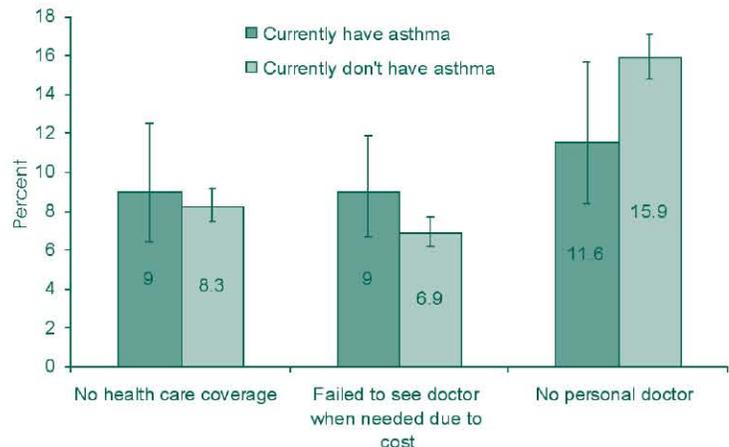


Whereas the BRFSS estimates the socioeconomic status using annual household income and the HHS estimates poverty level, results from both surveys consistently indicate that lower income families tend to have asthma more often than higher income families.

Health Care Access

Figure 13. Adults with limited access to health care by asthma status, BRFSS 2005-2006.

- The percent of respondents reporting no health care coverage or who failed to see a doctor when needed due to cost is slightly higher among those with asthma than among those without asthma (9% vs. 8.3%, 9% vs. 6.9% respectively), but this is not significantly higher.
- The percent reporting not having a personal doctor or health care provider is slightly lower among those with asthma than those without asthma (11.6% vs. 15.9%), but this is not significantly lower.

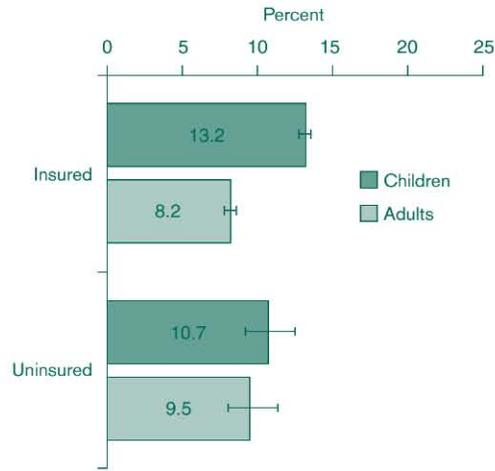


⁹ Poverty status takes into account family size and family income (refer to appendix for detailed descriptions of poverty status), based on guidelines published annually by the U.S. Department of Health and Human Services. Below Poverty-Poor <100% is defined as household income for the families below poverty level.

Asthma Prevalence

Figure 14. Prevalence of asthma by insurance status among children and adults, HHS 2003-2005.

- Children that are uninsured have a lower prevalence of asthma (10.7%) compared to children that are insured (13.2%; not statistically significant).
- The actual prevalence of asthma among uninsured children may be higher, given that the uninsured children may not have access to medical professionals and thus, being diagnosed for asthma.

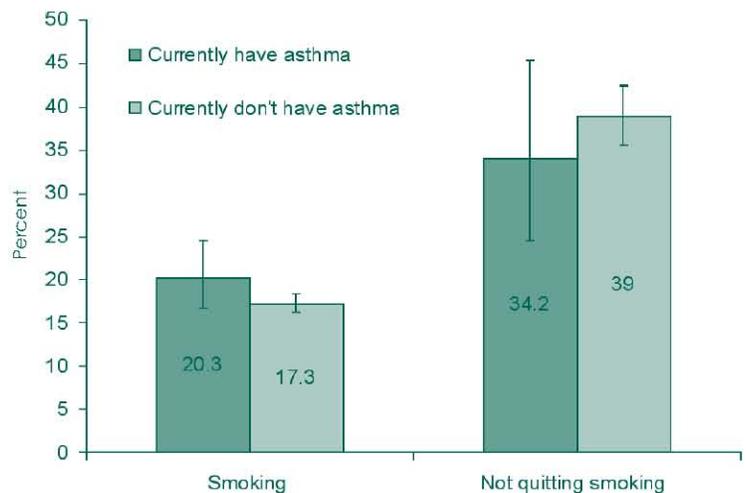


Risk Factors, Co-morbidities¹⁰ and Quality of Life – Tobacco Exposure and asthma

Second hand tobacco smoke (SHS) exposure is widespread, affecting many Hawaii adults and children. Because it contains potent respiratory irritants, SHS is perceived as a potentially important aggravating factor for adults and children with asthma. In children, substantial evidence indicates that SHS exposure increases asthma severity.

Figure 15. Adult smokers by asthma status, BRFSS 2005-2006.

- The prevalence of smoking among those with asthma is higher than among those without asthma (20.3% vs. 17.3%; not significantly significant).
- Among current smokers, more adults with current asthma are trying to quit than adults without asthma (34.2% vs. 39.0%; not significantly significant).



¹⁰ Co-morbidities are defined as presence of one or more disorders (or medical conditions) in addition to asthma diagnosis.

Asthma Prevalence

Table 2. Prevalence of asthma by smoker and lives with a smoker among children and adults, HHS 2003-2005.

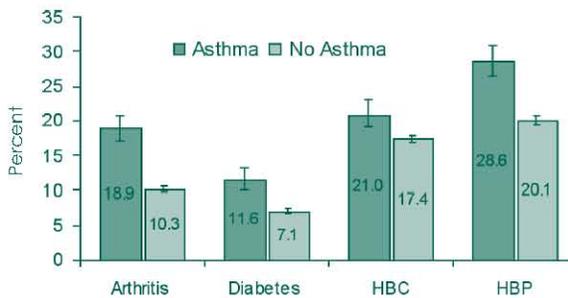
- Adults and youth who smoke also report higher proportions of having current asthma (statistically significant).
- Children (23.9%) and adults (9.6%) who live with people who smoke have a much higher prevalence of asthma than those who do not live with people who smoke. Among children, there is a statistically significant difference.
- There is not a significant difference between the numbers of people per household who smoke in relation to asthma prevalence.

Variable	Prevalence of Asthma			
	Child		Adult	
	%	95% CI	%	95% CI
Smoker	23.9	12.1 - 41.9	9.6	8.6 - 10.7
Non Smoker Total	13.0	12.1 - 14.0	8.0	7.6 - 8.4
No Smoker in Household	11.6	10.6 - 12.7	7.8	7.4 - 8.3
Lives with 1 Smoker	16.4	14.2 - 18.9	8.9	7.8 - 10.1
Lives with >1 Smoker	16.4	13.3 - 19.9	8.4	6.5 - 10.7

Health Status and Health Related Quality of Life

Figure 16. Prevalence of other chronic health conditions by asthma for adults, HHS 2003-2005.

- Adults with asthma have a higher prevalence of other chronic conditions such as arthritis, diabetes, high blood cholesterol (HBC) and high blood pressure (HBP) (statistically significant).



Asthma Prevalence

Figure 17. Percent of adults with at least 14 days of “health not good” and usual activities by asthma status, BRFSS 2005-2006.

- The proportions of adults reporting at least 14 days of not good physical or mental health is at least twice as high among those with asthma (26.5%) compared to those without asthma (13.4%).
- The proportion of adults with asthma reporting not being able to do their usual activities due to poor health is much higher among adults with asthma than adults without asthma (12.0% versus 4.5%).

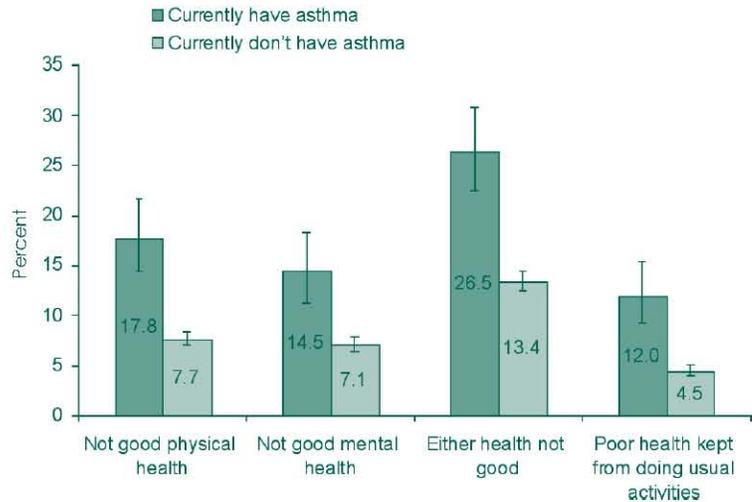
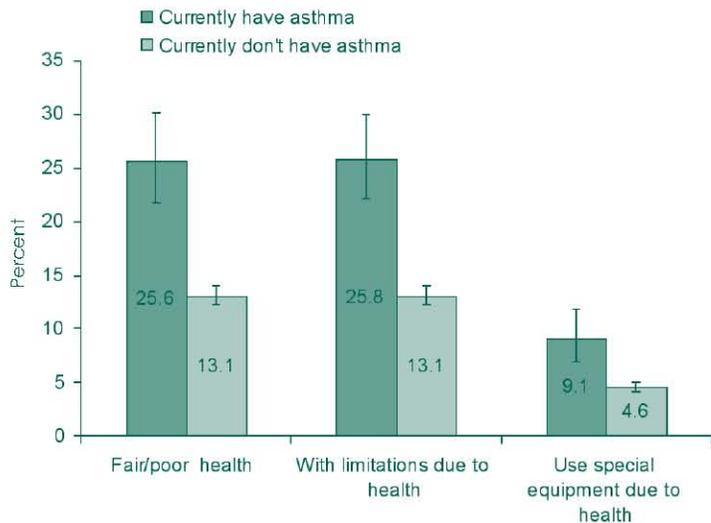


Figure 18. Fair/poor health, limitations and use of special equipment due to health problems by adult asthma status, BRFSS 2005-2006.

