REMEDIAL ALTERNATIVES ANALYSIS REPORT
For LEAD IMPACTED SOIL
AT
HAKALAU BEACH PARK, HAKALAU, HAWAII

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LIST OF ACRONYMS AND ABBREVIATIONS

ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
c-EHMP	Project-specific Construction Environmental Hazard Management Plan
COC	Contaminant of Concern
COPC	Contaminants of Potential Concern
CSM	Conceptual site model
CY	Cubic yard(s)
DU	Decision Unit
EAL	Environmental Action Level
EHMP	Environmental Hazard Management Plan
EPA	United States Environmental Protection Agency
HDOH	State of Hawaii Department of Health
HDOH TGM	State of Hawaii Department of Health Technical Guidance Manual
HDOT	State of Hawaii Department of Transportation
HEER	Hazardous Evaluation and Emergency Response
Kd	Desorption coefficient (SPLP test results)
LBP	Lead-Based Paint
mg/kg	Milligram per kilogram
RAA	Remedial Alternatives Analysis
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Levels
SCP	State Contingency Plan
SPLP	Synthetic Precipitation Leaching Procedure
TBC	to-be-considered
TCLP	Toxicity Characteristic Leaching Procedure
TMK	Tax Map Key
USDA NRCS	United States Department of Agriculture National Resource Conservation Service-
USEPA	United States Environmental Protection Agency

1 Introduction and Purpose

The site is located at Hakalau Beach Park, Hakalau, Hawaii on the Hamakua Coast approximately 14 miles north of Hilo HI. The site is used as a public park for general recreation, swimming, surfing, and fishing (Figure 1-1). The site includes the Hawaii County Tax Map Key (TMK) (3) 2-9-002 Parcel 080, which is owned by the County of Hawaii. The State of Hawaii Department of Transportation (HDOT) owns an easement under the Hakalau Bridge that extends out ten feet on either side of the bridge which is TMK (3) 2-9-002 Parcel 999. The access road transits across two privately owned triangular parcels which straddle the stream. Table 1-1 lists the TMKs and landowners of the properties in this project.

The park and surrounding area are located below the Hakalau Stream Bridge. This steel girder and trestle bridge lie 250+ feet above the park area. The bridge was originally constructed in 1911, and lead-based paints (LBPs) were frequently applied to the structure throughout the 20th Century (Historic Hawaii 2022). Lead-based paint flaked off and may have been spilled during application. The lead paint was removed from the bridge in 2000, but the area below the bridge now has lead-impacted soil.

1.1 Purpose

Lead-impacted soil has been documented at Hakalau Beach Park with potential impacts on human health. Several site investigations were conducted in 2016, 2020, and 2022 to identify and delineate the extent of lead-impacted soil within Decision Units (DUs) at the site. Triple phosphate treatment was also tested in 2022.

This report evaluates existing data and associated human health and/or environmental hazards and provides an analysis of potential remedial alternatives at the site.

Figure 1-1: Site Location and Tax Map Key Parcels: Hakalau Beach Park

Table 1-1: TMK and Landowner

TMK	Landowner
329002080	County of Hawaii
329002999	State of Hawaii Department of Transportation
331001002	Maria and Steven Wolf
331001001	Marian Land Company
329002025	Maria and Steven Wolf

2 Background

2.1 Site Description

The site is located in a steep gulch and is bisected by the wide and rocky Hakalau Stream which opens to the Pacific Ocean. A paved road descends into Hakalau Gulch and crosses Hakalau Stream via a stabilized channel crossing and becomes gravel/dirt/rock. The southern embankment includes the County of Hawaii Park parcel. This parcel is open and grassy, with a concrete-floor pavilion, and the partial walls from the former Hakalau Sugar Mill. Another dirt/rock road serves the northern embankment. The area under the Bridge is rocky with tall grasses.

2.2 Climate

The site is located on the Hamakua Coast of Hawaii Island on the windward side of the island. This area experiences higher than average rainfall than most of Hawaii. The average annual rainfall for the site is approximately 138 inches. March is the wettest month with over 15 inches of rainfall and June is the driest with approximately 8 inches (Giambelluca et al 2013). Temperatures have minimal variances with an average low of 65 to 70 degrees Fahrenheit and average highs of 79 to 84 degrees Fahrenheit (NOAA 2019).

2.3 Soils/Geology

The site is located adjacent to the Hakalau Stream mouth. Soils are identified by the United States Department of Agriculture National Resource Conservation Service (USDA NRCS) as Hilo Rock Outcrop, consisting of hydrous silty clay loam on the surface (USDA NRCS 2019). This soil consists of lava flows broken into a base of river cobble. The stream banks experience frequent erosion during storms and heavy rains.

2.4 Surface Water

Hakalau Stream bisects the site. This is a 29 mile long, wide freshwater perennial stream with a braided channel. It is part of a nine square mile watershed. The stream is not channelized and the banks shift during heavy flows. The mouth of the stream often has a rocky bar which forms a deeper pool in the stream but does not stop the flow to the ocean. A former seawall is angled on the southern edge, but it is now undermined and surrounded by cobbles. Hakalau County Park attained the Hawaii Department of Health (HDOH) water quality parameters for enterococci in 2022 (HDOH 2022).

2.5 Groundwater

The site is located below the Underground Injection Line according to the HDOH Safe Drinking Water Branch (HDOH SDWB 2019). Groundwater is not a source of drinking water. The site is primarily at sea level to approximately 10 feet above mean sea level.

2.6 Historic Land Use

The parcels targeted for remedial action alternatives are below Hawaii Belt Road in the Honomu-Kahua ahupua'a.

Figure 2-1: Hakalau sugar mill and town. Railroad bridge with train, flume system.

Source: Hakalau Home 2022

The site itself had been agricultural. In 1881 the Hakalau Sugar Mill was built at the southern embankment. Hakalau Gulch Camp (worker housing) on the northern embankment (Marian Land Parcel) is visible on topographic maps by 1915 and in 1925 photos. The current bridge was previously a railroad bridge that was constructed in 1911. It is identified by the State Historic Preservation Office as SHPD Historic Site Number 10-16-9090 (Historic Hawaii 2022). The bridge had multiple layers of lead-based paint applied to the metal structure throughout the 20th century. The associated plantation flume ran parallel to the bridge, and it's possible that this metal support structure also was a contributing source of lead-based paint (Figure 2-1).

The mill, railroad, flume, and the Hakalau Gulch Camp were destroyed in the 1946 tsunami (Figure 2-2). The mill reopened the following year, but the housing was not reconstructed. The railroad was converted to a highway in the 1950s, and the flume was not rebuilt. The company merged, and the mill remained in operation until 1974 (Hakalau

Home 2022). The main structure was demolished by 1979, but the foundation outline still appears on topo maps until 1992. The seawall and portions of the former plantation structure remain on-site today.

Figure 2-2: Aftermath of 1946 Tsunami. Facing South. Seawall still present on-site.

Source: Hakalau Home 2022

2.7 Current/Future Land Use

The site is currently a public County of Hawaii-managed park, which is used for general recreation, surfing, and fishing (Figure 1-1). The site is anticipated to remain a public park.

3 Magnitude and Extent of Contamination

Previous site investigations on bridges along the Hamakua Coast identified that lead-based paint flakes and arsenic could be a concern in the HDOT Highways right of way below the bridges.

Multi-increment soil sample investigations in 2016 identified lead-impacted soils in 15 of the 19 DUs at the site. One DU was paved and not sampled. Only four DUs met the HDOH Hazard Evaluation and Emergency Response Branch (HEER) Unrestricted Land Use (residential land use) Environmental Action Levels (EALs) for total lead (HDOH revised Fall 2017). Follow-up sampling in 2020 and 2022 expanded the DU areas and included additional depth profiles. See Table 3-1 for 2016, 2020, and 2022 combined soil sample results at Hakalau Beach Park.

The sampling confirmed that the southern embankment HDOT ROW contained the highest lead concentration sample results. The area under the Hakalau bridge had lead concentrations that exceeded the gross contamination levels (<1,000 milligrams per kilogram [mg/kg]) in soil beginning from surface soil to a depth of 12-inches below ground surface (bgs). The highest results in the ROW were 25,000 mg/kg of total lead.

Ultimately every DU in the HDOT ROW exceeded both the HDOH Tier 1 EAL for unrestricted land use and the construction/trench worker action level of 800 mg/kg of total lead. Levels that exceed the construction trench worker EAL require a Construction EHMP while working on the site and may require additional PPE and monitoring equipment. The areas of exceedance were not confined to the ROW. Lead-impacted soil was found in the adjacent properties (Figure 3-1), primarily upstream on the southern embankment. In total approximately 6,000 sq. feet on the Northern Embankment and approximately 43,000 sq. feet on the southern embankment both the unrestricted land used EAL and the 800 mg/kg lead EAL for Construction/Trench Workers. Impacts decreased at greater distances from the bridge. Total lead remained between 200 mg/kg and 800 mg/kg even 80 to 100 feet from the bridge in the northern embankment. Lead-impacted soils were found approximately 225 ft from the bridge on the southern embankment.

The County of Hawaii park area DUs were between 200 mg/kg and 800 mg/kg within the primary park area. No DUs exceeded 800 mg/kg. Lead-impacted soils covered an area of approximately 43,000 sq ft of the parcel (the majority of the park space). Some DU depth profiles in the County of Hawaii parcel met the HDOH Tier I EALs for unrestricted land use.

3.1 X-Ray Fluorescence: HDOH 2016

In 2016, the HEER Office performed a surface soil site investigation to evaluate the impacts of LBP and sugar plantation activities at the site. HDOH used an X-ray Fluorescence (XRF) analyzer to screen for lead, arsenic, and mercury in a single composite soil sample. This single-exposure DU was located directly below Hakalau

Bridge and represented the most probable location of the lead-impacted soil. Thirty (30) increments of soil were collected from the top 2 to 3 inches of soil within this DU. The DU was approximately 120-feet long by 30-feet wide.

Sixteen (16) XRF measurements were taken from the combined incremental soil samples and averaged. The average lead concentration was 196 milligrams per kilogram [mg/kg] and the average arsenic concentration was less than 8.7 mg/kg. Mercury was not detected in any of the XRF measurements (HDOH, 2016).

3.2 Paint and Soil Sampling: ESI 2016

Due to high levels of LBP found at other locations on the Hamakua Coast, ESI tested paint chips that were found on the bridge footings and steel girders (ESI, 2016). Greyish-black paint chips were collected from the base of four (4) of the steel girders. Lead concentrations ranging from 89 to 510 mg/kg and arsenic concentrations ranging from 61 to 110 mg/kg were found. Red and black paint chips on the rocks beneath the bridge were also tested, and lead was detected in the red paint at 11,000 mg/kg, and in the black paint at 2,700 mg/kg. Arsenic was detected in the red paint at 130 mg/kg and was not detected in the black paint (ESI, 2017a).

Additional multi-incremental soil samples were collected from nine DUs in Spring 2016 and twelve more DUs in Fall 2016 (Table 1-1) at depths of 0 to 3 inches bgs and 3 to 6 inches bgs. The 2016 soil sample results found exceedances for lead, with results as high as 25,000 mg/kg directly below the bridge. Nine DUs exceeded the HDOH Construction/Trench Worker Direct Exposure EAL of 800 mg/kg for lead, and eight exceeded the HDOH Gross Contamination EAL of 1000 mg/kg for lead.

As a result of the high lead exceedances, soil from seven DUs was analyzed by the Toxicity Characteristic Leaching Procedure (TCLP) (KPC 2022). TCLP is a soil sample extraction method for the assessment of the toxicity of heavy metals or other compounds in contaminated soil media. The method incorporates an extraction fluid with a pH that simulates the acidic conditions that soil if it were disposed of in a permitted landfill.

If TCLP is detected at concentrations that exceed the Resource Conservation and Recovery Act (RCRA) hazardous waste criteria (in the case of lead it is 5 mg/L), the material is classified as hazardous waste and must be disposed of in the continental United States as there are currently not any landfills in Hawaii that can accept this type of waste.

TCLP analysis results for three of the DUs exceeded the RCRA listed hazardous waste criterium of 5 mg/L (DU-1B, 11A, and 21A) Figure 1-1. All of these are located on the southern embankment, under the middle girder (KPC 2022). However, it is estimated that DU2 could also fail TCLP based on the high total lead concentrations.

3.3 Soil Sampling: EQI February and November 2020

In 2020, DUs were added to identify the extent of lead-impacted soil. DU depths were extended to 12 inches bgs unless refusal occurred.

Due to the number of DUs, DUs with similar 2016 sample results (above 200 mg/kg and above 800 mg/kg) were consolidated into larger DUs. Table 3-1 and Figure 3-1 summarized data from all sampling events and include the former DU and revised DU numbers. Data summary tables and laboratory reports are presented in Appendix A.

As presented in Table 3-1, the southern bank bench of the HDOT ROW under the Hakalau Bridge exhibited the highest lead concentration sample results even to depths of 12 inches bgs. Sample results for total exceeded the gross contamination levels (<1,000 mg/kg).

In general, the concentration of lead dropped as depth increased, but not at all of the DUs. The DUs upstream of the HDOT ROW on the southern embankment saw an increase in total lead concentrations (Table 3-1). Additional sampling also found that soil under the northern embankment, under the girder exceeded the HDOH Construction/Trench Worker EAL for 800 mg/kg for lead.

3.4 Soil Sampling: KPC Spring 2022 (April 18-20 and May 10-12)

Concerns about the extent of impacts along both banks of the stream valley floor, shoreline, and the leachability of lead-impacted areas transferring to groundwater and surface water were addressed in the 2022 sampling. The purpose of the 2022 sampling was to determine where soil at the site no longer exceeded the unrestricted land use EAL of 200 mg/kg for lead.

Sampling had been planned for 2021, however, it was delayed due to COVID and right of entry documentation to access private land areas in the vicinity of the project area. Surface and subsurface soil samples were collected along the northern bank as well as upstream at the southern embankment. As shown in Figure 3-1 and Table 3-1 the vertical and horizontal extent of the lead-impacted soil had not been established further upstream and downstream of the bridge on the northern stream bank nor upstream of the bridge on the southern stream bank

3.4.1 Sediment Sampling from Stream Bank

During this mobilization, sediment sampling had been proposed along both sides of the stream bank (KPC, 2022). When KPC arrived to perform the first of two sampling events in April 2022, extensive scouring, associated with a heavy rain event days preceding the sampling had removed all fine sediment associated with the planned sediment DUs and only large cobble and boulder-sized material remained on the banks. As a result of the high stream discharge rate following the rain event, the vast majority of the sediment formerly along the banks of either side of the stream mouth had been transported out into Hakalau Bay. KPC discussed this event with Mr. Thomas Gilmore (HDOH HEER Remedial Project Manager) who visited the site on April 18, 2022, while KPC was conducting sampling on the northern bank of the Hakalau Stream. Mr. Gilmore concurred that sampling for sediment was not practicable since there was longer fine sediment available to sample in the four planned DU locations on either side of the stream.

KPC returned approximately one month later on May 10, 2022, to complete the sampling activities and observed that the sediment in the planned sediment sampling DUs still had not fully returned to its former position. Coarse cobble and boulder-sized sediment made up the bulk of the stream shoreline in these areas, while the gravel-sized sediment was still in the littoral region of the bay and was only beginning the regress into the mouth of the stream.

Based on the April and May 2022 observations it was apparent that the fine sediment is displaced from the mouth of the stream into Hakalau Bay following high rainfall events, then constant wave action winnows the fine sediment particles out of the slug of new sediment entering the bay and slowly pushes the remaining courser sediment back in the mouth of the stream over days/weeks. The rate that sediment returns into the mouth of the stream depends on the wave conditions and a large portion of the fine sediment formerly in the estuary likely remains offshore and the vast majority of the material originally transported into the bay is redeposited is medium to coarse gravel and cobble sized material. This cyclical process is repeated perhaps a couple of times per year on the scale that we observed, and several times per year on a smaller scale that acts to continuously winnow out the fine sediment (including fine lead particles in the sediment) from the mouth of the stream. Based on these observations it is unlikely that there is a complete exposure pathway to human receptors (beachgoers, fishermen) posed by lead in the beach and river sediments.

3.4.2 Delineation Sampling North and South Stream Bank Benches Results

As shown in Figure 3-1 the vertical and horizontal extent of the lead-impacted soil had not been established on the upstream and downstream sides of the bridge on the northern stream bank and in the upstream direction of the southern stream bank. The purpose of the 2022 sampling events was to identify the limits of the contamination “hot zone” to the point where concentrations of total lead in soil fall below the HDOH Tier 1 EAL for unrestricted land use (200 mg/kg).

The results showed a drop-off in total lead concentrations approximately 225 feet upstream along the southern stream bench and 125 feet along the northern stream bench. The goal was to identify the limits of contamination, where soil met HDOH Tier 1 EALs for unrestricted land use (Figure 3-2). In the 2022 sampling event, no DU exceeded 800 mg/kg of total lead. Three DUs exceeded the HDOH Tier 1 EALs for unrestricted land use (Table 1-2).

3.4.3 Groundwater Sampling Results

The plans to collect a groundwater sample from within the highly contaminated zone represented by DUs 32 and 33 using an auger and a gas-powered direct push rig were abandoned based on the observation of the sub-surface cross-section of the southern stream bank adjacent to these DUs. On May 10, 2022, a steep stream bank resulted from high volumes of water scouring the southern bank exposed a 4-foot cross-section that exhibited that a thin veneer of a coarse gravel layer mixed with sand and silt extend from

the surface to about 8-12 inches below the upper surface layer. This unit was underlain by rounded large cobble to small boulder-sized rock unit from the base of the described upper layer to the base of the stream bank cross-section where it was covered by other course sediments that made up the rest of the stream bank sediment. This type of geologic unit would not allow a boring to be installed using the available drilling methods and in lieu of the temporary monitoring well, an additional surface water sample collected from the slow meandering stream that passes through the southern side of the steam where the DUs with the highest lead concentrations were found this portion of the stream bench was conducted as a proxy to evaluate the potential soil groundwater leaching effects. This is described in greater detail below.

3.4.4 Surface Water Sampling Results

In accordance with the Final SAP, Addendum samples were collected from surface water at two locations from the small stream flowing along the base of the southern embankment that supports the access road down the side of Hakalau Valley (KPC, 2022). An additional location was added at the approximate midpoint where the stream passes through the highly contaminated zone (DUs 32 and 33). DU sample from the stream was conducted following the HEER Technical Guidance Manual (HDOH TGM) and the Hawai‘i Administrative Rules (HAR) Chapter 11-54 (HDOH, 2014).

This tributary stream has a width of approximately 6 feet and a depth of approximately 3 feet and runs parallel to the southern wall of the valley, then cuts north and discharges into the Hakalau stream, close to the public beach area. Because this stream passes through the most contaminated areas identified, a sample was planned to be collected in the SAP where the stream turns north and discharged into the main course of Hakalau stream just before where an open concrete dip stream crossing is present in the access roadway connecting to the park, As described above, this point was selected to assess the potential that lead in the soil may be leaching into the surface water as it passes through this highly contaminated zone as described above. These surface water DUs and presented as 202249, 202250, and 202251 in Figure 3-2.

A total of three (3) surface water samples were collected and tested for total lead concentration (mg/L). Concentrations of lead in the water samples were all below the laboratory method reporting limit. Results indicate that there is likely no impact on the surface water body via lead mobilizing from soil to groundwater and groundwater then discharging to surface water.

This is supported by the results of the Batch Test Leaching Model (HDOH, 2007), presented in Section 4.4.4 of this document, which concluded that the mobility of lead in the soil was very low based on the result of the Synthetic Precipitation Leaching Procedure (SPLP) results of the ISM samples collected from the DUs with the highest concentration of lead (DUs 32 and 33).

Table 3-1: 2016, 2020, and 2022 Combined Soil Sample Results at Hakalau Beach Park

	Lead results below HDOH Tier 1 EAL Unrestricted Land Use (200 mg/kg)
	Lead results above HDOH Tier 1 EAL Unrestricted Land Use (200 mg/kg), but below Construction/Trench Worker Scenario (800 mg/kg)
	Lead results above HDOH Tier 1 EAL above Construction/Trench Worker Scenario (800 mg/kg), but below gross contamination (1,000 mg/kg)
	Lead results above gross contamination (1,000 mg/kg)

2020/2022 DU	2016 DU	Previous Sample ID	Sample Date	Depth (in)	Previous Lead Results (mg/kg)	Current Use Description	Owner
	1	DU-1	2016	0-3	25,000	Area around the bents 4 and 5 under the bridge on the south side stream.	HDOT
	1	DU-1D	2016	0-3	23,700		
	1	DU-1T	2016	0-3	23,600		
	1	DU-1B	2016	3-6	7,880		
32/33	1	DU-1B	2020	6-12	3,250*; 3,360*; 2,960*		
	2	DU-2	2016	0-3	10,200	Between the road and stream around bent 6	HDOT
	2	DU-2B	2016	3-6	9,480		
32/33	2	DU-2B	2020	6-12	3,250*; 3,360*; 2,960*		
	3	DU-3a	2016	0-6	69.4	Southern stream bank	HDOT
	4a	DU-4a	2016	0-6	3.81	Northern stream bank.	HDOT
Observed scour in Feb. 2020	4a	DU-9+	2016	0-6	2.8		
	4a	DU-10+	2016	0-6	2.52		
	4b	DU-4b	2016	6-18	2.99		
	5	DU-5	2016	0-3	3,730	Northern stream bank. Areas around the bridge bents.	HDOT
34	5	DU-5	2020	0-6	221*		
34	5	DU-5	2020	6-12	918*		
34	6	DU-6	2016	0-3	282	Northern bank: Access road between Bents 9-10	HDOT
	7	DU-7	2016	0-3	2,530	Road on S. Embankment, between Bents 5 and 6.	HDOT
	7	DU-7B	2016	3-6	Refusal		
33	7	DU-7B	2020	6-12	3,538*		
	8	DU-8	2016	0-3	1,850	Vegetated area on S. embankment south of the access road to park area.	Wolf Property
32	8	DU-8	2020	3-6	13,500*		
8B	8	DU-8	2020	3-6	2,680**		
32	8	DU-8	2020	6-12	7,510*		
8B				12+	Refusal		

2020/2022 DU	2016 DU	Previous Sample ID	Sample Date	Depth (in)	Previous Lead Results (mg/kg)	Current Use Description	Owner
	11	DU-11A	2016	0-3	8,820	Narrow DU south of DU1	HDOT
	11	DU-11B	2016	3-6	Refusal		
32/33	11	DU-11B		6-12	3,538*; 7510*		
	12	DU-12A	2016	0-3	1,410	Grassy area, likely used by public.	Marian Land Co.
	12	DU-23A	2016	0-3	1,040		
	12	DU-24A	2016	0-3	897		
12	12	DU-12A/B, 24A/B	2016	4-6	738**		
	12	DU-12B	2016	3-6	773		
	13	DU-13A	2016	0-3	357	Grassy area, likely used by public.	Marian Land Co.
	13	DU-13B	2016	3-6	372		
	14	DU-14A	2016	0-3	57	Driveway area, acceptable for public use	Marian Land Co.
	14	DU-14B	2016	3-6	93.4		
	15	DU-15A	2016	N/A	Paved	Paved drainage swale.	Marian Land Co.
	15	DU-15B	2016	N/A	Paved		
	16	DU-16A	2016	0-3	339	Park area. Heavy use by public.	County of Hawaii
	16	DU-16B	2016	3-6	348		
37	16	DU-16B		6-12	368*		
	17	DU-17A	2016	0-3	232	Grassy area south of park.	County of Hawaii
	17	DU-17B	2016	3-6	161		
37	17	DU-17B	2020	6-12	368*		
	18	DU-18A	2016	0-3	104	Grassy Park area at mouth of Hakalau stream.	County of Hawaii
	18	DU-18B	2016	3-6	226		
38	18	DU-18B	2020	6-12	764*		
	19	DU-19A	2016	0-3	28.4	Grassy strip west of DU 18. Acceptable for public.	County of Hawaii
	19	DU-19B	2016	3-6	14.1		
	20	DU-20A	2016	0-3	760	Vegetated area west of DU-8.	Wolf Property
	20	DU-20B	2016	3-6	570		
20	20	DU-20A and DU20B	2020	3-6	1,640**		
20				6+	Refusal		
	21	DU-21A	2016	0-3	5,080	Directly below bridge south bank.	HDOT ROW
	21	DU-21B	2016	3-6	2,720		
32	21	DU-21B	2020	6-12	3,538*; 7510*		
	22	DU-22A	2016	0-3	3,830	Wolf Property: Area between driveway and stream.	HDOT/ Wolf Property
32	22	DU-22B	2016/2020	3-6	2,870; 13,500*		
32	22	DU-22B		6-12	7,510*		

2020/2022 DU	2016 DU	Previous Sample ID	Sample Date	Depth (in)	Previous Lead Results (mg/kg)	Current Use Description	Owner
						Potential high use.	
26			2020	0-3	1,320**	Southern bank upstream of DU22	Wolf Property
				3+	Refusal		
				6-18			
27			2020	0-3	1,680**	Southern bank upstream of DU26	Wolf Property
27				3+	Refusal		
34			2020	0-6	221*	Northern bank: renumbered from DU35 in 2020 SAP	HDOT
34			2020	6-12	918*		
202239			2022	0-6	490	Northern bank: adjacent to bridge downstream	Marian Land Co.
202239			2022	6-12	737		
202240			2022	0-6	131	Northern bank: downstream from DU 39	Marian Land Co.
202241			2022	0-6	386	Northern bank: adjacent to ROW upstream	Majority Wolf Property
202241			2022	6-12	360		
202242a			2022	0-6	99	Northern bank: upstream of 41.	Wolf Property
202242b			2022	0-6	76.8 (arithmetic mean)	Northern bank: upstream of 42A.	Wolf Property
202243			2022	0-6	146	Southern bank: streambank	Wolf Property
202244			2022	0-6	402	Southern bank: across from 43.	Wolf Property
202244			2022	6-12	339		
202245			2022	0-6	83.7 (arithmetic mean)	Southern bank: upstream of 44	Wolf Property

Notes DU9 and DU10 are replicates of DU4.
** = 2020 sampling event – February*
*** = 2020 sampling event - November*

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Figure 3-1: 2016 and 2020 DU and Sample Results Hakalau

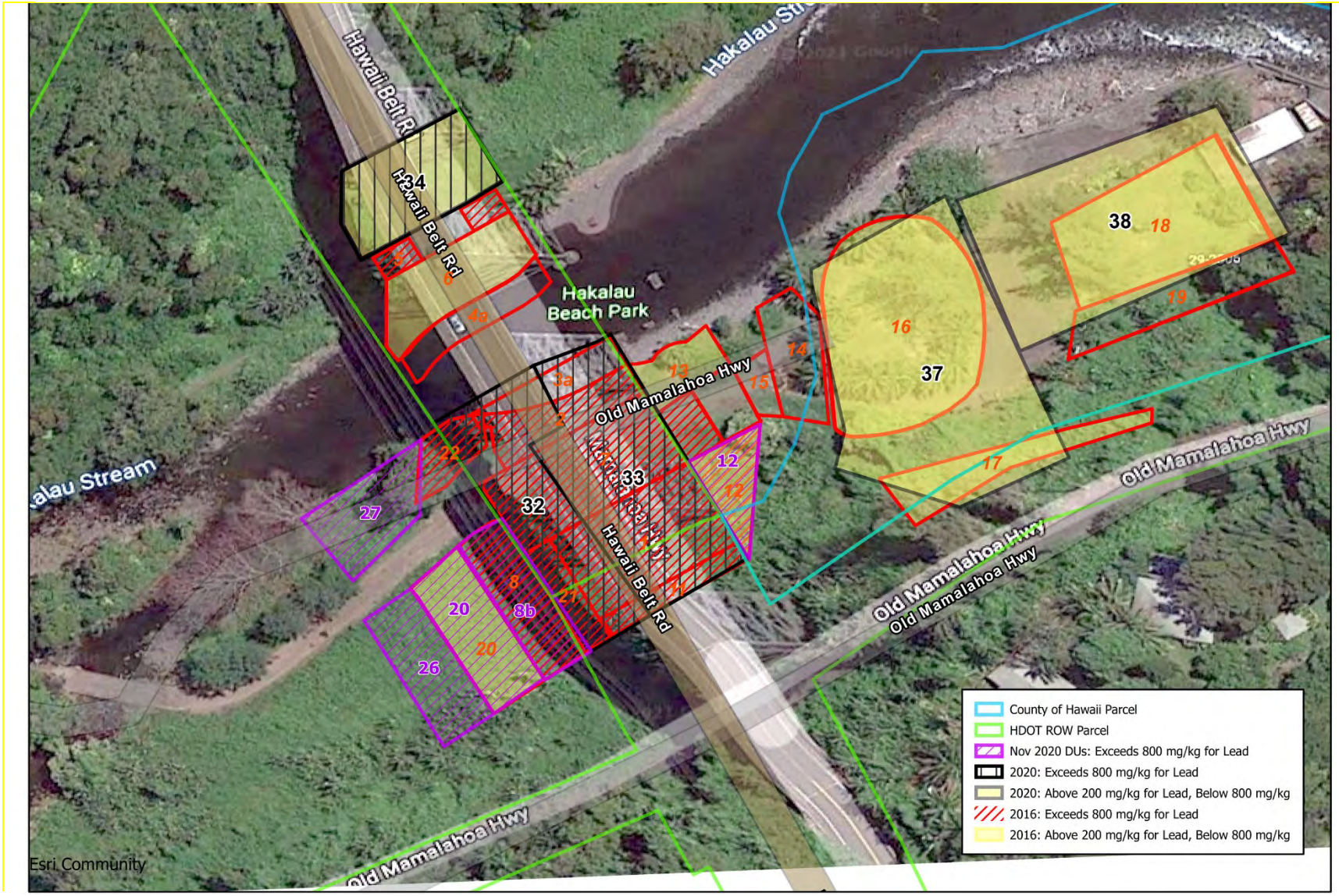

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Figure 3-2: 2022 DU and Sample Results

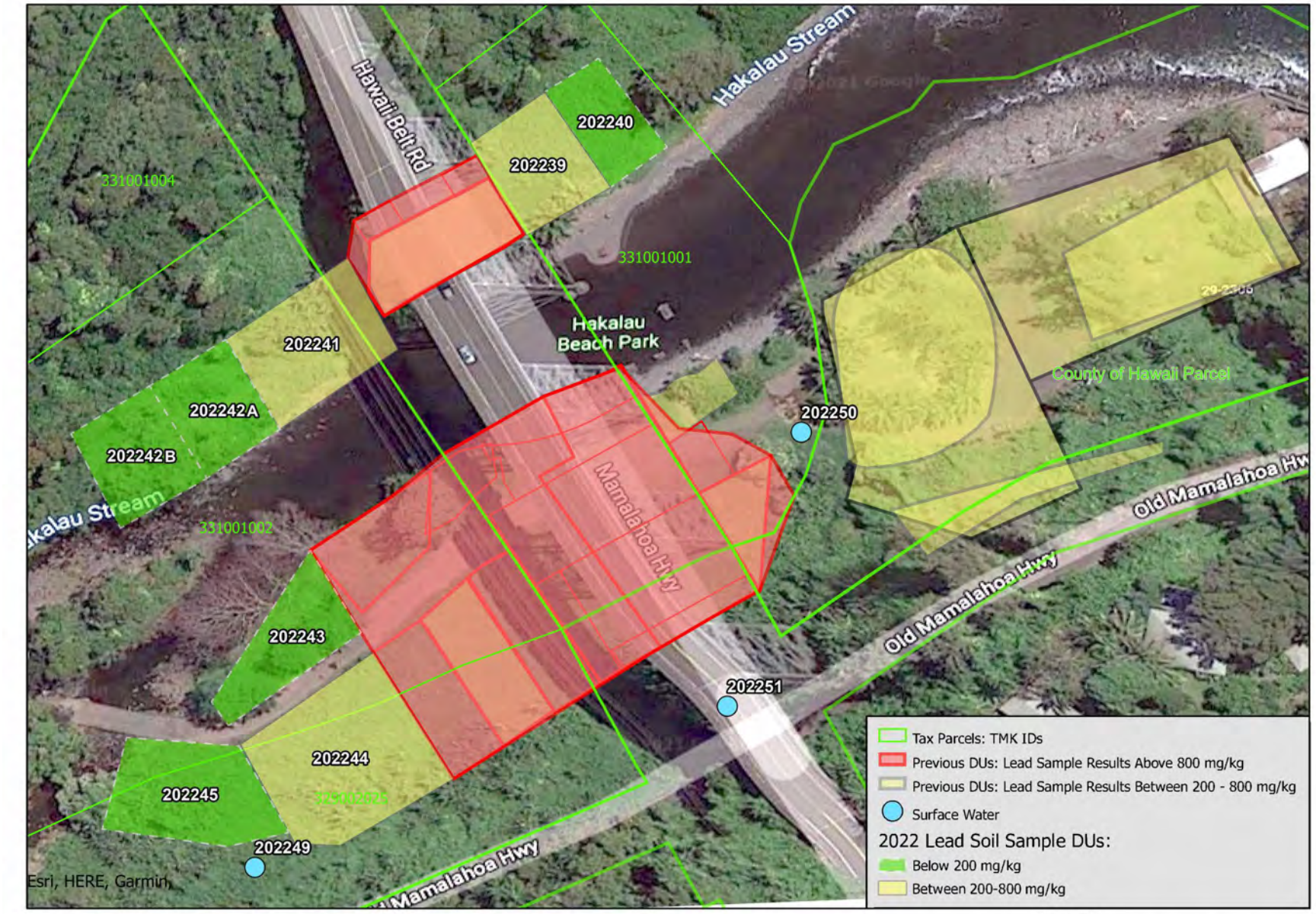

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Table 3-2: Hakalau Beach Park Southern Bank
Results above 800 mg/kg for Lead

	Lead results above HDOH Tier 1 EAL Unrestricted Land Use (200 mg/kg), but below Construction/Trench Worker Scenario (800 mg/kg)
	Lead results above HDOH Tier 1 EAL above Construction/Trench Worker Scenario (800 mg/kg), but below gross contamination (1,000 mg/kg)
	Lead results above gross contamination (1,000 mg/kg)
NA	Not sampled

2020/2022 DU	2016 DU		Depth (in)	Previous Lead Results (mg/kg)	Current Use Description	Owner
HDOT ROW DUs						
	1	DU-1	0-3	25,000	Area around the bents 4 and 5	HDOT
		DU-1D	0-3	23,700		
		DU-1T	0-3	23,600		
		DU-1B	3-6	7,880		
32/33		DU-1B	6-12	3,250*; 3,360*; 2,960*		
	2	DU-2	0-3	10,200	Between the road and stream around bent 6	HDOT
		DU-2B	3-6	9,480		
32/33		DU-2B	6-12	3,250*; 3,360*; 2,960*		
	7	DU-7	0-3	2,530	Road on South stream bank, between Bents 5 and 6.	HDOT
		DU-7B	3-6	Refusal		
33		DU-7B	6-12	3,538*		
	11	DU-11A	0-3	8,820	Narrow DU south of DU1	HDOT
		DU-11B	3-6	Refusal		
32/33		DU-11B	6-12	3,538*; 7510*		
	21	DU-21A	0-3	5,080	Directly below bridge south bank.	HDOT ROW
		DU-21B	3-6	2,720		
32		DU-21B	6-12	3,538*; 7510*		
	22	DU-22A	0-3	3,830	Wolf Property: Area between driveway and stream. Potential high use.	HDOT/ Wolf Property
32		DU-22B	3-6	2,870; 13,500*		
32		DU-22B	6-12	7,510*		
PRIVATELY OWNED PARCELS DUs						
	8	DU-8	0-3	1,850	Vegetated area On southern stream bank south of the access road to park area.	Wolf Property
32		DU-8	3-6	13,500*		
8B		DU-8	3-6	2,680**		
32		DU-8	6-12	7,510*		
8B			12+	Refusal		

2020/2022 DU	2016 DU		Depth (in)	Previous Lead Results (mg/kg)	Current Use Description	Owner
	12	DU-12A	0-3	1,410	Grassy area, likely used by public.	Marian Land Co.
		DU-23A	0-3	1,040		
		DU-24A	0-3	897		
	20	DU-20A	0-3	760	Vegetated area west of DU-8.	Wolf Property
		DU-20B	3-6	570		
20		DU-20A and DU20B	3-6	1,640**		
20			6+	Refusal		
	22	DU-22A	0-3	3,830	Wolf Property: Area between driveway and stream. Potential high use.	HDOT/ Wolf Property
32		DU-22B	3-6	2,870; 13,500*		
32		DU-22B	6-12	7,510*		
26			0-3	1,320**	Southern stream bank upstream of DU22	Wolf Property
			3+	Refusal		
			6-18			
27			0-3	1,680**	Southern bank upstream of DU26	Wolf Property
27			3+	Refusal		

**DU10 consists of a sample, duplicate, and triplicate. For the purposes of this table, the highest total lead sample result is identified.*
2016/2017/2019: Year Sampled

4 Environmental Hazard Evaluations

4.1 Chemicals of Potential Concern

Lead paint was used for decades on the Hakalau Bridge and may have been used on the Hakalau Plantation Flume (destroyed in 1946). Other bridges in the Hamakua Coast have also been identified as sources of lead-based paint which have flaked off and been deposited below the structure on the valley floor.

