

**Summary of Pesticide and Dioxin Contamination Associated  
with Former Sugarcane Operations**

**Hawai'i Department of Health**

**Hazard Evaluation and Emergency Response Office**



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**Prepared with the assistance of Tetra Tech EM Inc.**

## **Introduction**

This report provides a summary of data for pesticide-related contamination of soils associated with former sugarcane operations throughout the State of Hawaii. The summaries were prepared by Tetra Tech EM, Inc., under a contract with the Hazard Evaluation and Emergency Response (HEER) office of the Hawai'i Department of Health (HDOH).

Section 9 of the HEER office *Technical Guidance Manual* (TGM) provides an overview of historical pesticide use related to sugarcane operations in Hawai'i (HDOH 2009). Targeted pesticides are primarily associated with the need for weed control during sugarcane cultivation (herbicides) or the control of fungus during initial planting of "seed" cane (fungicides). As described below, arsenic, dioxin, ametryn and atrazine (associated with herbicides) and in some cases mercury (associated with fungicides) are key chemicals of potential concern (COPCs), although a much longer suite of chemicals was evaluated.

Operations where soil investigations are typically carried out include:

- Fields,
- Pesticide mixing areas;
- Seed dipping areas;
- Settling ponds;
- Bagasse piles;
- Pesticide container disposal areas;
- Plantation camps;
- Rail lines.

Other operations that could have lead to contamination of soil at former sugar mills include maintenance facilities (petroleum, solvents, etc.) and transformers (PCBs), although these operations were not specific to sugar mills. Early sugar mills typically produced their own energy, in part by burning crushed cane after the sugar had been extracted ("bagasse").

## **Historical Use of Pesticides at Sugar Mill Operations**

Pesticide use at sugar mill operations varied over time and potential contamination is directly tied to the period in which the operation was active. Arsenic-based pesticides were in widespread use in the period from the 1910s through the early 1940s (refer to HDOH 2009). Trace to heavy contamination of soils with arsenic is often identified at operations that were active during this period. The heaviest contamination is associated with former pesticide mixing areas. The arsenic tends to be tightly bound to iron in the volcanic soils of the islands, however, which greatly reduces its potential toxicity. This is evaluated on a site-specific basis by testing soils that exceed likely background levels of arsenic for "bioaccessible arsenic" for final, decision making purposes (see HDOH 2010a). Contamination slightly above soil action levels for bioaccessible arsenic under a residential land use scenario has been identified in a few former field areas, especially in the area of Hilo. Exposure studies of residents living in these

areas did not identify health effects associated with exposure to the arsenic, which is likely to be well below typical dietary exposure (USDHHS 2008).

Arsenic-based herbicides were replaced with more effective and cheaper, chlorinated herbicides beginning in the 1940s. Of particular interest from a soil contamination standpoint was the widespread use of pentachlorophenol (PCP) from the mid 1940s through the late 1960s to early 1970s. Pentachlorophenol degrades over time and in itself poses only localized, long-term environmental concerns at a limited number of sites. However, PCP was later found to contain significant levels of dioxins that were generated during production of the chemical (see HDOH 2009). A key finding of this study is that significant dioxin contamination can be present in soil even though PCP has degraded to well below levels of concern. This is especially significant at pesticide mixing areas that operated between the mid 1940s and the late 1960s, several of which are heavily contaminated with both arsenic and dioxins. Dioxins in soil at these sites could pose potential direct-exposure concerns if the soil is not properly managed. Trace levels of dioxins have been identified in former sugarcane fields, but have been consistently below levels of potential concern and well below levels associated with former mixing areas. A summary of available soil dioxin data from non-sugarcane operations is also included for comparison. The herbicide 2,4-D was also widely used, although it appears to rarely poses long-term soil contamination concerns.

The import of PCP into Hawai'i was banned in the late in the late 1960s (see HDOH 2009). Sugarcane cultivators subsequently switched to less toxic and more efficient herbicides such as ametryn and atrazine for weed control. Unlike arsenic and dioxins, these herbicides degrade relatively rapidly in soil and are significantly persistent. As noted the summary tables, low to moderate levels of these chemicals can still be identified in soils associated pesticide mixing areas that operated from the 1970s through the 1990s. The herbicides are rarely if ever present at levels that could pose direct-exposure concerns. These chemicals do not bind tightly to the soil, however, and pose potential leaching hazards to underlying drinking water aquifers if the soil is not properly managed.

## **Summary of Findings**

A summary of chemicals identified in soil at these operations above HDOH Tier 1 Environmental Action Levels (EALs) is provided in Table 2. Detailed summaries for each site investigated are provided in the attachments. Attachment 1 provides summaries of individual sites. Attachment 2 provides a summary of dioxin soil data. This information will be updated as additional data become available and will ultimately be used to prepare a more extensive review of pesticide contamination associated with former sugarcane operations in the near future. Important findings from this review include the following:

- Contaminants found in soil reflect the historical period that the site was active, with arsenic characteristic of operations active from 1910s-1940s, dioxins of operations active from the 1940s through the late 1960s and early 1970s, and ametryn and atrazine of operations active the 1970s;
- Arsenic is tightly bound to iron hydroxides in volcanic soils, with bioaccessible data continuing to be a more accurate and reliable indicator of potential direct exposure risk than total arsenic;
- The presence or absence of pentachlorophenol (PCP) in soil is not a reliable indicator of associated dioxin contamination;

- Data for soil samples collected outside of obviously impacted areas do not support raising the assumed, background level of TEQ dioxins in soil above the currently assumed concentration of 20 ng/kg, including urban areas (HDOH 2010b);
- Atrazine and ametryn are more strongly sorbed to soil than predicted by screening models but can still pose a leaching threat to groundwater.

Contamination associated with former pesticide mixing areas by far represent the most significant concern associated with former sugarcane operations. The majority of the sites investigated are impacted with dioxins and/or arsenic, depending on the time period that they were in operation. Contamination at most of the former pesticide mixing areas exceeds soil action levels for unrestricted land and in some cases exceeds action levels for commercial and industrial land use, without further assessment and remediation. Examples of the latter include the former pesticide mixing area at Kilauea, Kaua'i (Site # 9 in summary tables), the former mixing area in Kohala, Kaua'i (Site #10 in the summary tables) and the East Kapolei and Ewa/O'ahu Sugar Mill pesticide mixing areas on the island of O'ahu (Sites #28 and #44 in summary tables).

Data summarized to date do not clearly support raising the HDOH default background level of TEQ dioxins ("dioxins") in soil from the current level of 20 ng/kg (ie., dioxins in soil not specifically related to past sugarcane cultivation or other anthropogenic activities; HDOH 2010b). Data from sites not obviously impacted with other pesticides suggest that background could be as high as 50 ng/kg in some areas. Background levels of dioxins in soil are most certainly well below the HDOH residential soil action level of 240 ng/kg, however, and further evaluation of background levels of dioxins in soil is not necessary or warranted at this time.

Background levels of dioxins in urban areas are also expected to be below 20 ng/kg. This is still well below the residential soil action level, however. A potential exception for urban areas is fill material that incorporates ash from municipal incinerators. Samples from ash-impacted fill material in the Kaka'ako area contained up to 600 ng/kg TEQ dioxins (see Site #51). An ash sampled from the former Kaka'ako incinerator contained over 5,000 ng/kg TEQ dioxins (see Site #52 in summary tables). H-Power has been reported to contain up to 2,000 ng/kg TEQ dioxins (see Site #56). Ash from municipal incinerators is also heavily contaminated with lead, however, and co-located lead ash-impacted soil drives potential health risk over dioxins (e.g., refer to reports for Kaka'ako Makai Development site investigation, Site #51).

### **Future Updates and Guidance**

This report will be revised and updated as additional data become available and used to expand and update HEER office guidance for the investigation of former sugarcane operations. The HEER office intends to prepare a more detailed overview of pesticide contamination associated with former sugarcane operations in the near future.

## References

- HDOH, 2009, *Technical Guidance Manual* (2009 and updates): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response, <http://www.hawaiidoh.org/>
- HDOH, 2010a, Update to Soil Action Levels for inorganic Arsenic and Recommended Soil Management Practices (October 2010): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response, <http://www.hawaiidoh.org/>
- HDOH, 2010b, Update to Soil Action Levels for TEQ Dioxins and Recommended Soil Management Practices (June 2010): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response, <http://www.hawaiidoh.org/>
- HDOH, 2011, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (Fall 2011): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response, [www.hawaii.gov/health/environmental/hazard/eal2005.html](http://www.hawaii.gov/health/environmental/hazard/eal2005.html).
- USDHHS, 2008, *Health Consultation, Exposure Investigation, Kea'au 8.5 and 9.5 Mile Camps, Kea'au, Hawaii County, Hawai'i* (August 15, 2008): Prepared by U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry and Hawai'i Department of Health-Office of Hazard Evaluation and Emergency Response.

Table 1. Sugarcane operations and targeted pesticides of potential concern (see also HDOH 2009).