- About one in four adults with asthma (25.6%) reports that their general health is fair or poor in contrast to about one in eight adults without asthma (13.1%).
- Similarly, one in four adults with asthma (25.8%) reports they are limited in their activities because of physical, mental, or emotional problems in contrast to about one in eight adults without asthma (13.1%).
- The percent of adults that use special equipment (such as a cane, a wheelchair, a special bed, or a special telephone) due to health problems among those with current asthma is more than twice as high than among those without asthma (9.1% vs. 4.6%).



Asthma Prevalence

Mental and Physical Health

Asthma can impair health-related quality of life and is consistently associated with an increased prevalence of depressive disorders. Depression among those with asthma is associated with poor adherence to medication regimens, more severe asthma, and poorer disease outcomes.¹¹

Figure 19. Anxiety or depressive disorder and estimate of recent depression by asthma status for adults, BRFSS 2005-2006.

- The percent of adults reporting a diagnosis of anxiety, lifetime depression or recent depression is twice as high among those with asthma as among those without asthma.
- The proportion of adults with both anxiety and depressive disorder and with asthma is at least two times greater than those without asthma (10.1% vs. 3.9%).

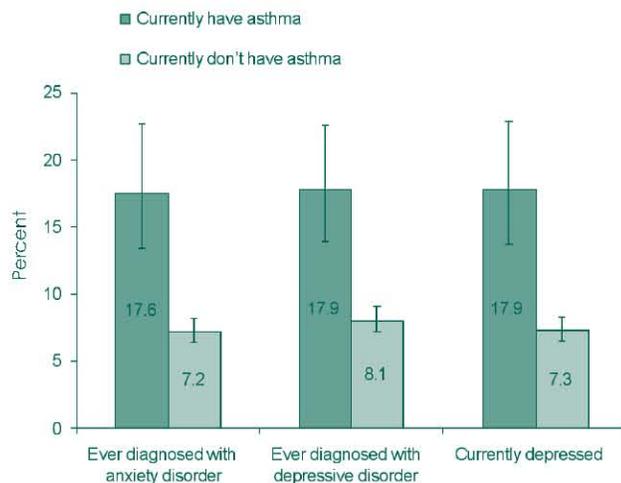
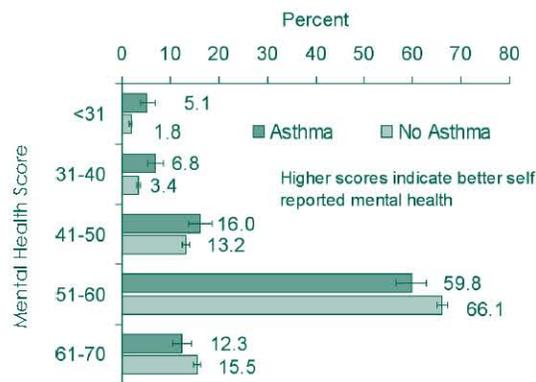


Figure 20. Distribution of mental health summary scores (SF-12®)¹² by asthma status among adults, HHS 2003-2005.

- Adults with asthma are more likely to report poorer mental health (summary mental health scores below 51) than adults with no asthma (27.9% vs. 18.4%; statistically significant).



Results from both the BRFSS 2005-2006 and the HHS 2003-2005 consistently indicate that adults with asthma are more likely to have poorer mental health than adults without asthma.

¹¹ Scott KM, Von Korff M, Alonso J, Angermeyer MC, Benjet C, Bruffaerts R, de Girolamo G, Haro JM, Kessler RC, Kovess V, Ono Y, Omel J, Posada-Villa J. Childhood Adversity, Early-Onset Depressive/Anxiety Disorders, and Adult-Onset Asthma. *Psychosom Med.* 2008 Oct 21.

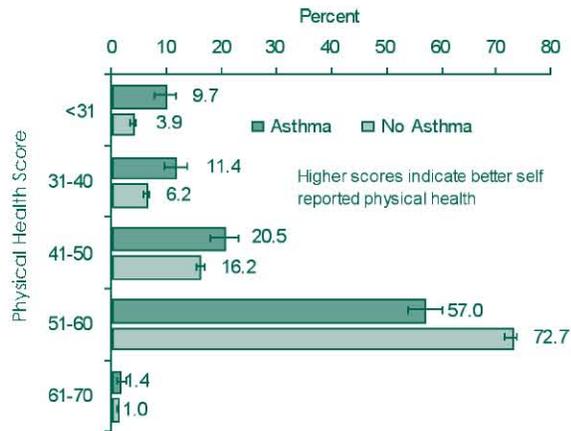
¹² Health Related Quality of Life was measured by questions from the SF-12® Version One (a shortened 12 questionnaire from the SF-36® questionnaire). Questions were related to self-reported general health, limitations caused by physical and/or emotional problems, pain limiting activities, limitations to amount and type of work and limitations in social activities due to health problems.

Scoring for the summary scales MCS-12 (mental component summary scale) and PCS-12 (physical component summary scale) from the twelve questions on health are outlined in the SF-12® manual. The SF-12® scoring algorithm is a composite score of weighted item responses to twelve questions on self-reported physical and mental health status. A higher summary scale value indicates better health for both the mental and physical summary scale. The scores are standardized so that the mean equals 50 and the standard deviation 10 for the general U.S. population.

Asthma Prevalence

Figure 21. Distribution of physical health scores (SF-12®) by asthma status among adults, HHS 2003-2005.

- Adults with asthma are more likely to report poorer physical health (summary physical health scores below 51) than adults with no asthma (41.6% vs. 26.3%; statistically significant).
- See appendix for description of physical health score (SF-12)

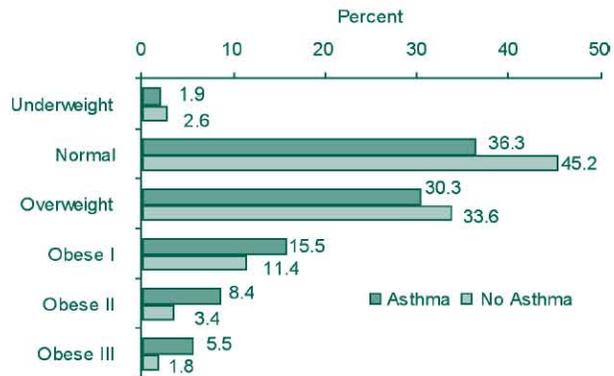


Obesity and Asthma

Obesity is a risk factor for developing asthma. Reports have shown that nearly 75% of emergency department (ED) visits for asthma have been among obese individuals, and studies have shown that obesity pre-dates asthma. The risk for developing asthma increases with increasing obesity among individuals.¹³

Figure 22. Prevalence of Body Mass Index¹⁴ categories by asthma status among adults, HHS 2003-2005.

- Adults with asthma are more likely to report being obese in comparison to those without asthma (statistically significant).



¹³ Tompson CC, Clark S, Chamargo CA Jr. Body mass index and asthma severity among adults presenting to the emergency department. Chest 2003; 124: 795-802

¹⁴ Body Mass Index (BMI) is a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems.

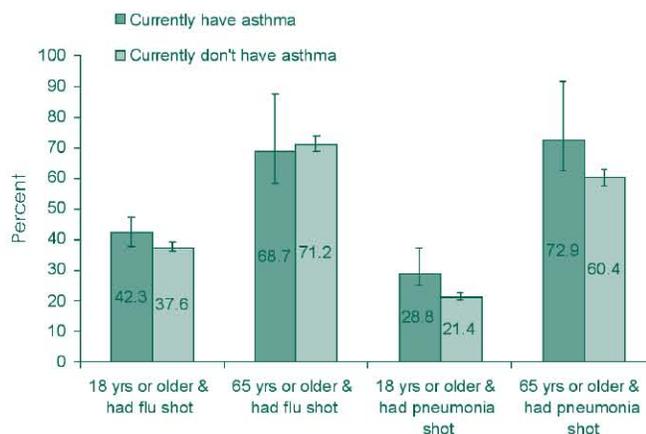
Asthma Prevalence

Vaccination and Asthma

Adults with asthma are at high risk of developing major problems after contracting the flu, yet many adults with asthma do not receive an annual flu vaccination.

Figure 23. Flu and pneumonia immunization by asthma status, BRFSS 2005-2006.

- *Hawaii's flu vaccine rates among adults with asthma are lower than the Healthy People 2010 goal of 60% (high-risk adults).*
- *For flu immunizations, there are no statistically significant differences in rates between adults with asthma and those without asthma.*
- *Adults with asthma report much higher rates of immunization for pneumonia than among those without asthma, particularly among the elderly 65 years or older (72.9% vs. 60.4%).*



Asthma Emergency Department Visits

Asthma is a chronic yet manageable disease, which can be controlled through appropriate medical treatment and the avoidance of triggers. The majority of emergency department (ED) visits and hospitalizations could be avoided with appropriate management. Despite this fact, each year many patients seek care at EDs for their symptoms.

In the United States, there are approximately 1.8 million visits for asthma each year. Data from ED can be used to examine the severity and management of asthma in terms of morbidity and overall cost on society. Management of asthma according to established National Asthma Education and Prevention Program guidelines can prevent a large number of emergency department visits for this disease.

Methods

In this section, data on ED visits for asthma for the state of Hawaii from 2000 to 2005 are presented. The focus covers five major issues: asthma severity, disparity, cost, trends and season of the year. The Hawaii data are compared to the Healthy People 2010 goals for asthma emergency department visit rates to assess our progress toward achieving the goals.

For the purpose of this report, asthma was defined as primary diagnosis with ICD-9 code 493. The definition excludes newborns, pregnancy-related admissions and patients admitted through a transfer from another facility. The ED data represent the number of visits (rather than persons) for asthma in the emergency department, thus any multiple events by an individual are recorded as separate events. The ED visit rate was derived by dividing the number of asthma visits for a given year by the specific population obtained from BRFSS 2005-2006.

Data were received from Hawaii's non-federal, hospital-based ED, with the exception of (1) Kahuku Hospital ED, (2) hospitalizations via ED and (3) Straub Hospital ED before 2005. ED visit data were obtained from Hawaii Health Information Corporation (HHIC). HHIC's mission is to collect, analyze and disseminate statewide health information to support efforts to continuously improve the quality and cost-efficiency of Hawaii's health care services. A private, not-for-profit corporation established in 1994, HHIC maintains one of Hawaii's largest healthcare databases, which contains nearly 1,000,000 inpatient discharge records collected from Hawaii's 22 acute care hospitals for each year since 1993. HHIC has the ability to generate comparative information using the extensive records in this database.