Initial studies performed at Hakalau Beach Park assessed lead, arsenic, and mercury as chemicals of potential concern (COPC). Sampling identified lead as the chemical of concern (COC). Lead-based paints were used as a corrosion-inhibiting coating on the Hakalau Bridge for decades until removed in 2000.

During previous analyses, lead was found to exceed the HDOH Tier 1 EALs for construction/trench worker direct exposure scenario of 800 mg/kg for lead within multiple DUs (Table 3-2) for a total area of approximately 46,550 sq. ft. Approximately 103,390 sq. ft. were found to be above the HDOH Tier 1 EALs for unrestricted land use (200 mg/kg).

Lead is persistent in the environment and accumulates in soils and sediments through deposition. Once absorbed into the body, lead may be stored for long periods in mineralizing tissue (e.g., teeth, bones, etc.). The stored lead may be released again into the bloodstream, especially in times of calcium stress (e.g., pregnancy, lactation, osteoporosis, etc.) or calcium deficiency.

Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproduction and developmental systems, and the cardiovascular system. Lead exposure also affects the oxygen-carrying capacity of the blood.

The lead effects most commonly encountered in current populations are neurological in children and cardiovascular effects (e.g., high blood pressure, heart disease, etc.) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits, and lowered IQ.

Ecosystems near point sources of lead demonstrate a wide range of adverse effects including losses in biodiversity, changes in community composition, decreased growth and reproductive rates in plants and animals, and neurological effects in vertebrates.

4.2 Exposure Setting

Hakalau Beach Park is a public County of Hawaii Park. However, some portions of private parcels (TMKs) adjacent to the County and HDOT-owned parcels have been used as defacto extensions of the parking area as they are readily accessible to park users but are not owned by the County of Hawaii.

The park was closed in 2017 due to concerns about lead-impacted soil and previously served as a park, fishing area, and general recreation site.

4.3 Potential Human/Ecological Receptors

A conceptual site model (CSM) provides a framework regarding potential sources of contamination, types of contaminants, contaminated media, exposure and migration pathways, and receptors. The CSM (Table 4-1) was used in the preparation of the Remedial Alternatives Analysis (RAA). Based on the results of the document review, the following are identified as potential human receptors:

- On-site construction workers – including personnel involved in repair or construction/ trenching during future site activities; and
- On-site landscapers/site workers – personnel who may maintain landscaped areas and may mow, weed whack, and perform general site maintenance (trash pickup, re-seeding, shrub trimming).
- General Public/Site Users – Including individuals of all ages, who may camp, recreate, or otherwise use the park setting and may potentially dig, touch, drive, lie, or be exposed to lead-impacted soil or dust.
- Ecological Receptors – including native and non-native birds, and mammals that may nest, loaf, hunt, or transit across the site (AECOS, 2019).

4.4 Exposure Pathway Analysis

Direct exposure to lead-impacted soil is a potential exposure pathway to human receptors at the site via the following pathways:

- Direct Contact: Incidental ingestion or dermal contact with soil;
- Air: Inhalation of fugitive dust;
- Surface Runoff and Sediment Exposure: Contaminants bourn by water or revealed by erosion; and
- Groundwater Exposure: Contaminants leaching from soil or impacting flowing groundwater.

4.4.1 Direct Contact Pathways

Direct contact with soil may result in incidental oral ingestion and/or dermal absorption of lead. Dermal absorption is not considered a pathway at the site, as lead at the site is not organic. Direct contact exposure may occur for the following groups:

- *Construction/Trench Workers and Landscaping/Site Workers:* may experience direct contact with lead-impacted soils during trenching, construction, and landscaping activities.

  The HDOH construction/trench worker exposure scenarios are set equal to assumptions used in the United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) (USEPA 2016) for consistency with screening levels for occupational exposure assumptions. The exposure rate reflects projects that may require the same workers returning frequently to the same site

(construction workers in utility trenches). The HDOH TGM uses a total exposure duration of seven years for both carcinogens and noncarcinogens. An exposure frequency of 20 days (4 weeks) per year for 7 years yields a total of 140 days total exposure. Construction workers may receive 140 days (roughly 6 months) of exposure in a single year and never visit the site again. The United States Environmental Protection Agency (EPA) evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model which recommends that soil lead levels less than 400 mg/kg are generally safe for residential use (HDOH 2017).

- *General Public:* The primary concern is that on a regular basis, some people may unintentionally swallow very small amounts of contaminated soil, especially young children who are unaware of the hazards and may be exposed to contaminated soil through normal play activities. Lead enters the body through normal hand-to-mouth activity. Also, residual dirt on plants grown in lead-contaminated soil and on hands after digging or outside work may contribute to lead exposure through accidental ingestion of soil particles. Direct contact with lead-impacted soil is a concern as 20% to 70% of ingested lead is absorbed.
- *Ecological Receptors:* Ecological receptors including birds, mammals, and aquatic species may come into contact with the impacted soil through walking, loafing, digging, or directly in sediments.

4.4.2 Air Exposure Pathways

Inhalation of lead dust is another route of exposure, and almost all inhaled lead is absorbed into the body (ATSDR 2005). Lead particles can be absorbed from fugitive dust particles. The generation of fugitive dust may occur through disturbance of affected soil; such as wind or construction activities. Dust particles may be inhaled, may settle on human skin and be ingested (hand to mouth), and/or may settle on vegetation ingested by humans.

Construction/Trench Workers and Landscaping/Site Workers: may inhale fugitive dust during normal construction, landscaping, or maintenance activities. Total lead results in the HDOT ROW exceed 1,000 mg/kg for lead. This level is above the construction/trench worker scenario of 800 mg/kg and only trained personnel familiar with risks associated with exposure to lead should be allowed to conduct activities such as trenching, grading, and drilling operations. If the soil in these areas is disturbed, site workers would potentially require respirators based on air monitoring results.

- *General Public:* may inhale dust while camping, driving, digging (children), sitting/lying, or crawling (children).
- *Ecological receptors:* Ecological receptors including birds, mammals, and aquatic species may come into contact with the dust through walking, loafing, nesting, or digging.

4.4.3 Surface Runoff and Sediment Exposure Pathway

Surface runoff is part of the current conceptual exposure site model. Upstream and ROW DUs along the southern embankment had exceedances of the gross contamination EAL of 1,000 mg/kg. These include the 2016 DU 22 and 2a and the 2020 DU27. Likely, the shoreline itself does not have exceedances as the soils have been scoured. The exposed shoreline area did not have enough soil to sample. In 2016 the shoreline results were below the HDOH Tier 1 EALs of 200 mg/kg.

The stream banks shift during storms. If extensive flooding, scouring, or high waves (tsunami or hurricane) causes extensive erosion of surface soil from the impacted DUs they may migrate to Hakalau Stream. Sediment may accumulate in the adjacent marine environment and be available for contact with various receptors. Recreational users of the marine environment (swimmers, surfers, fishermen) may come into direct contact with sediment and be exposed through oral ingestion and/or dermal absorption. Ecological receptors may live directly in the impacted sediment and may be exposed to COC through feeding within the sediment. As a secondary transport mechanism, COC may bioaccumulate in ecological receptors (i.e., fish, shellfish), then ingested by human receptors.

4.4.4 Groundwater Exposure Pathway

To assess the potential environmental/groundwater leaching pathway, the SPLP analysis was conducted on a soil sample collected from DU32 and DU 33, and the SPLP value was 4.32 mg/L and the method reporting limit (MRL) is 0.03 mg/L (Appendix B).

The SPLP assists in the determination of the mobility of both organic and inorganic analytes present in liquids, solids, and wastes. The results of the SPLP test are used to determine the Desorption Partitioning Coefficient (Kd), which is important to understanding how mobile the lead in the soil is and whether it poses a potential risk to ecological receptors in the vicinity of the park (e.g., vertebrate and invertebrate organisms). EPA Method 1312 SPLP West extraction procedure was used on the Hakalau soil samples from DU32 and DU33. West refers to the pH of the extraction fluid that is made by adding 60/40 weight percent of sulfuric and nitric acids to reagent water until the pH is 5.00 +/- 0.05 used to determine the leachability of a site that is west of the Mississippi River. This method's pH is higher than the EPA methods extraction fluid for sites east of the Mississippi River (4.20 +/- 0.05).

The result of the SPLP was inputted in the Batch Test Leaching Model (HDOH, 2007), and used to determine the relative mobility of lead in the soil. The Batch Test Leaching Model uses a combination of SPLP results and the total lead concentration in the sample to calculate a desorption coefficient (Kd). The calculated desorption coefficient is greater than 20 (Kd>20), so the contaminant is considered not significantly mobile and is unlikely to pose a leaching hazard to groundwater. If it was less than 20, then an estimated concentration in groundwater should be calculated and compared to the HDOH Tier 1 EAL The Kd value calculated by this model for the soil sample was 2,500, which is much greater than Kd 20 (Appendix B).

This result demonstrates that the lead present in the soil is strongly bound to the soil and is considered immobile (soil is weathered volcanic alluvial sediments including gravel, sand, and clay). Thus, there is a low likelihood that the lead concentrations in the soil at the park pose a risk to ecological receptors (e.g., aquatic organisms) as a result of lead leaching from the soil into rainwater and sediments or impacting the groundwater as it flows toward the stream and ocean that form the northern and eastern perimeter of the park.

4.5 Environmental Hazard Evaluation Summary

The exposure pathway analysis described in the previous section identifies various exposure pathways (direct and indirect) where lead-impacted soil may pose a risk to human and ecological receptors. The conceptual site exposure model provides a graphical comparison of release mechanism, pathways, and exposure routes to potential current and future receptors at the Site (Table 4-1).

4.5.1 COPC Sources and Release Mechanisms

The primary source of the COPC at Hakalau Beach Park is lead-impacted surface and subsurface soil from lead released into the environment from lead-based paint used in historical bridge maintenance activities.

Lead-impacted soil present at the site has been shown to exist at concentrations above the HDOH Tier EALs for gross contamination (1000 mg/kg). Total concentrations vary across the site and include portions that are at or below HDOH Tier 1 EALs for unrestricted land use. The secondary release mechanism, besides direct contact with soil, includes dust, surface water runoff, and leaching.

4.5.2 Pathways and Exposure Routes

Lead poses a hazard to potential receptors through direct exposure to contaminated media through pathways including surface soil, subsurface soil, ambient air, surface water and sediments, and groundwater. These pathways potentially expose receptors to lead via inhalation, ingestion, or dermal adsorption.

4.5.3 Potential Receptors Current and Future Land Use

The main human exposure scenarios identified under current land use as a County Beach Park are the general public, maintenance workers, and construction works. Since the park's land use is restricted due to its location and ownership, it is not likely to change, and future land use includes these same human exposure scenarios. This is also true for avian and aquatic receptors.

4.5.4 Complete Exposure Pathways

Complete exposure pathways exist for all receptor scenarios exposed to surface and subsurface soil at this site under current and future conditions. Exposure to dust is a complete pathway to on-site maintenance and construction workers when the current grass cover is disturbed and there is potential for inhalation of dust under dry windy conditions when activities such as land mowing and excavation occur.

4.5.5 Potentially Complete Exposure Pathways

Potentially complete pathways to the general public, terrestrial and aquatic ecological receptors exist via direct exposure to fugitive dust if the grass cover was not maintained or a construction excavation project was conducted at the park and dust controls were not implemented correctly. This potential exposure route could be controlled using proper materials management practices and could limit this exposure pathway. Currently, there is no complete pathway to any receptors via surface water runoff, but again, future construction activities could potentially complete this pathway if not conducted with care. Additionally, if there were a natural disaster such as a tsunami that could scour away the

current stream bank and redistribute lead-impacted soils in the current park in valley floor sediment and runoff could be a completed exposure pathway.

4.5.6 Exposure to Lead Leaching

There has not been an identified complete pathway to current and future receptors via leaching in subsurface soil or groundwater. A batch test leachability model based on SPLP analyses from soil collected from the DUs with the highest documented throughout the aggregated sampling events demonstrated that the absorption coefficient is high enough to prevent contaminant mobilization from the soil to groundwater (Appendix B). This is also in part supported by the results of surface water sampling conducted in May of 2022 from a small slow-flowing stream that borders the southern valley escarpment that meanders through and around the most heavily lead-impacted areas. Three surface water DUs were sampled from this stream (DUs 202249, 202250, and 202251, See Figure 3-2) from locations; 1) prior to passing through most impacted areas (DU 202249), 2) at the point which was adjacent to the areas where highest soil concentrations have been identified (DU 202251), and the final point just downstream of the areas of greatest lead concentrations (just before draining into the mouth of Hakalau stream and Hakalau Bay) (DU 202250).

Table 4-1: Conceptual Site Exposure Model

Primary Sources	Primary Release Mechanism	Secondary Sources	Secondary Release Mechanism	Pathway	Exposure Route	Potential Receptors							
						Current Land Use				Future Land Use*			
						On-site Landscape or Construction Workers	General Public	Terrestrial Ecological	Aquatic Ecological	On-site Landscape or Construction Workers	General Public/	Terrestrial Ecological	Aquatic Ecological
Lead Impacted Soil	Lead-Based Paint from Bridge	Lead Impacted Soil	None	Surface Soil	Ingestion	X	X	X	X	X	X	X	X
					Dermal	X	X	X	X	X	X	X	X
			None	Sub-Surface Soil	Ingestion	X	X	X	X	X	X	X	X
					Dermal	X	X	X	X	X	X	X	X
			Dust	Ambient Air	Inhalation	X	O	O	O	X	O	O	O
			Surface Water Runoff	Surface Water and Sediments	Ingestion	O	O	O	O	O	O	O	O
					Dermal	O	O	O	O	O	O	O	O
			Leaching	Subsurface Soil	Ingestion	I	I	I	I	I	I	I	I
					Dermal	I	I	I	I	I	I	I	I
				Ground- water	Ingestion	I	I	I	I	I	I	I	I
					Dermal	I	I	I	I	I	I	I	I
					Inhalation	I	I	I	I	I	I	I	I

Notes: X - Complete exposure pathway O – Potentially Complete I - Incomplete
** - No significant change to the land use is planned in the near future*

5 Establishing Alternatives

Under amended Section 121(d) of CERCLA, remedial actions for hazardous substance cleanup must attain or waive federal environmental potentially applicable or relevant and appropriate requirements (ARARs), or more stringent state environmental ARARs, upon completion of the remedial action (EPA 2019).

ARARs include only federal and state environmental or facility-citing laws/regulations and do not include occupational safety or worker protection requirements. Compliance with OSHA standards is required by 40 C.F.R. 300.150 and therefore the CERCLA requirement for compliance with or waiver of ARARs does not apply to OSHA standards (EPA 2019). In addition to ARARs, non-promulgated criteria, advisories, guidance, or policies referred to as to-be-considered criteria (TBC) information may also apply to the conditions found at a site. Unlike ARARs, identification of and compliance with TBC information is not mandatory or legally binding; however, where TBC information is used as a cleanup level, its use for this purpose should be explained and justified.

See Appendix C for a table for ARARs and TBC criteria for remedial alternatives considered for Hakalau Beach Park. The alternatives evaluated to meet the ARARs and compliance may require consultation with State and Federal Agencies.

5.1 Potential ARARs and TBC Criteria

5.1.1 Potential Chemical-Specific ARARs and TBCs

Chemical-specific ARARs include those environmental laws and regulations that regulate the release to the environment of materials with certain chemical or physical characteristics or that contain specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limits for specific hazardous substances by media. In this instance, the chemical of concern is lead. This contaminant is identified in the EPA RSLs specifically and identified as acceptable for park users at 400 mg/kg in soil. The RSLs are defined as TBCs as they are not promulgated.

5.1.2 Potential Location-Specific ARARs and TBCs

Location-specific ARARs govern activities in certain environmentally sensitive areas. These requirements are triggered by the specific location and the proposed activity at the site. The site is a public park. The EPA RSLs currently allow for 400 mg/kg of total lead at pre-schools and parks. Under the HRS 128D, the HDOH Hazard Evaluation and Emergency Response (HEER) office have provided guidance that recommended a stricter standard of 200 mg/kg for unrestricted land use and active park space. The RSLs and EALs are not promulgated.

The site is also less than 150 meters from the water and within the Coastal Zone Management Special Management Area. It is below the Hawaii-designated underground

injection control line and is not a source of drinking water. It is not located in a designated critical habitat or a designated wetland.

5.1.3 Potential Action-Specific ARARs and TBCs

Action-specific ARARs generally set performance, design, or other similar action-specified controls or restrictions on particular kinds of response activities. For example, action-specific ARARs may include restrictions that define acceptable treatment and disposal procedures for hazardous substances under 40 CFR Part 261 and 262. The EPA regulatory limit for lead is 5 mg/L. DUs at the site have been identified as exceeding this limit and would be classified as hazardous waste.

DU1, DU11, and DU21 failed TCLP at different depth profiles, (0 to 3-inches bgs), and near-surface soil (3 to 6-inches bgs). It is possible that DU2, which was not tested at the time, could also fail TCLP due to its high total lead concentrations. “In addition, any soil with total lead concentrations somewhere between 1410 mg/kg (DU-12A, TCLP lead of 1.3 mg/L) and 5080 mg/kg (approximate range of total lead concentration 1500 - 5000 mg/kg) may likely have TCLP lead results greater than 5 mg/L, and thus be classified as hazardous waste based on the 2016 results” (KPC 2022).

There are no approved waste disposal sites in Hawaii authorized to accept this waste. This type of waste is sent off island for disposal.

5.2 Remedial Action Objectives

The Remedial Action Objectives for Hakalau as identified by the site owners and as recommended by the state guidance is to remove the direct contact pathway to human receptors (park goers and site workers) and ecological receptors to lead-impacted soil which exceeds concentrations of 200 mg/kg.

5.3 General Response Actions

Actions may include restricting access, fencing, administrative/institutional controls, reducing contact with lead-impacted soil through physical barriers, or removing the source of contamination.

6 Detailed Analysis of Alternatives

The HDOH TGM (Section 16.2.2.2) and the Hawaii State Contingency Plan (SCP) [HAR 11-451-8(c)] (HAR 1995) identify a hierarchy of remedial response actions in this descending order:

1. Recycle or reuse
2. Destruction or detoxification
3. Separation, concentration, or volume reduction
4. Immobilization of hazardous substances
5. On-site or off-site disposal, isolation, or containment
6. Institutional controls or long-term monitoring.

6.1 Alternative 1: Recycle or Reuse

The contaminant of concern is dispersed lead-paint flakes. The lead paint material is not dense enough to be separated from the soil in order to be recycled or reused. This alternative is not suitable to remove the contaminant from the site or reduce potential exposure pathways.

6.2 Alternative 2: Destruction or Detoxification

The lead at the site is also not organic, corrosive, or explosive and is relatively immobile. This alternative is not suitable to remove the contaminant from the site or reduce potential exposure pathways.

6.3 Alternative 3: Separation, concentration, or volume reduction

Under this alternative, contaminated material may be completely or partially separated from material that is not contaminated, or contamination may be reduced in a large volume of material by concentrating the contaminant in a smaller volume. Soil particle size separation is conducted to reduce contaminated soil volume. Soils at Hakalau and lead paint flakes are not suitable for volume reduction in this form and contamination would not be reduced significantly.

6.4 Alternative 4: Immobilization of Hazardous Substances

Portions of the site exceed gross contamination and fail TCLP. The soil in some DUs (approximately 8,390 sq ft) would be classified as hazardous waste if removed for disposal. This soil cannot be disposed of in Hawaii as there are no facilities that are permitted to accept hazardous waste. Reducing bioavailability by stabilizing the lead with a strong buffering agent application was tested to reduce the concentration which could allow for disposal in the state (e.g., through the application of triple superphosphate (TSP) as an amendment to the soil). This would be in conjunction with soil excavation and removal and would not be used for in-situ stabilization. Treated soil would be hauled to RCRA subpart D permitted landfill (e.g., West Hawaii Sanitary Landfill).

TSP is a commercially available soil fertilizer that can also be used to reduce the mobility of lead in the soil. Phosphate is a compound made up of phosphorous (P) and oxygen

(O) and phosphorous atoms that act as an anion that binds readily to lead cations. TSP can also be combined with different ions to impact solubility under acidic conditions. It is most commonly used as fertilizer produced from phosphate rock and phosphoric acid and is technically known as calcium dihydrogen phosphate and as monocalcium phosphate, [Ca $(H_2PO_4)_2.H_2O$]. Treatability studies for in situ lead stabilization that used phosphate-based binders found a significant reduction in the bioavailable lead in soil when it was amended with TSP (Hettiarachchi et al. 2001 and Gene 2008). TSP can also be combined with different ions to impact solubility under acidic conditions. Based on the high concentrations of lead in soil at the Hakalau site, TSP was not considered as a potential in situ stabilization remedial alternative approach. Instead, TSP is evaluated in this alternative and was considered as an amendment to be added to the contaminated soil after it is excavated to reduce the toxicity through immobilization/stabilization of the soil to allow it to be disposed of at an on-island landfill. This is a variation of the scenarios that are evaluated under Alternative 5.

As part of the remedial alternative evaluation, in May of 2022, KPC collected a bulk sample using ISM from the most heavily impacted areas below the bridge on the southern side of the Hakalau stream from DUs 32 and 33 which had been documented in previous investigations as having the highest total lead concentrations in the project area (DUs 32 and 33 were composed of the consolidated DUs 1, 2, 11, and 21). The methodology and results of this treatability study are presented in Appendix E.

The study concluded that TSP was effective at reducing the toxicity of lead in the areas where the highest total lead was present. The total lead concentrations from ISM soil samples collected from DU32 and DU33 were 11,400 mg/kg and had a respective TCLP result of 25.6 mg/l, which is well above the RCRA toxicity characteristic for lead of 5.0 mg/L. However, if TSP is added to an aliquot from this same ISM from DU32 and DU33 at a concentration of just 5% of the total soil mass, the TCLP results were shown to reduce concentrations below the laboratories method reporting limit (or in other words non-detectable dissolved lead). This was achieved without any additional pH buffering additives and demonstrated that immobilization/ stabilization using TSP is highly effective and has ratios that are economically feasible.

As a component of the bench test treatability study in addition to evaluation of the effectiveness of immobilizing lead by adding TSP as an amendment, KPC also evaluated the effectiveness of adding Portland Cement as a way to stabilize the lead. The concept was that if Portland Cement could both buffer the soil to reduce the mobility of the lead and create a material that could consolidate the lead soil as long-term management to reduce disposal costs (e.g., construct an onsite encapsulation cell). Portland Cement was added to the impacted soil at a typical mass ratio for making concrete (1:3). Samples of the soil were weighed, and Portland Cement was mixed with the soil, no other sand or gravel was added and because the soil already had a high moisture content, water was not added to the mix. After the mix was cured, samples were pulverized and submitted to Eurofins for analysis. TCLP analysis on this final material also showed that Portland cement is able to reduce the TCLP result to below the laboratory reporting limit without the addition of TSP Appendix E.

6.5 Alternative 5: On-site or off-site disposal, isolation, or containment

This method offers a good option to prevent the general public from coming into contact with lead-impacted soils. There are three scenarios evaluated in the RAA that are considered effective presumptive remedies for addressing lead-impacted sites by the USEPA. Generally, if lead-impacted soil remains on-site it will be encapsulated and direct exposure to park users is prevented, however, site maintenance workers/construction workers may come into contact with it in the future. An Environmental Hazard Management Plan (EHMP) will need to be maintained and updated when future work activities are planned in areas where encapsulated contaminated soil is present. A project-specific construction EHMP (C-EHMP) will need to be prepared for each future repair and construction activities need to plan for managing lead-impacted soil to be protective of all potentially exposed receptors for the duration of the project. Alternatively, if lead-impacted soil is removed in its entirety from the site as a remedial approach then all potential exposure risk is removed and no EHMP is required for the long term. This alternative presents the remedial alternatives that reduce or remove contamination from direct contact with receptors at the site.

Due to the overlapping rounds of sampling and DUs that have occurred between the period 2016 and 2022, Tables 6-1 and 6-2 identify the total area of the exceedances broken down by landowner, location, and DU.

Table 6-1: HDOT and Privately Owned Parcels which exceed 800 mg/kg

Stream Side	Owner (Description)	Lead	Area (sq ft)	Perimeter (ft)	DUs	Total (sq ft)
North	HDOT (ROW)	800+ mg/kg	5885	313	5,6,34	
South	HDOT (ROW Streamside)	800+ mg/kg	5510	331	1,2,7,33, 22 (partial)	
South	HDOT (ROW Roadway)	800+ mg/kg	3026	285	7,32,33,	
South	HDOT (ROW Upslope)	800+ mg/kg	10805	421	1,7,11, 21,32,33	
South	Wolf Property (Streamside)	800+ mg/kg	5219	308	22,27	
South	Wolf Property (Roadway)	800+ mg/kg	1817	248	Not sampled, likely 800 mg/kg +	
South	Wolf Property (Upslope)	800+ mg/kg	10382	404	8,20,26	
South	Marian Land Co (downstream of bridge)	800+ mg/kg	3907	345	12, portion 13	
					Total HDOT Area 800 + mg/kg	***25,226***
					Total Privately Owned Parcel	***21,325***
					Total Area 800+ mg/kg	***46,551***

Table 6-2: Hawaii County and Privately Owned Parcels which exceed 200 mg/kg and are below 800 mg/kg *

Stream Side	Owner	Lead	Area (sq ft)	Perimeter (ft)	DUs*	Total (sq ft)
North	Wolf Property (upstream)	200+ mg/kg	5847	310	202241	
North	Marian Land Co (downstreami)	200+ mg/kg	4100	267	202239	
			North Side: Between 200-800 mg/kg			***9947***
South	County of Hawaii	200+ mg/kg	36017	875	16, 17,18,37,38	***36017***
South	Wolf Property upslope	200+ mg/kg	9035	374	202244	***9035***
South	Marian Land Co	200+ mg/kg	1355	161	13	***1355***
			South Side: Between 200-800 mg/kg			***46407***
				Total Area 200- 800 mg/kg		***56354***
All HDOT DUs exceed 800 mg/kg						

6.5.1 Alternative 5a: On-site isolation and containment

HDOH and EPA-acceptable mitigation measures include soil encapsulation. During soil encapsulation, DUs that exceed HDOH unrestricted land use EALs (200 mg/kg) for lead would first be covered with orange mirafi (geotextile) or black geotextile material with caution tape laid at intervals to produce a visible barrier between the clean and impacted soils. Visual confirmation will be conducted to ensure that all targeted soil is covered (Figure 6-1, Table 6-3).

- Clean fill would be brought in and overlaid across the impacted site at a depth of either 18 or 24 inches and grass would be maintained to prevent potential exposure. Additional cubic yards of clean soil would also be needed for drainage and grading.

An exposure assessment conducted at nearby Kolekole Beach Park in 2017 for park maintenance workers demonstrated the grass cover on the impacted soil areas effectively prevented a complete exposure pathway while performing maintenance activities (e.g., lawn mowing). The results of this assessment also demonstrated that grass cover was protective of park user exposure scenarios as long as there were restrictions on activities that could render the grass cover ineffective (e.g., digging, driving fence posts, etc.). This may be suitable for the County of Hawaii Park Parcels but may not be adequate for the HDOT ROW due to high COPC levels.

This option leaves the lead-impacted soil on site (including areas of Gross Contamination) and an EHMP would still be needed. Batch Test Leachability analysis demonstrated that lead is immobile and unlikely to affect groundwater and surface water. Workers within the DOT ROW would need respirators when performing maintenance tasks where they are digging/trenching in soil.

Table 6-3: Alternative 5a: No Removal, Cap Only, Cubic Yards

		Cubic Yards	
Ownership	**Sq Ft**	**Clean fill 18" Grass Cap**	**Clean fill (24") Grass Cap**
County of Hawaii 200-800 mg/kg	36017	2001	2667
HDOT ROW (North) 800+ mg/kg	5885	327	436
HDOT ROW (South) 800+ mg/kg	19341	1075	1433
Private Parcels (North) 200 - 800 mg/kg	9947	553	737
Private Parcels (South) 200 – 800 mg/kg	10390	577	770
Private Parcels (South) 800+ mg/kg	21325	1185	1580
Total	**102905**	**5718**	**7623**

Annual operation and maintenance costs are not typically high for this alternative; however, the location could be impacted by erosion due to heavy rains and storms. The

hard cap and soil cover option may be undermined during large storms. If this occurs, additional soil or hard cap repairs may be needed. If evidence of erosion impacts the mirafi layer, there is a potential that impacted soil may be spread over areas currently identified as “lower risk” and additional sampling could be required. It is vital that this cap is maintained to protect park users. An annual inspection of this cap will be required per the EHMP and will be documented and submitted to HDOH.

Areas, where this would be impracticable (steep slopes, areas of intense vegetation/trees on the southern embankment), would be fenced and signs would be maintained to restrict access.

6.5.2 Alternative 5b: Removal of all soil that exceeds 200 mg/kg for lead and replacement with clean fill

DUs which pass TCLP and exceed HDOH Tier I unrestricted land use EALs for lead (200 mg/kg) will be excavated (Figure 6-1), hauled to West Hawaii Sanitary Landfill and replaced with clean fill at a design fill depth of 24 inches. DUs in the County of Hawaii parcel meet this standard. Other locations, particularly the DOT ROW area and some private parcels, do not meet this standard and may require disposal off-island (Table 6-4).

Initial costs would be high as soil which is classified as hazardous waste could not be disposed of at facilities in Hawaii. DU1, DU2, DU11, and DU21 failed TCLP at different depth profiles, (0 to 3-inches bgs), and near-surface soil (3 to 6-inches bgs). This is approximately 8,390 sq ft. It is possible that DU2, which was not tested at the time, could also fail TCLP due to its high total lead concentrations. DU2 is approximately 2,444 sq ft but both 0.25-inch depth layers are likely to fail TCLP so at least 0.5 feet would be removed and would require off-island disposal.

Table 6-4: DUs which Failed TCLP (2016) and Require Mainland Disposal

DU	**Owner**	**sq. ft**	**Depth***	**CY**	**Total Lead mg/kg**	**TCLP**
DU-1B	HDOT	5847	3 – 6 inches	54.14	7880	26.2
DU-11	HDOT	1228	0 – 3 inches	11.37	8820	31.8
DU-21	HDOT	1315	0 – 3 inches	12.18	5080	14.2
DU-2A	HDOT	2444	0 – 3 inches	22.63	10200	Fails TCLP*
DU-2B	HDOT	2444	3 – 6 inches	22.63	9480	Fails TCLP*
Total		13258		122.94*		

Soil Excavation, and Off-Site Disposal of all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill.
Note = DUs 2A and 2B are assumed to fail TCCP based on total lead concentrations
* As a conservative measure assume that an entire 0.5 will be removed from each of these DUs total of 246 cubic yards (123 CY x 2=246 CY).

Confirmation sampling will be conducted to ensure that all targeted soil is removed from each DU. All DUs would be excavated in 6-inch lifts until confirmation samples indicated

that soil concentrations were below the HDOH EAL for unrestricted land use (200 mg/kg). Approximately 103,000 sq ft of soil would need to be removed to various depths. For this alternative, we used an estimated depth of 12 inches. The depth may be less on a site-wide average (Table 6-5).

Clean fill would then be brought in and overlaid across the impacted site at a depth of 18-24 inches to relevel the site for use and allow for revegetation, drainage, and grading. Additional cubic yards of clean soil may also be needed for drainage and grading.