Areas of Concern	<sup>1</sup> Target Pesticide Groups
<b>Sugarcane Operations</b>	
<ul style="list-style-type: none"> <li>• Fields</li> </ul>	Dioxins/furans, Heavy Metals (As, Pb), Organochlorine Pesticides
<ul style="list-style-type: none"> <li>• Pesticide mixing areas</li> </ul>	Carbamates, Chlorinated Herbicides, Dioxins/furans, Heavy Metals (As, Pb), Organochlorine Pesticides, Organophosphorus Pesticides (known spill areas only), SVOCs, Triazine Pesticides
<ul style="list-style-type: none"> <li>• Air Strip mixing and storage areas</li> </ul>	Same as above
<ul style="list-style-type: none"> <li>• Seed dipping areas</li> </ul>	Fungicides (benomyl, propiconazole, mercury)
<ul style="list-style-type: none"> <li>• Settling ponds</li> </ul>	Dioxins/furans, Heavy Metals (As, Pb), Organochlorine Pesticides
<ul style="list-style-type: none"> <li>• Bagasse piles</li> </ul>	Dioxins/furans, Heavy Metals (As, Pb), Organochlorine Pesticides
<ul style="list-style-type: none"> <li>• Pesticide container disposal areas</li> </ul>	Carbamates, Chlorinated Herbicides, Dioxins/furans, Heavy Metals (As, Pb), Organochlorine Pesticides, Organophosphorus Pesticides (known spill areas only), SVOCs, Triazine Pesticides
<ul style="list-style-type: none"> <li>• Mill ditch (mill wastewater)</li> </ul>	Site-specific (pesticide mixing areas, seed dipping vats, cane wash, etc.)
<b>Other Potential Areas of Concern</b>	
<ul style="list-style-type: none"> <li>• Plantation camps, Community Gardens</li> </ul>	Site-specific
<ul style="list-style-type: none"> <li>• Maintenance facilities (vehicle, carpentry shop, wood treatment, etc)</li> </ul>	Site-specific
<ul style="list-style-type: none"> <li>• Transformers</li> </ul>	PCBs; TPH
<ul style="list-style-type: none"> <li>• Rail lines</li> </ul>	Same as fields (arsenic weed killers used along tracks)

Sugarcane Operation	No. of Sites Reviewed	Site Name	<sup>1</sup> Number of Sites Exceeding Tier 1 EALs
Sugarcane Field	11	Anahola, East Kapolei (DHHL), East Kapolei (Ho'opili), Ewa Makai Middle School, Hamakua Andisol Ag Field, <sup>3</sup> Kea'au Area-Wide Study, <sup>3</sup> Kea'au Pahoa Rd, <sup>4</sup> Ke'ei (Estoy Property), Kehalani Development–Maui, Pa'auhau, Pu'u Nene, Royal Kunia Subdivision, Wai'awa Ridge	<sup>3,4</sup> Bioaccessible As: 3 <sup>4</sup> TEQ dioxins: 1 <sup>4</sup> Lead: 1
Pesticide Mixing & Storage Area	23	Ewa Sugar Mill-Waipio (PMA), Ewa Sugar Mill-Waipio (fumigant storage area), Hakalau, Hilo Sugar, Kahuku Sugar Mill, Ka'u, Kawela, Kekaha (makai), Kekaha (mauka), Kilauea-Kaua'i, Kohala, Koloa, Lihue Sugar Plantation, McBryde Numila, O'ahu Sugar Mill-East Kapolei, Onomea, Pa'auhau, Pa'auilo #1, Pa'auilo #2, Papa'aloa, Pioneer Mill, Pu'u Nene Sugar Mill, Waialua Sugar Mill	Ametryn: 2 Atrazine: 2 <sup>2</sup> Arsenic (total): 12 Bioaccessible As: 4 Chloroaniline: 1 TEQ Dioxins: 19 2,4- Dichlorophenol: 1 Lead: 4 Mercury: 4 Pentachlorophenol: 7 Simazine: 1 Tetrachlorophenol: 2
Air Strip (Pesticide Mixing & Storage Area)	3	Hakalau Airstrip, Honokaa Airstrip, Kunia Airstrip, Pepe'ekeo Airstrip	Ametryn: 1 Atrazine: 1 <sup>2</sup> Arsenic (total): 1 BaP: 1 (asphalt?) TEQ Dioxins: 1
Seed Dipping Vat	7	HSPA–Pa'auilo, HSPA-Wainaku, Kekaha, Lihue Sugar Plantation, Onomea, Pa'auhau, Waipunalei,	TEQ Dioxins: 1 Mercury: 6
Mill Settling Pond	2	Paia Mill, Pu'u Nene Mill, Waialua Mill	Below action levels
Bagasse Pile	1	<sup>3</sup> Ola'a (Puna) Mill	<sup>2</sup> Arsenic (total): 1
Pesticide container disposal areas	2	Kilauea-Kaua'i (public housing area), Pa'ahau PMA	Bioaccessible Arsenic: 1 TEQ: Dioxins 1
Mill Drainage Ditch	1	Kekaha Sugar Mill	Mercury: 1
Plantation Camp	1	<sup>3</sup> Kea'au Hotel Site	Bioaccessible As: 1 Lead: 1

Sugarcane Operation	No. of Sites Reviewed	Site Name	<sup>1</sup> Number of Sites Exceeding Tier 1 EALs
Community Gardens	4	<sup>3</sup> Kea'au Area-Wide Study (three separate gardens tested), Kea'au Middle School	Bioaccessible As: 4
Garage/shop	1	Lihue Sugar Plantation	<sup>2</sup> Arsenic (total): 1 TEQ Dioxins: 1 Pentachlorophenol: 1
Carpentry Shop	2	Kekaha Sugar Mill, Lihue Sugar Plantation	<sup>2</sup> Arsenic (total): 1 TEQ Dioxins: 1
Sugar Mill (general)	2	Kahuku Sugar Mill, Lihue Sugar Plantation	<sup>2</sup> Arsenic (total): 1 Chlordane: 1 2,4-D:1 1,1,2,2-TCA: 1
Wood treatment plant	1	Kekaha (mauka)	Arsenic (total): 1 TEQ dioxins: 1 Pentachlorophenol: 1
<b>Non-agricultural sites (dioxin and/or arsenic exceedences noted)</b>			
Ash-contaminated fill material	1	<sup>4</sup> Kaka'ako Makai Development	TEQ dioxins: 1
Incinerator ash	2	<sup>4</sup> Kaka'ako incinerator, <sup>4</sup> H-Power Incinerator	TEQ dioxins: 2
Landfill burnpit debris	1	Hickam AFB Golf Course	Below action levels
Wood treatment facility	1	Hilo Safeway Target, Honolulu Wood Treatment	TEQ dioxins: 1 Bioaccessible As: 2
Other sites with dioxin data	2	Kauai Agricultural Research Center Agent-Orange site, Ke Kula o Samuel Kamakau (Haiku)	Below action levels

**Blue:** Bioaccessible arsenic data exceeds HDOH action levels of 23 mg/kg.

**Yellow:** Bioaccessible arsenic data not available. Site highlighted in yellow for potential EAL exceedence if 50% of total arsenic concentration reported exceeds bioaccessible arsenic action level of 23 mg/kg (i.e., conservatively assuming 50% bioaccessibility).

1. Number of sites with exceedences of EALs noted for specific COPCs (e.g., "TEQ Dioxins: 6, Arsenic: 9," etc.)
2. Total arsenic noted if bioaccessible arsenic data not available for site.
3. Elevated arsenic only identified in former sugarcane fields (and mill bagasse) in the Kea'au-Hilo area and Ke'ei area of the Big Island (latter included a house with possible lead paint).
4. Co-located lead contamination in soil mixed with ash drives health risk over dioxins.



**ATTACHMENT 1**

**INDIVIDUAL SITE SUMMARIES**

## INDIVIDUAL SITE SUMMARIES

Table A provides a summary of sites assigned to specific sugarcane operations. Note that some sites include multiple operations. Table B provides a summary description for each of the sites reviewed during the study, including: Investigation data, Targeted COPCs, Targeted soil (surface or subsurface), Soil sample type (multi-incremental sample [MIS] or discrete), Number of MIS decision units (DUs) and/or the number of discrete samples and COPCs that were identified in soil above HDOH 2011 EALs (HDOH 2011). Summaries of additional, non-sugarcane sites with dioxin and/or arsenic data are also included for comparison. Table C provides a summary specific to dioxin data.

These tables will be updated in the future as additional data are received for the sites reviewed and as additional sites are added. Data presented in the summaries have not been thoroughly reviewed for errors and should be verified by reference to the original reports.

Data for Sites 1-21 are based on summary tables for *Sampling of Opportunity* sites. The remaining sites were summarized from the reports noted at the head of each summary.