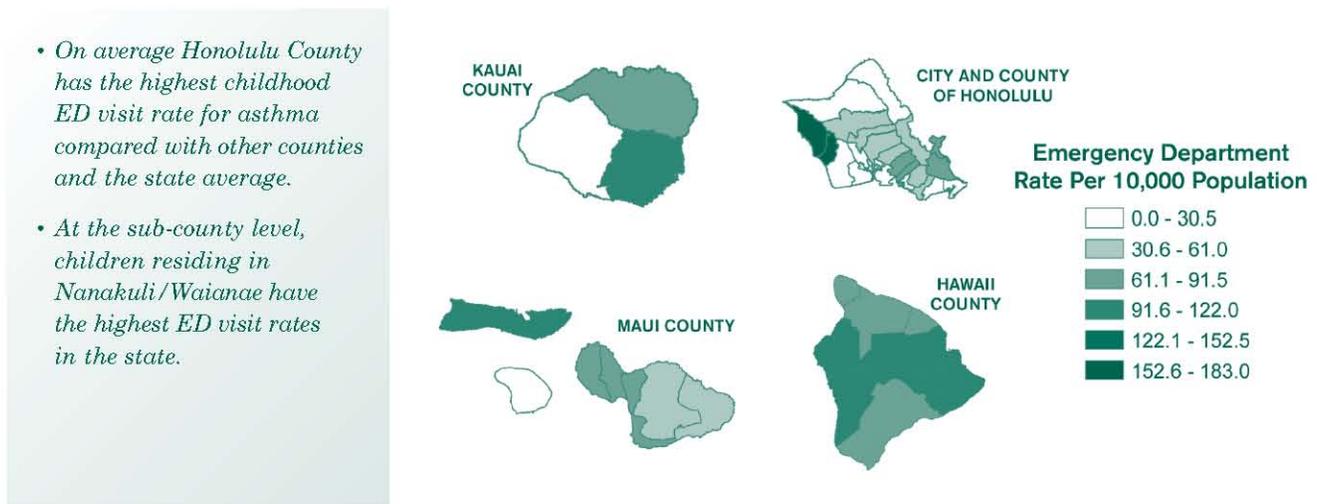
Asthma Emergency Department Visits

Asthma emergency department (ED) visits are expensive and may be preventable. Many of these ED visits could be avoided with better access to primary care physicians, health education and preventive medicine.

Children:

There were on average 4,810 ED visits per year¹⁵ with a primary diagnosis of asthma (ICD-9 code: 493); 1,850 (38%) of them were children under 18 years old during 2000-2005.

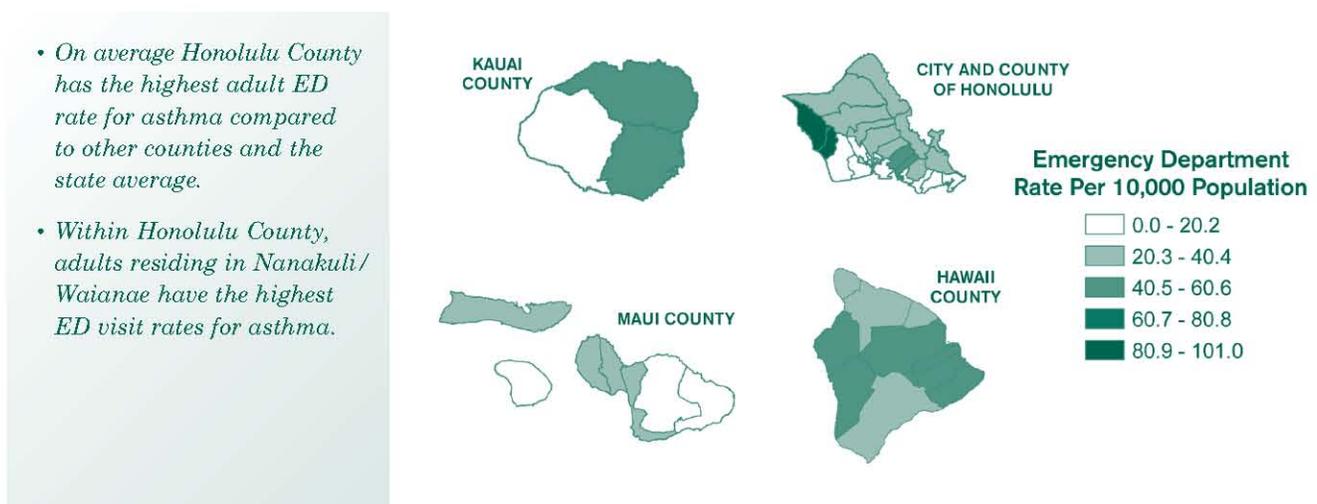
Figure 24. Asthma ED visits per 10,000¹⁶ children by geographic area, HHIC 2000-2005.



Adults:

There were on average 4,810 annual ED visits per year with a primary diagnosis of asthma (ICD-9 code: 493); 2,960 (62%) were adults during 2000-2005.

Figure 25. Asthma ED visits per 10,000 adults by geographic area, HHIC 2000-2005.



¹⁵ Hospitalization admissions via ED were excluded.

¹⁶ Average number of ED visits during 2000-2005 was multiplied by 10,000 and was divided by population size for the specific geographic areas obtained from BRFSS.

Asthma Emergency Department Visits

Local Geographic Area Prevalence

Table 3. Annual asthma ED visits¹⁷ by geographic area, HHIC 2000-2005 and BRFSS 2005-2006.

Child (<18)	ANNUAL AVERAGE		
	Number of ED Visits	Number of ED Visits Per 10,000 population ¹⁸	Estimated Percent of People with Asthma visit ED ¹⁹
HONOLULU COUNTY			
Aiea/Pearl City	111	57	7.5%
Ala Moana	35	-	-
Kaawa/Kahaluu/Kaneohe	70	57	6.6%
Kailua/Waimanalo	101	67	5.8%
Kaimuki/Palolo/Waikiki	41	34	5.0%
Manoa/Upper Makiki	48	52	4.4%
Mililani/Wahiawa	110	41	2.9%
Nanakuli/Waianae	282	183	10.4%
North Shore/Laie	25	27	3.8%
Nuuanu/Kalihi/Moanalua	138	70	5.6%
Salt Lake/Foster Village	39	21	2.6%
Wailae/Kahala/Hawaii Kai	18	18	2.2%
Waipahu/Kapolei/Ewa	61	15	1.2%
HAWAII COUNTY			
Hilo	123	106	8.3%
Kona	79	101	13.8%
North Hawaii	82	72	3.9%
Puna/Kau	90	75	4.6%
KAUAI COUNTY			
Hanalei/Kapaa	55	78	6.8%
Lihue/Waimea	107	121	8.7%
MAUI COUNTY			
Kahului	77	67	7.7%
Lahaina/Wailuku	69	69	7.2%
Lanai	1	12	3.0%
Molokai	23	112	4.7%
Upcountry/Hana	50	49	5.1%

Table continued on next page.

¹⁷ [average number of ED visits during 2000-2005]*10,000/ [population size for the specific geographic areas obtained from BRFSS 2005-2006].

¹⁸ [average number of ED visits during 2000-2005]*100/ [number of people with asthma reside in the specific geographic areas obtained from BRFSS 2005-2006].

¹⁹ Hospitalization admissions via ED and out of state residents were excluded.

Asthma Emergency Department Visits

Adult (≥18)	ANNUAL AVERAGE		
	Number of ED Visits	Number of ED Visits Per 10,000 population ¹⁸	Estimated Percent of People with Asthma visit ED ¹⁹
HONOLULU COUNTY			
Aiea/Pearl City	148	22	3.5%
Ala Moana	81	24	2.7%
Kaawa/Kahaluu/Kaneohe	105	22	2.2%
Kailua/Waimanalo	150	31	3.7%
Kaimuki/Palolo/Waikiki	125	20	4.1%
Manoa/Upper Makiki	110	24	4.2%
Milliani/Wahiawa	169	26	3.6%
Nanakuli/Waianae	317	101	10.0%
North Shore/Laie	50	22	2.3%
Nuuanu/Kalihi/Moanalua	310	42	5.2%
Salt Lake/Foster Village	48	14	1.5%
Wailae/Kahala/Hawaii Kai	30	7	1.4%
Waipahu/Kapolei/Ewa	99	8	1.1%
HAWAII COUNTY			
Hilo	192	56	5.3%
Kona	120	42	6.1%
North Hawaii	95	32	3.3%
Puna/Kau	125	40	4.9%
KAUAI COUNTY			
Hanalei/Kapaa	87	43	5.7%
Lihue/Waimea	142	51	5.2%
MAUI COUNTY			
Kahului	79	23	2.6%
Lahaina/Wailuku	68	21	2.2%
Lanai	2	7	0.9%
Molokai	23	38	3.9%
Upcountry/Hana	52	17	2.5%

- Honolulu County overall, along with the Nanakuli/Waianae sub-area, has the highest overall asthma ED visit rates per 10,000 population, and residents (adults and children) with asthma are more likely to visit the ED for their condition.
- The Kona sub-area in Hawaii County has the highest ED visit rate for children with asthma. On average, one in seven children with asthma residing in Kona visited the ED in the past 12 months.
- Although the Molokai sub-area has the highest childhood asthma prevalence in the state (Table 1), the childhood asthma ED visit rate is around the state average.

Asthma Emergency Department Visits

Basic Demographic Characteristics - Age, Gender and Ethnicity

Figure 26. Annual average ED visit rates per 10,000 population by gender and age, HHIC 2000-2005.

- Children have higher rates of asthma ED visits compared to adults, specifically among young boys (higher than HP 2010 Objective 24-3a).²⁰
- Female adults are more likely to visit the ED for asthma than adult males.
- These findings are similar to the trends found in the BRFSS (Figure 4).