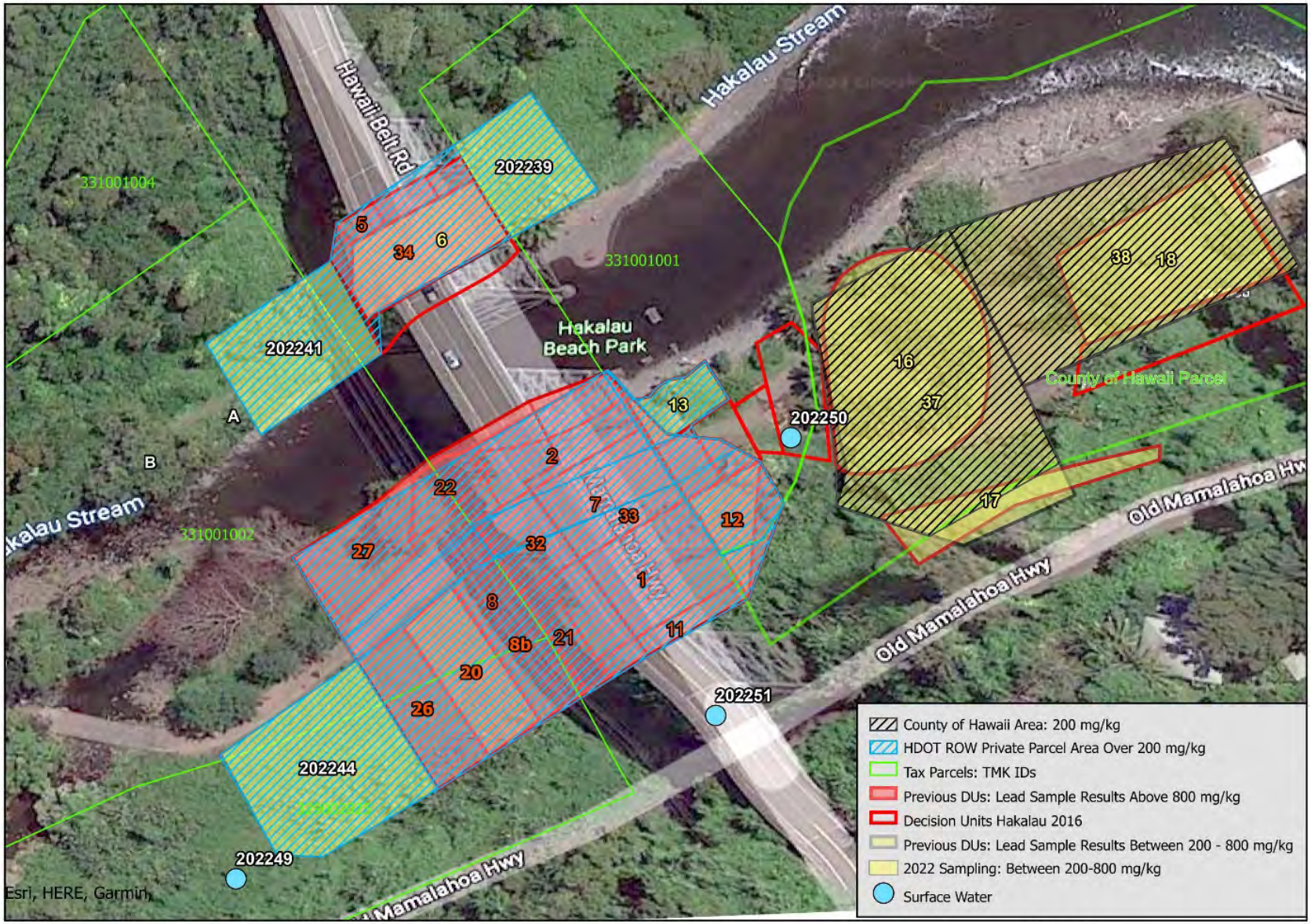
An archaeological consultation and monitoring would be required during the excavation. The lead-impacted soil would be removed, therefore an EHMP will not be needed.

Once removal is completed, soil onsite would not require an EHMP. The primary maintenance item would be cutting grass and addressing any erosional issues to the grass cover over the new layer of imported soil.

Table 6-5: Alternative 5b, Soil Removal 200+ mg/kg, Clean Fill, Cubic yards

Ownership	Sq Ft	DU ID	Remove soil (12" estimate) that exceeds 200 mg/kg (CY)	Clean fill 18" (CY)	Clean fill 24" (CY)
County of Hawaii 200-800 mg/kg	36017	16, 17,18,37,38	1334	2001	2667
HDOT ROW (North) 800+ mg/kg	5885	5,6,34	218	327	436
HDOT ROW (South) 800+ mg/kg	19341	1,2,7, 11, 21, 22, 32, 33	716	1075	1433
Private Parcels (North) 200 – 800 mg/kg	9947	202241, 202239	368	553	737
Private Parcels (South) 200 – 800 mg/kg	10390	13, 202244	385	577	770
Private Parcels (South) 800+ mg/kg	21325	8, 12, 13, 22,27, 26	790	1185	1580
Total	**102905**		**3811**	**5718**	**7623**

Figure 6-1: Alternative 5a or 5b, Removal 200+ mg/kg and Capped Soil Areas



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6.5.3 *Alternative 5c: Removal of soil which exceeds 800 mg/kg for lead, containment, and replacement with clean fill. Soil cap for soil which exceeds 200 mg/kg but is below 800 mg/kg.*

DUs within the HDOT ROW and privately owned parcel exceed the HDOH EALs for the construction/trench worker exposure for lead (800 mg/kg). This is approximately 46,551 sq ft (Figure 6-2, Table 6-6). Soil from these DUs will be removed. Confirmation sampling will be conducted to ensure that all targeted soil is removed. The soil will be replaced with clean fill at an estimated fill depth of 24 inches.

DUs which exceed the HDOH EALs for unrestricted land use for lead (200 mg/kg) would first be covered with orange mirafi (geotextile) or black geotextile with caution tape laid at intervals to produce a visible barrier between the clean and impacted soils. Clean fill would then be brought in and overlaid across these DUs at a depth of 18- 24 inches and grass will be maintained to prevent potential exposure. Additional cubic yards of clean soil may also be needed for drainage and grading. An EHMP for the remaining lead-impacted soil on site would still be needed.

Table 6-6: Alternative 5c – Soil Removal 800+ mg/kg, Clean Fill Cubic Yards

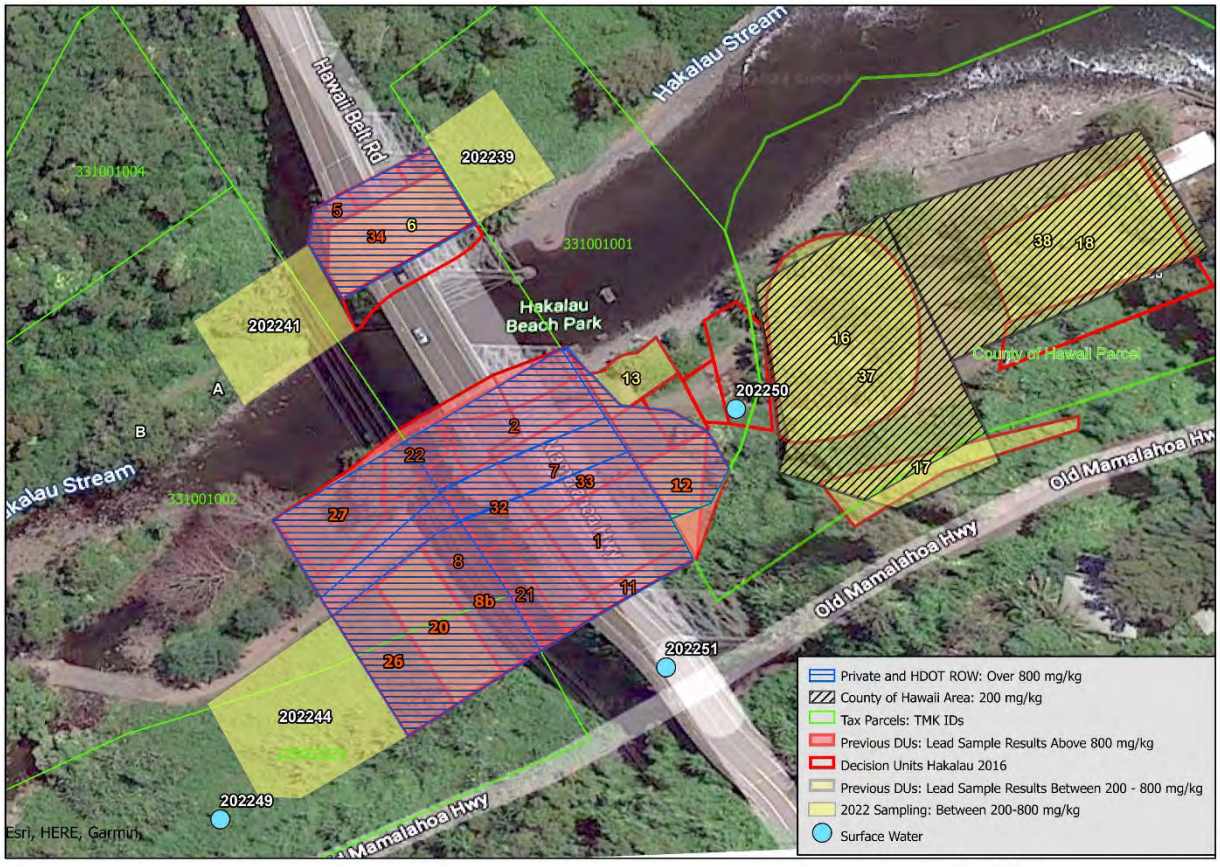
		Cubic Yards		
Ownership	**Sq Ft**	**Remove soil (12" estimate) that exceeds 800 mg/kg**	**Clean fill 18"**	**Clean fill (24")**
County of Hawaii 200-800 mg/kg	36017		2001	2667
HDOT ROW (North) 800+ mg/kg	5885	218	327	436
HDOT ROW (South) 800+ mg/kg	19341	716	1075	1433
Private Parcels (North) 200 – 800 mg/kg	9947		553	737
Private Parcels (South) 200 – 800 mg/kg	10390		577	770
Private Parcels (South) 800+ mg/kg	21325	790	1185	1580
Total	**102905**	**1724**	**5718**	**7623**

Archaeological consultation and monitoring would be required during the excavation period (approximately five weeks). A portion of the lead-impacted soil would remain on-site, therefore an EHMP will be needed.

Initial costs would be high as soil which is classified as hazardous waste could not be disposed of at facilities in Hawaii and be required to be disposed of in the mainland United States. DU1, DU11, and DU21 failed TCLP at different depth profiles, (0 to 3-inches bgs), and near-surface soil (3 to 6-inches bgs). This is approximately 8,390 sq ft. DU 2 is also likely to fail the TCLP threshold and has been included for removal as lead concentrations in this DU range between 9480 – 10,200 mg/kg. DU2 is approximately 2,444 sq ft. (See Table 6-4).

Annual operation and maintenance costs are not expected to be high for this alternative and would fit in with the park's current budget. An annual inspection of the cap will be required per the EHMP and will be documented and submitted to HDOH. The primary maintenance item would be cutting grass and addressing any erosional issues to the grass cover over the new layer of imported soil.

Figure 6-2: Removal of Soil Over 800 mg/kg, Cap 200 mg/kg



6.6 Institutional Controls or Long-Term Monitoring

This option removes harm to the public but does not remove or reduce the impacts from the site. This option also removes the use value from the site.

6.6.1 Alternatives 6a: No Action

Under the no-action, no remediation activities will be performed. The park will remain closed indefinitely. The costs associated with this alternative were evaluated however, there are likely to be unforeseen costs such as security issues associated with trespassing and other unwanted activity. Based on the concentrations of lead on the Hakalau Valley floor, if left unmitigated, lead-impacted soil poses an unacceptable risk to current and future park users and maintenance workers via a direct pathway to highly contaminated soil media. Lead is persistent in the environment and will not decay in the soil over time. To prevent the public from exposure to areas that are grossly contaminated with lead the county could permanently close Hakalau Park down and restrict public use. Social acceptance of having a popular park permanently inaccessible to the public would be unlikely to be accepted and supported.

This alternative does not meet the needs of the residents of Hawaii nor the County of Hawaii Parks Department and is the lowest-ranked remedial alternative under the HDOH TGM and Hawaii SCP.

6.6.2 Alternatives 6b: Institutional and Engineering Controls

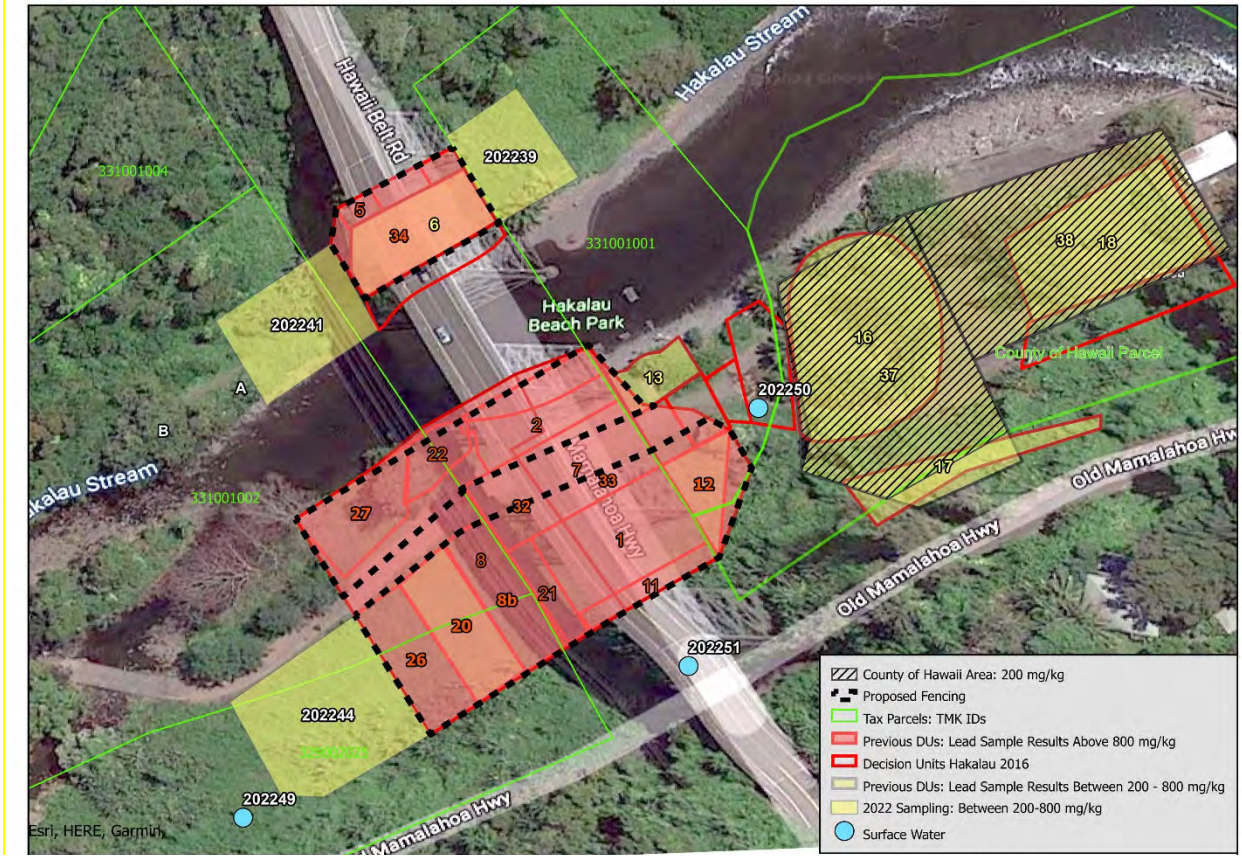
Under the no-action institutional controls alternative, no remediation activities will be performed. The park will would reopen and all areas where lead has been documented to exist in concentrations greater than 200 mg/kg for lead would either be allowed to overgrow with vegetation preventing the public from direct exposure to the soil. A site-specific Environmental Hazard Management Plan (EHMP) would need to be prepared that would outline the areas where various lead concentrations are on the site to facilitate awareness about the risks to current and future maintenance workers. Maintenance (mowing with a mower or line trimmer) would only be conducted where concentrations were below commercial/industrial EALs.

To prevent unintentional exposure a healthy grass cover would be maintained, and any bare soil areas would be seeded and covered with jute netting to prevent direct exposure. Signage warning park users of the hazards and some fencing would be installed to prevent access to the areas where contamination exceeds the HDOH HEER Office EALs for construction/industrial land use (and grossly contaminated areas)(Figure 6-3).

The costs associated with this alternative were not evaluated however, there are likely to be unforeseen costs such as security issues associated with trespassing and other unwanted activity. Periodic inspections of the grass surface for exposed soil areas of erosion would be required and will need to be documented in annual reports. Site workers may be required to wear respirators due to the high levels of lead in some areas. The EHMP would need to be updated periodically and the effectiveness of this alternative would be reviewed every 5 years. This alternative assumes four updates per 30-year period to accommodate park maintenance and use changes.

This alternative may meet the needs of the residents of Hawaii and the County of Hawaii Parks Department however, leaving lead in place on public and private land may not be socially acceptable and the public may reject this remedial alternative under the HDOH TGM and Hawaii SCP.

Figure 6-3: Fencing all areas that exceed 800 mg/kg, soil cap for County of Hawaii Parcels



7 Comparative Analysis of Remedial Alternatives

7.1 Overall Protectiveness

The first three identified alternatives do not meet the overall protectiveness requirements as these alternatives would not remove, limit, or reduce the potential lead exposure pathways for receptors. Alternative 4 could potentially be used in conjunction with other remedial actions to reduce disposal costs.

- Alternative 1: The lead paint material is not dense enough to be separated from the soil in order to be recycled or reused.
- Alternative 2: The lead at the site is also not organic, corrosive, or explosive and is relatively immobile.
- Alternative 3: Soils at Hakalau and lead paint flakes are not suitable for volume reduction in this form and would not be reduced significantly.
- Alternative 4: The Bench Test Treatability study (Appendix E) has demonstrated that immobilization via treatment with TSP to reduce the mobility of lead has been shown to be feasible. This alternative combined with either 5b or 5c to reduce the quantity of lead-impacted soil that would need to be disposed of at mainland US facilities would increase the protectiveness both locally if it able to be treated and accepted for disposal at the WHSL facility. A permit to treat hazardous waste in Hakalau Valley would be required to conduct this alternative. Unfortunately, the uncertainties in the timeline that would be needed to complete the permitting and in obtaining public acceptance of the treatment process make this alternative an unknown. This alternative also has additional costs associated with treatment (industrial machinery for mixing TSP or Portland Cement into the lead-impacted soil, grading, managing stormwater controls on site). The application of this alternative would be in conjunction with soil excavation and removal and would not be used for in-situ stabilization.

Alternatives 5a, 5b, 5c, 6a, and 6b, presented in Table 7-1 and summarized below vary in protectiveness. The following assumptions are made.

- The public obeys signage and restricted areas.
- Site workers (Landscapers) have frequent exposure to surface soil. Site workers primarily handle vegetation and do not excavate below the surface (0 to 3 inches).
- Construction/Trench Workers dig below surface soil (6+ inches bgs) and handle soil.
- Ecological receptors primarily nest, dig, loaf, or lie on the surface of the soil.
- The site remains vegetated, as consistent rainfall in the area typically ensures vegetation growth.
- Construction/Trench Workers and Landscapers do not enter the river/interact with sediment in the water.

Remedial Alternatives for Hakalau include the County of Hawaii parcels and the HDOT ROW. The remedial actions are addressed on a parcel and location basis due to the differences in site use and disparity in total lead results of the remedial actions.

Table 7-1: Alternatives Analysis - Protectiveness

	5a/6. On-site isolation and containment. Soil cap entire site.	**5a/6.** On-site isolation and containment. Hard cap on areas of 800 mg/kg exceedances	**5b.** Removal of all soil which exceeds 200 mg/kg for lead and replace with clean fill	**5c.** Removal of all soil which exceeds 800 mg/kg for lead, containment, and replacement with clean fill.	**6a.** Institutional and Engineering Controls: Fencing, No Action	**6b.** Institutional and Engineering Controls: Fencing to Limit Access
Is Lead-Impacted Soil Still Present?	Yes	Yes	No	Yes	Yes	Yes
Direct Contact Does the site have a complete exposure pathway for the following users under the scenario?						
Public	No	Potential (if breached)	No	Potential	No	No
Construction/ Trench Workers	Potential	Potential	No	No: Lead is below direct exposure for construction/trench worker scenario	Yes	Yes
Site Workers (Landscapers)	Potential	Potential (if breached)	No	No	Yes	Yes
Ecological Receptors	Potential	Potential (if breached)	No	Potential: Unlikely	Yes	Yes
Air Exposure Does the site have a complete exposure pathway for the following users under the scenario?						
Public	Potential	No	No	No	Potential	Potential
Construction/ Trench Workers	Potential	Potential	No	Potential	Yes	Yes
Site Workers (Landscapers)	Potential	No	No	No	Yes	Yes
Ecological Receptors	Potential	No	No	No	Yes	Yes
Surface Water Runoff (Sediment) in River Does the site have a complete exposure pathway for the following users under the scenario?						
Public	Potential	No	No	No	Potential	Potential
Construction/ Trench Workers	No	No	No	No	No	No
Site Workers (Landscapers)	Potential	No	No	No	No	No
Ecological Receptors	Potential	No	No	No	Potential	Potential

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7.2 Compliance with ARARs

All of the alternatives shall meet the requirements of the ARARs and will use TBC as guidance (EPA RSLs, HDOH EALs). The actions are compatible with standard excavation and/or earth-moving activities and waste disposal in Hawaii. Depending on the chosen alternative, the site work plan will identify methods to prevent, mitigate, and respond to the conservation of cultural and ecological resources ARARs. ARARs evaluation is presented in Appendix C.

7.3 Reduction of Toxicity, Mobility, and Volume through Treatment

The degree to which the remedial alternative reduces toxicity, mobility, and reduction of volume is achieved, including how the treatment is used to address the COC at the site is presented below (Table 7-2). Factors considered, as appropriate, include the following:

- The number of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled;
- The degree of the expected reduction in toxicity, mobility, or volume of the waste due to treatment; and
- The degree to which the treatment is irreversible.

Alternative 5a - On-site isolation and containment would not remove the volume of contamination, but it would reduce the mobility through a soil cap. This cap is potentially vulnerable to scouring from flooding. The toxicity would not be reduced but the potential for the public and landscapers/site workers to encounter it would be reduced. Treatment under this alternative may not protect against future seismic or climatic events (e.g., tsunami, flooding, or sea-level rise) Table 7-2).

Alternative 5b – Removal of all soil that exceeds 200 mg/kg for lead and replacement with clean fill offers the greatest reduction in toxicity, mobility, and volume as the entire contaminated source will be removed from the site resulting in a volume reduction of 4,057 cubic yards (CY) of lead impacted soil. Treatment under this alternative is permanent.

Alternative 5c - Removal of all soil which exceeds the HDOH Tier 1 EAL for commercial/industrial land use for lead (800 mg/kg), containment, and replacement with clean fill offers a reduction in toxicity. Mobility will be reduced through the soil cap, but the soil cap could be scoured during extensive flooding.

The overall volume of lead-impacted soil would be reduced by 1,970 CY. Treatment under this alternative may not protect against future seismic or climatic events (e.g., tsunami, flooding, or sea-level rise) (Table 7-2).

Alternatives 6a and 6b reduce the potential toxicity for the general public as they no longer will be allowed to access the site or will not be able to access the areas where the concentrations of lead are present. There is no change in toxicity for landscapers/site workers and construction/trench workers who may need to maintain the site or work within

the areas that still have high concentrations of lead. There is no change in mobility or reduction of contaminant volume under these options (Table 7- 2).

Table 7-2: Reduction of Toxicity, Mobility, and Volume through Treatment Comparison

5a/6. On-site isolation and containment. Grass cap on Park area. Hard cap on areas of 800 mg/kg exceedances.	**5b.** Removal of all soil which exceeds 200 mg/kg for lead and replacement with clean fill.	**5c.** Removal of all soil which exceeds 800 mg/kg for lead, containment, and replacement with clean fill.	**6a.** Institutional and Engineering Controls: Entire Site Restricted, No Action.	**6b.** Institutional and Engineering Controls: Partial Reopening and Restricted Access to Areas of Highest Contamination.
Toxicity: No change - contaminants are still present for construction/site workers. Impacts are reduced for maintenance crews, the public and ecological receptors.	**Toxicity**: Eliminated	**Toxicity:** Reduced.	**Toxicity:** No Change - contaminants are still present for ecological receptors, maintenance crews and any potential construction/site workers. Reduced for the public.	**Toxicity:** No Change - contaminants are still present for ecological receptors, maintenance crews and any potential construction/site workers. Reduced for the public.
Mobility: Contaminant is potentially mobile through erosion and surface runoff.	**Mobility:** Eliminated Contamination is no longer present.	**Mobility:** Reduced but potentially mobile during extensive erosion.	**Mobility:** No change - contaminant is potentially mobile through erosion and surface runoff.	**Mobility:** No change - contaminant is potentially mobile through erosion and surface runoff.
Volume: No reduction in volume of contaminant	**Volume:** Eliminated: all contaminant removed.	**Volume:** Reduced – all soil above 800 mg/kg removed	**Volume:** No reduction in volume of contaminant	**Volume:** No reduction in volume of contaminant

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7.4 Long-Term and Short-Term Effectiveness

Alternative 5a: Offers short-term effectiveness. The park reopens without soil removal disposal costs. Site work is still needed in terms of applying mirafi, soil, and re-vegetation/stabilization of the site. The park is located in an area that can experience torrential rains and associated flooding, increasing the potential for long-term exposure risks. The site will need to be maintained to ensure that the containment soil cap is not breached.

Alternative 5b: Repairs to the site will take longer, and the park will not open as quickly as under scenario 5a. This alternative has long-term effectiveness. Sitework will include scraping soil, disposing of soils (off-island), laying clean soil, and stabilization. All work will be completed, and additional work is not anticipated. The source should be removed from direct contact for all users. An EHMP will not be needed for the affected area of the park under this alternative. Construction and Landscaping crews would not require additional PPE while working in these DUs after soil removal. Other sources of lead may be present in the park, and areas outside of the DUs may need soil testing.

Alternative 5c: Repairs to the site will offer long-term effectiveness. Site work will take as long as alternative 5a but less than 5b and will require additional materials (mirafi). Soil disposal costs and soil disposal work will remain high. Sitework will include scraping soil, disposing of soils (off-island), applying mirafi, laying clean fill, and stabilization. An EHMP will also be required as lead-impacted soil will remain on-site in the parking area. The removal of soils with total lead greater than 800 mg/kg will mean that construction/trench workers will not require additional PPE while working on the site. Lead-impacted soil may be present in the upper steep gulch slopes and could migrate to the park area below.

Institutional controls under 6a and 6b offer short-term effectiveness. The lead-impacted source is removed from public contact, but the material remains and will need to be managed by site workers and potentially by construction/trench workers. Ecological receptors will still access the site and be exposed. The site will need to be protected from erosion and washouts. Surface soil may wash into areas used by the general public and into Hakalau Stream and the Pacific Ocean. EHMPs will be needed, and any site work will need to refer to recommendations in the EHMP.

7.5 Implementability

Alternative 5a is implementable using equipment and supplies from Hawaii County or shipped to Hawaii County. This alternative will require excavators, work crews, clean fill (from Hawaii County), and EHMP document production.

Alternatives 5b and 5c are implementable using equipment and supplies from Hawaii County or shipped to Hawaii County. However, both alternatives require off-island disposal costs and shipping. Immobilization using TSP or Portland Cement could be used to eliminate the need for offsite disposal but the uncertainty in the time need to gain regulatory and public acceptance pose a risk to using this approach. These alternatives will require excavators, work crews, topsoil, and clean fill (from Hawaii County), and alternative 5c will require EHMP document production. The source of the topsoil and

clean fill will need to be documented that the source is free of chemical and biological contamination (e.g., chlordane, little fire ants, etc.).

Alternative 6a will be the easiest to implement. This alternative requires fencing installation and EHMP document production. This alternative will require the County of Hawaii to maintain an EHMP and conduct periodic inspections of the engineering controls (e.g., monthly inspections) reports documenting the results of the inspection (e.g., annual reports).

7.6 Estimated Costs

A complete cost table of the alternatives is found in Appendix D. A summary table is found below in Table 7-3. All alternatives are assumed to have the same costs for the planning component including project management, permitting, and public meeting support. This cost is estimated at $44,818 and is included in all alternative costs.

For alternatives that consider a soil cap, the thickness of the soil cap can vary from 18 to 24 inches depending on HDOH requirements. This can have an impact on total costs which are summarized in the table below.

Table 7-3: Cost Comparison

	5a. On-site isolation and containment. Grass cap on Park area.	**5b.** Removal of all soil which exceeds 200 mg/kg for lead and replace with clean fill.	**5c.** Removal of all soil which exceeds 800 mg/kg for lead, containment, and replace with clean fill. Grass cap on Park area.	**6a.** Institutional and Engineering Controls: Entire Site Restricted, No Action.	**6b.** Institutional and Engineering Controls: Partial Reopening and Restricted Access to Areas of Highest Contamination.
Planning Costs	Yes	Yes	Yes	Yes	Yes
EHMP Needed	Yes	No	Yes	Yes	Yes
Soil Removal	No	Yes	Yes	No	No
300 additional CY clean soil for drainage grading.	Yes	Yes	Yes	No	No
Archeological consultation and monitoring	Yes	Yes	Yes	No	No
Mirafi/ Geotextile defined boundary	Yes	No	Yes	No	No
Planning and Permitting	$44,818	$44,818	$44,818	$44,818	$44,818
Cost including 24 inches soil cover	$2,310,386	$7,585,862	$5,309,860	$167,024	$271,537
Cost including 18 inches soil cover	$1,775,454	$3,862,345	$3,580,956	$109,176	$271,537
O&M Cost -30 years	$120,000	$0	$120,00	55,000	55,000

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8 Preferred Alternative

The five remedial alternatives are compared the to nine evaluation criteria previously in Section 7 presented qualitatively in a summary comparison in Table 8-1.

Table 8-1: Evaluation of Cleanup Alternatives: Hakalau RAA

Evaluation Criteria	Alternatives				
	5a	5b	5c	6a	6b
	On-site isolation and containment	Removal of all soil which exceeds 200 mg/kg for lead and replacement with clean fill ☆	Removal of all soil which exceeds 800 mg/kg for lead, containment, and replacement with clean fill	Institutional and Engineering Controls: No Action	Institutional and Engineering Controls: Partial Reopening: Restricted Area
1. Overall protection of human health and the environment.	○	●	○	○	○
2. Compliance with applicable or relevant and appropriate requirements.	○	●	○	○	○
3. Long-term effectiveness and permanence.	○	●	○	○	○
4. Reduction of toxicity, mobility, or volume through treatment.	○	●	○	○	○
5. Short-term effectiveness.	●	●	●	●	●
6. Implementability.	○	○	○	●	●
7. Cost.	$2.310M	$7.585M	$5.309M	$0.167M	$0.271M
8. State regulator acceptance.	○	●	○	○	○
9. Community acceptance.	○	●	○	○	○

○ satisfies the criterion to a low degree or does not satisfy the criterion in a timely manner.
○ satisfies criterion to a moderate degree in a timely manner.
● satisfies criterion to a high degree in a timely manner.
☆ satisfies criterion to a high degree – preferred alternative.

Alternative 5b fully satisfies 7 out of 9 of the evaluation criteria to a high degree, while alternatives 6a and 6b satisfy only 2 out of 9 evaluation criteria to a high degree, and 5a and 5c only satisfy 1 out of 9 criteria to the highest degree.

While alternative 6b, Institutional and Engineering controls may receive state and community acceptance as an interim action to allow public access to the park under restricted use requirements on an interim basis it did not address overall protection to human health and the environment, long-term effectiveness and permanence, or the reduction of toxicity, mobility, or volume through treatment. The remaining alternatives met the evaluation of regulator and public acceptance criteria either equally or at a lower level than alternative 6b.

Alternatives 5a and 5c, while having price points in the range of alternative 5b, they ranked low relative to alternative 5b at satisfying the other 7 evaluation criteria.

Based on all the evaluation criteria the preferred alternative is 5b: Removal of All Soil that Exceeds 200 mg/kg for Lead and Replacement with Clean Fill. This alternative is recommended because it will achieve substantial risk reduction, removes the source of

contamination, eliminates the need for an EHMP, and removes lead-impacted soil or sediment from becoming exposed during flooding/erosion in the future. This alternative is cost-effective since it offers a permanent reduction of toxicity, mobility, and completely reduces the volume of contamination at the site. It provides the most long-term effectiveness, and the park will not need additional controls. Moreover, the park can be opened for use by the public, site workers, and construction/trench workers with no additional monitoring or maintenance stipulations.

9 References

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APPENDIX A:

LABORATORY ANALYTICAL REPORTS

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APPENDIX A-1:

2022 SAMPLING RESULTS SUMMARY TABLES AND LABORATORY ANALYTICAL REPORTS

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Table A1 - Analytical Results for Total Lead in Multi-Increment Soil Samples
Hakalau Beach Park

							Sample Identifier													
							Sample Date													
							Sample Depth (inches)													
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Residential Direct-Exposure Action Levels [2]**	**Construction Worker Direct-Exposure Action Levels [3]**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**
							HKDU32-0-6-021720 17-Feb-2020 0-6		HKDU32-6-12-021720 17-Feb-2020 6-12		HKDU33-6-12-021820 18-Feb-2020 6-12		HKDU34-0-6-021920 19-Feb-2020 0-6		HKDU34-6-12-021920 19-Feb-2020 6-12		HKDU37-6-12-021920 19-Feb-2020 6-12		HKDU38-6-12-021920 19-Feb-2020 6-12	
Lead	EPA 6010B	7439-92-1	mg/kg	**200**	**200**	**800**	**13,500**	J	**7,510**	J	**3,250**	J	**221**	J	**918**	J	**368**	J	**764**	J

Notes:

Results shown in bold and highlighted orange equal or exceed the Residential Direct Action Levels

Results shown in bold and highlighted red equal or exceed the Construction Worker Direct-Exposure Action Levels

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A-1 of the

[2] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017

[3] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and

CASRN = Chemical Abstracts Service Registry No.

mg/kg= milligram(s) per kilogram

Q = qualifier

Data Qualifiers:

U = If the reading was less than the MDL.

J = The reported value was obtained from a reading that was less than the quantitation limit but greater than or equal to the MDL (Method Detection Limit).