**List of Sites Reviewed:**

<b>Site No.</b>	<b>Site Name/Location</b>	<b>Sugarcane Operation(s)</b>
1	Hamakua Andisol Ag Field	Sugarcane Field
2	Hakalau Airstrip	Pesticide Mixing & Storage
3	Hakalau	Pesticide Mixing & Storage
4	Hilo Sugar	Pesticide Mixing & Storage
5	Honoka'a Airstrip	Pesticide Mixing & Storage
6	HSPA Experiment Station-Pa'auilo	Seed Dipping Vat
7	HSPA Experiment Station-Wainaku	Seed Dipping Vat
8	Kawela	Pesticide Mixing & Storage
9	Kilauea	Pesticide Mixing & Storage
10	Kohala	Pesticide Mixing & Storage
11	'Onomea	Seed Dipping Vat
12	Pa'auhau	Sugarcane Field
13	Pa'auhau	Pesticide Mixing & Storage
14	Pa'auhau Seed Vat	Seed Dipping Vat
15	Pa'auilo Mill	Pesticide Mixing & Storage #1
16	Pa'auilo Mill	Pesticide Mixing & Storage #2
17	Papa'aloa	Pesticide Mixing & Storage
18	Pepe'ekeo Airstrip	Pesticide Mixing & Storage
19	Waipunalei	Seed Dipping Vat
20	'Onomea Sugar	Pesticide Mixing & Storage
21	Ka'u Agribusiness	Pesticide Mixing & Storage
22	Kekaha Sugar Mill	Pesticide Mixing & Storage (makai)
23	Kekaha Sugar Mill	Seed Dipping Vat, Mill Ditch, Carpentry Ditch
24	Kekaha Sugar Mill	Pesticide Mixing & Storage (mauka)
25	Kehalani	Sugarcane Field
26	Kunia Air Strip	Pesticide Mixing & Storage
27	Royal Kunia Subdivision	Sugarcane Field
28	East Kapolei	Sugarcane Field
29	O'ahu Sugar Mill-East Kapolei	Pesticide Mixing & Storage
30	Pioneer Mill	Pesticide Mixing, Seed Dipping Vat, Carpentry Ditch
31	Waiialua Sugar Mill	Pesticide Mixing, Settling Pond
32	Lihue Sugar Plantation	Pesticide Mixing Area, Carpentry Shop, Seed Dipping Vat, Settling Pond, Garage/Shop
33	Anahola	Sugarcane Field
34	Ho'opili Development	Sugarcane Field
35	Hanama'ulu	Pesticide Mixing & Storage
36	Kahuku	Pesticide Mixing & Storage
37	Wai'awa Ridge	Sugarcane Field
38	Kea'au Hotel Site	Plantation Camp
39	Kea'au Area-Wide Study	Sugarcane Field
40	Kea'au Middle School	Sugarcane Field
41	Kea'au Pahoia Road Development	Sugarcane Field
42	Ola'a (Puna) Mill	Bagasse
43	Puhi	Pesticide Mixing & Storage
44	Ewa Sugar Mill - Waipio	Pesticide Mixing & Storage
45	Ewa Sugar Mill - Waipio	Fumigant Storage Area
46	A&B Mill	Settling Pond

<b>Site No.</b>	<b>Site Name/Location</b>	<b>Sugarcane Operation(s)</b>
47	Ke'ei (Estoy Property)	Sugarcane Field
48	Ewa Makai Middle School	Sugarcane Field
49	Pu'u Nene Sugar Mill	Pesticide Mixing & Storage, Sugarcane Field
50	Pu'u Nene Sugar Mill	Settling Pond
51	Makaha Valley	Sugarcane Field
52	Numila Sugar Mill	Pesticide Mixing & Storage
53	Koloa Sugar Mill	Pesticide Mixing & Storage
<b>Non-Sugarcane Operation Sites</b>		
A	Kaka'ako Makai Development	Ash-contaminated fill material
B	Kaka'ako Ala Moana Pumping Station	Former municipal incinerator
C	Kauai Agricultural Research Center	Agent Orange testing area
D	Ke Kula o Samuel Kamakau	Former Navy communications facility
E	Kalopa Park	Native forest
F	H-Power Incinerator Ash	Municipal incinerator
G	Hilo Safeway-Target	Adjacent to Wood Treatment Facility
H	Hickam AFB	Fill material, landfill debris
I	Honolulu Wood Treatment	Wood treatment facility

**Table B - Individual Site Summaries**

<b>Site 1</b>		
1.	Facility Site Name	Hamakua Andisol Ag Field
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Former sugarcane field
4.	Investigation Date	2007
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatile Organic Compounds (SVOCs)
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments: None		

<b>Site 2</b>		
1.	Facility Site Name	Hakalau Airstrip PMA
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide mixing and storage area (airstrip)
4.	Investigation Date	2007
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 3</b>		
1.	Facility Site Name	Hakalau Pesticide Mixing and Drainage Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide mixing and storage area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 3.84 – 150 Bioaccessible Arsenic: ? TEQ Dioxins: ? Dieldrin: ND - 3.9ppb?
Comments: None		
<b>Site 4</b>		
1.	Facility Site Name	Hilo Sugar Pesticide Mixing Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide mixing and storage area
4.	Investigation Date	2009
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	6 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 75 – 627 Bioaccessible Arsenic: TEQ Dioxins: 264 – 6,487 ng/kg Chloroaniline, p-: ND - 0.216 Dichlorophenol, 2,4-: ND - 0.652 Pentachlorophenol: 0.31 - 32.6 Tetrachlorophenol, 2,3,4,6-: ND - 0.841
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 5</b>		
1.	Facility Site Name	Honokaa Airstrip PMA
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Airstrip Mixing Area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Benzo(a)pyrene: 0.00016-1.0
Comments: BaP probably from asphalt.		

<b>Site 6</b>		
1.	Facility Site Name	HSPA Experiment Station Seed Dipping Vat- Pa'auilo
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Seed Dipping Vat
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	6 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 7</b>		
1.	Facility Site Name	HSPA Experiment Station Seed Dipping Vat- Wainaku
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Seed Dipping Vat
4.	Investigation Date	2009
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ Dioxins: 108 - 608 ng/kg Mercury: 1.23 - 25.8
Comments: None		
<b>Site 8</b>		
1.	Facility Site Name	Kawela Pesticide Mixing Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	9
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ Dioxins: 24-703 ng/kg Arsenic (total): 2.68 - 94.3 <b>Bioaccessible Arsenic:</b>
Comments: None		



Table B (cont.) - Individual Site Summaries

Site 9		
1.	Facility Site Name	Kilauea Pesticide Mixing Area
2.	Location (include GPS coordinate)	Kaua'i
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area and debris pit
4.	Investigation Date	2010-2011
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	6 (2 replicates)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<p><i>Pesticide Mixing Area</i></p> <p>Arsenic (total): ND – 6,900            Bioaccessible As: 9.2-2,860            TEQ Dioxins: 19 – 3,517 ng/kg            Lead: 15 - 680            Mercury: 0.28 – 45</p> <p><i>Debris Pit</i></p> <p>Arsenic (total): 880            Bioaccessible As: 62            Lead: 3,300</p>
Comments: Bioaccessible arsenic not tested in all samples.		

Table B (cont.) - Individual Site Summaries

Site 10		
1.	Facility Site Name	Kohala Sugar Pesticide Mixing Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2009
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	6 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ Dioxins: 248 – 10,549 Arsenic (total): 23.8 – 821 <b>Bioaccessible As:</b> Lead: 25.1 - 210 Mercury: 0.311 - 14.2 Pentachlorophenol: 0.25 - 3.52
Comments: Mercury would pass EAL of 23 mg/kg based on a target HQ of 1.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 11</b>		
1.	Facility Site Name	'Onomea Sugar Seed Dipping Vat
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Seed Dipping Vat
4.	Investigation Date	2009
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	4 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Mercury: 9.76 - 31.7
Comments: None		
<b>Site 12</b>		
1.	Facility Site Name	Pa'auhau Ag Field
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2007
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	2 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments: Data entry pending; no significant contamination identified		

Table B (cont.) - Individual Site Summaries

Site 13		
1.	Facility Site Name	Pa'auhau Pesticide Mixing Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area, debris pit
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	10 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<p><i>Pesticide Mixing Area</i>            Arsenic (total): 5.82 – 603  <b>Bioaccessible As:</b>            TEQ Dioxins: 17 – 240,266 ng/kg            Mercury: ND - 10.3</p> <p><i>Debris Pit</i>            TEQ Dioxins: 598 ng/kg</p>
Comments: Mercury would pass EAL of 23 mg/kg based on a target HQ of 1.		

Site 14		
1.	Facility Site Name	Pa'auhau Seed Vat
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Seed Dipping Vat
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Mercury: 0.816 - 8.21
Comments: Mercury would pass EAL of 23 mg/kg based on a target HQ of 1.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 15</b>		
1.	Facility Site Name	Pa'auilo Mill Pesticide Mixing Area #1
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Benzo(a)pyrene: ND - 0.219 TEQ Dioxins: 29 – 401 ng/kg
Comments:		
<b>Site 16</b>		
1.	Facility Site Name	Pa'auilo Mill Pesticide Storage Area #2
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Storage Area
4.	Investigation Date	2011
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	7 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ Dioxins: 209-24,056 ng/kg Pentachlorophenol: ND-23
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 17</b>		
1.	Facility Site Name	Papa'aloa Pesticide Mixing Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicides, Dioxins, Metals, Organochlorine Pesticide, Triazine Pesticides, SVOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	6 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 2.14 -156 <b>Bioaccessible Arsenic:</b> TEQ Dioxins: 973 – 9,048 Lead: 57.1 - 543
Comments: None		

<b>Site 18</b>		
1.	Facility Site Name	Pepe'ekeo Airstrip
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide mixing area
4.	Investigation Date	2008
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments:		