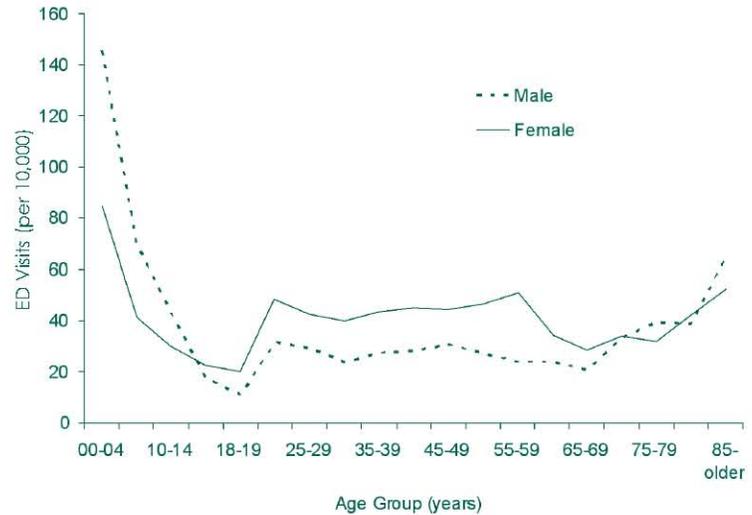
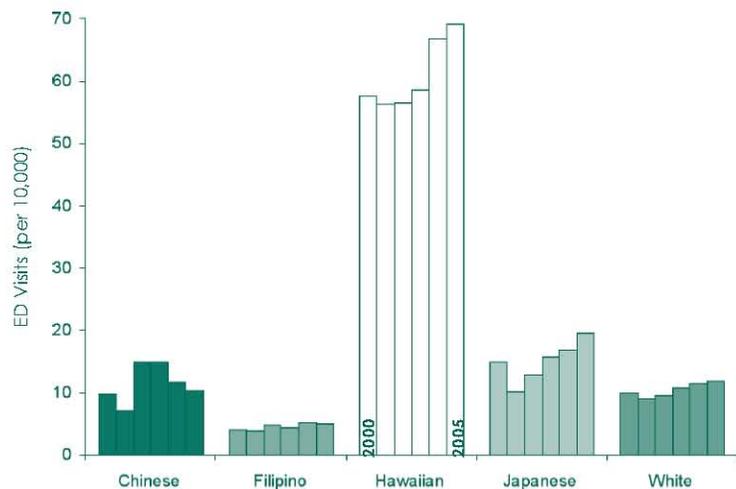


Figure 27. Annual average ED visit rates per 10,000 children by ethnicity, HHIC 2000-2005.

- Among children, Native Hawaiians have the highest ED visit rates than any other ethnic group for all years; the rate seems to be increasing.²¹
- The rate seems to be increasing for Japanese and Whites but not for Chinese or Filipinos.



²⁰ Healthy People 2010 Objective 24-2: Reduce hospital ED visits for asthma (Rate per 10,000) by 2010:

24-3a. Children under age 5 years	80
24-3b. Children and adults aged 5 to 64 years	50
24-3c. Adults aged 65 years and older	15

²¹ Disclaimer: The race/ethnicity data are not collected in a standardized format by the hospitals in Hawaii. However, because of the interest in race/ethnicity data, HHIC has attempted to distill data that might be useful. We have derived what we refer to as the conformed race data, i.e. if a race/ethnicity category is collected by all hospitals it is available for reporting purposes. If the race/ethnicity grouping is not collected/reported by all hospitals it is classified within the category "other". Hospitals that do not collect race/ethnicity for a patient ('Data not collected') or report race/ethnicity as 'Unknown' are classified as submitted. Hospitals that collect incomplete race/ethnicity data that do not conform to the minimum HHIC groupings are classified 'Not applicable'. The graphs exclude 'other', 'not applicable', 'unknown', and 'data not collected'.

Asthma Emergency Department Visits

Figure 28. Annual average ED visit rates per 10,000 adults by ethnicity, HHIC 2000-2005.

- Among adults, ED visits seem to be increasing for all ethnic groups except among the Chinese from 2000-2005.
- Native Hawaiian, Filipino, and White adults have higher rates of ED visits compared to other ethnic groups.

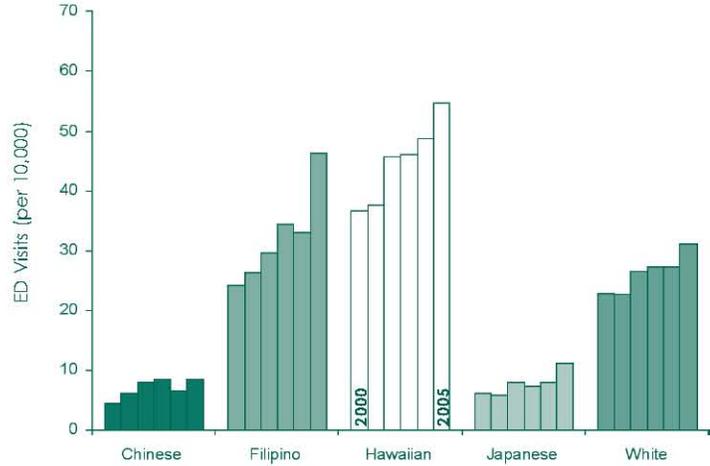
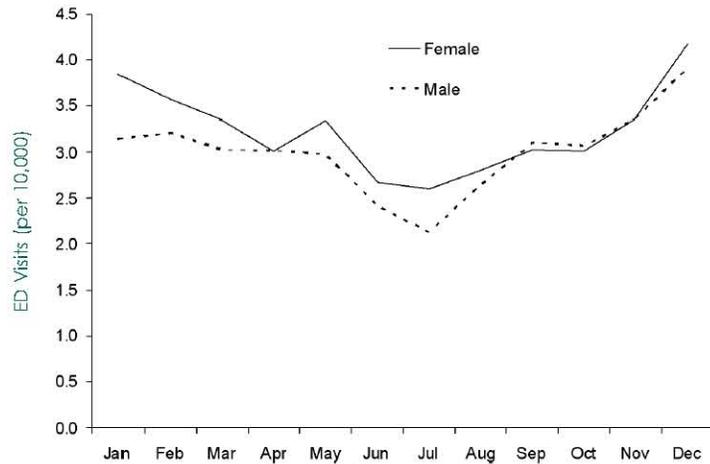


Figure 29. Annual average ED visit rates per 10,000 population by month and gender²², HHIC 2000-2005.

- Asthma ED visits for both males and females increase during the cooler season when flu is more prevalent.



²² Annual average asthma related ED visit rates per 10,000 population by month and gender was derived from $\{([10,000] * [\text{total number of gender specific visits for the given month}]) / ([\text{US Census 2000 gender specific Hawaii population}] * [\text{number of year data is available} = 6 \text{ years}])\}$.

Asthma Emergency Department Visits

Emergency Department Costs

Figure 30. Average annual ED visit costs for children and adults by payer, HHIC 2000-2005.

- Almost half of the asthma ED visits for both children and adults are paid by government programs (Medicaid and Medicare).
- 37% of the asthma ED visits are paid by private insurance
- Annual cost of asthma ED visits for the state of Hawaii is around \$4.2 million dollars per year.

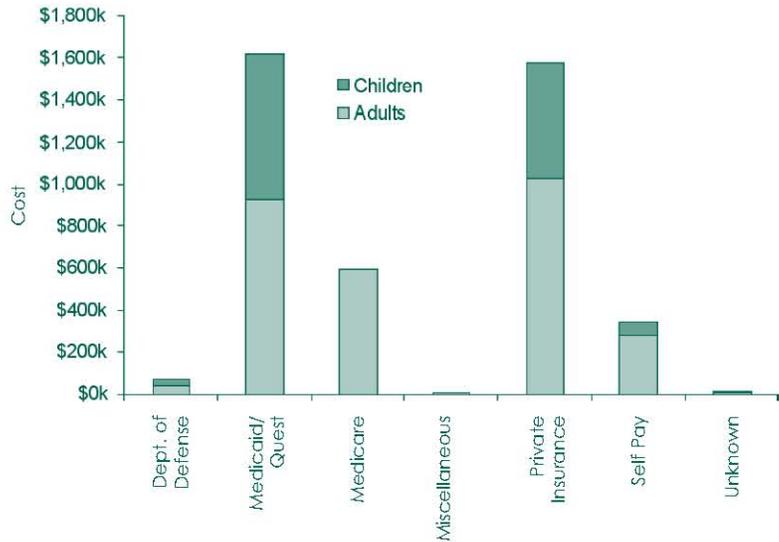
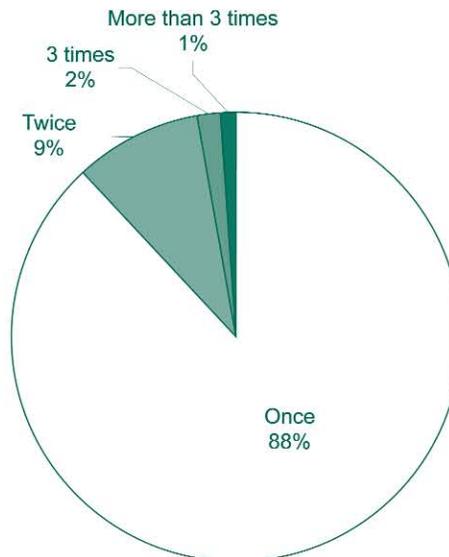


Figure 31. Repeated ED utilization in the past 12 months, HHIC 2000-2005.

- At least 12 % of ED visits are repeat ED utilizations²³ within the past 12 months.



²³ Based on the unique patient ID assigned by the HHIC; some patients that visited multiple hospitals might have more than one unique ID which leads to underestimation of the true ED visit rate.

Asthma Hospital Discharges

In the United States, approximately 500,000 (or 17 per 10,000 people) are hospitalized for asthma each year. Similar to ED visits, hospitalization data can be used to examine the severity and management of asthma in terms of morbidity and overall burden on society. Management of asthma according to established National Asthma Education and Prevention Program guidelines can prevent a large portion of hospitalization for this disease.

Methods

Asthma-related hospital discharge data for the State of Hawaii from 1995 to 2005 are presented (while ED data only covered 2000-2005). The focus covers five major issues: asthma severity, disparity, cost, trends and season of the year. The Hawaii data are compared to the Healthy People 2010 goals for asthma hospital discharge rates to assess our progress toward achieving the goals.