Table A2 - 95 Percent Upper Confidence Level Calculations for Replicate Sample Detections

Hakalau Gulch Park

Analyte	EPA Method	Sample Identification	Sample Type	Result (mg/kg)	Relative Percent Difference		Mean	Standard Deviation	Relative Standard Deviation	95% UCL Calculations			Comment	Residential Direct-Exposure Action Levels [1]	Construction Worker Direct-Exposure Action Levels [2]
					Primary and Duplicate	Primary and Triplicate				Number of samples	t value	95% UCL			
Lead	EPA 6010B	HKDU33-6-12-021820	Primary	3,250	9%	3%	3,190	206.6	6%	3.0	2.9	**3538**	The data indicates that there is 95% confidenc that the true mean for lead does not exceed **3,538** mg/kg within this Decision Unit	**200**	**800**
		HKDU33-6-12-021820	Duplicate	2,960											
		HKDU33-6-12-021820	Triplicate	3,360											

Notes:

[1] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[2] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

mg/kg Milligrams per kilogram

UCL Upper Confidence Level

% Percent

Table A3 - Analytical Results for Lead TCLP and SPLP

Hakalau Gulch Park

					Sample Identifier		HKDU32-0-6-021720		HKDU32-6-12-021720		HKDU33-6-12-021820		HKDU34-6-12-021920		HKDU38-6-12-021920	
					Sample Date		17-Feb-2020		17-Feb-2020		18-Feb-2020		19-Feb-2020		19-Feb-2020	
					Sample Depth (inches)		0-6		6-12		6-12		6-12		6-12	
Analyte	**Analytical Method**	**CASRN**	**Units**	**MDL**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**
TCLP Lead	6010B	7439-92-1	mg/L	0.500	nr	J	nr	-	4.62	J	<0.500	U	nr	-		
SPLP Lead	6010B	7439-92-1	mg/L	0.500	<0.500	U	<0.500	U	<0.500	U	<0.500	U	<0.500	U		

Notes:

CASRN = Chemical Abstracts Service Registry No.

mg/L= milligram(s) per liter

MDL= Method Detection Limit

nr = not requested (samples were not requested to be analyzed by the lab)

Q = qualifier

Data Qualifiers:

U = If the reading was less than the MDL.

J = The reported value was obtained from a reading that was less than the quantitation limit but greater than or equal to the MDL (Method Detection Limit).

Table A4 - Analytical Results for Total Lead in Multi-Increment Soil Samples

Hakalau Beach Park

						Sample Identifier	HKL_DU8B_3-6_20201116		HKL_DU12_4-6_20201117		HKL_DU20_3-6_20201116		HKL_DU26_0-3_20201117		HKL_DU27_0-3_20201116	
						Sample Date	16-Nov-2020		16-Nov-2020		16-Nov-2020		16-Nov-2020		16-Nov-2020	
						Sample Depth (inches)	3-6		4-6		3-6		0-3		0-3	
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Residential Direct-Exposure Action Levels [2]**	**Construction Worker Direct-Exposure Action Levels [3]**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**	**Results**	**Q**
Lead	EPA 6010B	7439-92-1	mg/kg	**200**	**200**	**800**	**2,680**	J	**738**	J	**1,640**	J	**1,320**	J	**1,680**	J

Notes:

Results shown in bold and highlighted orange equal or exceed the Residential Direct Action Levels

Results shown in bold and highlighted red equal or exceed the Construction Worker Direct-Exposure Action Levels

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A-

[2] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall

[3] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and

CASRN = Chemical Abstracts Service Registry No.

mg/kg= milligram(s) per kilogram

Q = qualifier

Data Qualifiers:

U = If the reading was less than the MDL.

J = The reported value was obtained from a reading that was less than the quantitation limit but greater than or equal to the MDL (Method Detection Limit).

ANALYTICAL REPORT

Eurofins Calscience LLC
7440 Lincoln Way
Garden Grove, CA 92841
Tel: (714)895-5494

Laboratory Job ID: 570-21843-2
Client Project/Site: DOT - Hakalau Lead Assessment

For:
EnviroQuest, Inc.
98-029 Hekaha Street
Suite 21
Aiea, Hawaii 96701

Attn: Randy Takemoto

Authorized for release by:
3/19/2020 12:00:49 PM

Terri Chang, Project Manager I
(714)895-5494
terrichang@eurofinsus.com

Table of Contents

Definitions/Glossary

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Qualifiers

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD recovery exceeds control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Job ID: 570-21843-2

Laboratory: Eurofins Calscience LLC

Narrative

Job Narrative
570-21843-2

Comments
No additional comments.

Receipt
The samples were received on 2/26/2020 9:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 18.5º C.

Metals
Method 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 570-57161 and 570-57611 and analytical batch 570-57596 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 570-57225 and 570-58135 and analytical batch 570-58259 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Client Sample ID: HKDU32-0-6-021720 Lab Sample ID: 570-21843-1

No Detections.

Client Sample ID: HKDU32-6-12-021720 Lab Sample ID: 570-21843-2

No Detections.

Client Sample ID: HKDU33-6-12-021820C Lab Sample ID: 570-21843-5

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	4.62		0.500		mg/L	1		6010B	TCLP

Client Sample ID: HKDU34-6-12-021920 Lab Sample ID: 570-21843-7

No Detections.

Client Sample ID: HKDU38-6-12-021920 Lab Sample ID: 570-21843-9

No Detections.

This Detection Summary does not include radiochemical test results.

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Method: 6010B - Metals (ICP) - TCLP

Client Sample ID: HKDU33-6-12-021820C **Lab Sample ID: 570-21843-5**
Date Collected: 02/18/20 14:00 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	**4.62**		0.500		mg/L		03/16/20 14:00	03/17/20 11:57	1

Client Sample ID: HKDU34-6-12-021920 **Lab Sample ID: 570-21843-7**
Date Collected: 02/19/20 10:30 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/16/20 14:00	03/17/20 11:54	1

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Method: 6010B - Metals (ICP) - SPLP West

Client Sample ID: HKDU32-0-6-021720 **Lab Sample ID: 570-21843-1**
Date Collected: 02/17/20 15:00 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/18/20 16:00	03/19/20 00:14	1

Client Sample ID: HKDU32-6-12-021720 **Lab Sample ID: 570-21843-2**
Date Collected: 02/17/20 15:00 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/18/20 16:00	03/19/20 00:11	1

Client Sample ID: HKDU33-6-12-021820C **Lab Sample ID: 570-21843-5**
Date Collected: 02/18/20 14:00 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/18/20 16:00	03/19/20 00:17	1

Client Sample ID: HKDU34-6-12-021920 **Lab Sample ID: 570-21843-7**
Date Collected: 02/19/20 10:30 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	F1	0.500		mg/L		03/18/20 16:00	03/19/20 00:00	1

Client Sample ID: HKDU38-6-12-021920 **Lab Sample ID: 570-21843-9**
Date Collected: 02/19/20 16:30 **Matrix: Solid**
Date Received: 02/26/20 09:50

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/18/20 16:00	03/19/20 00:08	1

Method: 6010B - Metals (ICP)

Lab Sample ID: LB 570-57161/1-C
Matrix: Solid
Analysis Batch: 57596

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 57611

Analyte	LB Result	LB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/16/20 14:00	03/16/20 19:55	1

Lab Sample ID: LCS 570-57161/2-C
Matrix: Solid
Analysis Batch: 57596

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 57611

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			5.00	4.242		mg/L		85	80 - 120		

Lab Sample ID: LCSD 570-57161/3-C
Matrix: Solid
Analysis Batch: 57596

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 57611

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			5.00	4.372		mg/L		87	80 - 120	3	20

Lab Sample ID: 570-23384-B-1-I MS
Matrix: Solid
Analysis Batch: 57596

Client Sample ID: Matrix Spike
Prep Type: TCLP
Prep Batch: 57611

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead	ND	F1	5.00	4.025	F1	mg/L		78	84 - 120		

Lab Sample ID: 570-23384-B-1-J MSD
Matrix: Solid
Analysis Batch: 57596

Client Sample ID: Matrix Spike Duplicate
Prep Type: TCLP
Prep Batch: 57611

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	ND	F1	5.00	4.193	F1	mg/L		81	84 - 120	4	7

Lab Sample ID: LB2 570-57225/1-B
Matrix: Solid
Analysis Batch: 58259

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 58135

Analyte	LB2 Result	LB2 Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		03/18/20 16:00	03/18/20 23:36	1

Lab Sample ID: LCS 570-57225/2-B
Matrix: Solid
Analysis Batch: 58259

Client Sample ID: Lab Control Sample
Prep Type: SPLP West
Prep Batch: 58135

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			5.00	4.260		mg/L		85	80 - 120		

Lab Sample ID: LCSD 570-57225/3-B
Matrix: Solid
Analysis Batch: 58259

Client Sample ID: Lab Control Sample Dup
Prep Type: SPLP West
Prep Batch: 58135

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			5.00	4.407		mg/L		88	80 - 120	3	20

QC Sample Results

Client: EnviroQuest, Inc.
Project/Site: DOT - Hakalau Lead Assessment

Job ID: 570-21843-2

Method: 6010B - Metals (ICP)

Lab Sample ID: 570-21843-7 MS
Matrix: Solid
Analysis Batch: 58259

Client Sample ID: HKDU34-6-12-021920
Prep Type: SPLP West
Prep Batch: 58135

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead	ND	F1	5.00	4.158	F1	mg/L		83	84 - 120		

Lab Sample ID: 570-21843-7 MSD
Matrix: Solid
Analysis Batch: 58259

Client Sample ID: HKDU34-6-12-021920
Prep Type: SPLP West
Prep Batch: 58135

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	ND	F1	5.00	4.085	F1	mg/L		82	84 - 120	2	7

Metals

Leach Batch: 57161

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-5	HKDU33-6-12-021820C	TCLP	Solid	1311	
570-21843-7	HKDU34-6-12-021920	TCLP	Solid	1311	
LB 570-57161/1-C	Method Blank	TCLP	Solid	1311	
LCS 570-57161/2-C	Lab Control Sample	TCLP	Solid	1311	
LCSD 570-57161/3-C	Lab Control Sample Dup	TCLP	Solid	1311	
570-23384-B-1-I MS	Matrix Spike	TCLP	Solid	1311	
570-23384-B-1-J MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

Leach Batch: 57225

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-1	HKDU32-0-6-021720	SPLP West	Solid	1312	
570-21843-2	HKDU32-6-12-021720	SPLP West	Solid	1312	
570-21843-5	HKDU33-6-12-021820C	SPLP West	Solid	1312	
570-21843-7	HKDU34-6-12-021920	SPLP West	Solid	1312	
570-21843-9	HKDU38-6-12-021920	SPLP West	Solid	1312	
LB2 570-57225/1-B	Method Blank	SPLP West	Solid	1312	
LCS 570-57225/2-B	Lab Control Sample	SPLP West	Solid	1312	
LCSD 570-57225/3-B	Lab Control Sample Dup	SPLP West	Solid	1312	
570-21843-7 MS	HKDU34-6-12-021920	SPLP West	Solid	1312	
570-21843-7 MSD	HKDU34-6-12-021920	SPLP West	Solid	1312	

Analysis Batch: 57596

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 570-57161/1-C	Method Blank	TCLP	Solid	6010B	57611
LCS 570-57161/2-C	Lab Control Sample	TCLP	Solid	6010B	57611
LCSD 570-57161/3-C	Lab Control Sample Dup	TCLP	Solid	6010B	57611
570-23384-B-1-I MS	Matrix Spike	TCLP	Solid	6010B	57611
570-23384-B-1-J MSD	Matrix Spike Duplicate	TCLP	Solid	6010B	57611

Prep Batch: 57611

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-5	HKDU33-6-12-021820C	TCLP	Solid	3010A	57161
570-21843-7	HKDU34-6-12-021920	TCLP	Solid	3010A	57161
LB 570-57161/1-C	Method Blank	TCLP	Solid	3010A	57161
LCS 570-57161/2-C	Lab Control Sample	TCLP	Solid	3010A	57161
LCSD 570-57161/3-C	Lab Control Sample Dup	TCLP	Solid	3010A	57161
570-23384-B-1-I MS	Matrix Spike	TCLP	Solid	3010A	57161
570-23384-B-1-J MSD	Matrix Spike Duplicate	TCLP	Solid	3010A	57161

Analysis Batch: 57805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-5	HKDU33-6-12-021820C	TCLP	Solid	6010B	57611
570-21843-7	HKDU34-6-12-021920	TCLP	Solid	6010B	57611

Prep Batch: 58135

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-1	HKDU32-0-6-021720	SPLP West	Solid	3010A	57225
570-21843-2	HKDU32-6-12-021720	SPLP West	Solid	3010A	57225
570-21843-5	HKDU33-6-12-021820C	SPLP West	Solid	3010A	57225
570-21843-7	HKDU34-6-12-021920	SPLP West	Solid	3010A	57225
570-21843-9	HKDU38-6-12-021920	SPLP West	Solid	3010A	57225

Metals (Continued)

Prep Batch: 58135 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB2 570-57225/1-B	Method Blank	SPLP West	Solid	3010A	57225
LCS 570-57225/2-B	Lab Control Sample	SPLP West	Solid	3010A	57225
LCSD 570-57225/3-B	Lab Control Sample Dup	SPLP West	Solid	3010A	57225
570-21843-7 MS	HKDU34-6-12-021920	SPLP West	Solid	3010A	57225
570-21843-7 MSD	HKDU34-6-12-021920	SPLP West	Solid	3010A	57225

Analysis Batch: 58259

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-21843-1	HKDU32-0-6-021720	SPLP West	Solid	6010B	58135
570-21843-2	HKDU32-6-12-021720	SPLP West	Solid	6010B	58135
570-21843-5	HKDU33-6-12-021820C	SPLP West	Solid	6010B	58135
570-21843-7	HKDU34-6-12-021920	SPLP West	Solid	6010B	58135
570-21843-9	HKDU38-6-12-021920	SPLP West	Solid	6010B	58135
LB2 570-57225/1-B	Method Blank	SPLP West	Solid	6010B	58135
LCS 570-57225/2-B	Lab Control Sample	SPLP West	Solid	6010B	58135
LCSD 570-57225/3-B	Lab Control Sample Dup	SPLP West	Solid	6010B	58135
570-21843-7 MS	HKDU34-6-12-021920	SPLP West	Solid	6010B	58135
570-21843-7 MSD	HKDU34-6-12-021920	SPLP West	Solid	6010B	58135

Lab Chronicle

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Client Sample ID: HKDU32-0-6-021720 — Lab Sample ID: 570-21843-1
Date Collected: 02/17/20 15:00 — **Matrix: Solid**
Date Received: 02/26/20 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.08 g	2000 mL	57225	03/13/20 19:00	SUJ5	ECL 3
SPLP West	Prep	3010A			5 mL	50 mL	58135	03/18/20 16:00	SUJ5	ECL 1
SPLP West	Analysis	6010B		1			58259	03/19/20 00:14	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKDU32-6-12-021720 — Lab Sample ID: 570-21843-2
Date Collected: 02/17/20 15:00 — **Matrix: Solid**
Date Received: 02/26/20 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.03 g	2000 mL	57225	03/13/20 19:00	SUJ5	ECL 3
SPLP West	Prep	3010A			5 mL	50 mL	58135	03/18/20 16:00	SUJ5	ECL 1
SPLP West	Analysis	6010B		1			58259	03/19/20 00:11	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKDU33-6-12-021820C — Lab Sample ID: 570-21843-5
Date Collected: 02/18/20 14:00 — **Matrix: Solid**
Date Received: 02/26/20 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.11 g	2000 mL	57225	03/13/20 19:00	SUJ5	ECL 3
SPLP West	Prep	3010A			5 mL	50 mL	58135	03/18/20 16:00	SUJ5	ECL 1
SPLP West	Analysis	6010B		1			58259	03/19/20 00:17	ULPF	ECL 1
	Instrument ID: ICP8									
TCLP	Leach	1311			100.04 g	2000 mL	57161	03/13/20 19:00	SUJ5	ECL 3
TCLP	Prep	3010A			5 mL	50 mL	57611	03/16/20 14:00	SUJ5	ECL 1
TCLP	Analysis	6010B		1			57805	03/17/20 11:57	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKDU34-6-12-021920 — Lab Sample ID: 570-21843-7
Date Collected: 02/19/20 10:30 — **Matrix: Solid**
Date Received: 02/26/20 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.05 g	2000 mL	57225	03/13/20 19:00	SUJ5	ECL 3
SPLP West	Prep	3010A			5 mL	50 mL	58135	03/18/20 16:00	SUJ5	ECL 1
SPLP West	Analysis	6010B		1			58259	03/19/20 00:00	ULPF	ECL 1
	Instrument ID: ICP8									
TCLP	Leach	1311			99.87 g	2000 mL	57161	03/13/20 19:00	SUJ5	ECL 3
TCLP	Prep	3010A			5 mL	50 mL	57611	03/16/20 14:00	SUJ5	ECL 1
TCLP	Analysis	6010B		1			57805	03/17/20 11:54	ULPF	ECL 1
	Instrument ID: ICP8									

Lab Chronicle

Client: EnviroQuest, Inc.
Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Client Sample ID: HKDU38-6-12-021920
Lab Sample ID: 570-21843-9
Date Collected: 02/19/20 16:30
Matrix: Solid
Date Received: 02/26/20 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			100.07 g	2000 mL	57225	03/13/20 19:00	SUJ5	ECL 3
SPLP West	Prep	3010A			5 mL	50 mL	58135	03/18/20 16:00	SUJ5	ECL 1
SPLP West	Analysis	6010B		1			58259	03/19/20 00:08	ULPF	ECL 1
	Instrument ID:	ICP8								

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

ECL 3 = Eurofins Calscience LLC Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494

Accreditation/Certification Summary

Client: EnviroQuest, Inc. Job ID: 570-21843-2
Project/Site: DOT - Hakalau Lead Assessment

Laboratory: Eurofins Calscience LLC

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	Los Angeles County Sanitation Districts	10109	09-29-20
California	SCAQMD LAP	17LA0919	11-30-20
California	State	2944	09-29-20
Guam	State	20-003R	10-31-20
Nevada	State	CA00111	07-31-20
Oregon	NELAP	CA300001	01-29-21
USDA	US Federal Programs	P330-20-00034	02-10-23
Washington	State	C916-18	10-11-20

Method Summary

Client: EnviroQuest, Inc.
Project/Site: DOT - Hakalau Lead Assessment

Job ID: 570-21843-2

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	ECL 1
1311	TCLP Extraction	SW846	ECL 3
1312	SPLP Extraction	SW846	ECL 3
3010A	Preparation, Total Metals	SW846	ECL 1

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

ECL 3 = Eurofins Calscience LLC Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494

Sample Summary

Client: EnviroQuest, Inc.
Project/Site: DOT - Hakalau Lead Assessment

Job ID: 570-21843-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
570-21843-1	HKDU32-0-6-021720	Solid	02/17/20 15:00	02/26/20 09:50	
570-21843-2	HKDU32-6-12-021720	Solid	02/17/20 15:00	02/26/20 09:50	
570-21843-5	HKDU33-6-12-021820C	Solid	02/18/20 14:00	02/26/20 09:50	
570-21843-7	HKDU34-6-12-021920	Solid	02/19/20 10:30	02/26/20 09:50	
570-21843-9	HKDU38-6-12-021920	Solid	02/19/20 16:30	02/26/20 09:50	

ESN PACIFIC'S CHAIN-OF-CUSTODY RECORD

CLIENT: Kealamahi Pacific Consultants

ADDRESS: 103 South Kalaheo Ave, Kailua, HI 96734

PHONE: 808-286-0222 FAX:

EMAIL: scottmoncrief808@gmail.com

CLIENT PROJECT #: Project Manager: S. Moncrief

TAT (circle one): standard

DATE: 2/25 PAGE 1 OF 1

ESN PROJECT #: D2002210025

LOCATION/PROJECT NAME: DOT - Hakalau Lead Assessment

COLLECTOR: SM DATE COLLECTED: 2/17-2/19

	Sample ID#	Depth	Time	Sample Type	Container Type	total Pb	TCLP	SPLP	Comments	# of Containers
1	HKDU32-0-6-021720	0-6	1500	MIS	bag	X	*	*		1
2	HKDU32-6-12-02172	0-6	1500	MIS	bag	X	*	*		1
3	HKDU33-6-12-02182	6-12	1400	MIS	bag	X	*	*		1
4	HKDU33-6-12-02182	6-12	1400	MIS	bag	X	*	*		1
5	HKDU33-6-12-02182	6-12	1400	MIS	bag	X	*	*		1
6	HKDU34-0-6-021920	0-6	1030	MIS	bag	X	*	*		1
7	HKDU34-6-12-02192	6-12	1030	MIS	bag	X	*	*		1
8	HKDU37-6-12-02192	6-12	1230	MIS	bag	X	*	*		1
9	HKDU38-6-12-02192	6-12	1630	MIS	bag	X	*	*		1
	Last entry									
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

570-21843 Chain of Custody

RELINQUISHED BY:(Signature) DATE/TIME

K. Carvallo to FedEx/Calscience 2/25/20 1500

RECIEVED BY (Signature) DATE/TIME 2/26/20 0950

RELINQUISHED BY:(Signature) DATE/TIME

RECIEVED BY (Signature) DATE/TIME

(Fedex Box) 19-4|18 J 56

SAMPLE RECEIPT:

TOTAL # OF CONTAINERS 9

COC SEALS N

SEALS INTACT NA

RECEIVED TEMP:

LABORATORY NOTES:

Samples have been MI prepped at ESN-HI.
*Please notify PM immediately with preliminary results for total lead to identify which samples will be analyzed for TCLP and SPLP.

3/19/2020

Login Sample Receipt Checklist

Client: EnviroQuest, Inc.

Job Number: 570-21843-2

Login Number: 21843
List Number: 1
Creator: Andujo, Italy

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Calscience LLC
7440 Lincoln Way
Garden Grove, CA 92841
Tel: (714)895-5494

Laboratory Job ID: 570-44279-1
Client Project/Site: Hakalau Beach Park Supplimental Lead Assessment

For:
Kealamahi Pacific Consultants, LLC
103 South Kalaheo Avenue
Kailua, Hawaii 96734-2933

Attn: Scott Moncrief

Terri Chang

Authorized for release by:
12/7/2020 1:39:51 PM

Terri Chang, Project Manager I
(714)895-5494
Terri.Chang@eurofinset.com

Table of Contents

Definitions/Glossary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-44279-1
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Laboratory: Eurofins Calscience LLC

Narrative

Job Narrative
570-44279-1

Comments
No additional comments.

Receipt
The samples were received on 11/19/2020 10:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.9º C.

Receipt Exceptions
The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. No relinquished time listed.

Metals
Method 6010B: The method blank for preparation batch 570-113495 and analytical batch 570-113944 contained Lead above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

Method 6010B: The following samples were diluted due to the presence of Iron which interferes with Lead: HKL_DU27_0-3_20201116 (570-44279-1), HKL_DU8B_3-6_20201116 (570-44279-2), HKL_DU20_3-6_20201116 (570-44279-3), HKL_DU12_4-6_20201117 (570-44279-4) and HKL_DU26_0-3_20201117 (570-44279-5). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Client Sample ID: HKL_DU27_0-3_20201116 — Lab Sample ID: 570-44279-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	1680		5.00		mg/Kg	10		6010B	Total/NA

Client Sample ID: HKL_DU8B_3-6_20201116 — Lab Sample ID: 570-44279-2

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	2680		5.00		mg/Kg	10		6010B	Total/NA

Client Sample ID: HKL_DU20_3-6_20201116 — Lab Sample ID: 570-44279-3

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	1640		5.00		mg/Kg	10		6010B	Total/NA

Client Sample ID: HKL_DU12_4-6_20201117 — Lab Sample ID: 570-44279-4

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	738		5.00		mg/Kg	10		6010B	Total/NA

Client Sample ID: HKL_DU26_0-3_20201117 — Lab Sample ID: 570-44279-5

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	1320	B	5.00		mg/Kg	10		6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Method: 6010B - Metals (ICP)

Client Sample ID: HKL_DU27_0-3_20201116
Date Collected: 11/16/20 10:00
Date Received: 11/19/20 10:00
Lab Sample ID: 570-44279-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	1680		5.00		mg/Kg		12/02/20 18:00	12/04/20 10:05	10

Client Sample ID: HKL_DU8B_3-6_20201116
Date Collected: 11/16/20 11:00
Date Received: 11/19/20 10:00
Lab Sample ID: 570-44279-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	2680		5.00		mg/Kg		12/02/20 18:00	12/04/20 10:06	10

Client Sample ID: HKL_DU20_3-6_20201116
Date Collected: 11/16/20 13:30
Date Received: 11/19/20 10:00
Lab Sample ID: 570-44279-3
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	1640		5.00		mg/Kg		12/02/20 18:00	12/04/20 10:08	10

Client Sample ID: HKL_DU12_4-6_20201117
Date Collected: 11/17/20 08:30
Date Received: 11/19/20 10:00
Lab Sample ID: 570-44279-4
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	738		5.00		mg/Kg		12/02/20 18:00	12/04/20 10:10	10

Client Sample ID: HKL_DU26_0-3_20201117
Date Collected: 11/17/20 10:00
Date Received: 11/19/20 10:00
Lab Sample ID: 570-44279-5
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	1320	B	5.00		mg/Kg		12/02/20 18:00	12/04/20 10:03	10

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 570-113491/1-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 113491

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/Kg		12/02/20 18:00	12/04/20 09:34	1

Lab Sample ID: LCS 570-113491/2-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 113491

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			25.1	24.66		mg/Kg		98	80 - 120		

Lab Sample ID: LCSD 570-113491/3-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 113491

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			24.9	25.00		mg/Kg		100	80 - 120	1	20

Lab Sample ID: MB 570-113495/1-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 113495

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.6430		0.505		mg/Kg		12/02/20 18:00	12/04/20 09:56	1

Lab Sample ID: LCS 570-113495/2-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 113495

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			25.0	25.23		mg/Kg		101	80 - 120		

Lab Sample ID: LCSD 570-113495/3-A
Matrix: Solid
Analysis Batch: 113944

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 113495

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			24.6	24.55		mg/Kg		100	80 - 120	3	20

QC Association Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Metals

ISM Prep Batch: 111774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-44279-1	HKL_DU27_0-3_20201116	Total/NA	Solid	Increment, Prep	
570-44279-2	HKL_DU8B_3-6_20201116	Total/NA	Solid	Increment, Prep	
570-44279-3	HKL_DU20_3-6_20201116	Total/NA	Solid	Increment, Prep	
570-44279-4	HKL_DU12_4-6_20201117	Total/NA	Solid	Increment, Prep	
570-44279-5	HKL_DU26_0-3_20201117	Total/NA	Solid	Increment, Prep	

Prep Batch: 113491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-44279-1	HKL_DU27_0-3_20201116	Total/NA	Solid	3050B	111774
570-44279-2	HKL_DU8B_3-6_20201116	Total/NA	Solid	3050B	111774
570-44279-3	HKL_DU20_3-6_20201116	Total/NA	Solid	3050B	111774
570-44279-4	HKL_DU12_4-6_20201117	Total/NA	Solid	3050B	111774
MB 570-113491/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-113491/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-113491/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Prep Batch: 113495

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-44279-5	HKL_DU26_0-3_20201117	Total/NA	Solid	3050B	111774
MB 570-113495/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-113495/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-113495/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Analysis Batch: 113944

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-44279-1	HKL_DU27_0-3_20201116	Total/NA	Solid	6010B	113491
570-44279-2	HKL_DU8B_3-6_20201116	Total/NA	Solid	6010B	113491
570-44279-3	HKL_DU20_3-6_20201116	Total/NA	Solid	6010B	113491
570-44279-4	HKL_DU12_4-6_20201117	Total/NA	Solid	6010B	113491
570-44279-5	HKL_DU26_0-3_20201117	Total/NA	Solid	6010B	113495
MB 570-113491/1-A	Method Blank	Total/NA	Solid	6010B	113491
MB 570-113495/1-A	Method Blank	Total/NA	Solid	6010B	113495
LCS 570-113491/2-A	Lab Control Sample	Total/NA	Solid	6010B	113491
LCS 570-113495/2-A	Lab Control Sample	Total/NA	Solid	6010B	113495
LCSD 570-113491/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	113491
LCSD 570-113495/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	113495

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Client Sample ID: HKL_DU27_0-3_20201116
Lab Sample ID: 570-44279-1
Date Collected: 11/16/20 10:00
Matrix: Solid
Date Received: 11/19/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					111774	11/19/20 16:00	C4LT	ECL 3
Total/NA	Prep	3050B			10 g	500 mL	113491	12/02/20 18:00	SP7J	ECL 1
Total/NA	Analysis	6010B		10			113944	12/04/20 10:05	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKL_DU8B_3-6_20201116
Lab Sample ID: 570-44279-2
Date Collected: 11/16/20 11:00
Matrix: Solid
Date Received: 11/19/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					111774	11/19/20 16:00	C4LT	ECL 3
Total/NA	Prep	3050B			10 g	500 mL	113491	12/02/20 18:00	SP7J	ECL 1
Total/NA	Analysis	6010B		10			113944	12/04/20 10:06	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKL_DU20_3-6_20201116
Lab Sample ID: 570-44279-3
Date Collected: 11/16/20 13:30
Matrix: Solid
Date Received: 11/19/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					111774	11/19/20 16:00	C4LT	ECL 3
Total/NA	Prep	3050B			10 g	500 mL	113491	12/02/20 18:00	SP7J	ECL 1
Total/NA	Analysis	6010B		10			113944	12/04/20 10:08	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKL_DU12_4-6_20201117
Lab Sample ID: 570-44279-4
Date Collected: 11/17/20 08:30
Matrix: Solid
Date Received: 11/19/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					111774	11/19/20 16:00	C4LT	ECL 3
Total/NA	Prep	3050B			10 g	500 mL	113491	12/02/20 18:00	SP7J	ECL 1
Total/NA	Analysis	6010B		10			113944	12/04/20 10:10	ULPF	ECL 1
	Instrument ID: ICP8									

Client Sample ID: HKL_DU26_0-3_20201117
Lab Sample ID: 570-44279-5
Date Collected: 11/17/20 10:00
Matrix: Solid
Date Received: 11/19/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					111774	11/19/20 16:00	C4LT	ECL 3
Total/NA	Prep	3050B			10 g	500 mL	113495	12/02/20 18:00	SP7J	ECL 1
Total/NA	Analysis	6010B		10			113944	12/04/20 10:03	ULPF	ECL 1
	Instrument ID: ICP8									

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

ECL 3 = Eurofins Calscience LLC Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494

Accreditation/Certification Summary

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-44279-1
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Laboratory: Eurofins Calscience LLC

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
California	Los Angeles County Sanitation Districts	10109	09-30-21
California	State	2944	09-30-21
Nevada	State	CA00111	07-31-21
Oregon	NELAP	CA300001	01-29-21
USDA	US Federal Programs	P330-20-00034	02-10-23
Washington	State	C916-18	10-11-21

Method Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	ECL 1
3050B	Preparation, Metals	SW846	ECL 1
Increment, Prep	ISM - Dry, Disaggregate, Sieve, Split,	EPA	ECL 3

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

ECL 3 = Eurofins Calscience LLC Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494

Sample Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Beach Park Supplimental Lead Assessment

Job ID: 570-44279-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
570-44279-1	HKL_DU27_0-3_20201116	Solid	11/16/20 10:00	11/19/20 10:00	
570-44279-2	HKL_DU8B_3-6_20201116	Solid	11/16/20 11:00	11/19/20 10:00	
570-44279-3	HKL_DU20_3-6_20201116	Solid	11/16/20 13:30	11/19/20 10:00	
570-44279-4	HKL_DU12_4-6_20201117	Solid	11/17/20 08:30	11/19/20 10:00	
570-44279-5	HKL_DU26_0-3_20201117	Solid	11/17/20 10:00	11/19/20 10:00	

44279

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For courier service / sample drop off information, contact us26_sales@eurofinsus.com or call us.

570-44279 Chain of Custody

CHAIN OF CUSTODY RECORD

DATE: 11/18/20

PAGE: 1 OF 1

LABORATORY CLIENT: EnviroQuest Inc.	CLIENT PROJECT NAME / NUMBER: Hakalau Beach Park Supplimental Lead Assessment
ADDRESS: 103 South Kalaheo Ave.	P.O. NO.:
CITY: Kailua STATE: HI ZIP: 96734	PROJECT CONTACT: Scott Moncrief
TEL: 808 286 0222 E-MAIL: scottmoncrief808@gmail.com	SAMPLER(S): (PRINT) Scott Moncrief, Chrisian Schneider

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ STANDARD

☐ COELT EDF | GLOBAL ID: | LOG CODE:

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH ___	BTEX / MTBE ☐ 8260 ☐ ___	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6	Tota Lead	MI Prep		
1	HKL_DU27_0-3_20201116	11/16/20	10:00	Soil	1																		x	x		
2	HKL_DU8B_3-6_20201116	11/16/20	11:00	Soil	1																		x	x		
3	HKL_DU20_3-6_20201116	11/16/20	13:30	Soil	1																		x	x		
4	HKL_DU12_4-6_20201117	11/17/20	8:30	Soil	1																		x	x		
5	HKL_DU26_0-3_20201117	11/17/20	10:00	Soil	1																		x	x		

Relinquished by: (Signature) Scott Moncrief	Received by: (Signature/Affiliation)	Date: 11/18/20	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date: 11/19/2020	Time: 10:00
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

5.7/4.9 SCa

06/02/14 Revision

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-44279-1

Login Number: 44279
List Number: 1
Creator: Ramos, Maribel

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	Refer to Job Narrative for details.
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Tel: (714)895-5494

Laboratory Job ID: 570-97597-2
Client Project/Site: Hakalau Assessment

For:
Kealamahi Pacific Consultants, LLC
111 Hekili Street
Ste. A601
Kailua, Hawaii 96734

Attn: Scott Moncrief

Authorized for release by:
7/15/2022 3:28:22 PM

Terri Chang, Project Manager I
(657)210-6295
Terri.Chang@et.eurofinsus.com

Table of Contents

Definitions/Glossary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Job ID: 570-97597-2

Laboratory: Eurofins Calscience

Narrative

Job Narrative
570-97597-2

Comments
No additional comments.

Receipt
The samples were received on 5/26/2022 10:35 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 23.6º C.