**Table B (cont.) - Individual Site Summaries**

<b>Site 19</b>		
1.	Facility Site Name	Waipunalei Seed Dipping Area
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Seed Dipping Vat
4.	Investigation Date	2007
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	10 DUs (one has no data)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Chromium (total): 263 – 3,690 (background?) Mercury: ND - 778
Comments: None		
<b>Site 20</b>		
1.	Facility Site Name	'Onomea Sugar
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Pesticide mixing area
4.	Investigation Date	2011
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 13-397 <b>Bioaccessible As:</b> TEQ Dioxins: 161-3,755 ng/kg
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 21</b>		
ACSI and ERM-West, 2008, Remedial Alternatives Analysis and Response Action Report: Former Ka'u Agribusiness Herbicide Mixing Plant, Pahala, Hawaii, November 2008.		
1.	Facility Site Name	ML Macadamia Orchard, Ka'u Agribusiness
2.	Location (include GPS coordinate)	Pahala, Hawaii TMK 3-9-6-005:054).
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2008
5.	Targeted COPCs	Arsenic, Dioxin, Ametryn, Atrazine, TPH
6.	Targeted Soil (e.g., surface vs subsurface)	4-6 in. bgs
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Total Arsenic: 2.4-2,350 Bioaccessible Arsenic: 1.1 - 713 mg/kg TEQ Dioxins: 14 – 1,900 ng/kg Ametryn: ND-3.1 Atrazine: ND-0.23
Comments: None		
<b>Site 22</b>		
TEC Inc, 2010, Final Site Investigation Report Phase II Environmental Site Assessment, Portion of TMK No.: (4) 1-2-02:001, Kekaha, Kauai, Hawaii, October 2010 (Document # 93063); Weston Solutions, 2011, Phase I/II Investigation Targeted Brownsfield's Assessment – Kekaha Sugar Mill Final Report.		
1.	Facility Site Name	Kekaha Sugar Mill Diesel Generator Site
2.	Location (include GPS coordinate)	3.2 acre portion of 13,000 acre site, TMK No.: (4) 1-2-02:001
3.	Former Sugarcane Operation(s)	Makai Pesticide Mixing Area
4.	Investigation Date	2010
5.	Targeted COPCs	Dioxins, Chlorinated herbicides, heavy metals, bioaccessible arsenic
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 – DUs were not divided by land use (three equal size DUs)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Total Arsenic: 13-126 Bioaccessible arsenic: ND-48 TEQ Dioxins: 265 - 1,800 ng/kg
Comments: None		



**Table B (cont.) - Individual Site Summaries**

<b>Site 23</b>		
TEC Inc, 2004, Site Inspection Report Kekaha Sugar Company, LTD, Kekaha, Kauai, Hawaii, December 22, (EPA ID #HID000875203); Weston Solutions, 2011, Phase I/II Investigation Targeted Brownsfield's Assessment – Kekaha Sugar Mill Final Report.		
1.	Facility Site Name	Kekaha Sugar Mill
2.	Location (include GPS coordinate)	8315 Kekaha Road Kekaha, Kauai
3.	Former Sugarcane Operation(s)	Former sugar mill, seed dipping plant, settling pond, carpentry shop, automotive shop, mill ditch
4.	Investigation Date	2003, 2010
5.	Targeted COPCs	Metals, arsenic, SVOCs, VOCs, Chlorinated herbicides, dioxins/furans
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	Discrete (2003), MIS (2010)
8.	Number of DUs (or discrete samples)	2003: 35 surface soil samples; 3 subsurface soil samples (9.5-11 ft bgs); 2010: 4 sediment DUs (mill ditch)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>Seed dipping tanks &amp; upper Mill Ditch (2004): Mercury: ND-267</i> <i>Lower Mill Ditch (2010): Mercury &lt;1 (background)</i>  <i>Carpentry shop (SS07, SS08):</i> <i>Arsenic (total): 11.80 - 47</i> <i>Bioaccessible As: not analyzed</i>
Comments: See separate entry for Kekaha sugar mill makai and mauka pesticide mixing areas.		

**Table B (cont.) - Individual Site Summaries**

Site 24		
Hawaii Department of Health, 2005, Site Inspection Report of the Kekaha Sugar Company, September 2005; BV, 2011, Initial Site Investigation Report, Kekaha Herbicide Mixing and Wood Treatment Facility, April 2007.		
1.	Facility Site Name	Kekaha Sugar Mill
2.	Location (include GPS coordinate)	21°59'43"N; 159°43'37"W
3.	Former Sugarcane Operation(s)	Mauka Pesticide Mixing Area, Wood Treatment Plant
4.	Investigation Date	2002, 2011
5.	Targeted COPCs	Metals, SVOC, VOC, Dioxins/furans, Pesticides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	Discrete and MIS (all soil samples appear to be discrete)
8.	Number of DUs (or discrete samples)	13 DUs – Wood Treatment Plant, 10 DUs- Pesticide Mixing Area 1 DU - Background
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)*	<i>Wood treatment plant (SS02-SS14):</i> Arsenic (total): 0.72 – 215  <i>Mauka Herbicide Mixing Area:</i> Arsenic (total): 15 – 587 Bioaccessible As: 82-213 TEQ dioxins: 32 – 165,211 ng/kg Mercury: 0.12 -10.1 Pentachlorophenol: ND-420
Comments: Bioaccessible arsenic not tested for in all samples. Mercury would pass EAL of 23 mg/kg based on a target HQ of 1.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 25</b>		
Bureau Veritas, 2011, Multi-Increment Sampling Investigation report for 2210.5 acres of Proposed Residential Use, 38.5 acres of proposed Non-residential Use, Kehalani Development, Wailuku, Maui, Hawaii, February 2011.		
1.	Facility Site Name	Kehalani Development - Maui
2.	Location (include GPS coordinate)	Tax Map Key (TMK) Numbers: (2) 3-5-1: Parcels 63, 67, and 75.
3.	Former Sugarcane Operation(s)	Former sugarcane field
4.	Investigation Date	2010
5.	Targeted COPCs	Arsenic, dioxin, organochlorine pesticides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (0-3 in bgs)
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	64 DUs total: 59 residential, 5 non-residential area
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
10.	COPCs exceeding Tier 1 EALs	None
Comments: None		
<b>Site 26</b>		
Element Environmental, 2009, Response to HDOH comments to the draft project workplan titled "Kunia Staging Area Site Investigation, Kunia, Oahu, Hawaii", January 26, 2009.		
Element Environmental, Inc. 2009. Project Report Kunia staging Area Site Investigation. Kunia, Oahu, Hawaii. (Document # 60402)		
1.	Facility Site Name	Ewa Sugar Mill – Kunia Air Strip Staging Area
2.	Location (include GPS coordinate)	
3.	Former Sugarcane Operation(s)	Airstrip Pesticide Mixing Area
4.	Investigation Date	1995, 1996, 1999, 2009
5.	Targeted COPCs	Dioxins, Metals
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	Discrete and MIS
8.	Number of DUs (or discrete samples)	48+ discrete samples (1995-1999), 14 DUs for MIS (2009)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>Mixing Area</i> Ametryn: ND-47 Atrazine: ND-2.17 Arsenic (total): ND-3,800 <b>Bioaccessible Arsenic:</b> TEQ dioxins: 24 – 869 ng/kg
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 27</b>		
EnviroServices and Training Center, 2008, Site Investigation Report Lot 3, Royal Kunia Subdivision II, Kunia, Oahu, Hawaii, October 2008.		
1.	Facility Site Name	Royal Kunia Subdivision, Phase I
2.	Location (include GPS coordinate)	Kunia, Oahu; TMK (1) 9-4-002: Parcels 70, 71, 78, and 79
3.	Former Sugarcane Operation(s)	Former sugarcane field
4.	Investigation Date	2008
5.	Targeted COPCs	Metals, organochlorine pesticides, chlorinated herbicides, triazine pesticides, carbamate pesticides, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (0-6in)
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	64 lots size DU plus 15 neighborhood size DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>none</i>
Comments: Average TEQ dioxins in field 100 ng/kg (maximum 404 ng/kg; 2008 screening level revised of 450 ng/kg to 390 ng/kg during course of project).		

<b>Site 28</b>		
Tetra Tech EM Inc, 2007, Final Site Assessment report. East Kapolei Affordable Housing Project, Kapolei, Oahu, Hawaii. December 2007 (Document # 7046).		
1.	Facility Site Name	East Kapolei
2.	Location (include GPS coordinate)	Kapolei, Oahu TMK 1-9-1-017-071 and TMK 1-9-1-017-088
3.	Former Sugarcane Operation(s)	Former sugarcane land
4.	Investigation Date	2007
5.	Targeted COPCs	Metals, arsenic, organophosphorus pesticides, organochlorine pesticides, chlorinated herbicides, total dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	59 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>none</i>
Comments: Calux dioxin data also collected.		