For the purpose of this report, asthma was defined as a primary diagnosis with ICD-9 code 493. The definition excludes newborns, pregnancy-related admissions and patients admitted through a transfer from another facility. The hospital discharge data represent the number of hospitalizations (rather than persons) who sought medical assistance for their asthma in the hospital, thus any multiple events by an individual are recorded as separate events. The hospital discharge rate was derived by dividing the number of asthma discharges for a given year by the specific population obtained from BRFSS 2005-2006.

The hospital discharge data were obtained from the Hawaii Health Information Corporation database (page 23).

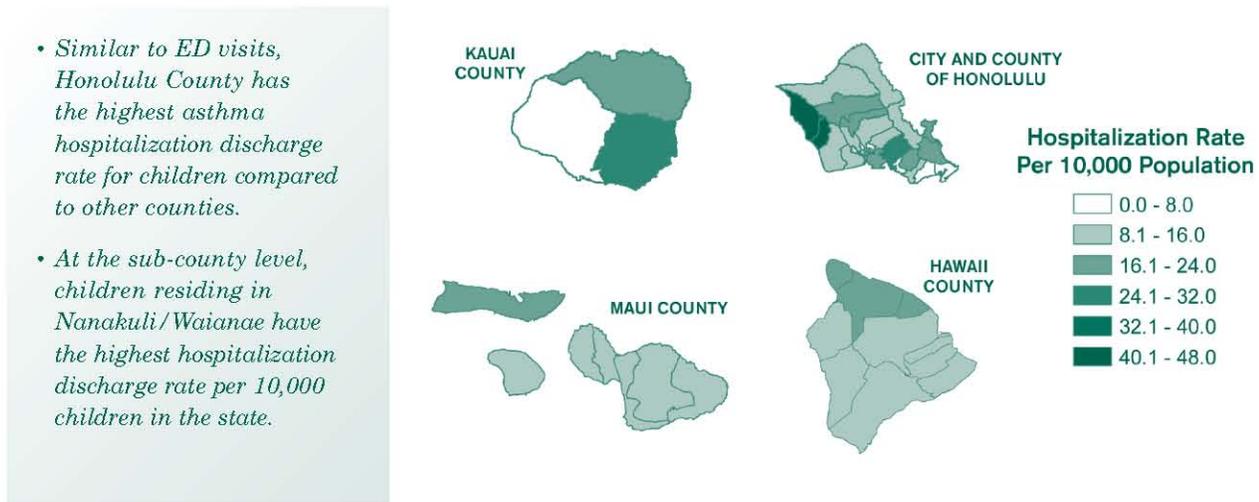
Asthma Hospital Discharges

Between 15% and 54% of childhood asthma hospitalizations could be prevented if children with asthma, particularly teens, took their medications as prescribed and scheduled, avoided asthma triggers and visited their doctor regularly.²⁴

Children:

During the period 1995-2005, there were on average 1,600 hospital inpatient discharges per year with a primary diagnosis of asthma (ICD-9 code: 493); 554 (35%) of them were children.

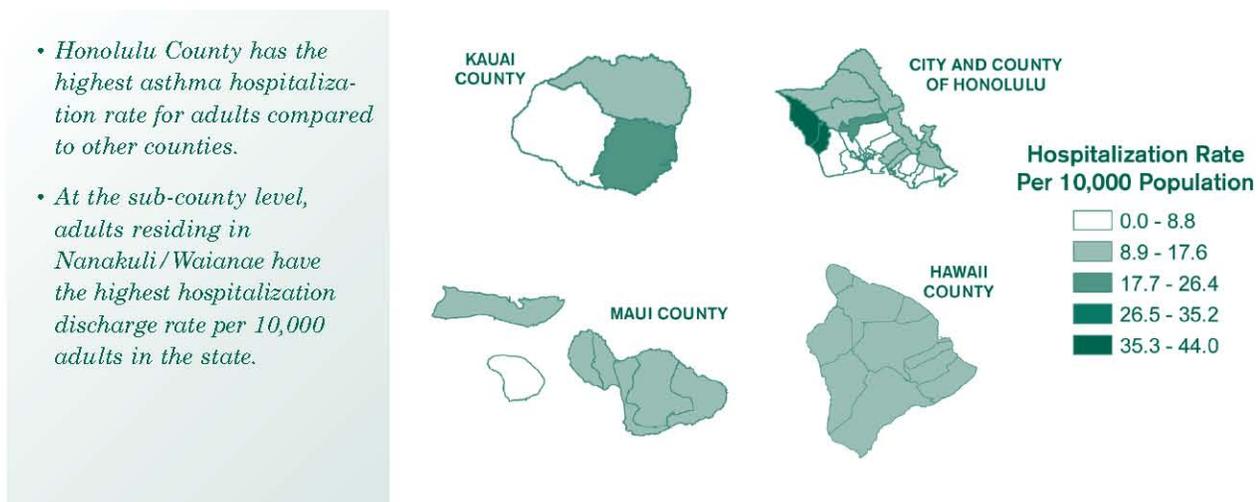
Figure 32. Childhood asthma hospitalization discharge rates per 10,000 children by geographic area, HHIC 1995-2005.



Adults:

During the period 1995-2005, there were on average 1,600 hospital inpatient discharges per year with a primary diagnosis of asthma (ICD-9 code: 493); 1,046 (65%) were adults.

Figure 33. Adult asthma hospitalization discharge rates per 10,000 adults by geographic area, HHIC 1995-2005.



²⁴ Flores, G., Areu M., Tomany-Koman, S., Meurer, J. Keeping children with asthma out of hospitals: Parents' and physicians' perspectives on how pediatric asthma hospitalizations can be prevented. Pediatrics 2005, vol. 116, no4, pp. 957-965

Asthma Hospital Discharges

Local Geographic Area Prevalence

Table 4. Annual asthma hospitalization discharge rates by geographic area, HHIC 1995-2005, BRFSS 2005-2006.

Child (<18)	ANNUAL AVERAGE		
	Number of Hospitalizations	Number of Hospitalizations Per 10,000 population ²⁵	Estimated Percent of People with Asthma Hospitalized ²⁶
HONOLULU COUNTY			
Aiea/Pearl City	31	16	2.1%
Ala Moana	10	-	-
Kaawa/Kahaluu/Kaneohe	20	16	1.9%
Kailua/Waimanalo	26	17	1.5%
Kaimuki/Palolo/Waikiki	17	14	2.1%
Manoa/Upper Makiki	17	18	1.5%
Milliani/Wahiawa	54	20	1.4%
Nanakuli/Waianae	73	48	2.7%
North Shore/Laie	14	16	2.2%
Nuuanu/Kalihi/Moanalua	61	31	2.5%
Salt Lake/Foster Village	44	23	2.9%
Wailae/Kahala/Hawaii Kai	6	6	0.8%
Waipahu/Kapolei/Ewa	45	11	0.9%
HAWAII COUNTY			
Hilo	18	15	1.2%
Kona	10	13	1.8%
North Hawaii	19	17	0.9%
Puna/Kau	15	13	0.8%
KAUAI COUNTY			
Hanalei/Kapaa	17	23	2.0%
Lihue/Waimea	23	26	1.9%
MAUI COUNTY			
Kahului	17	15	1.7%
Lahaina/Wailuku	16	16	1.7%
Lanai	1	10	2.6%
Molokai	5	23	1.0%
Upcountry/Hana	12	12	1.2%

²⁵ [average number of hospital discharges during 1996-2005]*10,000/ [population size for the specific geographic areas obtained from BRFSS 2005].

²⁶ [average number of hospital discharges during 1996-2005]*100/[number of people with asthma reside in the specific geographic areas obtained from BRFSS 2005]

Asthma Hospital Discharges

Adult (≥18)	ANNUAL AVERAGE		
	Number of Hospitalizations	Number of Hospitalizations Per 10,000 population ²⁵	Estimated Percent of People with Asthma Hospitalized ²⁶
HONOLULU COUNTY			
Aiea/Pearl City	30	4	0.7%
Ala Moana	25	8	0.8%
Kaawa/Kahaluu/Kaneohe	41	9	0.9%
Kailua/Waimanalo	45	9	1.1%
Kaimuki/Palolo/Waikiki	46	7	1.5%
Manoa/Upper Makiki	37	8	1.4%
Milliani/Wahiawa	67	10	1.4%
Nanakuli/Waianae	138	44	4.4%
North Shore/Laie	31	14	1.4%
Nuuanu/Kalihi/Moanalua	116	16	2.0%
Salt Lake/Foster Village	26	8	0.9%
Wailae/Kahala/Hawaii Kai	18	4	0.8%
Waipahu/Kapolei/Ewa	72	6	0.8%
HAWAII COUNTY			
Hilo	55	16	1.5%
Kona	31	11	1.6%
North Hawaii	26	9	0.9%
Puna/Kau	32	10	1.3%
KAUAI COUNTY			
Hanalei/Kapaa	23	11	1.5%
Lihue/Waimea	51	18	1.9%
MAUI COUNTY			
Kahului	34	10	1.1%
Lahaina/Wailuku	32	10	1.0%
Lanai	1	4	0.6%
Molokai	9	14	1.4%
Upcountry/Hana	28	9	1.4%

- Honolulu County overall, along with the Nanakuli/Waianae sub-area, has the highest overall asthma hospitalization rates per 10,000 population, and residents (adults and children) with asthma are more likely to be hospitalized for their condition.
- The Lanai sub-area in Maui County has the highest hospitalization rates among children with asthma; however, childhood asthma prevalence in this sub-area is the lowest in the state (4%). Only 6 children were hospitalized for asthma in the Lanai sub-area during 2000-2005; therefore, data should be interpreted with care.
- Although the Molokai sub-area has the highest childhood asthma prevalence in the state (Table 1), the childhood asthma hospitalization rate is around the state average.

Asthma Hospital Discharges

Basic Demographic Characteristics – Age, Gender and Ethnicity

Figure 34. Average hospitalization discharge rates per 10,000 population by gender and age, HHIC 1995-2005.

- Children have higher rates of asthma hospitalization compared to young adults (higher than HP 2010 Objective 24-2a).²⁷
- Female adults are more likely to be hospitalized for asthma than adult males
- The elderly and young children are more likely to be hospitalized for asthma than younger adults
- These findings are supported by results presented earlier that asthma is significantly higher among boys than girls and women compared to men (BRFSS and HHS).