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Client Sample ID: DU39_6-12_202239 — Lab Sample ID: 570-97597-10

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	737		4.00		mg/Kg	5		6010B	Total/NA

Client Sample ID: DU41_6-12_202241 — Lab Sample ID: 570-97597-12

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	360		4.00		mg/Kg	5		6010B	Total/NA

Client Sample ID: DU44_6-12_202244 — Lab Sample ID: 570-97597-14

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	339		4.00		mg/Kg	5		6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method: 6010B - Metals (ICP)

Client Sample ID: DU39_6-12_202239
Date Collected: 05/11/22 16:00
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-10
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	737		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:40	5

Client Sample ID: DU41_6-12_202241
Date Collected: 05/12/22 09:40
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-12
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	360		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:43	5

Client Sample ID: DU44_6-12_202244
Date Collected: 05/11/22 13:00
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-14
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	339		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:45	5

QC Sample Results

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 570-248997/1-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 248997

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.812		mg/Kg		07/13/22 19:45	07/14/22 13:57	1

Lab Sample ID: LCS 570-248997/2-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 248997

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			51.0	53.16		mg/Kg		104	80 - 120		

Lab Sample ID: LCSD 570-248997/3-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 248997

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			50.8	51.88		mg/Kg		102	80 - 120	2	20

QC Association Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Metals

ISM Prep Batch: 246211

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	Increment, Prep	
570-97597-12	DU41_6-12_202241	Total/NA	Solid	Increment, Prep	
570-97597-14	DU44_6-12_202244	Total/NA	Solid	Increment, Prep	

Prep Batch: 248997

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	3050B	246211
570-97597-12	DU41_6-12_202241	Total/NA	Solid	3050B	246211
570-97597-14	DU44_6-12_202244	Total/NA	Solid	3050B	246211
MB 570-248997/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-248997/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-248997/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Analysis Batch: 249306

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	6010B	248997
570-97597-12	DU41_6-12_202241	Total/NA	Solid	6010B	248997
570-97597-14	DU44_6-12_202244	Total/NA	Solid	6010B	248997
MB 570-248997/1-A	Method Blank	Total/NA	Solid	6010B	248997
LCS 570-248997/2-A	Lab Control Sample	Total/NA	Solid	6010B	248997
LCSD 570-248997/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	248997

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Client Sample ID: DU39_6-12_202239

Lab Sample ID: 570-97597-10

Date Collected: 05/11/22 16:00
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:40	K1UV	ECL 4
	Instrument ID: ICP10									

Client Sample ID: DU41_6-12_202241

Lab Sample ID: 570-97597-12

Date Collected: 05/12/22 09:40
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:43	K1UV	ECL 4
	Instrument ID: ICP10									

Client Sample ID: DU44_6-12_202244

Lab Sample ID: 570-97597-14

Date Collected: 05/11/22 13:00
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:45	K1UV	ECL 4
	Instrument ID: ICP10									

Laboratory References:

ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

Accreditation/Certification Summary

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-97597-2
Project/Site: Hakalau Assessment

Laboratory: Eurofins Calscience

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4175	01-31-23

Method Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	ECL 4
3050B	Preparation, Metals	SW846	ECL 4
Increment, Prep	ISM - Dry, Disaggregate, Sieve, Split,	EPA	ECL 4

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

Sample Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
570-97597-10	DU39_6-12_202239	Solid	05/11/22 16:00	05/26/22 10:35
570-97597-12	DU41_6-12_202241	Solid	05/12/22 09:40	05/26/22 10:35
570-97597-14	DU44_6-12_202244	Solid	05/11/22 13:00	05/26/22 10:35

97597

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570-97597 Chain of Custody

CHAIN OF CUSTODY RECORD

DATE: 05/12/22

PAGE: 1 OF 2

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For courier service / sample drop off information contact us26_sales@eurofinsus com or call us

LABORATORY CLIENT: Kealamahi Pacific Consultants, LLC	CLIENT PROJECT NAME / NUMBER: Hakalau Assessment
ADDRESS: 103 South Kalaheo Ave	PROJECT CONTACT:
CITY: Kailua STATE: HI ZIP: 96734-293	SAMPLER(S) (PRINT): KP, KC, EW, SM
TEL: 808-208-8616 E-MAIL: scottmoncrief808@gmail com	P O NO:

TURNAROUND TIME (Rush surcharges may apply to any TAT not 'STANDARD")

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS X STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS

Please hold DU43_6-12_202243, DU39_6-12_202239, DU41_6-12_202241, DU44_6-12_202244

REQUESTED ANALYSES

Please check box or fill in blank as needed

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH ____	BTEX / MTBE ☐ 8260 ☐ ____	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218 6	LEAD			
	DU45_6-12_202245	5/10/2022	1030AM	SOIL	1	X																	X			
	DU45_6-12_202245B	5/10/2022	2PM	SOIL	1	X																	X			
	DU45_6-12_202245C	5/10/2022	2PM	SOIL	1	X																	X			
	DU43_0-6_202243	5/10/2022	1145AM	SOIL	1	X																	X			
	DU43_6-12_202243	5/10/2022	1145AM	SOIL	1	X																	X			
	SW49_202249	5/11/2022	10AM	WATER	1	X																	X			
	SW50_202250	5/11/2022	1040AM	WATER	1	X																	X			
	SW55_202255	5/11/2022	1105AM	WATER	1	X																	X			
	DU39_0-6_202239	5/11/2022	4PM	SOIL	1	X																	X			
	DU39_6-12_202239	5/11/2022	4PM	SOIL	1	X																	X			

Relinquished by: (Signature) KATIE PAGE	Received by: (Signature/Affiliation)	Date:	Time.
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date	Time.
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date	Time.

06/02/14 Revision

7/15/2022

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ca suite 4

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WO # / LAB USE ONLY

CHAIN OF CUSTC

DATE: 05/12/2

PAGE: 2 OF

LABORATORY CLIENT: Kealamahi Pacific Consultants, LLC	CLIENT PROJECT NAME / NUMBER: Hakalau Assessment
ADDRESS: 103 South Kalaheo Ave	PROJECT CONTACT:
CITY: Kailua	STATE: HI ZIP: 96734-293
TEL.: 808-208-8616	E-MAIL.: scottmoncrief808@gmail com
P O NO	
SAMPLER(S): (PRINT KP, KC, EW, SI	

REQUESTED ANALYSES

TURNAROUND TIME (Rush surcharges may apply to any TAT not 'STANDARD")

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS X STANDARD

☐ COELT EDF | GLOBAL ID: | LOG CODE:

SPECIAL INSTRUCTIONS.

SEE PAGE 1

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH	BTEX / MTBE ☐ 8260 ☐	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Co	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/7	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218 6
	DU41_0-6_202241	5/12/2022	0940AM	SOIL	1	X																
	DU41_6-12_202241	5/12/2022	0940AM	SOIL	1	X																
	DU44_0-6_202244	5/11/2022	1PM	SOIL	1	X																
	DU44_6-12_202244	5/11/2022	1PM	SOIL	1	X																

Relinquished by: (Signature) KATIE PAGE	Received by: (Signature/Affiliation)	Date
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:

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CHAIN OF CUSTODY RECORD

DATE 5/12/2022

PAGE 1 OF 2

LAB USE ONLY

7440 Opportunity Way Garden Grove CA 92841-1427 714) 895-5494
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COMPANY	Kealamai Pacific Consultants LLC	PROJECT NAME / JOB #	Hakalau Assessment
PO			
ADDRESS	103 South Kalaheo Ave	CONTACT	S Moncrie
SAMPLERS (PRINT)	KP, JC, EW, SM		
CITY	Kailua	STATE HI	ZIP 96734 2833
PHONE	c 208 86 6	EMAIL	scot r e 808@gmail co

STANDARD ☑ | ☐ DELIVERABLE EDF | GLOBAL | LOG CODE

REQUESTED ANALYSES

Please check or blank as needed

Please hold
- DV54_Sediment_202254
- DV45_6-12_202245
- DV45_6-12_202245B
- DV45_6-12_202245C
- DV43_6-12_202243
- DV39_6-12_202239

SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Filtered	Preserved	Field Filtered	TPH-DRO/MRO	BTEX / MTBE ☐ 8260 ☐	Oxygenates (8260)	SVOCs (8270)	PAH ☐ 8270 ☐ 8270 SIM	Lead
DV51_Sediment_202251	05/09/22	3PM	Sediment	1									✓
DV54_Sediment_202254	05/12/22	9 AM	Sediment	1									✓
DV45_6-12_202245	05/10/22	~~10 AM~~ 10:30am	Soil	1									✓
DV45_6-12_202245B	05/10/22	2 PM	Soil	1									✓
DV45-6-12_202245C	05/10/22	2PM	Soil	1									✓
DV43_0-6_202243	05/10/22	~~12:45~~ 11:45	Soil	1									✓
DV43_6-12_202243	05/10/22	~~12PM~~ 11:45	Soil	1									✓
SW49_202249	05/11/22	10AM	Water	1									✓
SW50_202250	05/11/22	10 40AM	Water	1									✓
SW55_202255	05/11/22	11:05AM	Water	1									✓

Relinquished by Signature	Received by Signature Affiliation	Date	Time
Relinquished by Signature	Received by Signature Affiliation	Date	Time
Relinquished by Signature	Received by Signature Affiliation	Date 5/12/22	Time 10:35

*Invoice to 22-9/23.6

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7/15/2022

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CHAIN OF CUSTODY RECORD

DATE 5/12/2022
PAGE 2 OF 2

LAB USE ONLY

7440 Lincoln Way Garden Grove CA 92841 1427 (714) 895 4 4
For customer service sample drop off information contact us26 @eurofinsus.com or ca

LABORATORY CLIENT	Kealamea Pacific Consultants LLC
ADDRESS	103 South Kalaheo Ave
CITY	Kailua
STATE	HI
ZIP	96734 293
TEL	808 208-8616
E MAIL	scotfin e 808@gmail.c
TURNAROUND TIME	☑ STANDARD
	☐ COELT EDF
GLOBAL ID	
LOG CODE	
SPECIAL INSTRUCTIONS	

PROJECT NAME / NUMBER	Hakalau Assessment
PO NO	
PROJECT CONTACT	Scott Moncrief
SAMPLER(S) (PRINT)	KP, KC, EW, SM

REQUESTED ANALYSES

Please check box or fill in blank as needed

SAMPLE ID	DATE	TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	[illegible]	TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH DRO/MRO	BTEX / MTBE ☐ 8260 ☐	VOC (8260)	Oxygenates (8260)	Terra Core	SVOCs (8270)	[illegible]	[illegible]	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/7471X ☐ 6020/7471X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6	[illegible]	Lead
DV39_0-6_202239	05/11/22	4PM	Soil	1	✓																		✓
DV39_6-12_202239	05/11/22	4PM	Soil	1	✓																		✓
DU41_0-6_202241	05/12/22	9:40AM	Soil	1	✓																		✓
DU41_6-12_202241	05/12/22	9:40AM	Soil	1	✓																		✓
DU44_0-6_202244	5/11/22	1:00 pm	Soil	1																			
DU44_6-12_202244	5/11/22	1:00 pm	Soil	1																			

Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
[signature]			
Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
	[signature]	5/26/22	10:30

06/02/14 Revision

USDA United States Department of Agriculture

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection & Quarantine
4700 River Road
Riverdale, MD 20737

Permit to Receive Soil
Regulated by 7 CFR 330

This permit was generated electronically via the cPermits system

PERMITTEE NAME	Terri Garcia	PERMIT NUMBER	P330-20-00034
COMPANY	Eurofins Cebstence, LLC	APPLICATION NUMBER	PRQS-191121001
RECEIVING ADDRESS	7440 Lincoln Way Garden Grove, CA 92841	DATE ISSUED	02-10-2020
MAILING ADDRESS	7440 Lincoln Way Garden Grove, CA 92841		
PHONE	(714) 895-5494		
FAX		EXPIRES	02/10/2023

PORTS OF ARRIVAL/PLANT INSPECTION STATIONS: AK Anchorage, AL Huntsville, AL Mobile, AZ Douglas, AZ Lukeville, AZ Nogales, AZ Phoenix, AZ Santa Cruz, AZ Tucson, CA Calexico, CA El Segundo, CA Fresno, CA Long Beach, CA Oakland, CA Ontario, CA Otay Mesa, CA Port Hueneme, CA Sacramento, CA San Diego, CA San Jose, CA San Ysidro, CA Scattered Ports, CA Terminal, CO Denver, CT Hartford, CT New Haven, DE Dover, DE Wilmington, FL Fort Lauderdale, FL Fort Myers, FL Miami, FL Pierce, FL Jacksonville, FL Key West, FL Miami, FL Miami (Cargo DHL, FedEx, UPS, etc.), FL Orlando, FL Pensacola, FL Port Canaveral, FL Port Everglades, FL Sanford, FL Tampa, FL West Palm Beach, GA Atlanta, GA Savannah, GU Agana, HI Hilo, HI Honolulu, HI Kahului, HI Kailua-Kona, HI Lihue, ID Eastport, IL Chicago, IN Indianapolis, KY Louisville, MA South Boston, MD Baltimore, MD Beltsville, ME Bangor, MI Detroit, MI Houlton, ME Portland, MI Detroit, MI Port Huron, MI Romulus, MI Sault Saint Marie, MN Duluth, MN Grand Portage, MN International Falls, MN Minneapolis, MO Kansas City, MO St Louis, MP Commonwealth of the Northern Mariana Islands, MS Gulfport, MS Port Bienville, NC Fayetteville, NC Roosville, NC Sweetgrass, NC Raleigh, NC Wilmington, ND Dunseith, ND Fortuna, ND Portal, NJ Trenton, NM Albuquerque, NM Columbus, NM Santa Teresa, NV Las Vegas, NY Albany, NY Alexandria Bay, NY Brooklyn, NY Buffalo, NY Champlain, NY Rouses Point, NY Jamaica, NY Newburgh, OH Ashtabula, OH Cincinnati, OH Cleveland, OH Columbus, OH Toledo, OH Wilmington, OK Oklahoma City, OR Portland, PA Allentown, PA Harrisburg, PA Philadelphia, PA Pittsburgh, PA Scranton, PR Aguadilla, PR Carolina, PR Fajardo, PR Mayaguez, PR Ponce, RI Warwick/Providence, SC Charleston, TN Memphis, TN Nashville, TX Austin, TX Brownsville, TX Corpus Christi, TX Dallas, TX Del Rio, TX Eagle Pass, TX El Paso, TX Fabens, TX Falcon, TX Fort Hancock, TX Freeport, TX Galveston, TX Hidalgo, TX Humble, TX Laredo, TX Los Indios, TX Pharr, TX Port Arthur, TX Presidio, TX Progresso, TX Rio Grande City, TX Roma, TX San Antonio, TX Victoria, UT Salt Lake City, VA Dulles, VI Norfolk, VI St Croix, VI St Thomas, VT Berlin, WA Blaine, WA Oroville, WA Port Angeles, WA Seattle, WA Sumas, WI Green Bay, WI Milwaukee

HAND CARRY: No

Under the conditions specified, this permit authorizes the following:

Quantity of Soil per Shipment and Treatment

Sterilization will interfere with intended use. Your facility MUST be inspected and approved to receive this soil

SPECIAL INSTRUCTIONS TO INSPECTORS

See permit conditions below

P330-20-00034

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS Gibbs Smith	DATE 02/10/2020

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-97597-2

Login Number: 97597
List Number: 1
Creator: Chang, Terri

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received extra samples not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Tel: (714)895-5494

Laboratory Job ID: 570-105614-1
Client Project/Site: Hakalau Lead Assessment

For:
Kealamahi Pacific Consultants, LLC
111 Hekili Street
Ste. A601
Kailua, Hawaii 96734

Attn: Scott Moncrief

Authorized for release by:
8/19/2022 12:44:30 PM
Lori Thompson, Project Manager I
(657)212-3035
Lori.Thompson@et.eurofinsus.com

Designee for

Terri Chang, Project Manager I
(657)210-6295
Terri.Chang@et.eurofinsus.com

Table of Contents

Definitions/Glossary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
H3	Sample was received and analyzed past holding time.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 570-105614-1

Laboratory: Eurofins Calscience

Narrative

Job Narrative
570-105614-1

Comments
No additional comments.

Receipt
The samples were received on 8/5/2022 9:40 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 0.9º C and 1.2º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method Moisture - 2540: The following samples were received outside of holding time: HAKA_BT_A (570-105614-1), HAKA_BT_AZ (570-105614-2), HAKA_BT_B (570-105614-3), HAKA_BT_C (570-105614-4), HAKA_BT_D (570-105614-5) and HAKA_BT_E (570-105614-6).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_A — Lab Sample ID: 570-105614-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	10900		8.00		mg/Kg	10		6010B	Total/NA
Lead	25.6		0.500		mg/L	1		6010B	TCLP
Lead	4.32		0.0300		mg/L	1		6010B	SPLP West

Client Sample ID: HAKA_BT_AZ — Lab Sample ID: 570-105614-2

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	11400		8.00		mg/Kg	10		6010B	Total/NA
Lead	22.9		0.500		mg/L	1		6010B	TCLP

Client Sample ID: HAKA_BT_B — Lab Sample ID: 570-105614-3

No Detections.

Client Sample ID: HAKA_BT_C — Lab Sample ID: 570-105614-4

No Detections.

Client Sample ID: HAKA_BT_D — Lab Sample ID: 570-105614-5

No Detections.

Client Sample ID: HAKA_BT_E — Lab Sample ID: 570-105614-6

No Detections.

Client Sample ID: HAKA_BTPC_A — Lab Sample ID: 570-105614-7

No Detections.

Client Sample ID: HAKA_BTPC_B — Lab Sample ID: 570-105614-8

No Detections.

Client Sample ID: HAKA_BTPC_C — Lab Sample ID: 570-105614-9

No Detections.

Client Sample ID: HAKA_BTPC_D — Lab Sample ID: 570-105614-10

No Detections.

Client Sample ID: HAKA_BTPC_E — Lab Sample ID: 570-105614-11

No Detections.

This Detection Summary does not include radiochemical test results.

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP)

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	10900		8.00		mg/Kg		08/11/22 12:59	08/15/22 16:37	10

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	11400		8.00		mg/Kg		08/11/22 12:59	08/15/22 16:40	10

Method: 6010B - Metals (ICP) - TCLP

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	**25.6**		0.500		mg/L		08/09/22 20:18	08/10/22 14:26	1

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	**22.9**		0.500		mg/L		08/09/22 20:18	08/10/22 14:28	1

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-3
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:31	1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-4
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:33	1

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-5
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:36	1

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-6
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:38	1

Client Sample ID: HAKA_BTPC_A
Date Collected: 07/28/22 15:25
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-7
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:40	1

Client Sample ID: HAKA_BTPC_B
Date Collected: 07/28/22 15:30
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-8
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:43	1

Client Sample ID: HAKA_BTPC_C
Date Collected: 07/28/22 15:35
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-9
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:45	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP) - TCLP

Client Sample ID: HAKA_BTPC_D
Date Collected: 07/28/22 15:40
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-10
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:48	1

Client Sample ID: HAKA_BTPC_E
Date Collected: 07/28/22 15:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-11
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:55	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP) - SPLP West

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	4.32		0.0300		mg/L		08/17/22 20:17	08/18/22 14:53	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

General Chemistry

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22.0	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	28.2	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-3
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	34.1	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-4
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	28.3	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-5
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	27.6	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-6
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	25.0	H H3	0.100		%			08/09/22 16:00	1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 570-256107/1-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256107

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.821		mg/Kg		08/11/22 12:59	08/15/22 12:42	1

Lab Sample ID: LCS 570-256107/2-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256107

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			49.5	47.79		mg/Kg		97	80 - 120		

Lab Sample ID: LCSD 570-256107/3-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256107

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			50.5	50.96		mg/Kg		101	80 - 120	6	20

Lab Sample ID: LB 570-255340/1-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 255638

Analyte	LB Result	LB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 13:57	1

Lab Sample ID: LCS 570-255340/2-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 255638

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			2.00	2.255		mg/L		113	80 - 120		

Lab Sample ID: LCSD 570-255340/3-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 255638

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			2.00	2.010		mg/L		101	80 - 120	11	20

Lab Sample ID: MB 580-400071/21-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 400945

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0300		mg/L		08/17/22 20:17	08/18/22 13:12	1

Lab Sample ID: LCS 580-400071/22-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Lab Control Sample
Prep Type: SPLP West
Prep Batch: 400945

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			1.00	1.035		mg/L		104	80 - 120		

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP)

Lab Sample ID: LCSD 580-400071/23-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Lab Control Sample Dup
Prep Type: SPLP West
Prep Batch: 400945

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			1.00	1.051		mg/L		105	80 - 120	2	20

Metals

Leach Batch: 255340

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	1311	
570-105614-2	HAKA_BT_AZ	TCLP	Solid	1311	
570-105614-3	HAKA_BT_B	TCLP	Solid	1311	
570-105614-4	HAKA_BT_C	TCLP	Solid	1311	
570-105614-5	HAKA_BT_D	TCLP	Solid	1311	
570-105614-6	HAKA_BT_E	TCLP	Solid	1311	
570-105614-7	HAKA_BTPC_A	TCLP	Solid	1311	
570-105614-8	HAKA_BTPC_B	TCLP	Solid	1311	
570-105614-9	HAKA_BTPC_C	TCLP	Solid	1311	
570-105614-10	HAKA_BTPC_D	TCLP	Solid	1311	
570-105614-11	HAKA_BTPC_E	TCLP	Solid	1311	
LB 570-255340/1-B	Method Blank	TCLP	Solid	1311	
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	1311	
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	1311	

Prep Batch: 255638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	3010A	255340
570-105614-2	HAKA_BT_AZ	TCLP	Solid	3010A	255340
570-105614-3	HAKA_BT_B	TCLP	Solid	3010A	255340
570-105614-4	HAKA_BT_C	TCLP	Solid	3010A	255340
570-105614-5	HAKA_BT_D	TCLP	Solid	3010A	255340
570-105614-6	HAKA_BT_E	TCLP	Solid	3010A	255340
570-105614-7	HAKA_BTPC_A	TCLP	Solid	3010A	255340
570-105614-8	HAKA_BTPC_B	TCLP	Solid	3010A	255340
570-105614-9	HAKA_BTPC_C	TCLP	Solid	3010A	255340
570-105614-10	HAKA_BTPC_D	TCLP	Solid	3010A	255340
570-105614-11	HAKA_BTPC_E	TCLP	Solid	3010A	255340
LB 570-255340/1-B	Method Blank	TCLP	Solid	3010A	255340
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	3010A	255340
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	3010A	255340

Analysis Batch: 255866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	6010B	255638
570-105614-2	HAKA_BT_AZ	TCLP	Solid	6010B	255638
570-105614-3	HAKA_BT_B	TCLP	Solid	6010B	255638
570-105614-4	HAKA_BT_C	TCLP	Solid	6010B	255638
570-105614-5	HAKA_BT_D	TCLP	Solid	6010B	255638
570-105614-6	HAKA_BT_E	TCLP	Solid	6010B	255638
570-105614-7	HAKA_BTPC_A	TCLP	Solid	6010B	255638
570-105614-8	HAKA_BTPC_B	TCLP	Solid	6010B	255638
570-105614-9	HAKA_BTPC_C	TCLP	Solid	6010B	255638
570-105614-10	HAKA_BTPC_D	TCLP	Solid	6010B	255638
570-105614-11	HAKA_BTPC_E	TCLP	Solid	6010B	255638
LB 570-255340/1-B	Method Blank	TCLP	Solid	6010B	255638
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	6010B	255638
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	6010B	255638

Metals

ISM Prep Batch: 255881

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Increment, Prep	
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Increment, Prep	

Prep Batch: 256107

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	3050B	255881
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	3050B	255881
MB 570-256107/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-256107/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-256107/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Analysis Batch: 256849

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	6010B	256107
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	6010B	256107
MB 570-256107/1-A	Method Blank	Total/NA	Solid	6010B	256107
LCS 570-256107/2-A	Lab Control Sample	Total/NA	Solid	6010B	256107
LCSD 570-256107/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	256107

Leach Batch: 400071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	1312	
MB 580-400071/21-B	Method Blank	SPLP West	Solid	1312	
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	1312	
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	1312	

Prep Batch: 400945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	3010A	400071
MB 580-400071/21-B	Method Blank	SPLP West	Solid	3010A	400071
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	3010A	400071
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	3010A	400071

Analysis Batch: 401081

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	6010B	400945
MB 580-400071/21-B	Method Blank	SPLP West	Solid	6010B	400945
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	6010B	400945
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	6010B	400945

General Chemistry

Analysis Batch: 255207

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Moisture - 2540	255507
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Moisture - 2540	255507
570-105614-3	HAKA_BT_B	Total/NA	Solid	Moisture - 2540	255507
570-105614-4	HAKA_BT_C	Total/NA	Solid	Moisture - 2540	255507
570-105614-5	HAKA_BT_D	Total/NA	Solid	Moisture - 2540	255507
570-105614-6	HAKA_BT_E	Total/NA	Solid	Moisture - 2540	255507

QC Association Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

General Chemistry

ISM Prep Batch: 255507

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Increment,Prep	
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Increment,Prep	
570-105614-3	HAKA_BT_B	Total/NA	Solid	Increment,Prep	
570-105614-4	HAKA_BT_C	Total/NA	Solid	Increment,Prep	
570-105614-5	HAKA_BT_D	Total/NA	Solid	Increment,Prep	
570-105614-6	HAKA_BT_E	Total/NA	Solid	Increment,Prep	

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			1.0 g	1.0 mL	400071	08/10/22 14:13	JLS	EET SEA
SPLP West	Prep	3010A			50 mL	50 mL	400945	08/17/22 20:17	JLS	EET SEA
SPLP West	Analysis	6010B		1			401081	08/18/22 14:53	TMH	EET SEA
	Instrument ID: TAC047									
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:26	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment, Prep					255881	08/10/22 15:19	KZX6	EET CAL 4
Total/NA	Prep	3050B			10 g	500 mL	256107	08/11/22 12:59	CS5Z	EET CAL 4
Total/NA	Analysis	6010B		10			256849	08/15/22 16:37	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:28	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment, Prep					255881	08/10/22 15:19	KZX6	EET CAL 4
Total/NA	Prep	3050B			10 g	500 mL	256107	08/11/22 12:59	CS5Z	EET CAL 4
Total/NA	Analysis	6010B		10			256849	08/15/22 16:40	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:31	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.01 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:33	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-5
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:36	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.02 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:38	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BTPC_A
Date Collected: 07/28/22 15:25
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:40	VZ0K	EET CAL
	Instrument ID: ICP10									

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BTPC_B
Date Collected: 07/28/22 15:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.06 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:43	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_C
Date Collected: 07/28/22 15:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-9
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.06 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:45	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_D
Date Collected: 07/28/22 15:40
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-10
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.03 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:48	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_E
Date Collected: 07/28/22 15:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-11
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:55	VZ0K	EET CAL
	Instrument ID: ICP10									

[1] Completion dates and times are reported or not reported per method requirements or individual lab discretion.

Laboratory References:

EET CAL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-105614-1
Project/Site: Hakalau Lead Assessment

Laboratory: Eurofins Calscience

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4175	02-02-23

Laboratory: Eurofins Seattle

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4167	07-08-23

Method Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAL 4
6010B	Metals (ICP)	SW846	EET SEA
Moisture - 2540	Percent Moisture	SM	EET CAL 4
1311	TCLP Extraction	SW846	EET CAL 4
1312	SPLP Extraction	SW846	EET SEA
3010A	Preparation, Total Metals	SW846	EET CAL 4
3010A	Preparation, Total Metals	SW846	EET SEA
3050B	Preparation, Metals	SW846	EET CAL 4
Increment, Prep	ISM - Dry, Disaggregate, Sieve, Split,	EPA	EET CAL 4
Increment,Prep	ISM - As Received, Disaggregate, Split	EPA	EET CAL 4

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CAL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Sample Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
570-105614-1	HAKA_BT_A	Solid	07/28/22 13:30	08/05/22 09:40
570-105614-2	HAKA_BT_AZ	Solid	07/28/22 13:35	08/05/22 09:40
570-105614-3	HAKA_BT_B	Solid	07/28/22 13:45	08/05/22 09:40
570-105614-4	HAKA_BT_C	Solid	07/28/22 13:45	08/05/22 09:40
570-105614-5	HAKA_BT_D	Solid	07/28/22 13:50	08/05/22 09:40
570-105614-6	HAKA_BT_E	Solid	07/28/22 13:55	08/05/22 09:40
570-105614-7	HAKA_BTPC_A	Solid	07/28/22 15:25	08/05/22 09:40
570-105614-8	HAKA_BTPC_B	Solid	07/28/22 15:30	08/05/22 09:40
570-105614-9	HAKA_BTPC_C	Solid	07/28/22 15:35	08/05/22 09:40
570-105614-10	HAKA_BTPC_D	Solid	07/28/22 15:40	08/05/22 09:40
570-105614-11	HAKA_BTPC_E	Solid	07/28/22 15:45	08/05/22 09:40

Eurofins Calscience Irvine
2841 Dow Ave., Suite 100
Tustin CA 92780
Phone (949) 261-1022 Fax (949) 260-3297

105614

Chain of Custody Record

eurofins | Calscience

Client Information			
Client Contact: Scott Moncrief	Sampler: Scott Moncrief	Lab PM: Terri Chang	Carrier Tracking No(s):
Company: Kealamahi Pacific Consultants, LLC	Phone: 808 286 0222	E-Mail: scott.moncrief808@gma[illegible]	COC No: 440-179973-32609 1
Address: 111 Hekili St, St A601	Due Date Requested:		Page: Page 1 of 1
City: Kailua	TAT Requested (days): Normal		Job #:
State, Zip: Hawaii 96734	PO #:		
Phone: 808 286 0222	WO #:		
Email: scottmoncrief808@gmail.com	Project #:		
Project Name: Hakalau Lead Assessment	SSOW#:		
Site: Hakalau Beach Park			

Analysis Requested

570-105614 Chain of Custody

Preservation Codes:
A - HCL
B - NaOH
M - Hexane
N - None
[illegible]O2
[illegible]4S
[illegible]O3
[illegible]2O3
[illegible]4
Dodecahydrate
[illegible]ne
A
[illegible]-5
[illegible] (specify)

Other:

	Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	[illegible]	[illegible]	TCLP	[illegible]	SPLP Pb	Total Number of containers	Special Instructions/Note:
				Preservation Code:										
1	HAKA_BT_A	[illegible]	[illegible]		[illegible]				X	X		X		
2	HAKA_BT_A2		[illegible]						X	X		[illegible]		
3	HAKA_BT_B									X	X			
4	HAKA_BT_C													
5	HAKA_BT_D		[illegible]											
6	HAKA_BT_E													
7	HAKA_BTPC_A		152[illegible]											
8	HAKA_BTPC_B													
9	HAKA_BTPC_C													
10	HAKA_BTPC_D		14[illegible]											
	HAKA_BTPC_E		154[illegible]							X				

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by	Date	Time	Method of Shipment
Relinquished by: Scott Moncrief	Date/Time:	Company	Received by: [signature]	Date/Time: 8/5/22 0840	Company: EC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No

Cooler Temperature(s) °C and Other Remarks: 36/09 0-9/12 IR SC11

Ver: 01/16/2019

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin CA 92780
Phone 714-895-5494

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler	Lab PM: Chang, Terri	Carrier Tracking No(s)	COC No: 570-182827 1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Terri Chang@et.eurofinsus.com	State of Origin: Hawaii	Page: Page 1 of 1
Company: Eurofins Environment Testing Northwest,		Accreditations Required (See note): NELAP - Oregon, State - Hawaii		Job #: 570-105614-1
Address: 5755 8th Street East,	Due Date Requested: 8/17/2022			
City: Tacoma	TAT Requested (days):			
State Zip: WA, 98424				
Phone: 253-922-2310(Tel)	PO #:			
Email:	WO #:			
Project Name: Hakalau Lead Assessment	Project #: 57002418			
Site:	SSOW#:			

Analysis Requested

Preservation Codes.

A HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y Trizma, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010B/1312_W_M SPLP Lead	Total Number of containers	Special Instructions/Note.
			Preservation Code:						
HAKA_BT_A (570-105614-1)	7/28/22	13 30 Hawaiian		Solid			X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Calscience places the ownership of method analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Calscience laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Calscience attention immediately If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Calscience.

Possible Hazard Identification	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)***
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested I II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date.	Time:	Method of Shipment:

Relinquished by: Olga Cinelas	Date/Time: 8/11/22 17cc	Company: EC	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks.

Ver: 06/08/2021

8/19/2022

105614


ORIGIN ID:H NLA (808) 286-0222
SCOTT MONCR IEF
ENVIROQUES KAHA ST., #21
98-029 HEK
AIEA, HI 96701
UNITED S TATES US

SHIP DATE: 04AUG22
ACTWGT: 14.95 LB
CAD: 6994244/SSFE2321
DIMS: 13x8x13 IN
BILL THIRD PARTY

TO EUR OFINS CALSCIENCE IRVINE
284 1 DOW AVE., STE.100
TU TIN CA 92780
(949) 261 -1022 REF: KOLEKOLE
INV:
PO: DEPT:

FedEx Express

1 of 2
TRK# 0201 2764 1100 4107
MASTER
FRI - 05 AUG 4:30P
STANDARD OVERNIGHT

WZ DTHA
92780
CA-US SNA

Part # 156287-436 RRDB EXP 01/23


570-105614 Waybill

ORIGIN
SCOTT ML
ENVIROQUES!
98-029 HEKAHA ST., #21
AIEA, HI 96701
UNITED STATES US

AUG22
LB
CAD: 6994244/SSFE2321
DIMS: 13x8x13 IN
BILL THIRD PARTY

TO EUROFINS CALSCIENCE IRVINE
2841 DOW AVE., STE.100
TUSTIN CA 92780
(949) 261-1022 REF: KOLEKOLE
INV:
PO: DEPT:

FedEx Express

2 of 2
MPS# 0263 2764 1100 4118
Mstr# 2764 1100 4107 0201
FRI - 05 AUG 4:30P
STANDARD OVERNIGHT

WZ DTHA
92780
CA-US SNA

Part # 156287-436 RRDB EXP 01/23

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Phone: 714-895-5494

Chain of Custody Record

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Chang, Terri	Carrier Tracking No(s):	COC No: 570-182827.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Terri.Chang@et.eurofinsus.com	State of Origin: Hawaii	Page: Page 1 of 1
Company: Eurofins Environment Testing Northwest,		Accreditations Required (See note): NELAP - Oregon; State - Hawaii		Job #: 570-105614-1
Address: 5755 8th Street East, ,	Due Date Requested: 8/17/2022			
City: Tacoma	TAT Requested (days):			
State, Zip: WA, 98424				
Phone: 253-922-2310(Tel)	PO #:			
Email:	WO #:			
Project Name: Hakalau Lead Assessment	Project #: 57002418			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010B/1312_W_M SPLP Lead	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
HAKA_BT_A (570-105614-1)	7/28/22	13:30 Hawaiian		Solid			X	1	

Therm. ID: IR8 Cor: 3.1° Unc: 2.5°
Cooler Dsc: SR
Packing: Bub
Cust. Seal: Yes No
Blue Ice, Wet, Dry, None
FedEx: P6
UPS:
Lab Cour:
Other:

Note: Since laboratory accreditations are subject to change, Eurofins Calscience places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Calscience laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Calscience attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Calscience.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by: Olga Cinelas	Date/Time: 8/11/22 1700	Company: EC	Received by:	Date/Time: 8/12/22 0845 Company: EBN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-105614-1

Login Number: 105614
List Number: 1
Creator: Patel, Jayesh

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-105614-1

Login Number: 105614
List Number: 2
Creator: Holdener, Heather D

List Source: Eurofins Seattle
List Creation: 08/12/22 12:11 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	IR8 3.1/2.5
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX A-2:

2022 SAMPLING RESULTS SUMMARY TABLES AND LABORATORY ANALYTICAL REPORTS

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Table A5 - Analytical Results for Total Lead in Multi-Increment Soil Samples
Hakalau Beach Park

						Sample Identifier	DU42_0-6_202242B*			DU40_0-6_202240			DU42_0-6_202242A			DU45_0-6_202245		
						Sample Date	18-Apr-2022			19-Apr-2022			20-Apr-2022			21-Apr-2022		
						Sample Depth (inches)	0-6			0-6			0-6			0-6		
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Residential Direct-Exposure Action Levels [2]**	**Construction Worker Direct-Exposure Action Levels [3]**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**
Lead	EPA 6010B	7439-92-1	mg/kg	**200**	**200**	**800**	76.8*		0.800	131		0.800	99.0		0.800	104		0.800

Notes:

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[2] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[3] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

CASRN = Chemical Abstracts Service Registry No.

mg/kg= milligram(s) per kilogram

Q = qualifier

RL = reporting limit

* = Values listed for this decision unit represents the arithmetic mean of the replicate results.