**Table B (cont.) - Individual Site Summaries**

Site 29		
EnviroServices & Training Center, 2007, Final Site Investigation and Preliminary Remedial Alternatives Analysis Report, East Kapolei – Brownsfields, Former Oahu Sugar Company; EnviroServices & Training Center, 2010, Site Investigation Report and Environmental Hazards Evaluation, East Kapolei II Pesticide Mixing and Loading Site.		
1.	Facility Site Name	O'ahu Sugar Mill-East Kapolei
2.	Location (include GPS coordinate)	Kapolei, Oahu, Hawaii, TMK (1)-9-1-017: Parcel 088
3.	Former Sugarcane Operation(s)	Pesticide mixing area
4.	Investigation Date	2007, 2010
5.	Targeted COPCs	2007: Dioxins/furans (TEQ), organochlorine pesticides (dieldrin), triazines (trifluralin, atrazine, ametryn, simazine), semi-volatiles (pentachlorophenol/PCP, 2,3,4,6-tetrachlorophenol) arsenic, diuron 2010: arsenic, dioxins, PCP, triazines
6.	Targeted Soil (e.g., surface vs subsurface)	2007:surface/3-4ftbgs 2010:surface/10ftbgs
7.	Soil Sample Type (MIS and/or discrete)	2007: MIS & discrete 2010: MIS
8.	Number of DUs (or discrete samples)	2007:19 DUs + 8 replicate +1 other; 21 discrete 2010: 12 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Ametryn: 0.283 - 141 Atrazine: 0.05 - 16.5 Arsenic (total): 0.751 – 160 Bioaccessible As: not tested TEQ dioxins: 1.28 - 615,100 ng/kg Pentachlorophenol: 0.374 – 99 Simazine: 0.68 - 0.81 Tetrachlorophenol: 1.7 - 89
Comments: Triazines failed SPLP batch leaching tests. Arsenic co-located with dioxins; bioaccessibility tests not necessary.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 30</b>		
Weston Solutions, Inc., 2004, Preliminary Assessment/Site Inspection report Pioneer Mill Company. Lahaina, Maui, Hawaii. Prepared for the U.S. EPA Region 9, February 2007.		
1.	Facility Site Name	Pioneer Mill
2.	Location (include GPS coordinate)	380 Lahainaluna Road, Lahaina, Maui 20 52'54" N 156 40'44' W
3.	Former Sugarcane Operation(s) *	Sugar mill, carpentry shop, seed dipping, pesticide mixing
4.	Investigation Date	2003
5.	Targeted COPCs	VOCs, SVOCs. Chlorinated pesticides, PCBs, metals, organophosphorous pesticides, chlorinated herbicides, dioxins.
6.	Targeted Soil (e.g., surface vs subsurface)	Surface to 1ft bgs
7.	Soil Sample Type (MIS and/or discrete)	Discrete and composite
8.	Number of DUs (or discrete samples)	42 discrete, 12 composite
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted) **	Arsenic (total): ND – 104 Bioaccessible As: not tested Benzo(a)pyrene: ND - 1.4 Cadmium: ND -78.3 (data not confirmed)
Comments: Arsenic contamination assumed to be associated with former pesticide missing area.		

<b>Site 31</b>		
HEER, 2007, Site Inspection Memorandum-Waialua Sugar Mill (Palmer, Richard), March 2004		
1.	Facility Site Name	Waialua Sugar Mill
2.	Location (include GPS coordinate)	Kealohanui Street and Goodale Avenue, Waialua, HI 21 34'30N 158 07'30W TMK: 1-6-7-001:005
3.	Former Sugarcane Operation(s)	Sugar mill, pesticide mixing area, settling pond
4.	Investigation Date	2004
5.	Targeted COPCs	Metals, triazines, organochlorine pesticides, chlorinated herbicides, dioxins, VOCs, SVOCs, PCBs, TPH-O, TPH-D
6.	Targeted Soil (e.g., surface vs subsurface)	6 in bgs
7.	Soil Sample Type (MIS and/or discrete)	discrete
8.	Number of DUs (or discrete samples)	18 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 10.6 – 188 Bioaccessible As: not tested TEQ dioxins: 97 - 12,000 ng/kg Lead: 23.8 - 531
Comments: Contamination assumed to be associated with former pesticide mixing area.		

**Table B (cont.) - Individual Site Summaries**

Site 32		
Tetra Tech, Inc., 2006, Site Inspection Report Lihue Plantation, Lihue and Hanama'ulu, Kauai, Hawaii. Project No. 06-044. August 17.		
1.	Facility Site Name	Lihue Sugar Plantation
2.	Location (include GPS coordinate)	2970 Kele Street, Lihue, Kauai 21 58'41.1673 N 159 22.19.6680 W
3.	Former Sugarcane Operation(s)	Sugar mill, pesticide mixing, carpentry shop, seed dipping, settling ponds/cane washing, garage/shop
4.	Investigation Date	2004
5.	Targeted COPCs	Metals, PCBs, pesticides, SVOCs, , dioxins/furans
6.	Targeted Soil (e.g., surface vs subsurface)	surface
7.	Soil Sample Type (MIS and/or discrete)	Discrete
8.	Number of DUs (or discrete samples)	21
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<p><i>Sugar mill (SL 1-9):</i>            2,4-D: ND - 4.2            Arsenic (total): 14.3 - 108            Chlordane: 0.0150 - 67</p> <p><i>Pesticide mixing plant (SL 17, SL 18, SL 20, SL 21, SL 23):</i>            Arsenic (total): 38.9 - 1,020            TEQ dioxins: 141 - 4,081 ng/kg</p> <p><i>Carpentry shop (SL 6):</i>            Arsenic (total): 57.5            TEQ dioxins: 484 ng/kg</p> <p><i>Seed dipping (SL 10, 11):</i>            Mercury 1.2-17.5</p> <p><i>Garage/shop (SL 15, 16):</i>            Arsenic (total): 2.3 - 66.8            TEQ dioxins: 8.25 - 1,577 ng/kg            Pentachlorophenol: ND - 6.5</p>
Comments: No bioaccessible arsenic data. Mercury would pass EAL of 23 mg/kg based on a target HQ of 1.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 33</b>		
Amec Earth and Environmental, 2003, Anahola Project Faith Brownsfields Site Characterization Study.		
1.	Facility Site Name	Anahola Project Faith
2.	Location (include GPS coordinate)	Anahola, Kauai. TMK 4-7-4, TMK 4-8-03:19
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2003
5.	Targeted COPCs	Pesticides, chlorinated herbicides, SVOCs, TPH, Dioxins, metals
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	Discrete
8.	Number of DUs (or discrete samples)	36 soil samples, 5 sediment samples
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 4.2 - 44.9
Comments: The maximum total arsenic reported is not significantly above natural background.		
<b>Site 34</b>		
Report pending (being prepared by Tetra Tech)		
1.	Facility Site Name	Ho'opili Development
2.	Location (include GPS coordinate)	East Kapolei, O'ahu
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2009
5.	Targeted COPCs	Metals, pesticides, dioxins/furans
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete
8.	Number of DUs (or discrete samples)	118 lot-size DUs, 30 neighborhood-size DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments: Draft data similar to adjacent East Kapolei DHHL field.		



**Table B (cont.) - Individual Site Summaries**

<b>Site 35</b>		
HEER Sampling of Opportunity investigation		
1.	Facility Site Name	Hanama'ulu
2.	Location (include GPS coordinate)	Kaua'i
3.	Former Sugarcane Operation(s)	Pesticide mixing area
4.	Investigation Date	2010
5.	Targeted COPCs	Carbamate, Chlorinated Herbicide, Dioxin, Metals, Organochlorine Pesticide, Triazine Pesticides, Semi-volatiles
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete
8.	Number of DUs (or discrete samples)	
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): Bioaccessible As: TEQ Dioxins:
Comments:		
<b>Site 36</b>		
Tetra Tech, Inc., 2005, Site Investigation, Former Kahuku Sugar Mill. Prepared for State of Hawaii Department of Health Voluntary Response Program (HEER).		
1.	Facility Site Name	Kahuku Sugar Mill
2.	Location (include GPS coordinate)	56-565 Kamehameha Highway in Kahuku, Hawaii (21° 40' 42" North, 157° 57' 01" West) TMK: 56002017
3.	Former Sugarcane Operation(s)	Sugar mill and pesticide mixing area
4.	Investigation Date	2005
5.	Targeted COPCs	Pesticides, TPH, PAHs, total metals, dioxins/furans, PCBs, lead, arsenic, VOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface (through 6ft bgs)
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete
8.	Number of DUs (or discrete samples)	24 DU: 22 surface, 1 subsurface, 1 GW
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ dioxin: 169 – 1,042 ng/kg 1,1,2,2-tetrachloroethane: 1.9 - 19.0
Comments: Dioxins assumed related to pesticide mixing.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 37</b>		
Clayton Group Services, Inc., 2006, Final Environmental Investigation (Soil Impacts Associates with Former Agricultural Land Use). Prepared for A&B Properties, Inc, May 2006.		
1.	Facility Site Name	Wai'awa Ridge
2.	Location (include GPS coordinate)	TMK Nos. (1) 9-6-4: Parcels 24 & 26 and (1) 9-4-6: Parcels 34 & 35 Waiawa, Oahu, Hawaii 21°25'28.2"N and 157°58'46.9"W
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2005
5.	Targeted COPCs	Arsenic, chlorinate herbicides, organochlorine pesticides, metribuzine, hexazinone, triazine, VOCs
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete (VOCs)
8.	Number of DUs (or discrete samples)	59 DUs, 6 duplicates and triplicates (MIS), 12 (discrete)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): ND - 80 Bioaccessible As: 6.8
Comments: No dioxin data		