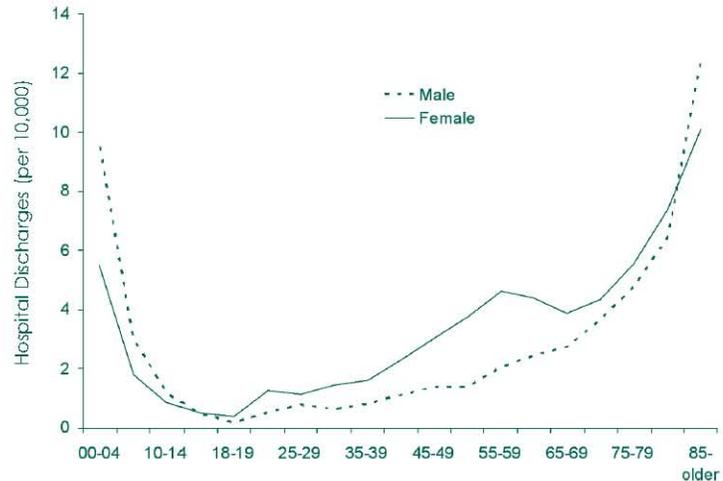
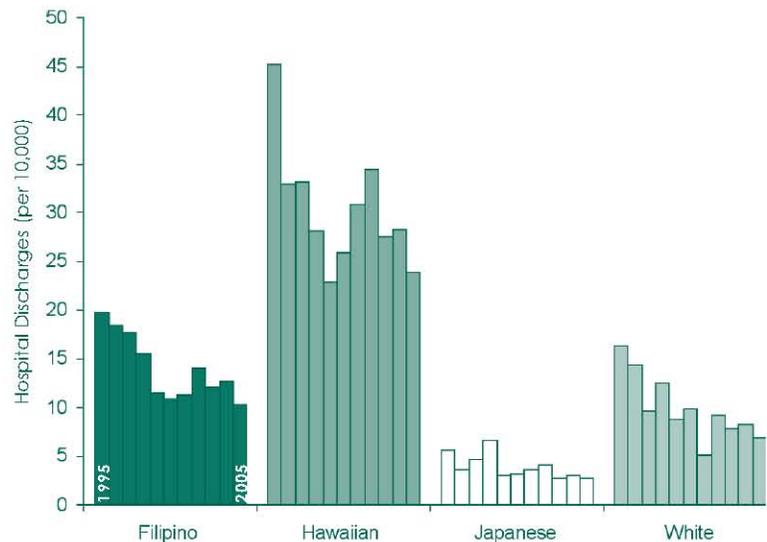


Figure 35. Average hospitalization discharge rates per 10,000 children by ethnicity, HHIC 1995-2005.

- Hospitalization for children with asthma seems to be decreasing for all ethnic groups.²⁸
- Among children, Native Hawaiians have the highest hospitalization rate followed by Filipino and Whites, with the lowest rate among the Japanese.



²⁷ Healthy People 2010 Objective 24-2: Reduce hospitalizations for asthma (Rate per 10,000)

24-2a. Children under age 5 years	25.0
24-2b. Children and adults aged 5 to 64 years	7.7
24-2c. Adults aged 65 years and older	11.0

²⁸ Disclaimer: The race/ethnicity data are not collected in a standardized format by the hospitals in Hawaii. However, because of the interest in race/ethnicity data, HHIC has attempted to distill data that might be useful. We have derived what we refer to as the conformed race data, i.e. if a race/ethnicity category is collected by all hospitals it is available for reporting purposes. If the race/ethnicity grouping is not collected/reported by all hospitals it is classified within the category "other". Hospitals that do not collect race/ethnicity for a patient ("Data not collected") or report race/ethnicity as "Unknown" are classified as submitted. Hospitals that collect incomplete race/ethnicity data that do not conform to the minimum HHIC groupings are classified "Not applicable". The graphs exclude "other", "not applicable", "unknown", and "data not collected".

Asthma Hospital Discharges

Figure 36. Average hospital discharge rates per 10,000 adults by ethnicity, HHIC 1995-2005.

- Adult asthma hospitalization rates do not show a change in overall trends, with the exception of the rate among Filipinos which seems to be increasing.
- Among adults, Native Hawaiians have the highest hospitalization rate followed by Whites and Filipinos, with the lowest rate among the Japanese.

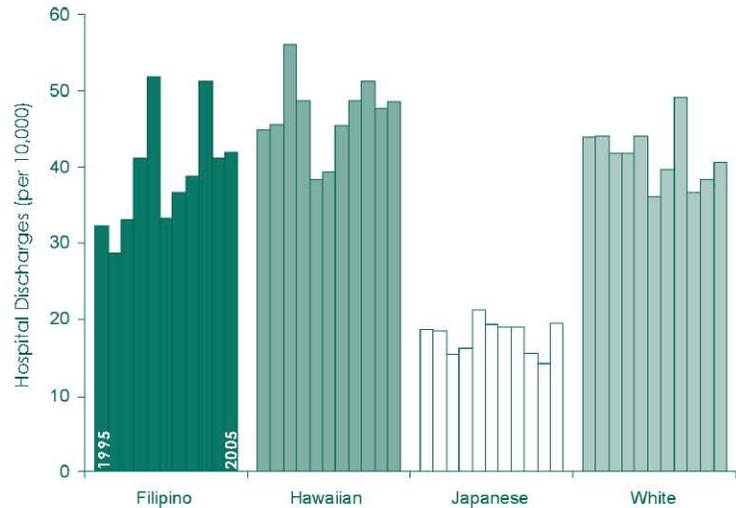
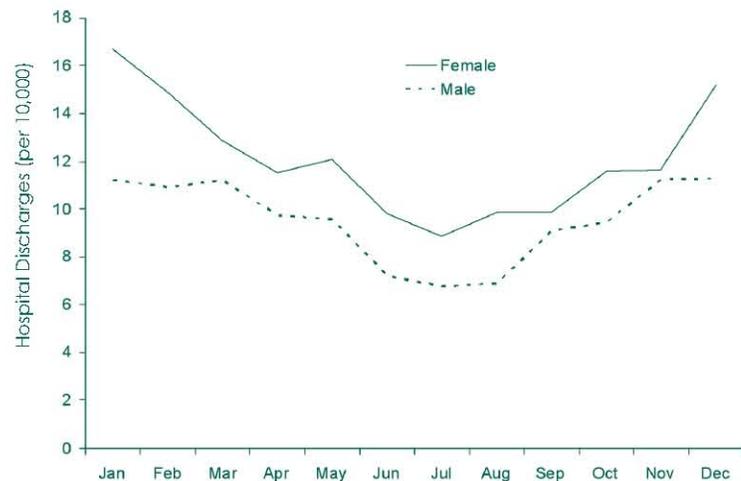


Figure 37. Annual average hospital discharge rates per 10,000 population by month and gender²⁹, HHIC 1995-2005.

- Asthma ED hospitalizations for both males and females increase during the cooler season when flu is more prevalent.



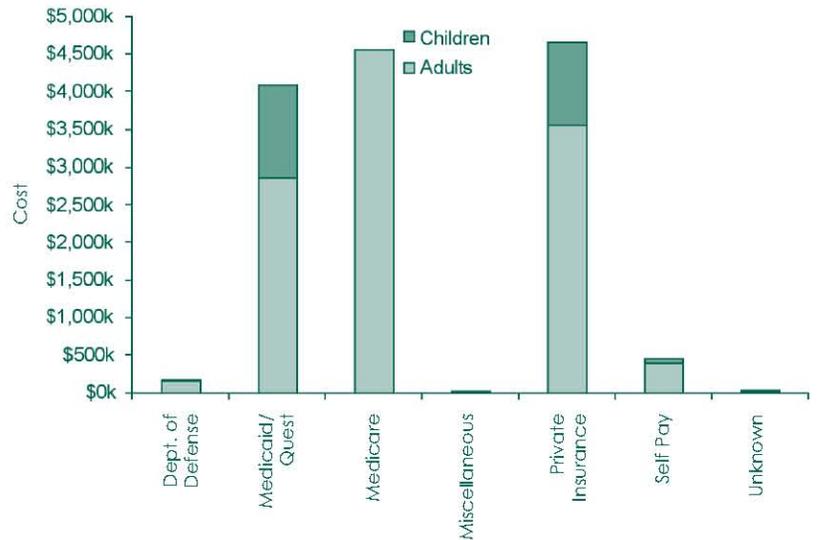
²⁹ Annual average asthma related hospitalization rate per 10,000 population by month and gender was derived from $\frac{[10,000] \times [\text{total number of gender specific asthma hospitalizations for the given month}]}{[\text{US Census 2000 gender specific Hawaii population}] \times [\text{number of year data is available} = 11 \text{ years}]}$.

Asthma Hospital Discharges

Asthma Hospitalization Cost

Figure 38. Average annual hospitalization cost by payer, HHIC 1995-2005.

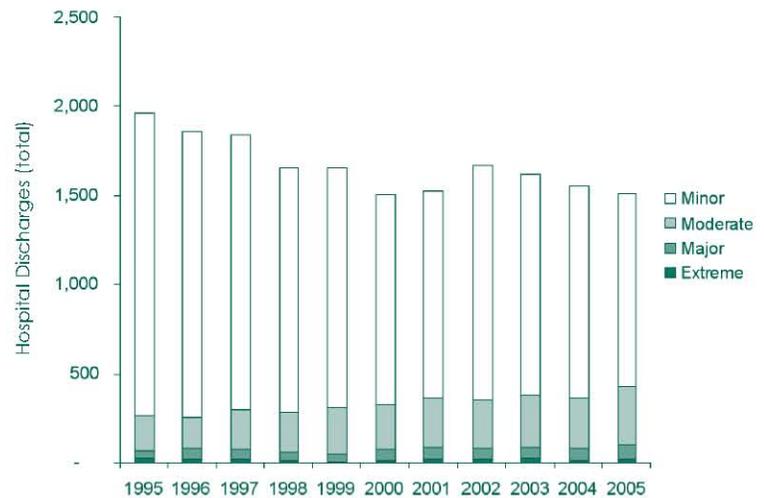
- Two-thirds of asthma hospital charges are paid by government programs (Medicaid and Medicare).
- The vast majority (83%) of asthma hospitalization costs are incurred by adults.
- Private insurance paid 45% of asthma hospitalization costs for children and 31% for adults.