TABLE A6 - Relative Percent Difference and Arithmetic Mean Calculations for Replicate Sample Detections - Total Lead in Multi-Increment Soil Samples
Hakalau Beach Park

Analyte	EPA Method	Sample Identification	Sample Type	Result (mg/kg)	Relative Percent		Mean (mg/kg)	Standard Deviation	Relative Standard Deviation	Comment
					Primary and Duplicate	Primary and Triplicate				
Lead	6010B	DU42_0-6_202242B (1)	Primary	82.9	4%	20%	**76.8**	8.11	11%	The data indicates that there is good precison in the replicate data set with 11% RPD. The arithmetic mean value of 76.8 mg/kg is used as the reported value within this Decision Unit.
		DU42_0-6_202242B (2)	Duplicate	79.9						
		DU42_0-6_202242B (3)	Triplicate	67.6						

Notes:
mg/kg = milligram(s) per kilogram (i.e. parts per million (ppm)).

Table A7 - Analytical Results for Total Lead in Multi-Increment Soil Samples
Hakalau Beach Park

						Sample Identifier	DU39_0-6_202239			DU41_0-6_202241			DU43_0-6_202243		
						Sample Date	11-May-2022			12-May-2022			10-May-2022		
						Sample Depth (inches)	0-6			0-6			0-6		
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Residential Direct-Exposure Action Levels [2]**	**Construction Worker Direct-Exposure Action Levels [3]**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**
Lead	EPA 6010B	7439-92-1	mg/kg	**200**	**200**	**800**	**490**		4.00	**386**		4.00	146		4.00

Notes:

490 Results shown in **bold** and highlighted yellow equal or exceed the Tier 1 Residential Direct-Exposure Action Level for lead.

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[2] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[3] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

CASRN = Chemical Abstracts Service Registry No.

mg/kg= milligram(s) per kilogram

Q = qualifier

RL = reporting limit

Table A8 - Analytical Results for Total Lead in Multi-Increment Soil Samples (continued)
Hakalau Beach Park

						Sample Identifier	DU44_0-6_202244			DU45_6-12_202245*		
						Sample Date	11-May-2022			10-May-2022		
						Sample Depth (inches)	0-6			6-12		
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Residential Direct-Exposure Action Levels [2]**	**Construction Worker Direct-Exposure Action Levels [3]**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**
Lead	EPA 6010B	7439-92-1	mg/kg	**200**	**200**	**800**	**402**		4.00	83.7*		4.00

Notes:

402 Results shown in **bold** and highlighted yellow equal or exceed the Tier 1 Residential Direct-Exposure Action Level for lead.

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[2] State of Hawaii Department of Health Tier I EALs, Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

[3] State of Hawaii Department of Health Tier I EALs, Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

CASRN = Chemical Abstracts Service Registry No.

mg/kg= milligram(s) per kilogram

Q = qualifier

RL = reporting limit

* = Values listed for this decision unit represents the arithmetic mean of the replicate results.

TABLE A9 - Relative Percent Difference and Arithmetic Mean Calculations for Replicate Sample Detections - Total Lead in Multi-Increment Soil Samples
Hakalau Beach Park

Analyte	EPA Method	Sample Identification	Sample Type	Result (mg/kg)	Relative Percent Difference		Mean (mg/kg)	Standard Deviation	Relative Standard Deviation	Comment
					Primary and Duplicate	Primary and Triplicate				
Lead	6010B	DU45_6-12_202245	Primary	72.1	25%	18%	**83.7**	10.44	12%	The data indicates that there is good precision in the replicate data set with 12% RPD. The arithmetic mean value of 83.7 mg/kg is used as the reported value within this Decision Unit.
		DU45_6-12_202245B	Duplicate	92.4						
		DU45_6-12_202245C	Triplicate	86.5						

Notes:
mg/kg = milligram(s) per kilogram (i.e. parts per million (ppm)).

Table A10 - Analytical Results for total Lead in Stream Water Samples

Hakalau Beach Park

				Sample Identifier	SW49_202249			SW50_202250			SW55_202255		
				Sample Date	11-May-2022			11-May-2022			11-May-2022		
				Sample Description	Stream water collected from all depths of the stream near DU 49			Stream water collected from all depths of the stream near DU 50			Stream water collected from all depths of the stream near DU 55		
Analyte	**Analytical Method**	**CASRN**	**Units**	**Tier 1 EAL >150m [1]**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**	**Results**	**Q**	**RL**
Total Resource Conservation and Recovery Act (RCRA) Metals													
Lead	EPA 6010B	7439-92-1	µg/l	15	ND		50	ND		50	ND		50

Notes:

[1] State of Hawaii Department of Health Tier I Environmental Action Levels (EALs), Groundwater Action Levels, Groundwater is a Current or Potential Source of Drinking Water (>150 meter to surface water body) presented in Table A of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

µg/l = microgram(s) per liter.

CASRN = Chemical Abstracts Service Registry No.

ND = Not Detected. Indicates that the analyte was not detected in concentrations above the laboratories method reporting limit.

NS = No Standard. Indicates that a State of Hawaii Department of Health and/or RCRA Waste Characterization action level for the contaminant of potential concern is not established.

Q = Data Qualifier.

RL = Reporting Limit (detection limit).

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Tel: (714)895-5494

Laboratory Job ID: 570-97597-2
Client Project/Site: Hakalau Assessment

For:
Kealamahi Pacific Consultants, LLC
111 Hekili Street
Ste. A601
Kailua, Hawaii 96734

Attn: Scott Moncrief

Authorized for release by:
7/15/2022 3:28:22 PM

Terri Chang, Project Manager I
(657)210-6295
Terri.Chang@et.eurofinsus.com

Table of Contents

Definitions/Glossary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Job ID: 570-97597-2

Laboratory: Eurofins Calscience

Narrative

Job Narrative
570-97597-2

Comments
No additional comments.

Receipt
The samples were received on 5/26/2022 10:35 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 23.6º C.

Metals
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Client Sample ID: DU39_6-12_202239 — Lab Sample ID: 570-97597-10

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	737		4.00		mg/Kg	5		6010B	Total/NA

Client Sample ID: DU41_6-12_202241 — Lab Sample ID: 570-97597-12

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	360		4.00		mg/Kg	5		6010B	Total/NA

Client Sample ID: DU44_6-12_202244 — Lab Sample ID: 570-97597-14

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	339		4.00		mg/Kg	5		6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method: 6010B - Metals (ICP)

Client Sample ID: DU39_6-12_202239
Date Collected: 05/11/22 16:00
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-10
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	737		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:40	5

Client Sample ID: DU41_6-12_202241
Date Collected: 05/12/22 09:40
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-12
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	360		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:43	5

Client Sample ID: DU44_6-12_202244
Date Collected: 05/11/22 13:00
Date Received: 05/26/22 10:35

Lab Sample ID: 570-97597-14
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	339		4.00		mg/Kg		07/13/22 19:45	07/14/22 14:45	5

QC Sample Results

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 570-248997/1-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 248997

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.812		mg/Kg		07/13/22 19:45	07/14/22 13:57	1

Lab Sample ID: LCS 570-248997/2-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 248997

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			51.0	53.16		mg/Kg		104	80 - 120		

Lab Sample ID: LCSD 570-248997/3-A
Matrix: Solid
Analysis Batch: 249306

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 248997

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			50.8	51.88		mg/Kg		102	80 - 120	2	20

QC Association Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Metals

ISM Prep Batch: 246211

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	Increment, Prep	
570-97597-12	DU41_6-12_202241	Total/NA	Solid	Increment, Prep	
570-97597-14	DU44_6-12_202244	Total/NA	Solid	Increment, Prep	

Prep Batch: 248997

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	3050B	246211
570-97597-12	DU41_6-12_202241	Total/NA	Solid	3050B	246211
570-97597-14	DU44_6-12_202244	Total/NA	Solid	3050B	246211
MB 570-248997/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-248997/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-248997/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Analysis Batch: 249306

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-97597-10	DU39_6-12_202239	Total/NA	Solid	6010B	248997
570-97597-12	DU41_6-12_202241	Total/NA	Solid	6010B	248997
570-97597-14	DU44_6-12_202244	Total/NA	Solid	6010B	248997
MB 570-248997/1-A	Method Blank	Total/NA	Solid	6010B	248997
LCS 570-248997/2-A	Lab Control Sample	Total/NA	Solid	6010B	248997
LCSD 570-248997/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	248997

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Client Sample ID: DU39_6-12_202239

Lab Sample ID: 570-97597-10

Date Collected: 05/11/22 16:00
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:40	K1UV	ECL 4
	Instrument ID: ICP10									

Client Sample ID: DU41_6-12_202241

Lab Sample ID: 570-97597-12

Date Collected: 05/12/22 09:40
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:43	K1UV	ECL 4
	Instrument ID: ICP10									

Client Sample ID: DU44_6-12_202244

Lab Sample ID: 570-97597-14

Date Collected: 05/11/22 13:00
Matrix: Solid
Date Received: 05/26/22 10:35

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	ISM Prep	Increment, Prep					246211	06/30/22 11:19	KZX6	ECL 4
Total/NA	Prep	3050B			10 g	500 mL	248997	07/13/22 19:45	CS5Z	ECL 4
Total/NA	Analysis	6010B		5			249306	07/14/22 14:45	K1UV	ECL 4
	Instrument ID: ICP10									

Laboratory References:

ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

Accreditation/Certification Summary

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-97597-2
Project/Site: Hakalau Assessment

Laboratory: Eurofins Calscience

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4175	01-31-23

Method Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	ECL 4
3050B	Preparation, Metals	SW846	ECL 4
Increment, Prep	ISM - Dry, Disaggregate, Sieve, Split,	EPA	ECL 4

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

Sample Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Assessment

Job ID: 570-97597-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
570-97597-10	DU39_6-12_202239	Solid	05/11/22 16:00	05/26/22 10:35
570-97597-12	DU41_6-12_202241	Solid	05/12/22 09:40	05/26/22 10:35
570-97597-14	DU44_6-12_202244	Solid	05/11/22 13:00	05/26/22 10:35

97597

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570-97597 Chain of Custody

CHAIN OF CUSTODY RECORD

DATE: 05/12/22

PAGE: 1 OF 2

7440 Lincoln Way Garden Grove CA 92841-1427 • (714) 895-5494
For courier service / sample drop off information contact us26_sales@eurofinsus com or call us

LABORATORY CLIENT: Kealamahi Pacific Consultants, LLC	CLIENT PROJECT NAME / NUMBER: Hakalau Assessment
ADDRESS: 103 South Kalaheo Ave	PROJECT CONTACT:
CITY: Kailua STATE: HI ZIP: 96734-293	SAMPLER(S) (PRINT): KP, KC, EW, SM
TEL: 808-208-8616 E-MAIL: scottmoncrief808@gmail com	P O NO:

TURNAROUND TIME (Rush surcharges may apply to any TAT not 'STANDARD")

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS X STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS

Please hold DU43_6-12_202243, DU39_6-12_202239, DU41_6-12_202241, DU44_6-12_202244

REQUESTED ANALYSES

Please check box or fill in blank as needed

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH ____	BTEX / MTBE ☐ 8260 ☐ ____	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218 6	LEAD			
	DU45_6-12_202245	5/10/2022	1030AM	SOIL	1	X																	X			
	DU45_6-12_202245B	5/10/2022	2PM	SOIL	1	X																	X			
	DU45_6-12_202245C	5/10/2022	2PM	SOIL	1	X																	X			
	DU43_0-6_202243	5/10/2022	1145AM	SOIL	1	X																	X			
	DU43_6-12_202243	5/10/2022	1145AM	SOIL	1	X																	X			
	SW49_202249	5/11/2022	10AM	WATER	1	X																	X			
	SW50_202250	5/11/2022	1040AM	WATER	1	X																	X			
	SW55_202255	5/11/2022	1105AM	WATER	1	X																	X			
	DU39_0-6_202239	5/11/2022	4PM	SOIL	1	X																	X			
	DU39_6-12_202239	5/11/2022	4PM	SOIL	1	X																	X			

Relinquished by: (Signature) KATIE PAGE	Received by: (Signature/Affiliation)	Date:	Time.
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date	Time.
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date	Time.

06/02/14 Revision

7/15/2022

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ca suite 4

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WO # / LAB USE ONLY

CHAIN OF CUSTC

DATE: 05/12/2

PAGE: 2 OF

LABORATORY CLIENT: Kealamahi Pacific Consultants, LLC	CLIENT PROJECT NAME / NUMBER: Hakalau Assessment
ADDRESS: 103 South Kalaheo Ave	PROJECT CONTACT:
CITY: Kailua	STATE: HI ZIP: 96734-293
TEL.: 808-208-8616	E-MAIL.: scottmoncrief808@gmail com
P O NO	
SAMPLER(S): (PRINT KP, KC, EW, SI	

REQUESTED ANALYSES

TURNAROUND TIME (Rush surcharges may apply to any TAT not 'STANDARD")

☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS X STANDARD

☐ COELT EDF | GLOBAL ID: | LOG CODE:

SPECIAL INSTRUCTIONS.

SEE PAGE 1

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO OF CONT.	Unpreserved	Preserved	Field Filtered	☐ TPH(g) ☐ GRO	☐ TPH(d) ☐ DRO	TPH ☐ C6-C36 ☐ C6-C44	TPH	BTEX / MTBE ☐ 8260 ☐	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Co	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☐ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/7	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218 6
	DU41_0-6_202241	5/12/2022	0940AM	SOIL	1	X																
	DU41_6-12_202241	5/12/2022	0940AM	SOIL	1	X																
	DU44_0-6_202244	5/11/2022	1PM	SOIL	1	X																
	DU44_6-12_202244	5/11/2022	1PM	SOIL	1	X																

Relinquished by: (Signature) KATIE PAGE	Received by: (Signature/Affiliation)	Date
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:

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CHAIN OF CUSTODY RECORD

DATE 5/12/2022

PAGE 1 OF 2

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7440 Opportunity Way Garden Grove CA 92841-1427 714) 895-5494
For courier service / sample drop off information contact us2b_sales@eurofinsus.com or call us

COMPANY	Kealamai Pacific Consultants LLC	PROJECT NAME / JOB #	Hakalau Assessment
PO			
ADDRESS	103 South Kalaheo Ave	CONTACT	S Moncrie
SAMPLERS (PRINT)	KP, JC, EW, SM		
CITY	Kailua	STATE HI	ZIP 96734 2833
PHONE	c 208 86 6	EMAIL	scot r e 808@gmail co

STANDARD ☑ | ☐ DELIVERABLE EDF | GLOBAL | LOG CODE

REQUESTED ANALYSES

Please check or blank as needed

Please hold
- DV54_Sediment_202254
- DV45_6-12_202245
- DV45_6-12_202245B
- DV45_6-12_202245C
- DV43_6-12_202243
- DV39_6-12_202239

SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Filtered	Preserved	Field Filtered	TPH-DRO/MRO	BTEX / MTBE ☐ 8260 ☐	Oxygenates (8260)	SVOCs (8270)	PAH ☐ 8270 ☐ 8270 SIM	Lead
DV51_Sediment_202251	05/09/22	3PM	Sediment	1									✓
DV54_Sediment_202254	05/12/22	9 AM	Sediment	1									✓
DV45_6-12_202245	05/10/22	~~10 AM~~ 10:30am	Soil	1									✓
DV45_6-12_202245B	05/10/22	2 PM	Soil	1									✓
DV45-6-12_202245C	05/10/22	2PM	Soil	1									✓
DV43_0-6_202243	05/10/22	~~12:45~~ 11:45	Soil	1									✓
DV43_6-12_202243	05/10/22	~~12PM~~ 11:45	Soil	1									✓
SW49_202249	05/11/22	10AM	Water	1									✓
SW50_202250	05/11/22	10 40AM	Water	1									✓
SW55_202255	05/11/22	11:05AM	Water	1									✓

Relinquished by Signature	Received by Signature Affiliation	Date	Time
Relinquished by Signature	Received by Signature Affiliation	Date	Time
Relinquished by Signature	Received by Signature Affiliation	Date 5/12/22	Time 10:35

*Invoice to 22-9/23.6

Page 15 of 18

7/15/2022

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CHAIN OF CUSTODY RECORD

DATE 5/12/2022
PAGE 2 OF 2

LAB USE ONLY

7440 Lincoln Way Garden Grove CA 92841 1427 (714) 895 5494
For courier service sample drop off information contact us26_s@eurofinsus.com or call

LABORATORY CLIENT	Kealamau Pacific Consultants LLC
ADDRESS	103 South Kalaheo Ave
CITY / STATE / ZIP	Kailua, HI 96734 293
TEL / EMAIL	808 208-8616 / scotfin e 808@gmail.c
TURNAROUND TIME	☑ STANDARD
	☐ COELT EDF
GLOBAL ID	
LOG CODE	
SPECIAL INSTRUCTIONS	
PROJECT NAME / NUMBER	Hakalau Assessment
PROJECT CONTACT	Scott Moncrief
P.O. NO.	
SAMPLER(S) (PRINT)	KP, KC, EW, SM

REQUESTED ANALYSES

Please check box or fill in blank as needed

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	Lead
	DU39_0-6_202239	05/11/22	4PM	Soil	1	✓			✓
	DU39_6-12_202239	05/11/22	4PM	Soil	1	✓			✓
	DU41_0-6_202241	05/12/22	9:40AM	Soil	1	✓			✓
	DU41_6-12_202241	05/12/22	9:40AM	Soil	1	✓			✓
	DU44_0-6_202244	5/11/22	1:00 pm	Soil	1				
	DU44_6-12_202244	5/11/22	1:00 pm	Soil	1				

Other analysis columns printed (not marked): TPH(g) ☐ DRO; TPH ☐ C6-C36 ☐ C6-C44; TPH DRO/MRO; BTEX / MTBE ☐ 8260 ☐; VOCs; Oxygenates (8260); En Core ☐ Terra Core; SVOCs (8270); PAHs ☐ 8270 ☐ 8270 SIM; T22 Metals ☐ 6010/747X ☐ 6020/747X; Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6

Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
[signature]			
Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
Relinquished by (Signature)	Received by (Signature/Affiliation)	Date	Time
	[signature]	5/26/22	10:30

USDA United States Department of Agriculture

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection & Quarantine
4700 River Road
Riverdale, MD 20737

Permit to Receive Soil
Regulated by 7 CFR 330

This permit was generated electronically via the cPermits system

PERMITTEE NAME	Terri Garcia	PERMIT NUMBER	P330-20-00034
COMPANY	Eurofins Cebstence, LLC	APPLICATION NUMBER	PRQS-191121001
RECEIVING ADDRESS	7440 Lincoln Way Garden Grove, CA 92841	DATE ISSUED	02-10-2020
MAILING ADDRESS	7440 Lincoln Way Garden Grove, CA 92841		
PHONE	(714) 895-5494		
FAX		EXPIRES	02/10/2023

PORTS OF ARRIVAL/PLANT INSPECTION STATIONS: AK Anchorage, AL Huntsville, AL Mobile, AZ Douglas, AZ Lukeville, AZ Nogales, AZ Phoenix, AZ Santa Cruz, AZ Tucson, CA Calexico, CA El Segundo, CA Fresno, CA Long Beach, CA Oakland, CA Ontario, CA Otay Mesa, CA Port Hueneme, CA Sacramento, CA San Diego, CA San Jose, CA San Ysidro, CA Scattered Ports, CA Terminal, CO Denver, CT Hartford, CT New Haven, DE Dover, DE Wilmington, FL Fort Lauderdale, FL Fort Myers, FL Miami, FL Pierce, FL Jacksonville, FL Key West, FL Miami, FL Miami (Cargo DHL, FedEx, UPS, etc.), FL Orlando, FL Pensacola, FL Port Canaveral, FL Port Everglades, FL Sanford, FL Tampa, FL West Palm Beach, GA Atlanta, GA Savannah, GU Agana, HI Hilo, HI Honolulu, HI Kahului, HI Kailua-Kona, HI Lihue, ID Eastport, IL Chicago, IN Indianapolis, KY Louisville, MA South Boston, MD Baltimore, MD Beltsville, ME Bangor, MI Detroit, MI Houlton, ME Portland, MI Detroit, MI Port Huron, MI Romulus, MI Sault Saint Marie, MN Duluth, MN Grand Portage, MN International Falls, MN Minneapolis, MO Kansas City, MO St Louis, MP Commonwealth of the Northern Mariana Islands, MS Gulfport, MS Port Bienville, NC Fayetteville, NC Roosville, NC Sweetgrass, NC Raleigh, NC Wilmington, ND Dunseith, ND Fortuna, ND Portal, NJ Trenton, NM Albuquerque, NM Columbus, NM Santa Teresa, NV Las Vegas, NY Albany, NY Alexandria Bay, NY Brooklyn, NY Buffalo, NY Champlain, NY Rouses Point, NY Jamaica, NY Newburgh, OH Ashtabula, OH Cincinnati, OH Cleveland, OH Columbus, OH Toledo, OH Wilmington, OK Oklahoma City, OR Portland, PA Allentown, PA Harrisburg, PA Philadelphia, PA Pittsburgh, PA Scranton, PR Aguadilla, PR Carolina, PR Fajardo, PR Mayaguez, PR Ponce, RI Warwick/Providence, SC Charleston, TN Memphis, TN Nashville, TX Austin, TX Brownsville, TX Corpus Christi, TX Dallas, TX Del Rio, TX Eagle Pass, TX El Paso, TX Fabens, TX Falcon, TX Fort Hancock, TX Freeport, TX Galveston, TX Hidalgo, TX Humble, TX Laredo, TX Los Indios, TX Pharr, TX Port Arthur, TX Presidio, TX Progresso, TX Rio Grande City, TX Roma, TX San Antonio, TX Victoria, UT Salt Lake City, VA Dulles, VI Norfolk, VI St Croix, VI St Thomas, VT Berlin, WA Blaine, WA Oroville, WA Port Angeles, WA Seattle, WA Sumas, WI Green Bay, WI Milwaukee

HAND CARRY: No

Under the conditions specified, this permit authorizes the following:

Quantity of Soil per Shipment and Treatment

Sterilization will interfere with intended use. Your facility MUST be inspected and approved to receive this soil

SPECIAL INSTRUCTIONS TO INSPECTORS

See permit conditions below

P330-20-00034

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS Gibbs Smith	DATE 02/10/2020

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-97597-2

Login Number: 97597
List Number: 1
Creator: Chang, Terri

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received extra samples not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Tel: (714)895-5494

Laboratory Job ID: 570-105614-1
Client Project/Site: Hakalau Lead Assessment

For:
Kealamahi Pacific Consultants, LLC
111 Hekili Street
Ste. A601
Kailua, Hawaii 96734

Attn: Scott Moncrief

Authorized for release by:
8/19/2022 12:44:30 PM
Lori Thompson, Project Manager I
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Table of Contents

Definitions/Glossary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
H3	Sample was received and analyzed past holding time.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 570-105614-1

Laboratory: Eurofins Calscience

Narrative

Job Narrative
570-105614-1

Comments
No additional comments.

Receipt
The samples were received on 8/5/2022 9:40 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 0.9º C and 1.2º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method Moisture - 2540: The following samples were received outside of holding time: HAKA_BT_A (570-105614-1), HAKA_BT_AZ (570-105614-2), HAKA_BT_B (570-105614-3), HAKA_BT_C (570-105614-4), HAKA_BT_D (570-105614-5) and HAKA_BT_E (570-105614-6).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_A — Lab Sample ID: 570-105614-1

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	10900		8.00		mg/Kg	10		6010B	Total/NA
Lead	25.6		0.500		mg/L	1		6010B	TCLP
Lead	4.32		0.0300		mg/L	1		6010B	SPLP West

Client Sample ID: HAKA_BT_AZ — Lab Sample ID: 570-105614-2

Analyte	Result	Qualifier	RL		Unit	Dil Fac	D	Method	Prep Type
Lead	11400		8.00		mg/Kg	10		6010B	Total/NA
Lead	22.9		0.500		mg/L	1		6010B	TCLP

Client Sample ID: HAKA_BT_B — Lab Sample ID: 570-105614-3

No Detections.

Client Sample ID: HAKA_BT_C — Lab Sample ID: 570-105614-4

No Detections.

Client Sample ID: HAKA_BT_D — Lab Sample ID: 570-105614-5

No Detections.

Client Sample ID: HAKA_BT_E — Lab Sample ID: 570-105614-6

No Detections.

Client Sample ID: HAKA_BTPC_A — Lab Sample ID: 570-105614-7

No Detections.

Client Sample ID: HAKA_BTPC_B — Lab Sample ID: 570-105614-8

No Detections.

Client Sample ID: HAKA_BTPC_C — Lab Sample ID: 570-105614-9

No Detections.

Client Sample ID: HAKA_BTPC_D — Lab Sample ID: 570-105614-10

No Detections.

Client Sample ID: HAKA_BTPC_E — Lab Sample ID: 570-105614-11

No Detections.

This Detection Summary does not include radiochemical test results.

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP)

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	10900		8.00		mg/Kg		08/11/22 12:59	08/15/22 16:37	10

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	11400		8.00		mg/Kg		08/11/22 12:59	08/15/22 16:40	10

Method: 6010B - Metals (ICP) - TCLP

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	**25.6**		0.500		mg/L		08/09/22 20:18	08/10/22 14:26	1

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	**22.9**		0.500		mg/L		08/09/22 20:18	08/10/22 14:28	1

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-3
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:31	1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-4
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:33	1

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-5
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:36	1

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-6
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:38	1

Client Sample ID: HAKA_BTPC_A
Date Collected: 07/28/22 15:25
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-7
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:40	1

Client Sample ID: HAKA_BTPC_B
Date Collected: 07/28/22 15:30
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-8
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:43	1

Client Sample ID: HAKA_BTPC_C
Date Collected: 07/28/22 15:35
Date Received: 08/05/22 09:40
Lab Sample ID: 570-105614-9
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:45	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP) - TCLP

Client Sample ID: HAKA_BTPC_D
Date Collected: 07/28/22 15:40
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-10
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:48	1

Client Sample ID: HAKA_BTPC_E
Date Collected: 07/28/22 15:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-11
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 14:55	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP) - SPLP West

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	4.32		0.0300		mg/L		08/17/22 20:17	08/18/22 14:53	1

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

General Chemistry

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22.0	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	28.2	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-3
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	34.1	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-4
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	28.3	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-5
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	27.6	H H3	0.100		%			08/09/22 16:00	1

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-6
Matrix: Solid

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	25.0	H H3	0.100		%			08/09/22 16:00	1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 570-256107/1-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 256107

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.821		mg/Kg		08/11/22 12:59	08/15/22 12:42	1

Lab Sample ID: LCS 570-256107/2-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 256107

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			49.5	47.79		mg/Kg		97	80 - 120		

Lab Sample ID: LCSD 570-256107/3-A
Matrix: Solid
Analysis Batch: 256849

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 256107

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			50.5	50.96		mg/Kg		101	80 - 120	6	20

Lab Sample ID: LB 570-255340/1-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 255638

Analyte	LB Result	LB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500		mg/L		08/09/22 20:18	08/10/22 13:57	1

Lab Sample ID: LCS 570-255340/2-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 255638

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			2.00	2.255		mg/L		113	80 - 120		

Lab Sample ID: LCSD 570-255340/3-B
Matrix: Solid
Analysis Batch: 255866

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 255638

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			2.00	2.010		mg/L		101	80 - 120	11	20

Lab Sample ID: MB 580-400071/21-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Method Blank
Prep Type: SPLP West
Prep Batch: 400945

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0300		mg/L		08/17/22 20:17	08/18/22 13:12	1

Lab Sample ID: LCS 580-400071/22-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Lab Control Sample
Prep Type: SPLP West
Prep Batch: 400945

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Lead			1.00	1.035		mg/L		104	80 - 120		

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method: 6010B - Metals (ICP)

Lab Sample ID: LCSD 580-400071/23-B
Matrix: Solid
Analysis Batch: 401081

Client Sample ID: Lab Control Sample Dup
Prep Type: SPLP West
Prep Batch: 400945

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Lead			1.00	1.051		mg/L		105	80 - 120	2	20

Metals

Leach Batch: 255340

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	1311	
570-105614-2	HAKA_BT_AZ	TCLP	Solid	1311	
570-105614-3	HAKA_BT_B	TCLP	Solid	1311	
570-105614-4	HAKA_BT_C	TCLP	Solid	1311	
570-105614-5	HAKA_BT_D	TCLP	Solid	1311	
570-105614-6	HAKA_BT_E	TCLP	Solid	1311	
570-105614-7	HAKA_BTPC_A	TCLP	Solid	1311	
570-105614-8	HAKA_BTPC_B	TCLP	Solid	1311	
570-105614-9	HAKA_BTPC_C	TCLP	Solid	1311	
570-105614-10	HAKA_BTPC_D	TCLP	Solid	1311	
570-105614-11	HAKA_BTPC_E	TCLP	Solid	1311	
LB 570-255340/1-B	Method Blank	TCLP	Solid	1311	
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	1311	
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	1311	

Prep Batch: 255638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	3010A	255340
570-105614-2	HAKA_BT_AZ	TCLP	Solid	3010A	255340
570-105614-3	HAKA_BT_B	TCLP	Solid	3010A	255340
570-105614-4	HAKA_BT_C	TCLP	Solid	3010A	255340
570-105614-5	HAKA_BT_D	TCLP	Solid	3010A	255340
570-105614-6	HAKA_BT_E	TCLP	Solid	3010A	255340
570-105614-7	HAKA_BTPC_A	TCLP	Solid	3010A	255340
570-105614-8	HAKA_BTPC_B	TCLP	Solid	3010A	255340
570-105614-9	HAKA_BTPC_C	TCLP	Solid	3010A	255340
570-105614-10	HAKA_BTPC_D	TCLP	Solid	3010A	255340
570-105614-11	HAKA_BTPC_E	TCLP	Solid	3010A	255340
LB 570-255340/1-B	Method Blank	TCLP	Solid	3010A	255340
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	3010A	255340
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	3010A	255340

Analysis Batch: 255866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	TCLP	Solid	6010B	255638
570-105614-2	HAKA_BT_AZ	TCLP	Solid	6010B	255638
570-105614-3	HAKA_BT_B	TCLP	Solid	6010B	255638
570-105614-4	HAKA_BT_C	TCLP	Solid	6010B	255638
570-105614-5	HAKA_BT_D	TCLP	Solid	6010B	255638
570-105614-6	HAKA_BT_E	TCLP	Solid	6010B	255638
570-105614-7	HAKA_BTPC_A	TCLP	Solid	6010B	255638
570-105614-8	HAKA_BTPC_B	TCLP	Solid	6010B	255638
570-105614-9	HAKA_BTPC_C	TCLP	Solid	6010B	255638
570-105614-10	HAKA_BTPC_D	TCLP	Solid	6010B	255638
570-105614-11	HAKA_BTPC_E	TCLP	Solid	6010B	255638
LB 570-255340/1-B	Method Blank	TCLP	Solid	6010B	255638
LCS 570-255340/2-B	Lab Control Sample	TCLP	Solid	6010B	255638
LCSD 570-255340/3-B	Lab Control Sample Dup	TCLP	Solid	6010B	255638

Metals

ISM Prep Batch: 255881

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Increment, Prep	
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Increment, Prep	

Prep Batch: 256107

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	3050B	255881
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	3050B	255881
MB 570-256107/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 570-256107/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-256107/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	

Analysis Batch: 256849

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	6010B	256107
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	6010B	256107
MB 570-256107/1-A	Method Blank	Total/NA	Solid	6010B	256107
LCS 570-256107/2-A	Lab Control Sample	Total/NA	Solid	6010B	256107
LCSD 570-256107/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	256107

Leach Batch: 400071

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	1312	
MB 580-400071/21-B	Method Blank	SPLP West	Solid	1312	
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	1312	
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	1312	

Prep Batch: 400945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	3010A	400071
MB 580-400071/21-B	Method Blank	SPLP West	Solid	3010A	400071
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	3010A	400071
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	3010A	400071

Analysis Batch: 401081

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	SPLP West	Solid	6010B	400945
MB 580-400071/21-B	Method Blank	SPLP West	Solid	6010B	400945
LCS 580-400071/22-B	Lab Control Sample	SPLP West	Solid	6010B	400945
LCSD 580-400071/23-B	Lab Control Sample Dup	SPLP West	Solid	6010B	400945

General Chemistry

Analysis Batch: 255207

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Moisture - 2540	255507
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Moisture - 2540	255507
570-105614-3	HAKA_BT_B	Total/NA	Solid	Moisture - 2540	255507
570-105614-4	HAKA_BT_C	Total/NA	Solid	Moisture - 2540	255507
570-105614-5	HAKA_BT_D	Total/NA	Solid	Moisture - 2540	255507
570-105614-6	HAKA_BT_E	Total/NA	Solid	Moisture - 2540	255507

QC Association Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

General Chemistry

ISM Prep Batch: 255507

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-105614-1	HAKA_BT_A	Total/NA	Solid	Increment,Prep	
570-105614-2	HAKA_BT_AZ	Total/NA	Solid	Increment,Prep	
570-105614-3	HAKA_BT_B	Total/NA	Solid	Increment,Prep	
570-105614-4	HAKA_BT_C	Total/NA	Solid	Increment,Prep	
570-105614-5	HAKA_BT_D	Total/NA	Solid	Increment,Prep	
570-105614-6	HAKA_BT_E	Total/NA	Solid	Increment,Prep	

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_A
Date Collected: 07/28/22 13:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
SPLP West	Leach	1312			1.0 g	1.0 mL	400071	08/10/22 14:13	JLS	EET SEA
SPLP West	Prep	3010A			50 mL	50 mL	400945	08/17/22 20:17	JLS	EET SEA
SPLP West	Analysis	6010B		1			401081	08/18/22 14:53	TMH	EET SEA
	Instrument ID: TAC047									
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:26	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment, Prep					255881	08/10/22 15:19	KZX6	EET CAL 4
Total/NA	Prep	3050B			10 g	500 mL	256107	08/11/22 12:59	CS5Z	EET CAL 4
Total/NA	Analysis	6010B		10			256849	08/15/22 16:37	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_AZ
Date Collected: 07/28/22 13:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:28	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment, Prep					255881	08/10/22 15:19	KZX6	EET CAL 4
Total/NA	Prep	3050B			10 g	500 mL	256107	08/11/22 12:59	CS5Z	EET CAL 4
Total/NA	Analysis	6010B		10			256849	08/15/22 16:40	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_B
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			255866	08/10/22 14:31	VZ0K	EET CAL 4
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL 4
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL 4
	Instrument ID: BAL62									

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BT_C
Date Collected: 07/28/22 13:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.01 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:33	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_D
Date Collected: 07/28/22 13:50
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-5
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:36	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BT_E
Date Collected: 07/28/22 13:55
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.02 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:38	VZ0K	EET CAL
	Instrument ID: ICP10									
Total/NA	ISM Prep	Increment,Prep					255507	08/09/22 13:30	KZX6	EET CAL
Total/NA	Analysis	Moisture - 2540		1			255207	08/09/22 16:00	B4QL	EET CAL
	Instrument ID: BAL62									

Client Sample ID: HAKA_BTPC_A
Date Collected: 07/28/22 15:25
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:40	VZ0K	EET CAL
	Instrument ID: ICP10									

Lab Chronicle

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Client Sample ID: HAKA_BTPC_B
Date Collected: 07/28/22 15:30
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.06 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:43	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_C
Date Collected: 07/28/22 15:35
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-9
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.06 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:45	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_D
Date Collected: 07/28/22 15:40
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-10
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.03 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:48	VZ0K	EET CAL
	Instrument ID: ICP10									

Client Sample ID: HAKA_BTPC_E
Date Collected: 07/28/22 15:45
Date Received: 08/05/22 09:40

Lab Sample ID: 570-105614-11
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.05 g	2000 mL	255340	08/08/22 23:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	255638	08/09/22 20:18	ECX6	EET CAL
TCLP	Analysis	6010B		1			255866	08/10/22 14:55	VZ0K	EET CAL
	Instrument ID: ICP10									

[1] Completion dates and times are reported or not reported per method requirements or individual lab discretion.