**Table B (cont.) - Individual Site Summaries**

<b>Site 38</b>		
Hawai'i Department of Health Hazard Evaluation and Emergency Response Office, 2006, Final Response Action Memorandum Kea'au Hospitality Group, Inc. "Hotel Site". July 21, 2006. Test America. 2009. TEQ Dioxin data for Kea'au Hotel site, Kea'au, Hawai'i. Memo from R. Brewer to J. Peard with Test America lab report attached.		
1.	Facility Site Name	Kea'au Hotel Site
2.	Location (include GPS coordinate)	16-590 Old Volcano Road, Ke'eaau Hawaii TMK parcel 3-1-6-143:33
3.	Former Sugarcane Operation(s)	Former plantation camp
4.	Investigation Date	2006 (dioxin samples held and tested in 2009)
5.	Targeted COPCs	Arsenic and lead (2006); TEQ Dioxin (2009)
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	4 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Total arsenic: 262 - 949 Bioaccessible arsenic: 24.8 - 186 TEQ dioxins: 71 - 434 ng/kg Total lead: 211 - 1,260 Bioaccessible lead: 142 - 939
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site 39</b>		
AMEC Earth and Environmental, Inc, 2005 Soil Arsenic Assessment Study, Kea'au, Hawaii. Prepared for the State of Hawaii DOH HEER Office. Report finalized and updated by HEER Office December 2007.		
1.	Facility Site Name	Kea'au Area-wide Study
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Former plantation camps and sugarcane fields
4.	Investigation Date	2004
5.	Targeted COPCs	Arsenic, VOCs, chlorinated herbicides, organochlorine pesticides, triazine pesticides, hexazinone and metribuzin, bioaccessability for stomach phase extraction
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface (0-4ft bgs)
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	18 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<p><i>Fields</i>            Arsenic (total): &lt;2mm soil fraction: 16 - 361            Arsenic (total): &lt;250 um: 55 – 569            Bioaccessible As: 0.6-24</p> <p><i>Community Gardens</i>            Arsenic (total): &lt;2mm soil fraction: 324-366            Arsenic (total): &lt;250 um: 467-629            Bioaccessible As: 82-101</p>
Comments: Field data combined with other Kea'au sugarcane field for final summary table.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 40</b>		
Environmental Resources Management, 2009, Combined Phase I & II Environmental Site Assessment, Kea'au Middle School, Kea'au, Hawaii. Prepared for the County of Hawai'i Department of Environmental Management, February 2009 (Dioxin data addendum November 2007)		
1.	Facility Site Name	Kea'au Middle School
2.	Location (include GPS coordinate)	16-565 Kea'au-Pahoa Road, Kea'au, Hawaii TMKs: 3-1-6-003:001 & 059 19°37'22.1" N, 155°2'13.9" W
3.	Former Sugarcane Operation(s)	Sugarcane field and school garden
4.	Investigation Date	2008
5.	Targeted COPCs	Arsenic, pesticides, metals
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS and Discrete
8.	Number of DUs (or discrete samples)	5 DUs for arsenic (MIS);
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Total arsenic <2 mm: 47.1 - 168 Lead: 218 - 377 Total arsenic <0.25 mm: 13.8 - 308 Bioaccessible arsenic <0.25 mm: 1.1 - 30
Comments: Combined with other Kea'au sugarcane field for final summary table. Screening XRF data for arsenic also collected.		

<b>Site 41</b>		
AMEC Earth and Environmental, 2007, Kea'au Pahoa Road Phase II (Part B) Environmental Site Assessment and Remedial Alternatives Analysis, September 2007.		
1.	Facility Site Name	Kea'au Pahoa Road Development
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2006, 2007
5.	Targeted COPCs	Arsenic, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	56 DUs (surface), 8 DUs (subsurface); 3 samples analyzed for dioxin
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total) <250 mm: 37.8 - 353.0 (surface); 44.9 - 239 (subsurface) Bioaccessible arsenic: 2.62 - 50.79 (surface); 5.45 - 15.52 (subsurface)
Comments: None TEQ dioxin: 112 - 194ng/kg		

**Table B (cont.) - Individual Site Summaries**

<b>Site 42</b>		
Oceanic Analytical Laboratories, 2006, Memo to John Peard		
1.	Facility Site Name	Ola'a (Puna) Mill Bagasse
2.	Location (include GPS coordinate)	Big Island
3.	Former Sugarcane Operation(s)	Bagasse storage and disposal
4.	Investigation Date	2006
5.	Targeted COPCs	Arsenic, lead
6.	Targeted Soil (e.g., surface vs subsurface)	Not Specified
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	2
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Bagasse: Arsenic (total): 66 - 144
Comments: Not tested for bioaccessible arsenic.		

<b>Site 43</b>		
Kevin S. Kennedy Consulting, 2008, Revised Follow-up soil and groundwater sampling and recovery system installation report. C. Brewer Former Puhi Facility. Prepared for C. Brewer Corp. December 2, 2008.		
1.	Facility Site Name	Puhi
2.	Location (include GPS coordinate)	N21°57'41.89" W150°24'30.8" 3-1480 Kaunualii Highway Puhi, Kauai, Hawaii
3.	Former Sugarcane Operation(s)	Pesticide mixing area
4.	Investigation Date	2008
5.	Targeted COPCs	TPH, PAHs, PCP, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	subsurface
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete
8.	Number of DUs (or discrete samples)	<i>Borehole core-wedge</i> : 6 DU, 18 samples  <i>Settling pond discrete soil samples</i> : 4 discrete
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>PMA</i> : TEQ Dioxins: 0.04 - 541 ng/kg  <i>Runoff pond (drains PMA)</i> : TEQ dioxins: 108 - 518 ng/kg
Comments: Soil and groundwater also contaminated with diesel fuel (used to make PCP emulsion). Arsenic and other metals not identified in earlier investigations.		

**Table B (cont.) - Individual Site Summaries**

<b>Site 44</b>		
ENVIRON International Corporation, 2011, Data Gap Study Work Plan: Former Pesticide Mixing Site Waipio Peninsula, Waipahu, HI. May 2011.		
1.	Facility Site Name	Ewa Sugar Mill - Waipio
2.	Location (include GPS coordinate)	Waipio Peninsula, Waipahu, HI
3.	Former Sugarcane Operation(s)	Pesticide Mixing Area
4.	Investigation Date	2002 (data summarized I 2011 workplan)
5.	Targeted COPCs	Dioxins, Organochlorine Pesticides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface: 0-0.5 ft bgs subsurface soil
7.	Soil Sample Type (MIS and/or discrete)	Discrete
8.	Number of DUs (or discrete samples)	67 discrete
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ dioxins: 0.61 – 866,776 ng/kg PCP: 0.370 - 140
Comments: None		

<b>Site 45</b>		
HEER, 1999, Site Inspection Memorandum (Amy Playdon), Fumigant Storage Area, Ewa Sugar Mill.		
1.	Facility Site Name	Ewa Sugar Mill - Waipio
2.	Location (include GPS coordinate)	Ewa, Hawaii 21 20'41N 158 02'30W
3.	Former Sugarcane Operation(s)	Fumigant Storage (Area1), PCB oil dumping (Area 2)
4.	Investigation Date	1999
5.	Targeted COPCs	Metals, pesticides, PCBs, RAP chlorinated herbicides, RAP triazine pesticides, SVOCs, VOCs, TPH-G/BTEX, TPH-D, TPH-O
6.	Targeted Soil (e.g., surface vs subsurface)	Surface soil
7.	Soil Sample Type (MIS and/or discrete)	Discrete
8.	Number of DUs (or discrete samples)	1999: 36
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 8.8 - 54.4,
Comments: Bioaccessible arsenic not tested. Additional samples collected in 2011?		

**Table B (cont.) - Individual Site Summaries**

<b>Site 46</b>		
EnviroServices and Training Center, 2006, Paia Mill Mud Characterization Report. July 2006.		
1.	Facility Site Name	A&B Mill Settling Pond (Maui)
2.	Location (include GPS coordinate)	Paia, Maui, Hawaii
3.	Former Sugarcane Operation(s)	Mill Settling Pond
4.	Investigation Date	2006
5.	Targeted COPCs	Metals, organophosphorus compounds, chlorinated herbicides, substituted urea
6.	Targeted Soil (e.g., surface vs subsurface)	Not Specified
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	4 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments: None		
<b>Site 47</b>		
Clayton Group Services, Inc., 2006, Site Clearing and Soil Sampling Activities, Kamehameha Schools Estoy Property, August 2006.		
1.	Facility Site Name	Ke'ei (Estoy Property)
2.	Location (include GPS coordinate)	83-5496 Middle Ke'ei Road Ka'ai, Honaunau, South Kona, Hawai'i [TMK]: [3] 8-3-08: Parcel 22
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	November 2005
5.	Targeted COPCs	Metals, TCLP SVOCs, TCLP VOCs
6.	Targeted Soil (e.g., surface vs subsurface)	surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	7 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 67 – 219 Bioaccessible As: 0.5-35 TEQ dioxins: 591 ng/kg ( <i>only one sample</i> ) Lead: 11 – 5,230
Comments: House formerly located on property, with various debris dumps not related to former sugarcane use.		