Asthma Hospitalization Severity

Figure 39. Average annual asthma hospitalizations, the risk of mortality³⁰ by year, HHIC 1995-2005.

- The majority of asthma-related hospitalizations (80%) have minor mortality risk.
- 15% of asthma hospitalizations have moderate risk for mortality and 5% of asthma hospitalizations have major or extreme mortality risks.



³⁰ Risk of mortality is defined as the likelihood of dying as defined by the HHIC.

Asthma Hospital Discharges

Figure 40. Average annual asthma hospitalization discharge by severity value³¹, HHIC 1995-2005.

- The majority of asthma hospitalizations (52%) are classified as minor patient severity.
- 36% of asthma hospitalizations are of moderate severity; while 12 % of asthma hospitalizations are of major or extreme severity.

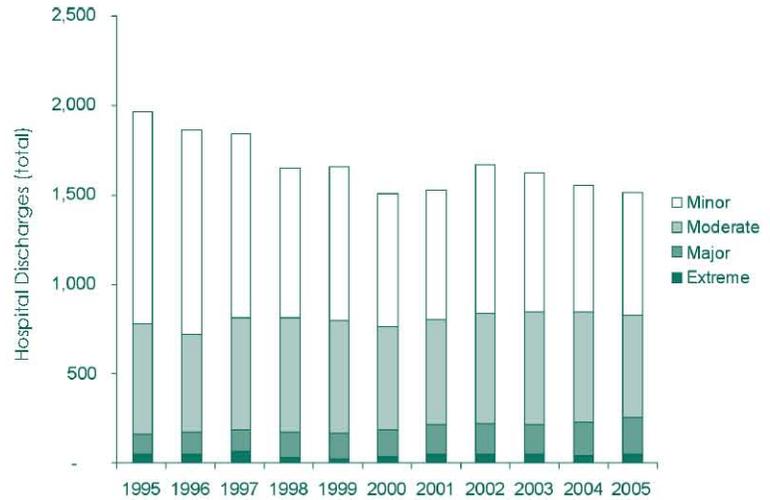
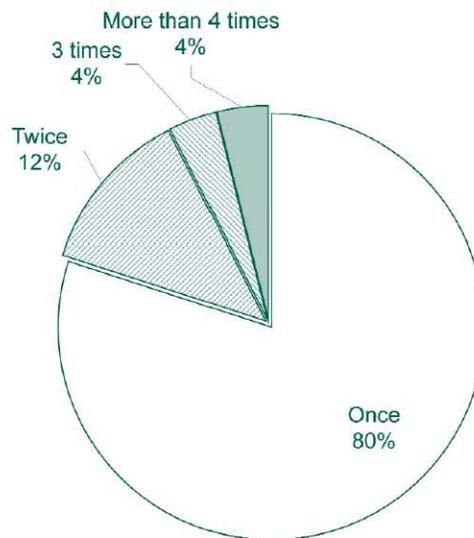


Figure 41 Repeated hospitalization³² in the past 11 years, HHIC 1995-2005.

- At least 20% of asthma hospitalizations are repeat patients in the past 11 years.



³¹ Severity of illness is defined as the extent of physiologic decompensation or organ system loss of function as defined by the HHIC.

³² Based on the unique patient ID assigned by the HHIC; some patients that visited multiple hospitals might have more than one unique ID which leads to underestimation of the true ED repeated utilization rates.

Asthma Mortality

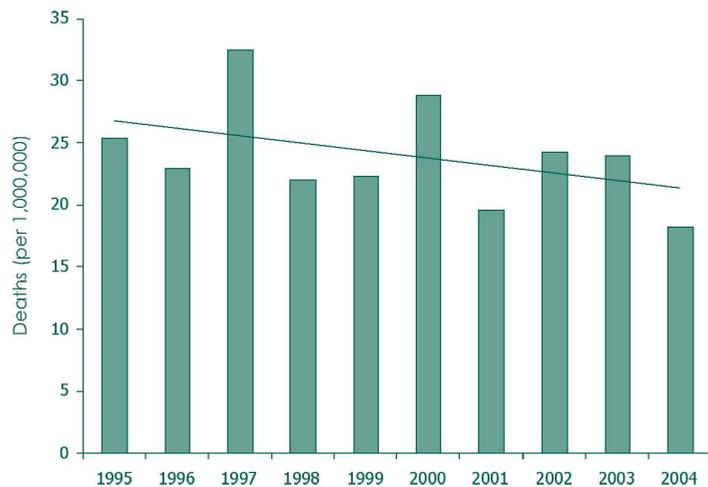
The Office of Health Status Monitoring (OHSM) of the Hawaii Department of Health collects, processes, analyzes and disseminates relevant, population-based data in a timely fashion in order to assess the health status of Hawaii's population and to fulfill health statistics legal requirements. The office also provides vital statistics, demographic and health data for use in identifying state and community health trends, identifying population groups at risk for serious health problems and evaluating program effectiveness. Other OHSM activities include maintaining health surveys for the purpose of collecting data on health conditions not otherwise monitored within the state, yet needed to analyze health status; disseminating information through published reports and through visual presentations such as charts, graphs and maps; and coordinating the integration and linkage of departmental databases with external databases. The OHSM also provides a repository for vital event records with the state such as births, deaths and marriages and provides copies to the general public on a timely basis. OHSM also issues marriage licenses as well as marriage, birth and death certificates.

To understand the succeeding discussion the following terms are being defined.

- Mortality Rate expresses the number of deaths occurring in a particular population during a given period of time.
- Underlying Cause of Death is the disease/condition that initiated the train of events leading to death.
- Contributory Causes of Death are diseases/conditions that did not initiate the train of events leading to death, but resulted in death directly or indirectly, or any other significant conditions, which unfavorably influenced the course of the morbid process and thus contributed to the fatal outcome.

Figure 42. Statewide asthma mortality (underlying cause) rates per 100,000 population, OHSM 1995-2004.

- *There is an overall downward trend in asthma mortality rates for underlying cause from 1995 to 2004.*
- *In 2004, 18 people died from asthma in the state of Hawaii.*



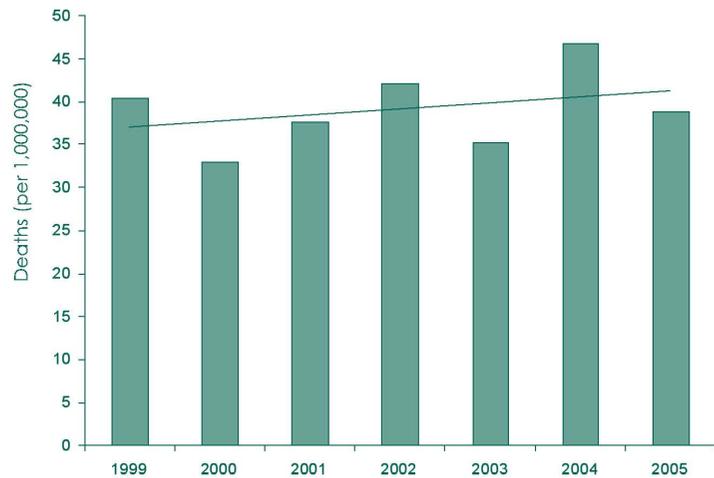
Source: Office of Health Status Monitoring, Hawaii State Department of Health Rates were calculated by the Hawaii State Asthma Control Program
*The Estimated Comparability Ratio was used to allow comparisons to be made across all years

Asthma Mortality

State Mortality

Figure 43. Statewide asthma mortality (non-underlying cause of death) rates per 100,000 population, OHMS 1999-2005.

- *There is an overall slight upward trend in asthma mortality rates for non-underlying cause of death from 1999 to 2005.*
- *In 2005, 49 people died where asthma was a non-underlying cause of death in the state of Hawaii.*



Source: Office of Health Status Monitoring, Hawaii State Department of Health Rates were calculated by the Hawaii State Asthma Control Program

These two questions on child asthma were asked up to calendar year 2004. However, in 2005 a procedural change occurred in that a child is randomly selected if there are children living with the respondent. Asthma information on the randomly selected child was asked from the adult respondent. To accommodate this procedural change, the wording of the child asthma questions were modified as: (1) 'Has a doctor, nurse or other health professional EVER said that the child has asthma?' (2) 'Does the child still have asthma?'

Adult Asthma Prevalence is defined by the Hawaii BRFSS as those who responded "yes" to the question, "Have you ever been told by a doctor, nurse, or other health professional that you had asthma?"

Adult Current Asthma Prevalence is defined by the Hawaii BRFSS as those who responded "yes" to the Adult Lifetime Asthma Prevalence question and who responded "yes" to the question, "Do you still have asthma?"

Child Lifetime Asthma Prevalence is defined by the Hawaii BRFSS by asking this question to adult respondents with a child or children in the household: "Has a doctor, nurse or other health professional EVER said that the child has asthma?"

Child Current Asthma Prevalence is defined by the Hawaii BRFSS by asking adult respondents who reported having a child or children in the household that have been diagnosed as "ever" having asthma the following question: "Does the child still have asthma?"

Community (sub-county geographic areas) in this report is defined by the aggregation of adjacent zip codes with at least one school complex in the area. A list of the community zip codes can be found on the following web site:

<http://hawaii.gov/health/statistics/brfss/others/subarea.html>

Ethnicity respondents are asked to choose up to six ethnicities from the ethnicity list following the question: "Which one or more of the following would you say is your ethnicity?" This question is followed up by another question when more than one ethnicity is mentioned: "Which one of these groups would you say best represents your ethnicity?" The ethnicity list includes Caucasian, Hawaiian, Chinese, Filipino, Japanese, Korean, Samoan, Black, American Indian/Alaska Native/Eskimo/Inuit, Vietnamese, Asian Indian, Portuguese, Guamanian/Chamorro, Puerto Rican, Mexican, Tongan, Laotian, Cambodian, Malaysian, Fijian, Micronesian and other Asian. In addition, a respondent can specify their own ethnicity if it is not listed, or they can say they don't know, they are not sure, or they refuse to answer. For simplicity, this document re-categorizes race/ethnicity into White (includes Portuguese), Hawaiian, Filipino, Japanese and "Others" (includes Chinese).