Laboratory References:

EET CAL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Kealamahi Pacific Consultants, LLC
Job ID: 570-105614-1
Project/Site: Hakalau Lead Assessment

Laboratory: Eurofins Calscience

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4175	02-02-23

Laboratory: Eurofins Seattle

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Oregon	NELAP	4167	07-08-23

Method Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAL 4
6010B	Metals (ICP)	SW846	EET SEA
Moisture - 2540	Percent Moisture	SM	EET CAL 4
1311	TCLP Extraction	SW846	EET CAL 4
1312	SPLP Extraction	SW846	EET SEA
3010A	Preparation, Total Metals	SW846	EET CAL 4
3010A	Preparation, Total Metals	SW846	EET SEA
3050B	Preparation, Metals	SW846	EET CAL 4
Increment, Prep	ISM - Dry, Disaggregate, Sieve, Split,	EPA	EET CAL 4
Increment,Prep	ISM - As Received, Disaggregate, Split	EPA	EET CAL 4

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CAL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Sample Summary

Client: Kealamahi Pacific Consultants, LLC
Project/Site: Hakalau Lead Assessment

Job ID: 570-105614-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
570-105614-1	HAKA_BT_A	Solid	07/28/22 13:30	08/05/22 09:40
570-105614-2	HAKA_BT_AZ	Solid	07/28/22 13:35	08/05/22 09:40
570-105614-3	HAKA_BT_B	Solid	07/28/22 13:45	08/05/22 09:40
570-105614-4	HAKA_BT_C	Solid	07/28/22 13:45	08/05/22 09:40
570-105614-5	HAKA_BT_D	Solid	07/28/22 13:50	08/05/22 09:40
570-105614-6	HAKA_BT_E	Solid	07/28/22 13:55	08/05/22 09:40
570-105614-7	HAKA_BTPC_A	Solid	07/28/22 15:25	08/05/22 09:40
570-105614-8	HAKA_BTPC_B	Solid	07/28/22 15:30	08/05/22 09:40
570-105614-9	HAKA_BTPC_C	Solid	07/28/22 15:35	08/05/22 09:40
570-105614-10	HAKA_BTPC_D	Solid	07/28/22 15:40	08/05/22 09:40
570-105614-11	HAKA_BTPC_E	Solid	07/28/22 15:45	08/05/22 09:40

105614

Eurofins Calscience Irvine
2841 Dow Ave., Suite 100
Tustin CA 92780
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

eurofins | Calscience

Client Information	Sampler: Scott Moncrief	Lab PM: Terri Chang	Carrier Tracking No(s):	COC No: 440-179973-32609 1
Client Contact: Scott Moncrief	Phone: 808 286 0222	E-Mail: scottmoncrief808@gmail.com		Page: Page 1 of 1
Company: Kealamahi Pacific Consultants, LLC				Job #:
Address: 111 Hekili St, St A601	Due Date Requested:			
City: Kailua	TAT Requested (days): Normal			
State, Zip: Hawaii 96734				
Phone: 808 286 0222	PO #:			
Email: scottmoncrief808@gmail.com	WO #:			
Project Name: Hakalau Lead Assessment	Project #:			
Site: Hakalau Beach Park	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL; M - Hexane
B - NaOH; N - None

570-105614 Chain of Custody

Other:

#	Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	[illegible]	[illegible]	TCLP	[illegible]	SPLP Pb	Total Number of containers	Special Instructions/Note:
				Preservation Code:		X	X						X	
1	HAKA_BT_A								X	X		X		
2	HAKA_BT_A2								X	X		X		
3	HAKA_BT_B									X	X			
4	HAKA_BT_C													
5	HAKA_BT_D													
6	HAKA_BT_E													
7	HAKA_BTPC_A		1520											
8	HAKA_BTPC_B													
9	HAKA_BTPC_C													
10	HAKA_BTPC_D		1 40											
	HAKA_BTPC_E		1545							X				

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested I, II III IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by	Date	Time	Method of Shipment

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Scott Moncrief			[signature]	8/5/22 0940	EC

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks: 36/09 0-9/12 IR SC11

Ver: 01/16/2019

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin CA 92780
Phone 714-895-5494

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler	Lab PM: Chang, Terri	Carrier Tracking No(s)	COC No: 570-182827 1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Terri Chang@et.eurofinsus.com	State of Origin: Hawaii	Page: Page 1 of 1
Company: Eurofins Environment Testing Northwest,		Accreditations Required (See note): NELAP - Oregon, State - Hawaii		Job #: 570-105614-1
Address: 5755 8th Street East,	Due Date Requested: 8/17/2022			
City: Tacoma	TAT Requested (days):			
State Zip: WA, 98424				
Phone: 253-922-2310(Tel)	PO #:			
Email:	WO #:			
Project Name: Hakalau Lead Assessment	Project #: 57002418			
Site:	SSOW#:			

Analysis Requested

Preservation Codes.

A HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y Trizma, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010B/1312_W_M SPLP Lead	Total Number of containers	Special Instructions/Note.
			Preservation Code:						
HAKA_BT_A (570-105614-1)	7/28/22	13 30 Hawaiian		Solid			X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Calscience places the ownership of method analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Calscience laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Calscience attention immediately If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Calscience.

Possible Hazard Identification	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)***
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested I II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date.	Time:	Method of Shipment:

Relinquished by: Olga Cinelas	Date/Time: 8/11/22 17cc	Company: EC	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks.

Ver: 06/08/2021

8/19/2022

105614


ORIGIN ID:H NLA (808) 286-0222
SCOTT MONCR IEF
ENVIROQUES KAHA ST., #21
98-029 HEK
AIEA, HI 96701
UNITED S TATES US

SHIP DATE: 04AUG22
ACTWGT: 14.95 LB
CAD: 6994244/SSFE2321
DIMS: 13x8x13 IN
BILL THIRD PARTY

TO EUR OFINS CALSCIENCE IRVINE
284 1 DOW AVE., STE.100
TU TIN CA 92780
(949) 261 -1022 REF: KOLEKOLE
INV:
PO: DEPT:

FedEx Express

1 of 2
TRK# 0201 2764 1100 4107
MASTER
FRI - 05 AUG 4:30P
STANDARD OVERNIGHT

WZ DTHA
92780
CA-US SNA

Part # 156287-436 RRDB EXP 01/23


570-105614 Waybill

ORIGIN
SCOTT ML
ENVIROQUES!
98-029 HEKAHA ST., #21
AIEA, HI 96701
UNITED STATES US

AUG22
LB
CAD: 6994244/SSFE2321
DIMS: 13x8x13 IN
BILL THIRD PARTY

TO EUROFINS CALSCIENCE IRVINE
2841 DOW AVE., STE.100
TUSTIN CA 92780
(949) 261-1022 REF: KOLEKOLE
INV:
PO: DEPT:

FedEx Express

2 of 2
MPS# 0263 2764 1100 4118
Mstr# 2764 1100 4107 0201
FRI - 05 AUG 4:30P
STANDARD OVERNIGHT

WZ DTHA
92780
CA-US SNA

Part # 156287-436 RRDB EXP 01/23

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Phone: 714-895-5494

Chain of Custody Record

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Chang, Terri	Carrier Tracking No(s):	COC No: 570-182827.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Terri.Chang@et.eurofinsus.com	State of Origin: Hawaii	Page: Page 1 of 1
Company: Eurofins Environment Testing Northwest,		Accreditations Required (See note): NELAP - Oregon; State - Hawaii		Job #: 570-105614-1
Address: 5755 8th Street East, ,	Due Date Requested: 8/17/2022			
City: Tacoma	TAT Requested (days):			
State, Zip: WA, 98424				
Phone: 253-922-2310(Tel)	PO #:			
Email:	WO #:			
Project Name: Hakalau Lead Assessment	Project #: 57002418			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010B/1312_W_M SPLP Lead	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
HAKA_BT_A (570-105614-1)	7/28/22	13:30 Hawaiian		Solid			X	1	

Therm. ID: IR8 Cor: 3.1° Unc: 2.5°
Cooler Dsc: SR
Packing: Bub
Cust. Seal: Yes No
Blue Ice, Wet, Dry, None
FedEx: P6
UPS:
Lab Cour:
Other:

Note: Since laboratory accreditations are subject to change, Eurofins Calscience places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Calscience laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Calscience attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Calscience.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by: Olga Cinelas	Date/Time: 8/11/22 1700	Company: EC	Received by:	Date/Time: 8/12/22 0845 Company: EBN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-105614-1

Login Number: 105614
List Number: 1
Creator: Patel, Jayesh

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Kealamahi Pacific Consultants, LLC

Job Number: 570-105614-1

Login Number: 105614
List Number: 2
Creator: Holdener, Heather D

List Source: Eurofins Seattle
List Creation: 08/12/22 12:11 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	IR8 3.1/2.5
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX B:

Synthetic Precipitation Leaching Procedure

Batch Test Leaching Method Results

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Batch Test Leaching Model

Version: Fall 2017Hawai'i Department of Health

Hazard Evaluation and Emergency Response Office

-Refer to accompanying technical memorandum for background and use of this spreadsheet (HDOH 2017).
-Physiochemical constants updated in Fall 2017 (refer to HDOH 2017).
-Spreadsheet calculates Kd desorption coefficient based on input contaminant concentration in soil and Batch Test data.
-Correlative concentration of contaminant in leachate calculated based on estimated Kd value (may differ from batch test data).
-Future impacts to groundwater estimated using simple groundwater/leachate dilution factor.
-Alternative model based on soil gas data provided in accompanying worksheet.
-Possibility of past impacts to groundwater not considered and must be evaluated separately.
-Check to ensure that this is an up-to-date version of the spreadsheet.
-Remove write protection if problems occur in selection of contaminant. Password to unprotect worksheet is "EAL" (under Tools menu).

STEPS:

1. Select chemical from pulldown list (unlisted chemicals - unprotect spreadsheet and input chemical name and chemical constants).
2. Input total contaminant concentration and SPLP (or other applicable batch test) concentration.
3. Input sample properties. Use default values if sample-specific data are not available.
4. Input Batch Test method information. Default SPLP method parameter values noted.
5. Input groundwater:leachate dilution factor (DF of 1.0 = no dilution; USEPA default = 20, USEPA 2002).
6. Input target groundwater action level for comparison to model calculation of groundwater impacts (optional).
7. Input chemical-specific Henry's Law Constant (Kh) and solubility if "Generic (Volatile)" or "Generic (Nonvolatile)" selected from pulldown list. Input "0" if values not available.
8. Spreadsheet calculates sample-specific Kd value and dissolved-phase concentration of contaminant in saturated sample.
9. Spreadsheet calculates concentration of contaminant in groundwater following impact by leachate.

Step 1: [10]Select Contaminant (use pulldown list)	**LEAD**

Step 2: Input Sample Data	**DEFAULT**	**INPUT**
[1]Concentration in soil sample (mg/kg)	N/A	1.1E+04
[1]Concentration in Batch Test solution (ug/L)	N/A	4.3E+03
Step 3: Input Sample Properties ([5]USEPA soil defaults noted)		
Sample density (g/cm^3)	1.50	1.50
Particle density (g/cm^3)	2.65	2.65
Fraction air-filled porosity (assume saturated soil)	0.00	0.00
Step 4: Batch Test Method Data (SPLP defaults noted)		
[2]Batch Test Solution Volume (ml):	2,000	2,000
[2]Batch Test Solution Density (g/cm^3):	1.0	1.0
[2]Batch Test Sample Weight (grams)	100	100

[3]Step 5: Input Groundwater/ Leachate Dilution Factor	**DEFAULT**	**INPUT**
	20	20
[4]Step 6 (optional): Input Target Groundwater Concentration (ug/L)		

Model Results	
[5]Kd partition Coefficient (cm^3/g):	2.5E+03
[6]Estimated Concentration in Source Area Leachate (ug/L):	-
[7]Estimated Concentration in Groundwater (ug/L):	-

Step 7: [10]Chemical Constants [Generic Chemical only]	

Kd >20. Contaminant not significantly mobile for concentration and soil type tested. Do not place below water table without further evaluation. Address other potential environmental concerns as needed (direct exposure, gross contamination, etc.).

Calculations:	
Sample porosity - total	0.43
Sample porosity - air-filled	0.00
Sample porosity - water-filled	0.43
Batch Test Solution Mass (grams)	2.0E+03
Batch Test Sample Mass (grams)	1.0E+02
Sample Mass:Solution Mass Ratio (gm/gm)	5.0E-02
Total Mass of Contaminant (ug)	1.1E+06
Mass Contaminant in Batch Test Solution (ug)	8.6E+03
Mass Contaminant Sorbed to Soil (ug)	1.1E+06
Concentration Sorbed (ug/kg)	1.1E+07
Batch Test Percent Solid Phase	99.2%
Batch Test Percent Dissolved Phase	0.8%
Batch Test Solid-Phase Contaminant Conc. (mg/kg)	1.1E+04
Batch Test Solution Contaminant Conc. (ug/L)	4.3E+03

Notes (refer also to accompanying memo).

1. Total contaminant concentration measured in soil sample and results of Batch Test analysis (e.g., SPLP).

2. Batch Test: Default SPLP method calls for 100 grams of sample and 2 liters of solution with a density of approximately 1.0
3. Site-specific or default groundwater/leachate dilution factor (default = 20, USEPA 2002).
4. Target groundwater action level. Refer to HDOH EAL document and appropriate groundwater category.
5. Partition Coefficient (Kd) = $Concentration_{sorbed}/Concentration_{solution}$ (after Roy et al 1992).
   Partition Coefficient units in L/Kg [(ug/Kg)/ug/L)] or cm^3/g [(ug/g)/ug/cm^3)]
6. Estimated dissolved-phase concentration of contaminant in saturated sample based on calculated partition coefficient Kd
   contaminant concentration in leachate during transport through vadose zone not considered. Refer to Tier 2 concentration
8. Caution Message: A caution message will appear if the input batch test concentration is greater than 75% of the assumed contaminant solubility and a Kd value will not be generated (refer to "Leaching Evaluation of Heavily Contaminated Soils" in text). Model assumes that free product is present in the batch test solution and a Kd cannot be calculated (see text).
9. Error Message: The batch test data are not valid if the contaminant mass calculated for solute exceeds total mass calculated for sample (based on sample mass and input total contaminant concentration). This may not be uncommon given the potential for lab error at very low concentrations of contaminants.
10. "GENERIC CHEMICAL" can be selected from pulldown menu an used to model of any chemical, including chemicals not listed. Selection requires input of Kh (atm m3/mole) and Solubility constants in Step 7 if available. Note that a chemicals physiochemcial constants affect results for VOCs only if input Fraction Air-Filled Porosity is >0% (model considers partitioning into pore space air for VOCs as well as leachate).

References:

HDOH, 2017, Use of laboratory batch tests to evaluate potential leaching of contaminants from soil (updated Fall 2017): Hawai'i Dept. of Health, Hazard Evaluation and Emergency Response, http://hawaii.gov/health/environmental/hazard/index.html

HDOH, 2017, Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater: Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response, Fall 2017, www.hawaii.gov/health/environmental/hazard/eal2005.html.

USEPA, 1994, Synthetic Precipitation Leaching Procedure: U.S. Environmental Protection Agency, Office of Solid Waste, SW-846 Method 1312, September 1994, www.epa.gov/epaoswer/hazwaste/test/main.htm.

USEPA, 1999, Understanding Variation in Partition Coefficient, Kd, Values: Office of Air and Radiation, August 1999, EPA/402/R/99/004A, http://www.epa.gov/radiation/docs/kdreport/

USEPA, 2002, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: U.S. Environmental Protection Agency, Solid Waste and Emergency Response, OSWER 9355.4-24, December 2002, http://www.epa.gov/superfund/resources/soil/ssg_main.pdf

APPENDIX C:

Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) Criteria

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Appendix C: Preliminary Applicable or Relevant and Appropriate Requirements (ARAR) and Guidance to be Considered.

Requirement	Citation	Description	Governmental Authority	ARAR/TBC Information Type	Applicability to Site	Determination
Removal or Remedial Action						
EPA RSLs	EPA RSL Tables (November 2019)	Predetermined risk-based criteria used as a screening tool to determine the presence of pollutants, trigger investigation, and identify initial cleanup goals.	Federal	Chemical-Specific	Lead is present in site soil at concentrations exceeding **EPA** RSLs for residential land use.	TBC Information. EPA RSLs are not promulgated.
HDOH EALs	HDOH EAL Tables (November 2017)	Predetermined risk-based criteria used as a screening tool to determine the presence of pollutants, trigger investigation, and identify initial cleanup goals.	State	Chemical-Specific	Lead is present in site soil at concentrations exceeding HDOH **EALs.**	TBC Information. HDOH EALs are not promulgated. Relevant to lead as the state recommended clean-up levels for parks is more stringent than the RSLs for residential land use.
Excavation and/or Earth Moving Activities						
Discharge of Dredged or Fill Material to Waters of the U.S.	33 use§ 1344; CWA § 404; 33 USC§ 1311(a)	Requires permits for the discharge of dredged or fill materials to into waters of the United States, including wetlands.	Federal	Action-Specific	The site is adjacent to Kolekole Stream.	Potentially relevant and appropriate. The site is adjacent to Kolekole Stream. The National Wetland Inventory classifies the stream channel and banks as riverine upper perennial, unconsolidated bottom, permanently flooded. If a survey determines that the wetland is jurisdictional, then compliance with the substantive requirements of the CWA and § 404 Permit process may be required for any response action that includes excavation of soil and installation of clean fill material in the wetland area.
Coastal Zones	HRS Title 13, Chapter 205A: Coastal Zone Management. S	Provides for the protection of coastal resources.	State	Location-Specific	The majority of the site is located within a Special Management Area as designated by the State of Hawaii.	Potentially applicable. Excavation activities that alter coastal vegetation and landforms will comply with substantive requirements to minimize effects on coastal resources.
Coastal Zones	16 USC §-1455 (c); 15 CFR § 930.30-33, 36(a}, and 39(b-d)	Requires federal actions or activities conducted within or affecting a coastal zone be consistent with the State's coastal program. Also requires protection of valuable coastal ecosystems and minimization of adverse impacts on coastal ecosystems.	Federal	Location-Specific	The majority of the site falls within a Special Management Area as designated by the State of Hawaii.	Potentially applicable. The selected response action will comply with this regulation because the site location is within the coastal zone.
NPDES	CWA§ 402; 33 USC§ 1311(a): 40 CFR Parts 122 and 125	Regulates the discharge of treated effluent and storm water runoff to waters of the United States.	Federal	Action-Specific	The site is adjacent to Kolekole Stream.	Applicable if the selected response action disturbs more than 1 acre (Current potential remedial action area is more than 1 acre). Response activities will comply with the **ARARs** to prevent discharge to the adjacent stream. BMPs will be implemented. Although administrative requirements do not qualify as **ARARs,** a stormwater pollution prevention plan will be prepared to demonstrate compliance with the substantive requirements of this regulation.
Soil Erosion and Sediment Control, Grading Excavation, Clearing and Grubbing.	HRS Title 12, Chapter 180C, Soil Erosion and Sediment Control. Hawaii County Code (1983, 2016 Amended) Chapter 10, Section 10-26	Regulates grading, excavation, clearing and grubbing activities for management of soil erosion and sediment control.	State County	Action-Specific	Response actions that include grading or excavation.	Applicable. Any grading, grubbing, stockpiling activities will require a permit and BMPs to manage soil erosion and sediment control. Any removed vegetation should not be stored along the banks of Kolekole Stream. Grading activities will result in positive drainage to prevent the accumulation or retention of surface water in depressions. Hazardous conditions will not be created by fill.

Appendix C: Preliminary Applicable or Relevant and Appropriate Requirements (ARAR) and Guidance to be Considered.

Requirement	Citation	Description	Governmental Authority	ARAR/TBC Information Type	Applicability to Site	Determination
Excavation and/or Earth Moving Activities *(continued)*						
Control of Fugitive Dust	HRS 19 342B-11; 34 HAR Title 11, Chapter 60.1-33: Air Pollution Control	Requires mitigation of fugitive dust visible beyond the property line through implementation of best practical operation or treatment.	State	Action-Specific	Response actions that include grading or excavation.	Potentially applicable. Response actions will not cause or permit the discharge of visible fugitive dust beyond the site perimeter. Dust may be controlled by screen or limited application of water spraying over disturbed area to prevent the discharge of fugitive dust. Runoff from dust control is not permitted.
Control of Noise	HRS Title 19, Chapter 342F-30; HAR Title 11, Chapter 46: Noise Pollution Control	Defines maximum permissible sound levels to prevent, control, and abate noise pollution from stationary noise sources and equipment related to agricultural, construction, and industrial activities.	State	Action-Specific	Response actions that include the use of heavy machinery and trucks.	Potentially applicable. Response actions will not cause excessive noise beyond the exclusion zone outside of the hours of 0700 and 2200. Permissible sound outside of the exclusion zone for multifamily residential, commercial, and resort areas shall not exceed 60 decibels. Outside of the hours of 0700 and 2200, permissible sound levels shall not exceed 50 decibels. Site is located within an isolated gulch. Residential housing is above the site.
Waste Disposal						
Identification of Hazardous Waste	40 CFR Part 261	Identifies solid wastes subject to regulation as hazardous wastes under **RCRA.** Identifies chemical characteristics of hazardous waste for comparison with site-specific waste data.	Federal	Chemical-Specific	Lead is present in site soil.	Potentially applicable for excavation activities because the regulation establishes procedures and numeric limits for the identification and management of listed and characteristic hazardous waste. Sample results in the bridge area are below the US EPA TCLP standard for Hazardous Waste.
Storage, Handling, and Pre-Transportation Requirements for Hazardous Waste	40 CFR Part 262	Specifies hazardous waste storage, handling, labeling, record keeping,manifesting, and all pre-transport requirements.	Federal	Action-Specific	Lead is present in site soil.	Potentially Applicable for excavation activities because the regulation establishes procedures for the storing and handling listed and characteristic hazardous waste. However, sample results from the DUs in the bridge area below the standards for TCLP identified hazardous waste.
Conservation and Protection of Ecological and Cultural Resources						
Migratory Bird Treaty Act	16 USC § 703(a)	Prohibits the taking, possessing, buying, selling, or bartering of any migratory bird, including feathers or other parts, nest eggs, or products, except as allowed by regulations.	Federal	Location-Specific	Potential for migratory birds to loaf/nest on site.	Potentially applicable. Survey site and follow guidelines for disturbance of migratory bird species. Potential for habitat for the indigenous Black-crowned Night-Heron (Nycticorax nycticorax) based on Kapue Bridge Survey (AECOS, 2018).
Native American Graves Protection and Repatriation Regulations	43 CFR 10, § 3c and 3d	Requires coordination with Native Hawaiian organization to determine disposition of human remains and cultural artifacts. Requires protection of said items when	Federal	Location-Specific	No identified archaeological sites. Additional review will be conducted. Site has been highly disturbed due to bridge construction, tsunami impacts, and flooding.	Potentially relevant and appropriate. Comply with substantive requirements excavation, removal. And preservation of human remains and artifacts if selected response action includes excavation and human remains, burial sites, or cultural artifacts are encountered.

Appendix C: Preliminary Applicable or Relevant and Appropriate Requirements (ARAR) and Guidance to be Considered.

Requirement	Citation	Description	Governmental Authority	ARAR/TBC Information Type	Applicability to Site	Determination
Conservation and Protection of Ecological and Cultural Resources *(continued)*						
Burial Sites and Human Remains	HAR Title 13, Chapter 300: Rules of Practice and Procedures Relating to Burial Sites and Human Remains	Governs practices and procedures relating to the proper care and protection of burial sites and human skeletal remains 50 years or older.	State	Location-Specific		Potentially applicable. Comply with the substantive requirements for the excavation, removal, and preservation of humans remains if selected response action includes excavation and human remains or burial sites are encountered.
Protection of Archaeological Resources	43 CFR § 7.4(a) and 7.5(b)(1)	Requires protection of archaeological resources if discovered.	Federal	Location-Specific		Potentially applicable. Comply with substantive requirements to prevent irreparable damage to or destruction of human remains and artifacts and to preserve archaeological and scientific data if selected response action includes excavation and human remains, burial sites, or cultural artifacts are encountered.
National Archaeological and Historical Preservation Act; National Historic Preservation Act	16 USC 469; 16 USC§ 470; 36 CFR Part 800	Alteration of terrain that threatens significant scientific, prehistoric, historic, or archeological data may require actions to recover and preserve artifacts. Includes coordination with federal and state officials to determine proposed site activities have the potential to cause adverse effects on historic properties.	Federal	Action-Specific and Location-Specific		Potentially applicable. Comply with the substantive requirements to provide for data recovery and preservation activities if selected response action includes terrain alterations that result in irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data.
Historic Preservation	HRS Chapter 6E.	Requires action to be taken to locate, identify, evaluate, and protect cultural resources.	State	Location-Specific		Potentially applicable. Comply with substantive requirements to prevent the irreparable damage and destruction of human remains or artifacts and to preserve the archaeological and scientific data if selected response action includes excavation and human remains. burial sites, or cultural artifacts are encountered.
Endangered Species Act	16 USC§ 1538(a)(1)(B); 50 CFR § 17.21	Requires action to conserve endangered or threatened species, including coordination with the Department of the Interior and the U.S. Fish and Wildlife Service.	Federal	Location-Specific	The site has potential habitat for the Hawaiian stilt (Himantopus mexicanus knudseni). Potential for Hawaiian Hoary bat (Aeorestes semotus), or Hawaiian Hawk (Buteo solitarius), however no trees will be removed or disturbed during site work, minimizing potential impacts. Construction will take place during daylight hours and will not use nocturnal lights. Vegetation is non-native or common species and consists of maintained landscaping (grass).	Potentially relevant and appropriate. No designated critical habitat is at the site. Comply with requirements to protect RTE species and their habitat if documented or if they appear at the site.

APPENDIX D:

REMEDIAL ALTERNATIVE COST COMPARISON

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Appendix D-1: Rough Order of Magnitude Cost Comparison

Hakalau Beach Park Lead Impacted Soil Remedial Alternative Analysis

Client: HDOT	Phase	01	6a	5a	5b	5c	6b
Project: Hakalau Beach Park Remedial Alterntive	Task:	Planning	Alternative A	Alternative B -	Alternative C	Alternative D	Alternative E
Location: Hakalau, Hawaii	Billing Type:	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum
			No Action- Prepare EHMP and updated every 5 years.	Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover.	Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill.	Soil Excavation and Off-Site Disposal greater than 800 mg/kg. IF pass the TCLP send to WHSL Concentrations > 800 mg/kg that fail TCLP dispose of CONUS. Relace with clean fill.	Institional Controls- Prepare EHMP and updated every 5 years. Install a fence around all the areas at park that exceed construction/industrial use and only alow access to pavilions and shoreline areas.
			EHMP needed.	EHMP needed.	No EHMP needed.	EHMP needed.Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 24-inches clean fill. Annual inspection of soil cover. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.	EHMP needed.
			Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs).	Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.	Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH.
			Rrequires an annual inspection performed according to the EHMP and submitted to DOH.				
		Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort and this cost would be in addition to each of the alternatives evaluated.					
	Task Title:						
Scope of Work:	Duration:		Days	46 Days	150 Days	125 Days	20 Days

1a. Labor	Loaded Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
Principal	$186.25	Hour	40	$7,450.20	40	$7,450.20	40	$7,450.20	40	$7,450.20	40	$7,450.20	20	$3,725.10
Project Manager	$130.96	Hour	40	$5,238.29	60	$7,857.44	100	$13,095.73	240	$31,429.75	240	$31,429.75	40	$5,238.29
Senior Environmental Scientist	$118.91	Hour	120	$14,269.09	400	$47,563.64								
Senior Project Scientist	$119.59	Hour			400	$47,837.56	400	$47,837.56	400	$47,837.56	400	$47,837.56	400	$47,837.56
Project Geologist	$89.64	Hour							400	$35,857.84	400	$35,857.84		
Project Geologist	$96.00	Hour	120	$11,520.00	200	$19,200.00	420	$40,320.00	1200	$115,200.00	1000	$96,000.00	200	$19,200.00
Assistant Project Scientist	$68.02	Hour												
Staff Geologist	$62.58	Hour												
Construction Manager	$142.89	Hour					368	$52,582.71	448	$64,013.73	180	$25,719.80	160	$22,862.05
Laborer	$39.77	Hour												
Technical Editor	$107.30	Hour	8	$858.40	40	$4,291.98	48	$5,150.38	8	$858.40	48	$5,150.38	40	$4,291.98
Word Processor	$57.45	Hour	8	$459.59	40	$2,297.93	8	$459.59	8	$459.59	48	$2,757.52	40	$2,297.93
Senior CADD Operator	$87.02	Hour	12	$1,044.28	60	$5,221.39	72	$6,265.66	12	$1,044.28	84	$7,309.94	60	$5,221.39
CADD Operator	$69.74	Hour												
Project Administrator	$66.18	Hour	40	$2,647.18	40	$2,647.18	40	$2,647.18	40	$2,647.18	40	$2,647.18	40	$2,647.18
Senior Project Accountant	$86.26	Hour			80	$6,901.07	80	$6,901.07	80	$6,901.07	80	$6,901.07	80	$6,901.07
		Subtotals	**388**	**$43,487.03**	**1360**	**$151,268.39**	**1576**	**$182,710.08**	**2876**	**$313,699.60**	**2560**	**$269,061.24**	**1080**	**$120,222.55**

1b. Subcontractor Labor	Loaded Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
Brush Clearing 1	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13	80	$2,358.28
Brush Clearing 2	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13	80	$2,358.28
Brush Clearing 3	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13	80	$2,358.28
Brush Clearing 4	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13	80	$2,358.28
		Subtotals	**0**	**$0.00**	**0**	**$0.00**	**720**	**$21,224.52**	**720**	**$21,224.52**	**720**	**$21,224.52**	**320**	**$9,433.12**

Appendix D-1: Rough Order of Magnitude Cost Comparison

Hakalau Beach Park Lead Impacted Soil Remedial Alternative Analysis

Client: HDOT	Phase	01	6a	5a	5b	5c	6b	
Project: Hakalau Beach Park Remedial Alterntive	Task:	Planning	Alternative A	Alternative B -	Alternative C	Alternative D	Alternative E	
Location: Hakalau, Hawaii	Billing Type:	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum	
			No Action- Prepare EHMP and updated every 5 years.	Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover.	Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill.	Soil Excavation and Off-Site Disposal greater than 800 mg/kg. IF pass the TCLP send to WHSL Concentrations > 800 mg/kg that fail TCLP dispose of CONUS. Relace with clean fill.	Institional Controls- Prepare EHMP and updated every 5 years. Install a fence around all the areas at park that exceed construction/industrial use and only alow access to pavilions and shoreline areas.	
			EHMP needed.	EHMP needed.	No EHMP needed.	EHMP needed.Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 24-inches clean fill. Annual inspection of soil cover. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.	EHMP needed.	
			Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs).	Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.	Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH.	
		Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort and this cost would be in addition to each of the alternatives evaluated.	Rrequires an annual inspection performed according to the EHMP and submitted to DOH.					
	Task Title:							
Scope of Work:	Duration:		Days	46 Days	150 Days	125 Days	20 Days	