**Table B (cont.) - Individual Site Summaries**

<b>Site 48</b>		
SSFM International, Inc., 2010, Draft Environmental Assessment for Ewa Makai Middle School. Appendix F is Myounghee Noh and Associates. 2008 Phase II ESA for Proposed Ewa Makai Middle School Location.		
1.	Facility Site Name	Ewa Makai Middle School
2.	Location (include GPS coordinate)	TMK (1) 9-1-069: 027
3.	Former Sugarcane Operation(s)	Sugarcane field
4.	Investigation Date	2008
5.	Targeted COPCs	TPH-DRO, VOCs, SVOCs, RCRA metals, pesticides, herbicides, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface and subsurface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs (1 surface, 1 2.5ft bgs, 1 5.5ft bgs)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments: None		
<b>Site 49</b>		
Hawaiian Commercial and Sugar Company, 2009, Summary of Pesticide Testing of Surface Soils – HC&S Sugarcane Fields 707 and 717. Memorandum with maps and analytical data.		
1.	Facility Site Name	Pu'u Nene Sugar Mill
2.	Location (include GPS coordinate)	Puunene, Maui
3.	Former Sugarcane Operation(s)	Pesticide mixing and storage area (Cade plant) and sugarcane fields
4.	Investigation Date	2009
5.	Targeted COPCs	dioxins/furans, arsenic, lead, mercury, chlorinated herbicides, organochlorine pesticides, organophosphate pesticides, triazine herbicides, and carbamate herbicides
6.	Targeted Soil (e.g., surface vs subsurface)	surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	1 DU (Cade plant), 2 DU (Ag fields)
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>Cade plant:</i> TEQ dioxins: 1,797-4,932 ng/kg  <i>Fields:</i> none
Comments: Fields: TEQ dioxins: 102.6 – 194.6 ng/kg;		

**Table B (cont.) - Individual Site Summaries**

<b>Site 50</b>		
EnviroServices and Training Center, 2009, Summary Letter: Mill Mud Sampling Activities-Field 7111 Settling Basins.		
1.	Facility Site Name	Pu'u Nene Sugar Mill
2.	Location (include GPS coordinate)	Puunene, Maui
3.	Former Sugarcane Operation(s)	Settling pond (mill mud)
4.	Investigation Date	2008
5.	Targeted COPCs	RCRA metals, organochlorine pesticides, chlorinated herbicides, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (top 2 inches)
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments: None		
<b>Site 51</b>		
Report pending		
1.	Facility Site Name	Makaha Valley (Kamehameha Schools-DHHL)
2.	Location (include GPS coordinate)	O'ahu
3.	Operation type(s)	Sugarcane field
4.	Investigation Date	2011
5.	Targeted COPCs	
6.	Targeted Soil (e.g., surface vs subsurface)	Surface 0- 0.5ft bgs
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	59 lot-size DUs plus 15 neighborhood-size
9.	Range of Reported COPCs Concentrations (mg/kg unless otherwise noted)	Arsenic (total): Bioaccessible As:
Comments:		

**Table B (cont.) - Individual Site Summaries**

<b>Site 52</b>		
HEER Sampling of Opportunity		
1.	Facility Site Name	Numila Sugar Mill
2.	Location (include GPS coordinate)	Kaua'i
3.	Former Sugarcane Operation(s)	Pesticide mixing & storage
4.	Investigation Date	2011
5.	Targeted COPCs	dioxins/furans, arsenic, lead, mercury, chlorinated herbicides, organochlorine pesticides, organophosphate pesticides, triazine herbicides, and carbamate herbicides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	3 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	Arsenic (total): 23-440 Bioaccessible As: TEQ Dioxins: 312-18625 ng/kg
Comments: None		

<b>Site 53</b>		
Report pending		
1.	Facility Site Name	Koloa Sugar Mill
2.	Location (include GPS coordinate)	Kaua'i
3.	Operation type(s)	Pesticide mixing & storage
4.	Investigation Date	2011
5.	Targeted COPCs	dioxins/furans, arsenic, lead, mercury, chlorinated herbicides, organochlorine pesticides, organophosphate pesticides, triazine herbicides, and carbamate herbicides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	1 DU
9.	Range of Reported COPCs Concentrations (mg/kg unless otherwise noted)	None
Comments: Probably not the right location		

**Table B (cont.) - Individual Site Summaries**

<b>Site A</b>		
Limtiaco Consulting Group, 2009, Environmental Hazard Evaluation, Kakaako Makai District, Honolulu, Oahu, Hawaii. June.		
1.	Facility Site Name	Kaka'ako Makai Development
2.	Location (include GPS coordinate)	TMK 2-1-060:1, 2, 4, 5, 6 TMK 2-1-058:2, 6, 41, 47, 82, 86, 91, 95, 107 TMK 2-1-015:22, 23, 43, 44, 53
3.	Operation type(s)	Ash-contaminated fill material
4.	Investigation Date	2009
5.	Targeted COPCs	TPH, VOCs, SVOCs, PCBs, Pesticides, Metals, Dioxin/furans, Methane gas
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (0-3 feet bgs) and subsurface (> 3 feet bgs)
7.	Soil Sample Type (MIS and/or discrete)	Discrete
8.	Number of DUs (or discrete samples)	8 units and the Ala Moana WWPS (AM) 40 discrete samples at ETC 2 & 4 ( <i>dioxin only a COPC at units 2, 4, 8, and WWTP</i> )
9.	Range of Reported COPCs Concentrations (mg/kg unless otherwise noted)	Surface soil: All Dioxin Data (DUs 2&4): TEQ dioxins 2.9-604 ng/kg
Comments: Co-located lead contamination drives health risk.		

<b>Site B</b>		
EnviroServices and Training Center, 2008, Phase II Environmental Site Assessment and Preliminary Remedial Alternatives Analysis Report.		
1.	Facility Site Name	Kaka'ako Ala Moana Pumping Station
2.	Location (include GPS coordinate)	TMK (1) 2-1-015: Parcels 35, 43, and 44
3.	Operation type(s)	Former municipal incinerator
4.	Investigation Date	2008
5.	Targeted COPCs	TPH, VOCs, PAHs, RCRA metals, Dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (MIS samples), subsurface (borings – discrete samples)
7.	Soil Sample Type (MIS and/or discrete)	MIS and Discrete
8.	Number of DUs (or discrete samples)	13 DUs, 6 discrete
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<i>Incinerator ash</i> TEQ dioxins: 5,809 ng/kg (discrete chimney stack ash)  <i>Ash-contaminated fill material</i> Below dioxin action levels
Comments: TEQ dioxins in MIS soil sample 2.93 - 27 ng/kg		

**Table B (cont.) - Individual Site Summaries**

<b>Site C</b>		
Remedial Site Assessment Decision – EPA Region IX: Kauai Agricultural Research Center. (EPA ID HISFN0905572)		

1.	Facility Site Name	Kauai Agricultural Research Center Agent-Orange site
2.	Location (include GPS coordinate)	Wailua, Kauai. 22.06N, 159.34W
3.	Operation type(s)	Experimental Pesticide Testing
4.	Investigation Date	2006
5.	Targeted COPCs	Chlorinated herbicides, dioxin
6.	Targeted Soil (e.g., surface vs subsurface)	Surface (0 – 6 in bgs), sediment (0-12 in)
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	2 DUs 4 + 1 background sample
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments: TEQ dioxins 4.80 - 5.63 ng/kg		

<b>Site D</b>		
HDOH letter report to Marci Sarsona, Ke Kula 'o Samuel M. Kamakau Public Charter School, Letter # 2009-533MGC, September 15, 2009.		
1.	Facility Site Name	Ke Kula o Samuel Kamakau (Haiku)
2.	Location (include GPS coordinate)	O'ahu
3.	Operation type(s)	Former Navy communications facility
4.	Investigation Date	2009
5.	Targeted COPCs	Metals, organochlorine pesticides, dioxins
6.	Targeted Soil (e.g., surface vs subsurface)	0-6in bgs
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	5 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	None
Comments:		

**Table B (cont.) - Individual Site Summaries**

<b>Site E</b>		
Sampling of Opportunity (HEER)		
1.	Facility Site Name	Kalopa Park (Background)
2.	Location (include GPS coordinate)	Hamakua coast, Big Island
3.	Operation type(s)	Native forest
4.	Investigation Date	2008
5.	Targeted COPCs	dioxins/furans, arsenic, lead, mercury, chlorinated herbicides, organochlorine pesticides, organophosphate pesticides, triazine herbicides, and carbamate herbicides
6.	Targeted Soil (e.g., surface vs subsurface)	Surface
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	1 DU
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	none
Comments: None		
<b>Site F</b>		
Shulgin, Alexander and DeHaas, Lisa, 2009, Evaluation of HMA Treatment to Allow for Reuse of Waste Ash as Landfill Cover, October 30, 2008.		
1.	Facility Site Name	H-Power Incinerator Ash
2.	Location (include GPS coordinate)	H-Power Facility Honolulu, Oahu, HI
3.	Operation type(s)	Incinerator ash disposal area
4.	Investigation Date	
5.	Targeted COPCs	RCRA metals, dioxins, bio-accessibility
6.	Targeted Soil (e.g., surface vs subsurface)	
7.	Soil Sample Type (MIS and/or discrete)	Discrete/Composite
8.	Number of DUs (or discrete samples)	12 discrete
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ dioxins (TEQ): (Nato, 1989 TEFs): 400 – 2,087 ng/kg (WHO, 2005 TEFs): 403 – 2,116 ng/kg
Comments: None		

**Table B (cont.) - Individual Site Summaries**

<b>Site G</b>		
Tetra Tech EM Inc, 2009. Proposed Hilo Target-Safeway Stores Location Northwest Corner of Makaala Street and Railroad Avenue TMK No.: (3) 2-2-047; Parcel 72 Hilo, Island of Hawaii: Final Removal Action Report and Environmental Hazard Evaluation.		
1.	Facility Site Name	Hilo Safeway Target
2.	Location (include GPS coordinate)	Makaala Street and Railroad Avenue Hilo, Hawaii; [TMK] No.: (3) 2-2-047:072
3.	Operation type(s)	Adjacent to Wood Treatment Facility
4.	Investigation Date	2009
5.	Targeted COPCs	Metals, VOCs, SVOCs, PAHs, dioxins and furans, organochlorine pesticides, petroleum related hydrocarbons
6.	Targeted Soil (e.g., surface vs subsurface)	Surface, 0-3ft bgs, and 5ft bgs or greater
7.	Soil Sample Type (MIS and/or discrete)	MIS
8.	Number of DUs (or discrete samples)	14 DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ dioxins: 35 - 2,100 ng/kg Arsenic (total): 22-428 Bioaccessible As: 5-310
Comments: Dioxin and arsenic contamination from adjacent Hilo Wood Treatment site.		