Frequent mental distress is at least 14 days of not good mental health. This 14-day minimum period was selected because physicians and clinical researchers often use a similar period as a marker for clinical depression and anxiety disorders.

Smoking Status is defined as a current smoker as a person who responds "yes" to currently smoking every day or some days. The Hawaii BRFSS defines a former smoker as a person who has smoked at least 100 cigarettes in their lifetime, but no longer smokes.





Hawaii Health Survey (HHS) Definitions

To determine household members with asthma, the adult respondent was asked, "Has anyone in the household been told by a physician or medical professional that they have asthma?" Answers to the question for each household member were categorized as yes, no, don't know or refused to answer.

Asthma prevalence was calculated by combining data from two or more years. The weight applied was averaged by the number of years of data combined. Calculating averages by combining years tends to smooth trend lines and decrease the range of the 95% confidence interval. In addition, adjusting prevalence values by the age structure of the groups being compared allows the comparison of groups with different age structures.

Age at last birthday was provided for each household member by the adult respondent. If age is missing, it is imputed using a "hot deck" method. The missing ages are less than 2.0% of the sample.

Body Mass Index (BMI) was defined as weight in kilograms divided by height in meters squared (kg/m²). Height and weight were asked only of the respondent, thus data are only for the population aged 18 years and up. The National Heart, Lung and Blood Institute (June 17, 1998) released the federal guidelines for the "clinical definition" of overweight and obese:

<i>Underweight</i>	<18.5
<i>Normal</i>	18.5-25.0
<i>Overweight</i>	25.0-30.0
<i>Obese I</i>	30.0-35.0
<i>Obese II</i>	35.0-40.0
<i>Obese III</i>	>40.0

Educational status was provided by the adult respondent for everyone aged eighteen years and greater in the household. The responses were coded not a high school graduate, high school graduate/GED, 1-3 years of college, college graduate and unknown.

Ethnicity was described by the respondent for each household member and his or her mother and father. Up to four ethnicities were listed for each household member. The responses were coded to White/Caucasian, Hawaiian, Chinese, Filipino, Japanese, Korean, Samoan/Tongan, Black/African American, Native American/Aleut/Eskimo/Inuit, Vietnamese, Asian Indian, Portuguese and/or Guamanian/Chamorro. In 2000, the responses Puerto Rican, Mexican, other Pacific Islander and Other Asian were added. The respondent could also specify another ethnicity if it is not listed, reply they do not know, or refuse to answer.

OHSM codes these eight possible responses for each individual to one ethnicity in order to comply with prior Census rules coding race/ethnicity. Specifically, if Hawaiian is listed for the mother or father, the person is coded to Hawaiian. Otherwise, the person is coded to the first ethnicity listed (other than Caucasian or unknown) for the father. If the father's responses are Caucasian or unknown, the person's ethnicity is coded to the first ethnicity listed (other than Caucasian or unknown) for the mother. Lastly, if there are no other responses other than Caucasian or unknown, the person is coded to Caucasian. Otherwise, the person is coded to "do not know," refused, or missing.

Health Related Quality of Life was measured by questions from the SF-12® Version One (a shortened 12 questionnaire from the SF-36® questionnaire). Questions were related to self-reported general health, limitations caused by physical and/or emotional problems, pain limiting activities, limitations to amount and type of work and limitations in social activities due to health problems.

Scoring for the summary scales MCS-12 (mental component summary scale) and PCS-12 (physical component summary scale) from the twelve questions on health are outlined in the SF-12® manual. The SF-12® scoring algorithm is a composite score of weighted item responses to twelve questions on self-reported physical and mental health status. A higher summary scale value indicates better health for both the mental and physical summary scale. The scores are standardized so that the mean equals 50 and the standard deviation 10 for the general U.S. population.

Marital status was provided by the adult respondent for everyone aged fifteen years and greater in the household. The responses were coded into married, divorced, separated, never married and too young to be married.

Poverty status was determined by using the "poverty guidelines" and took into account not only income, but also household size supported by the income. Thus, it is a more useful indicator of actual personal income. It was reported for the household and/or the household members.

Poverty guidelines are updated annually in the Federal Register by the U.S. Department of Health and Human Services. The poverty guidelines are designated for the year in which they are issued and reflect price changes for the prior year. The Hawaii Health Survey income question is asked also of the prior year. Thus, the 2004 Federal Poverty Guidelines were used for 2004 income data to compute percent poverty levels for 2004. Households below 100% of the guideline are said to be below the poverty guideline. Individuals in those households are said to be "living below the poverty line." Poverty levels for persons of unknown income were listed as unknown.

Smoking status was determined by several questions including: "Does anyone in your household smoke cigarettes?" "What are the names (initials) of those household members?" "In the past 30 days, has anyone, including yourself, smoked cigarettes, cigars or pipes inside your home?"





Reliability refers to the consistency of a survey. If sample denominators were less than 50 or the relative standard error was greater than 35, then data are indicated to not be reliable estimates based on small sample sizes or high variability.

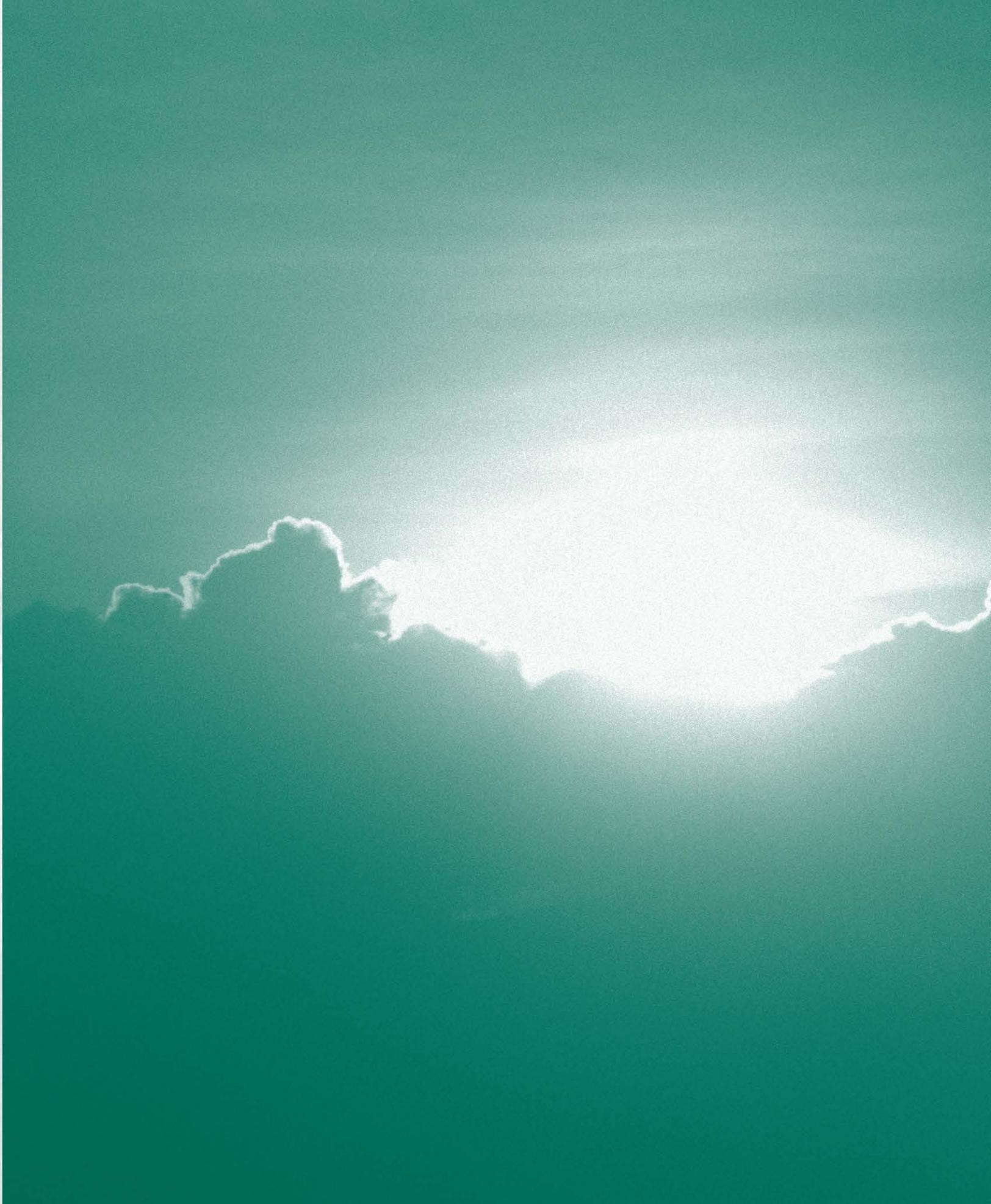
³¹ CDC. Self-reported frequent mental distress among adults—United States, 1993 - 1996 MMWR 1998; 47:326—31.

³² National Heart, Lung and Blood Institute in cooperation with National Institute of Diabetes and Digestive and Kidney Diseases. On the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. NIH Publications No. 98-4083. 1998. U.S. Department of Health and Human Services. The Evidence Report.

³³ Interagency Committee for the Review of Standards for Data on Race and Ethnicity. Tabulation Working group. Draft Provisional Guidance on the Implementation of the 1997 Standards for Federal Data on Race and Ethnicity. 1999;2-17.

³⁴ Ware, J.E., Kosinski, M., Keller, S.D. SF-12®: How to Score the SF-12® Physical and Mental Health Summary Scales. Lincoln, RHO: Quality Metric Incorporated, Third Edition, 1998.

³⁵ U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. Poverty Guidelines - Research and Measurement. 2000;1-2. <http://aspe.hhs.gov/poverty/poverty.htm>.





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age, sex, religion, or disability. Write or call our departmental Affirmative Action Officer at
P.O. Box 3378, Honolulu, HI 96801-3378, or at 808-586-4616 (voice) within 180 days of a problem.

Adults who ever smoked 100 cigarettes and who now smoke some days or every day Filter:	Yes
Year Filter:	2018, 2017, 2016
Data Grouped By:	Community

Chart

Cigarettes - current smoker, Age Adjusted by Community