2. Equipment	Loaded Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
Excavator with Shear attachment	$123.87	hr					40	$4,954.96	40	$4,954.96	40	$4,954.96	20	$2,477.48
Backhoe (operated)	$61.94	hr					40	$2,477.69	40	$2,477.69	40	$2,477.69	20	$1,238.85
Dump Truck operated	$68.14	hr					40	$2,725.50	40	$2,725.50	40	$2,725.50	20	$1,362.75
SUV 1	$2,682.00	mt					2.5	$6,705.00	7.5	$20,115.00	2.25	$6,034.50	1.5	$4,023.00
SUV 2	$2,682.00	mt					2.5	$6,705.00	7.5	$20,115.00	2.5	$6,705.00	1.5	$4,023.00
Porta Potty	$307.22	month					2.5	$768.05	7.5	$2,304.14	2.5	$768.05	1.5	$460.83
	$0.00													
		Subtotals		**$0.00**		**$0.00**		**$24,336.20**		**$52,692.29**		**$23,665.70**		**$13,585.91**

3. Materials and Other Dire	Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
consumables (water etc.) Health and safety	$30.97	day					46	$1,424.43	150	$4,644.87	125	$3,870.73		
PPE	$30.97	day					46	$1,424.43	150	$4,644.87	125	$3,870.73	20	$619.32
Eyewash	$92.91	ls					2	$185.82	4	$371.63	2	$185.82	1	$92.91
Misc Health and Safety items	$619.39	ls					2	$1,238.78	4	$2,477.56	2	$1,238.78	1	$619.39
Plastic sheeting	$135.02	roll					5	$675.12	15	$2,025.35	10	$1,350.23	1	$135.02
Restoration (not backfill)	$1,238.78	ls					0		0		0			
Disposal of Vegetation HD	$619.39	ls												
Fuel of vehicles	$5.70	gal					500	$2,851.55	1200	$6,843.72	1000	$5,703.10	250	$1,425.78
Report reproduction	$154.85						3	$464.55	3	$464.55	3	$464.55	3	$464.55
		Subtotals		**$0.00**		**$0.00**		**$8,264.68**		**$21,472.55**		**$16,683.94**		**$3,356.97**

Appendix D-1: Rough Order of Magnitude Cost Comparison

Hakalau Beach Park Lead Impacted Soil Remedial Alternative Analysis

Client: HDOT	Phase	01	6a		5a		5b		5c		6b		
Project: Hakalau Beach Park Remedial Alterntive	Task:	Planning	Alternative A		Alternative B -		Alternative C		Alternative D		Alternative E		
Location: Hakalau, Hawaii	Billing Type:	Lump Sum	Lump Sum		Lump Sum		Lump Sum		Lump Sum		Lump Sum		
			No Action- Prepare EHMP and updated every 5 years.		Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover.		Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill.		Soil Excavation and Off-Site Disposal greater than 800 mg/kg. IF pass the TCLP send to WHSL Concentrations > 800 mg/kg that fail TCLP dispose of CONUS. Relace with clean fill.		Institional Controls- Prepare EHMP and updated every 5 years. Install a fence around all the areas at park that exceed construction/industrial use and only alow access to pavilions and shoreline areas.	
			EHMP needed.		EHMP needed.		No EHMP needed.		EHMP needed.Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 24-inches clean fill. Annual inspection of soil cover. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		EHMP needed.	
			Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs).		Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.				Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH.	
			Rrequires an annual inspection performed according to the EHMP and submitted to DOH.										
		Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort and this cost would be in addition to each of the alternatives evaluated.											
Scope of Work:	Task Title:												
	Duration:			Days	46	Days	150	Days	125	Days	20	Days	

4. Subcontractors	Loaded Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
Construction Screening	$21,400.00	ls					1	$21,400.00	1	$21,400.00	1	$21,400.00		
Excavate, Load, Haul, and Tipping Fee (Mainland)	$2,140.00	yrd3					0		246	$526,440.00	246	$526,440.00		
Excavate, Load, Haul, and Tipping Fee (WHSL - On Island)	$1,050.00	yrd3							3811	$4,001,550.00	1724	$1,810,200.00		
import Clean Fill and Grade	$187.25	yrd3					7923	$1,483,581.75	7923	$1,483,581.75	9647	$1,806,400.75		
Hydroseed	$1.07	sqft					102905	$110,108.35	102905	$110,108.35	46551	$49,809.57		
Mirafi/Geotextile spread accorss site	$0.54	sqft					102905	$55,054.18			44500	$23,807.50		
Dust Controls, Water meter, water truck	$1,872.50	day					25	$46,812.50	48	$89,880.00	40	$74,900.00		
Plastic Sheeting	$0.54	sqft												
Cargo Air Samples Hilo to Hono	$154.85	ea					4	$619.40	4	$619.40	4	$619.40		
Fed EX Hono to AAL	$121.40	ea					4	$485.61	4	$485.61	4	$485.61		
Wood Chipper	$1,238.78	ls					20	$24,775.64	20	$24,775.64	20	$24,775.64		
Archeological Support	$18,725.00	ls					1	$18,725.00	1	$18,725.00	1	$18,725.00		
Archeological Monitoring	$5,885.00	wk					5	$29,425.00	15	$88,275.00	5	$29,425.00		
Fencing Installation	$45.00	ft.					250	$11,250.00			250	$11,250.00	2000	$90,000.00
Air Monitoring	$535.00	day					20	$10,700.00	20	$10,700.00	20	$10,700.00	10	$5,350.00
ISM Prep	$107.00	ea					5	$535.00	30	$3,210.00	16	$1,712.00		
RCRA 8 METAL	$86.71	ea					5	$433.56	30	$2,601.38	16	$1,387.40		
PERCENT MOISTURE	$12.39	ea					5	$61.95	30	$371.72	30	$371.72		
DRYSLIEVE	$30.97	ea					5	$154.83	30	$928.97	16	$495.45		
RCRA 8 METAL -TCLP	$171.20	ea					5	$856.00	30	$5,136.00	16	$2,739.20		
Shipping to lab	$428.00	ea					3	$1,284.00	6	$2,568.00	4	$1,712.00		
		Subtotals		**$0.00**		**$0.00**		**$1,816,262.77**		**$6,391,356.82**		**$4,417,356.24**		**$95,350.00**

Appendix D-1: Rough Order of Magnitude Cost Comparison

Hakalau Beach Park Lead Impacted Soil Remedial Alternative Analysis

Client: HDOT	Phase	01	6a		5a		5b		5c		6b		
Project: Hakalau Beach Park Remedial Alterntive	Task:	Planning	Alternative A		Alternative B -		Alternative C		Alternative D		Alternative E		
Location: Hakalau, Hawaii	Billing Type:	Lump Sum	Lump Sum		Lump Sum		Lump Sum		Lump Sum		Lump Sum		
			No Action- Prepare EHMP and updated every 5 years. EHMP needed. Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual inspection performed according to the EHMP and submitted to DOH.		Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover. EHMP needed. Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill. No EHMP needed. Assume miriafi/geotextile placed on contaimated soil, cover with 24-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Soil Excavation and Off-Site Disposal greater than 800 mg/kg. IF pass the TCLP send to WHSL Concentrations > 800 mg/kg that fail TCLP dispose of CONUS. Relace with clean fill. EHMP needed.Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 24-inches clean fill. Annual inspection of soil cover. Assume 300 additional cubic yards clean soil for drainage grading. Archeological Consultation and Monitoring.		Institional Controls- Prepare EHMP and updated every 5 years. Install a fence around all the areas at park that exceed construction/industrial use and only alow access to pavilions and shoreline areas. EHMP needed. Assume 4 updates per 30 year period accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH.	
Scope of Work:	Task Title: / Duration:	Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort and this cost would be in addition to each of the alternatives evaluated.		Days		46 Days		150 Days		125 Days		20 Days	

5. Travel	Loaded Rate ($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
Flights to Hilo RT Honolulu - Hawaii Construction Manager	$294.25	RT					8	$2,354.00	*16*	$4,708.00	12	$3,531.00	4	$1,177.00
Flights to Hilo RT Honolulu - Hawaii Geologist	$294.25	RT					8	$2,354.00	30	$8,827.50	25	$7,356.25	4	$1,177.00
Per Diem Construction Manager	$92.91	day					64	$5,946.12	76	$7,061.02	75	$6,968.11	30	$2,787.24
Per Diem Geologist	$92.91	day					64	$5,946.12	150	$13,936.22	125	$11,613.51	30	$2,787.24
Lodging Construction Manager	$180.00	day					64	$11,520.00	76	$13,680.00	75	$13,500.00	30	$5,400.00
Lodging Geologist	$180.00	day					64	$11,520.00	120	$21,600.00	100	$18,000.00	30	$5,400.00
		Subtotals		**$0.00**		**$0.00**		**$39,640.24**		**$69,812.74**		**$60,968.87**		**$18,728.48**
		SUBTOTALS		**$43,487.03**		**$151,268.39**		**$2,092,438.49**		**$6,870,258.52**		**$4,808,960.51**		**$260,677.03**
PROFIT	0.06	**Percent**		**$2,609.22**		**$9,076.10**		**$125,546.31**		**$412,215.51**		**$288,537.63**		**$15,640.62**
SUBTOTOTAL				**$46,096.25**		**$160,344.49**		**$2,217,984.80**		**$7,282,474.03**		**$5,097,498.14**		**$276,317.65**

Bonding, Insurance, and Tax	Rate ($)	Unit												
Markup	0.066	Percent												
HI GET	0.04166	Percent		$1,920.37		$6,679.95		$92,401.25		$303,387.87		$212,361.77		**$10,859.81**
Unit Rate Adjustment	$1.00	LS												
		TASK TOTALS		**$48,016.62**		**$167,024.44**		**$2,310,386.05**		**$7,585,861.90**		**$5,309,859.91**		**$271,536.84**

TASKS

Client: HDOT
Hakalau Beach Park Lead Impacted Soil Remedial Alternti
Location:
Estimate Date: 04/23/21

Phase 01
Task: Planning
Billing Type: Lump Sum

Task Title:
Scope of Work:

	06	5a	5b	5c
	Alternative A Lump Sum No Action- Prepare EHMP and updated every 5 years. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual inspection performed according to the EHMP and submitted to DOH.	Alternative B - Lump Sum Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring.	Alternative C Lump Sum Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill. No EHMP needed. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring..	Alternative 5 Lump Sum Soil Excavation and Off-Site Disposal. Excavate soil less than 800 or pass the TCLP at West Hawaii Sanitary Landfill replace with clean soil. For higher concentrations excavate soil greater than 800 mg/kg lead that fail TCLP and dispose at out of State Facility and replace with clean fill. EHMP needed.Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 18-inches clean fill. Assume 600 additional cubic yards clean soil for drainage grading.Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Archeological Consultation and Monitoring.
Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort.				
Duration:	Days	36 Days	125 Days	100 Days

Code	1a. Labor	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
101	Principal	$186.25	Hour	40	$7,450.20	40	$7,450.20	30	$5,587.65	40	$7,450.20	40	$7,450.20
103	Project Manager	$130.96	Hour	40	$5,238.29	60	$7,857.44	80	$10,476.58	240	$31,429.75	80	$10,476.58
105	Senior Project Geologist	$118.91	Hour	120	$14,269.09	400	$47,563.64	400	$47,563.64	400	$47,563.64	400	$47,563.64
106	Senior Project Scientist	$119.59	Hour			400	$47,837.56	520	$62,188.83	400	$47,837.56	480	$57,405.07
	Project Geologist	$89.64	Hour										
111	Project Geologist	$96.00	Hour	120	$11,520.00	200	$19,200.00	288	$27,648.00	1000	$96,000.00	800	$76,800.00
112	Assistant Project Scientist	$68.02	Hour										
114	Staff Geologist	$62.58	Hour										
125	Construction Manager	$142.89	Hour					288	$41,151.69	448	$64,013.73	368	$52,582.71
129	Laborer	$39.77	Hour										
140	Technical Editor	$107.30	Hour	8	$858.40	40	$4,291.98	48	$5,150.38	8	$858.40	48	$5,150.38
122	Word Processor	$57.45	Hour	8	$459.59	40	$2,297.93	48	$2,757.52	8	$459.59	48	$2,757.52
136	Senior CADD Operator	$87.02	Hour	12	$1,044.28	60	$5,221.39	82	$7,135.89	24	$2,088.55	82	$7,135.89
124	CADD Operator	$69.74	Hour										
120	Project Administrator	$66.18	Hour	40	$2,647.18	40	$2,647.18	80	$5,294.36	40	$2,647.18	80	$5,294.36
135	Senior Project Accountant	$86.26	Hour			80	$6,901.07	80	$6,901.07	40	$3,450.54 #	80	$6,901.07
			Subtotals	**388**	**$43,487.03**	**1360**	**$151,268.39**	**1944**	**$221,855.61**	**2648**	**$303,799.14**	**2506**	**$279,517.42**

Code	1b. Subcontractor Labor	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
	Brush Clearing 1	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13
	Brush Clearing 2	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13
	Brush Clearing 3	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13
	Brush Clearing 4	$29.48	hour					180	$5,306.13	180	$5,306.13	180	$5,306.13
			Subtotals	**0**	**$0.00**	**0**	**$0.00**	**720**	**$21,224.52**	**720**	**$21,224.52**	**720**	**$21,224.52**

TASKS

Client: HDOT
Hakalau Beach Park Lead Impacted Soil Remedial Alternti
Location:
Estimate Date: 04/23/21

Phase 01
Task: Planning
Billing Type: Lump Sum

Task Title:

	06	5a	5b	5c
	Alternative A Lump Sum No Action- Prepare EHMP and updated every 5 years. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual inspection performed according to the EHMP and submitted to DOH.	Alternative B - Lump Sum Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring.	Alternative C Lump Sum Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill. No EHMP needed. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring..	Alternative 5 Lump Sum Soil Excavation and Off-Site Disposal. Excavate soil less than 800 or pass the TCLP at West Hawaii Sanitary Landfill replace with clean soil. For higher concentrations excavate soil greater than 800 mg/kg lead that fail TCLP and dispose at out of State Facility and replace with clean fill. EHMP needed.Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 18-inches clean fill. Assume 600 additional cubic yards clean soil for drainage grading.Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Archeological Consultation and Monitoring.
Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort.				

Code	2. Equipment	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
	Excavator with Shear attachment	$123.87	hr					40	$4,954.96	40	$4,954.96	40	$4,954.96
	Backhoe (operated) - brush clearing	$61.94	hr					40	$2,477.69	40	$2,477.69	40	$2,477.69
	Dump Truck operated - brush clearing	$68.14	hr					40	$2,725.50	40	$2,725.50	40	$2,725.50
	SUV 1	$1,486.54	mt					2	$2,973.08	7.5	$11,149.05	5	$7,432.70
	SUV 2	$1,486.54	mt					2	$2,973.08	7.5	$11,149.05	5	$7,432.70
	Porta Potty	$307.22	month					2	$614.44	7.5	$2,304.14	5	$1,536.09
	ATV's	$309.70	week										
	Mine Labs	$30.97	dy										
	Trimble GPS	$92.91	dy										
	misc brush clearing equipemnt	$92.91	dy					40	$3,716.32	40	$3,716.32	40	$3,716.32
			Subtotals		**$0.00**		**$0.00**		**$20,435.07**		**$38,476.71**		**$30,275.96**

Code	3. Materials and Other Direct Costs	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
	Consumables (water etc.) Health and	$123.87	day					36	$4,459.46	150	$18,581.09	100	$12,387.39
	PPE -tyveck suit 20 per day (2XL)	$61.94	day					36	$2,229.92	150	$9,291.35	**100**	$6,194.23
	Eyewash	$68.14	ls					2	$136.28	2	$136.28	2	$136.28
	Misc Health and Safety items	$1,486.54	ls					2	$2,973.08	2	$2,973.08	2	$2,973.08
	Plastic sheeting	$1,486.54	roll					5	$7,432.70	10	$14,865.40	10	$14,865.40
	Restoration (not backfill)	$307.22	ls					0		0		# 10	$3,072.18
	Disposal of Vegetation HD	$309.70	ls										
	Fuel of vehicles	$30.97	gal					400	$12,386.32	1200	$37,158.96	750	$23,224.35
	Report reproduction	$92.91						3	$278.72	3	$278.72	3	$278.72
			Subtotals		**$0.00**		**$0.00**		**$29,896.48**		**$83,284.88**		**$63,131.63**

TASKS

Client: HDOT
Hakalau Beach Park Lead Impacted Soil Remedial Alternti
Location:
Estimate Date: 04/23/21

Phase
Task:
Billing Type:

Task Title:

	01	06	5a	5b	5c
	Planning	Alternative A	Alternative B -	Alternative C	Alternative 5
	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum
		No Action- Prepare EHMP and updated every 5 years. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual inspection performed according to the EHMP and submitted to DOH.	Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring.	Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill. No EHMP needed. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring..	Soil Excavation and Off-Site Disposal. Excavate soil less than 800 or pass the TCLP at West Hawaii Sanitary Landfill replace with clean soil. For higher concentrations excavate soil greater than 800 mg/kg lead that fail TCLP and dispose at out of State Facility and replace with clean fill. EHMP needed.Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 18-inches clean fill. Assume 600 additional cubic yards clean soil for drainage grading.Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Archeological Consultation and Monitoring.
	Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort.				

Code	4. Subcontractors	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
	Construction Screening	$21,400.00	ls					1	$21,400.00				
	Excavate, Load, Haul, and Tipping Fee (Mainland)	$2,000.00	yrd3					0		246	$492,000.00	246	$491,760.00
	Excavate, Load, Haul, and Tipping Fee (WHSL - On Island)	$1,050.00	yrd3							3811	$4,001,550.00	1724	$1,810,200.00
	import Clean Fill and Grade	$250.00	yrd3					6018	$1,504,500.00	6018	$1,504,500.00	9166	$2,291,500.00
	Hydroseed	$1.00	sqft					102905	$102,905.00	102905	$102,905.00	46,551	$46,551.00
	Mirafi/Geotextile spread accorss site	$0.50	sqft					102905	$51,452.50			46,551	$23,275.50
	Dust Controls, Water meter, water truck	$1,750.00	day					25	$43,750.00	150	$262,500.00	30	$52,500.00
	Plastic Sheeting	$0.50	sqft										
	Cargo Air Samples Hilo to Hono	$144.72	ea					4	$578.88	4	$578.88	4	$578.88
	Fed EX Hono to AAL	$113.46	ea					4	$453.84	4	$453.84	4	$453.84
	Wood Chipper	$1,157.74	day					20	$23,154.80	20	$23,154.80	20	$23,154.80
	Archeological Support	$17,500.00	ls					1	$17,500.00	1	$17,500.00	1	$17,500.00
	Archeological Monitoring	$5,500.00	wk					5	$27,500.00	15	$82,500.00	10	$55,000.00
	Air Monitoring	$500.00	day					20	$10,000.00	20	$10,000.00	20	$10,000.00
ISM	ISM Prep	$100.00	ea					5	$500.00	30	$3,000.00	16	$1,600.00
ISM	RCRA 8 METAL	$81.04	ea					5	$405.20	30	$2,431.20	16	$1,296.64
ISM	PERCENT MOISTURE	$11.58	ea					5	$57.90			16	$185.28
	RCRA 8 METAL -TCLP	$160.00	ea					5	$800.00	30	$4,800.00	16	$2,560.00
	Shipping to lab	$400.00	ea		0		0	3	1,200	6	2,400	4	1,600
			Subtotals		**$0.00**		**$0.00**		**$1,806,302.82**		**$6,511,141.92**		**$4,830,178.98**

TASKS

Client: HDOT
Hakalau Beach Park Lead Impacted Soil Remedial Alternti
Location:
Estimate Date: 04/23/21

Phase 01
Task: Planning
Billing Type: Lump Sum

Task Title: Project Management, Permiting, Public Meeting Support - Assume all alternatives have a simmilar amount of planning effort.

Code	5. Travel	($)	Unit	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)	Units	Task ($)
	Flights to Hilo RT Honolulu - Hawaii Construction Manager	$294.25	RT					6	$1,765.50	12	$3,531.00	10	$2,942.50
	Flights to Hilo RT Honolulu - Hawaii Geologist	$294.25	RT					6	$1,765.50	25	$7,356.25	20	$5,885.00
		$0.00	RT					0		0		0	
	Per Diem Construction Manager	$92.91	day					46	$4,273.77	75	$6,968.11	50	$4,645.41
	Per Diem Geologist	$92.91	day					46	$4,273.77	125	$11,613.51	100	$9,290.81
	Lodging Construction Manager	$180.00	day					46	$8,280.00	75	$13,500.00	50	$9,000.00
	Lodging Geologist	$180.00	day					46	$8,280.00	100	$18,000.00	80	$14,400.00
			Subtotals		**$0.00**		**$0.00**		**$28,638.54**		**$60,968.87**		**$46,163.72**
			SUBTOTALS		**$43,487.03**		**$151,268.39**		**$2,128,353.04**		**$7,018,896.04**		**$5,270,492.23**
	PROFIT	0.06	**Percent**		**$2,609.22**		**$9,076.10**		**$127,701.18**		**$421,133.76**		**$316,229.53**
	SUBTOTOTAL				**$46,096.25**		**$160,344.49**		**$2,256,054.22**		**$7,440,029.80**		**$5,586,721.76**
	Bonding, Insurance, and Taxes	Rate ($)	Unit										
	Markup	0.066	Percent										
	HI GET	0.04166	Percent		**$1,920.37**		**$6,679.95**		**$93,987.22**		**$309,951.64**		**$232,742.83**
	Unit Rate Adjustment	$1.00	LS										
			TASK TOTALS		**$48,016.62**		**$167,024.44**		**$2,350,041.44**		**$7,749,981.44**		**$5,819,464.59**

01	06	5a	5b	5c
Planning	Alternative A Lump Sum No Action- Prepare EHMP and updated every 5 years. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual inspection performed according to the EHMP and submitted to DOH.	Alternative B - Lump Sum Soil Cover All DUs which exceed the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg). Annual inspection of cover. EHMP needed. Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring.	Alternative C Lump Sum Soil Excavation, and Off-Site Disposalof all soil which exceeds the HDOH Tier 1 EAL for unrestricted land use for lead (200 mg/kg) Replace contaminated soil with clean fill. No EHMP needed. Miriafi/geotextile placed on contaimated soil, cover with 18-inches clean fill. Assume 300 additional cubic yards clean soil for drainage grading. Assume archeological monitoring..	Alternative 5 Lump Sum Soil Excavation and Off-Site Disposal. Excavate soil less than 800 or pass the TCLP at West Hawaii Sanitary Landfill replace with clean soil. For higher concentrations excavate soil greater than 800 mg/kg lead that fail TCLP and dispose at out of State Facility and replace with clean fill. EHMP needed.Assume 4 updates per 30 year period to accommodate park maintenance changes (Pre-construction EHMPs). Miriafi/geotextile placed as a barrier between clena fill and post excavation surface, replace volume removed from DUs cover all DUs with 18-inches clean fill. Assume 600 additional cubic yards clean soil for drainage grading.Rrequires an annual cap inspection performed according to the EHMP and submitted to DOH. Archeological Consultation and Monitoring.

APPENDIX E:

TREATABILITY STUDY

Appendix E

Bench Test Treatability Study on Hakalau Beach Park Soil – Batch 1: Triple Superphosphate and Batch 2: Portland Cement

Introduction

A Bench Test Treatability Study was performed to evaluate the potential for treating high concentrations of lead in the soil on the floor of Hakalau Valley to reduce the toxicity of the soil. During soil investigations performed at Hakalau Beach Park between 2017 and 2022, a large area under the Hakalau bridge and primarily on the State of Hawaii Department of Transportation right of entry easement land, soil sample results have identified concentrations of lead in the soil as high as 25,000 milligrams per kilogram (mg/kg). The total lead results are well above the HDOH Tier 1 EAL for Commercial/Industrial Land-use (800 mg/kg) and the HDOH Tier 1 EAL for Unrestricted Land-use (200 mg/kg) and are considered gross soil contamination. The DOH HEER office would require that lead-contaminated that meets the threshold for gross contamination be a priority for remedial action.

Additionally, these samples exhibited hazardous waste characteristics well over the United States Environmental Protection Agencies Resource Conservation Recovery Act (RCRA) definition of lead as a hazardous waste (5.0 milligrams per liter [mg/L]). Results from RCRA toxicity characteristic leaching procedure testing (TCLP) on samples from this area have had concentrations of leachable lead high as 31.8 mg/L on a sample with a total lead concentration of 8,820 mg/kg, let alone other samples as high as 25,000 mg/kg. There is no facility in the State of Hawaii that can accept lead-impacted soil that has a TCLP result higher than 5.0 mg/L.

One alternative that may potentially reduce the cost of remediating the soil would be to stabilize some portion of the soils that exceed the hazardous waste criterion so that their TCLP results were below the RCRA toxicity characteristic definition of a hazardous waste (TCLP lead <5.0 mg/L).

Materials

Batch 1

Triple Super Phosphate (TSP) was used as a soil additive to treat the contaminated soil that was removed from Hakalau Beach Park. To evaluate the effectiveness of TSP as a stabilizing agent on lead-impacted Hakalau soil, two (2) DUs that have previously been identified with high concentrations of lead were resampled to provide media for the bench test study.

TSP is a commercially available soil fertilizer than can also be used to reduce the mobility of lead in the soil. Phosphate is a compound made up of phosphorous (P) and

oxygen (O) and phosphorous atoms that act as an anion that binds readily to lead cations. TSP can also be combined with different ions to impact solubility under acidic conditions. It is most commonly used as fertilizer produced from phosphate rock and phosphoric acid and is technically known as calcium dihydrogen phosphate and monocalcium phosphate, [Ca $(H_2PO_4)_2.H_2O$]. Treatability studies for in situ lead stabilization that used phosphate-based binders found a significant reduction in the bioavailable lead in soil when it was amended with TSP (Hettiarachchi et al. 2001 and Gene 2008).

Batch 2

Portland Cement is composed of 60-67% Lime (CaO), 17-25% Silica (SiO2), 3-8% Alumina (Al2O3), 0.5-6% Iron oxide (Fe2O3), and 0.1-4% Magnesia (MgO). It is a global commodity used in making cement and is widely available in bulk quantities to supply the construction industry. Portland cement is the binding agent in industrial concrete and is alkaline and a good candidate for buffering acids (pH of 11). This property was evaluated as a way to reduce the mobility of lead in the bulk soil sample collected for Hakalau using a cost-effective ubiquitous material. The Portland Cement was also selected as a potential way to convert loose soil into a potentially structurally sound material that would be amenable to be put into a consolidation cell or a form that would be easily transported to a facility for disposal.

Methodology

As part of the remedial alternative evaluation, in May of 2022, KPC collected a bulk sample using ISM from the most heavily impacted areas below the bridge on the southern side of the Hakalau stream bench from DUs 32 and 33 which had been documented in previous investigations as having the highest total lead concentrations in the project area (DUs 32 and 33 were composed of the consolidated DUs 1, 2, 11, and 21).

The two (2) DUs sampled for the bench test material were DU32 and DU33, and these are confirmed as the locations for some of the highest lead concentrations in the Hakalau Bridge study area. Surface soil samples (0-3 inches bgs) were collected via the incremental sampling method (ISM) method from both DUs which provided a bulk sample that was used for the treatability test.

Fifty 200-gram incremental sampling locations were collected which resulted in 10 kg of soil collected from DUs 32 and 33 and placed into a new 5-gallon plastic bucket. On July 26th, 2022, all of the soil (a total of 23.290 kg) was poured into a 14-gallon open-head poly drum and was hand-pushed (rolled) for 30-minutes to ensure all soil was completely homogenized before the TSP addition.

After the soil was homogenized for the Batch 1 evaluation, aliquots of each bulk sample were submitted for the total lead and then TCLP lead. Each Aliquot will be a multi-

increment subsample from the bulk sample this will consist of 50 twenty (2) gram increments (1 kg total sample).

A 50-lb bag of granulated TSP was purchased locally on the island for the TSP addition. Using a large mill, the TSP material was ground down to a fine powder-like material. On July 28th, 2022, two (2) KPC team members conducted the bench test process. One (1) kg of TSP was weighed out per one (1) kg of soil sample. TSP was added at increments of 5% (50 grams), 10% (100 grams), 15% (150 grams), and 20% (200 grams). The TSP additives were mixed thoroughly with each soil sample by kneading the mixture in a bowl with gloved hands. Following the mixing, the treated soil samples were placed into plastic Ziploc Bags with their unique sample ID reflecting the TSP addition percentage in preparation for laboratory analysis.

Next, the second batch (Batch 2) of soil samples was weighed out and placed in five (5) trays for the Portland Cement addition. Portland Cement was added to the sample to decrease the leachability properties of the lead. A total of 500 grams of soil was weighed out and TSP was added at increments of 0 grams, 25 grams, 50 grams, 75 grams, and 100 grams (a total of 5 aliquots of soil). Next, the Portland cement was added following a ratio of 1 to 3, Portland cement to each of the 5 aliquots TSP treated soil. Water was not added since there was enough soil moister to allow complete mixing to achieve the desired consistency (a thick slurry resembling wet cookie dough). The mixture of soil, TSP, and Portland cement was then formed into cylindrical shapes, allowed to cure for 72 hours, crushed, bagged, and sent to the lab for TCLP analysis to evaluate whether a lead is stabilized using Portland Cement and TSP-treated soil mixture.

All samples were bagged and shipped overnight to Eurofins Calscience, Tustin, California for lead-level and TCLP analysis testing.

Results

Based on the laboratory results, the TSP addition was successful in reducing the lead concentrations in the soil. Table 1 presents the results from the bench test study. Sample ID HAKA_BT_A and the duplicate sample (HAKA_BT_AZ) were control samples and therefore were not treated with TSP and were analyzed for total lead, TCLP lead, and SPLP west lead. The control showed total lead results of approximately 11,000 mg/kg and TCLP results of approximately 23 mg/l. Both values were over the Reporting Limits. The lowest addition of TSP was 5%, and that resulted in TCLP lead concentrations below the laboratories method reporting limit (Non-Detectable [ND]).

Batch 2 – Portland Cement showed similar efficacy, where soil with 0% TSP and 33% by mass of Portland cement added to the aliquot, TCLP results were also ND. These results show that the addition of TSP and Portland Cement effectively reduces lead concentrations in the lead-contaminated soil.

Conclusions

The study concluded that TSP was effective at reducing the toxicity of the lead in the areas where the highest total lead. The total lead concentrations from ISM soil samples collected from DU32 and DU33 were 11,400 mg/kg and had a respective TCLP result of 25.6 mg/l, which is well above the RCRA toxicity characteristic for the lead of 5.0 mg/L. However, if TSP is added to an aliquot from this same ISM from DU32 and DU33 at a concentration of just 5% of the total soil mass, the TCLP results were shown to reduce concentrations below the laboratories method reporting limit (or in other words non-detectable dissolved lead). This was achieved without any additional pH buffering additives and demonstrated that immobilization/ stabilization using TSP is highly effective and has ratios that are economically feasible.

Portland Cement was added to the impacted soil at a typical mass ratio for making concrete (1:3). Samples of the soil were weighed, and Portland Cement was mixed with the soil, no other sand or gravel was added and because the soil already had a high moisture content, water was not added to the mix. After the mix was cured, samples were pulverized and submitted to Eurofins for analysis. TCLP analysis on this final material also showed that Portland cement can reduce the TCLP result to below the laboratory reporting limit without the addition of TSP. All of the aliquots of the primary ISM soil sample for DUs 32 to 33 to which Portland Cement was added exhibited structural properties similar to a bone-dry terracotta clay (unfired variety). It was durable but could be pulverized back into a powder with relative ease using a 50 lb millstone.

The bench test demonstrated that the addition of TSP and Portland Cement to reduce the leachability of lead is effective and could be used as a treatability recommendation for the lead-contaminated soil at Hakalau Beach Park. The TSP addition is a cost-effective on-site solution for remedial action for the lead-contaminated soil and could be applied on a larger scale to successfully treat contaminated DUs in the Beach Park.

Table 1: Bench Test Laboratory Results

Sample ID	Sample Treatment Description	Analysis	Unit	Results	RL
HAKA_BT_A	Not treated with TSP	Total Lead	mg/kg	**10,900**	8.0
		TCLP Lead	mg/l	**25.6**	0.500
		SPLP West Lead	mg/l	**4.32**	0.0300
HAKA_BT_AZ	Duplicate sample to HAKA_BT_A	Total Lead	mg/kg	**11,400**	8.0
		TCLP Lead	mg/l	**22.9**	0.500
		SPLP West Lead	mg/l	NA	-
HAKA_BT_B	+5% TSP	TCLP Lead	mg/l	ND	0.500
HAKA_BT_C	+10% TSP	TCLP Lead	mg/l	ND	0.500
HAKA_BT_D	+15% TSP	TCLP Lead	mg/l	ND	0.500
HAKA_BT_E	+20% TSP	TCLP Lead	mg/l	ND	0.500
HAKA_BTPC_A	+0% TSP with 33% by mass Portland cement	TCLP Lead	mg/l	ND	0.500
HAKA_BTPC_B	+5% TSP with 33% by mass Portland cement	TCLP Lead	mg/l	ND	0.500
HAKA_BTPC_C	+10% TSP with 33% by mass Portland cement	TCLP Lead	mg/l	ND	0.500
HAKA_BTPC_D	+15% TSP with 33% by mass Portland cement	TCLP Lead	mg/l	ND	0.500
HAKA_BTPC_E	+20% TSP with 33% by mass Portland cement	TCLP Lead	mg/l	ND	0.500

Notes:

200 mg/kg Lead or greater exceeds the State of Hawaii Department of Health Tier I EALs, Direct Exposure Action Levels - Unrestricted Land-Use Scenario presented in Table I-1 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

800 mg/kg Lead or greater exceeds the State of Hawaii Department of Health Tier I EALs, Direct Exposure Action Levels - Commercial/Industrial Land-Use Scenario presented in Table I-2 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

800 mg/kg Lead or greater exceeds the State of Hawaii Department of Health Tier I EALs, Direct Exposure Action Levels - Construction/Trench Worker Exposure Scenario presented in Table I-3 of the Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (Fall 2017 Edition).

mg/kg = milligram(s) per kilogram (i.e. parts per million (ppm)).

mg/l = milligram(s) per liter (i.e. parts per million (ppm)).

NA = Not Analyzed. Indicates that the sample was not requested to be analyzed by the laboratory for the specified analysis.

ND = Not Detected. Indicates that the analyte was not detected in concentrations above the laboratories method reporting limit.

RL= Reporting Limit.