<b>Site H</b>		
United States Air Force 15th Airlift Wing Environmental Restoration Program, 2010, Final Remedial Investigation Report for site SS024 (Reef Taxiway), January 15, 2010.		
1.	Facility Site Name	SS024 Reef Taxiway Golf Course
2.	Location (include GPS coordinate)	Site SS024 Hickam AFB Oahu, HI
3.	Operation type(s)	Fill material, landfill debris
4.	Investigation Date	2009
5.	Targeted COPCs	Metals, VOCs, PAH, pesticides, SVOCs, TPH
6.	Targeted Soil (e.g., surface vs subsurface)	Surface 0- 0.5ft bgs Subsurface 0-10ft bgs
7.	Soil Sample Type (MIS and/or discrete)	MIS and discrete
8.	Number of DUs (or discrete samples)	Surface (MIS): 2 DUs (42 increments in DU1, 37 in DU2) Subsurface (D): 15
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	TEQ dioxins: 30-105 mg/kg
Comments: Burn pits and fill material. Lead also present		

**Table B (cont.) - Individual Site Summaries**

Site I		
HEER, 2008, Additional data for soil at the Honolulu Wood Treatment Facility, 91-291 Hanua Street, Kapolei, Oahu, HDOH Hazard Evaluation and Emergency Response Technical Memorandum (2008-060-RB)		
1.	Facility Site Name	Honolulu Wood Treatment
2.	Location (include GPS coordinate)	O'ahu
3.	Operation type(s)	Commercial wood treatment facility
4.	Investigation Date	2008
5.	Targeted COPCs	arsenic
6.	Targeted Soil (e.g., surface vs subsurface)	surface
7.	Soil Sample Type (MIS and/or discrete)	Discrete, MIS
8.	Number of DUs (or discrete samples)	1 Discrete, 1 MIS DUs
9.	Range of reported concentrations for COPCs that exceeded Tier 1 EALs (mg/kg unless noted)	<p><i>Discrete</i> Arsenic (total): 97 Bioaccessible As: 55 (57%BA)</p> <p><i>MIS</i> Arsenic (total): 24,000 Bioaccessible As: 19,920 (83% BA)</p>
Comments:		



**Notes:**

2, 4-D- dichlorophenoxyacetic acid

EAL- environmental action level

bgs- below ground surface

COPC-contaminant of potential concern

DU- decision unit

MIS- multi-incremental sampling

mg/kg miligrams/kilogram

ND- non-detect

ng/kg- nanograms/kilogram

SVOCs- semi-volatile organic compounds

TEQ- Toxic Equivalent of combined dioxins and furans

TPH- total petroleum hydrocarbons

VOCs- volatile organic compounds

**ATTACHMENT 2**  
**SUMMARY OF DIOXIN DATA**

**SUMMARY OF DIOXIN DATA**

Summary of dioxin data available as of December 2011 for the sites listed in Table B.

**Table C - Summary of Dioxin Data**

Site No.	Site Name	Sampling Method	Low Value (ng/kg)	High Value (ng/kg)	Comments
1	Hamakua Andisol Ag Field	MIS	12	14	
2	Hakalau Airstrip PMA	MIS	16	21	
3	Hakalau Pesticide Mixing and Drainage Area	MIS	17	36	
4	Hilo Sugar Pesticide Mixing Area	MIS	264	6,487	
5	Honokaa Airstrip	MIS	6	85	
6	HSPA Experiment Station Seed Dipping Vat- Pa'auilo	MIS	53	191	
7	HSPA Experiment Station Seed Dipping Vat- Wainaku	MIS	108	608	
8	Kawela Pesticide Mixing Area	MIS	24	703	
9	Kilauea Pesticide Mixing Area	MIS	17	3,517	
10	Kohala Sugar Pesticide Mixing Area	MIS	248	10,549	
11	'Onomea Sugar Seed Dipping Vat	MIS	23	222	
12	Pa'auhau Ag Field	MIS	27	40	
13	Pa'auhau Pesticide Mixing Area	MIS	17	240,266	

**Table C - Summary of Dioxin Data**

Site No.	Site Name	Sampling Method	Low Value (ng/kg)	High Value (ng/kg)	Comments
14	Pa'auhau Seed Vat	MIS			Not tested for dioxins
15	Paauilo Pesticide Mixing & Seed Cane Dipping	MIS	29	401	
16	Paauilo Pesticide Storage Area	MIS	11	15	
17	Papaaloa Pesticide Mixing Area	MIS	973	9,048	
18	Pepeekeo Airstrip	MIS	9	9	Single sample
19	Waipunalei Seed Dipping Area	MIS	29	59	
20	Onomea Sugar PMA	MIS	161	3,755	
21	ML Macadamia Orchard, Ka'u	MIS; surface soil (4-6" bgs)	14	1,900	
22	Kekaha Sugar Mill PMA #1 (makai)	Discrete and MIS	265	1,800	
23	Kekaha Sugar Mill (Seed dipping vat, mill ditch, carpentry shop)	Discrete and MIS			Not tested for dioxins?
24	Kekaha Sugar Mill PMA #2 (mauka)	Discrete and MIS	32	165,211	
25	Kehalani Development - Maui	MIS; surface soil (0-3 ft bgs)	93	111	
26	Ewa Sugar Mill – Kunia Airstrip Staging Area	MIS; surface & subsurface soil	12	869	
27	Royal Kunia Phase I	MIS; surface soil (0-6" bgs)	17	404	
28	East Kapolei – Ag Land (Doc# 7046)	MIS; surface soil	19	101	

**Table C - Summary of Dioxin Data**

Site No.	Site Name	Sampling Method	Low Value (ng/kg)	High Value (ng/kg)	Comments
29	Oahu Sugar Mill - East Kapolei	Discrete & MIS	1.3	615,100	
30	Pioneer Mill	Discrete	ND	ND	
31	Waialua Sugar Mill	Discrete	97	12,000	
32	Lihue Sugar Plantation	Discrete	8.3	4,081	
33	Anahola Project Faith	Discrete			Not tested for dioxins
34	Ho'opili Development	MIS	35	150	Draft data
35	Hanama'ulu	Discrete & MIS			
36	Kahuku Sugar Mill	Discrete & MIS	169	1,042	1998 TEFs used
37	Wai'awa Ridge	Discrete			Not tested for dioxins
38	Ke'eau Hotel Site	MIS	71	434	
39	Ke'au Regional Study	MIS			Not tested for dioxins
40	Kea'au Middle School	MIS			Not tested for dioxins
41	Kea'au Pahoia Rd Development	MIS	112	194	
42	Ola'a (Puna) Mill Bagasse	MIS			Not tested for dioxins
43	Puhi	Discrete & MIS; subsurface	0.04	541	
44	Ewa Sugar Mill – Waipio (PMA)	Discrete	0.6	866,776	
45	Ewa Sugar Mill – Waipio (Fumigants)	Discrete			Not tested for dioxins
46	A&B Mill Settling Pond	MIS			Not tested for dioxins
47	Ke'ei (Estoy Property)	MIS	591	591	Single sample
48	Ewa Makai School Site	MIS			Not tested for dioxins?
49	Pu'u Nene Sugar Mill	MIS	1,797	4932	

**Table C - Summary of Dioxin Data**

Site No.	Site Name	Sampling Method	Low Value (ng/kg)	High Value (ng/kg)	Comments
50	Pu'u Nene Sugar Mill (mill mud)	MIS	49.9	79.05	Total TEQ
51	Makaha Valley (KS DHHL)51	MIS			Data pending
52	McBryde Numila PMA	MIS	312	18,625	
53	Koloa PMA	MIS	ND	ND	Probably not the PMA.
<b>Non-Sugarcane Operations</b>					
A	Kakaako Makai Development	Discrete	2.9	604	
B	Kakaako Pump Station	MIS	2.9	27	
		Discrete	5,809	5,809	Single sample
C	KARC – Agent Orange Site	MIS	4.8	5.6	
D	Ke Kula o Samuel Kamakau (Haiku)	MIS	0.85	6.4	
E	Kalopa Park (Background)	MIS	11	11	Single sample
F	H-Power Incinerator Ash	Discrete/ composite	400	2,117	
G	Hilo Safeway Target	Discrete & MIS	35	2,100	
H	Hickam Golf Course	MIS	0.003	0.117	
I	Honolulu Wood Treatment	Discrete/MIS			Not tested for dioxins?