Final
Second Quarter 2013 - Quarterly Groundwater Monitoring Report Outside Tunnel Wells

Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

DOH Facility ID: 9-102271
DOH Release ID: 990051, 010011, and 020028

July 2013

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH, HI 96860-3139

Contract Number N62742-12-D-1853, CTO 0002

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Prepared for:

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400 Marshall Road
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Prepared under:

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FINAL
SECOND QUARTER 2013 - QUARTERLY GROUNDWATER MONITORING REPORT
OUTSIDE TUNNEL WELLS
RED HILL BULK FUEL STORAGE FACILITY

Long-Term Groundwater and Soil Vapor Monitoring
Red Hill Bulk Fuel Storage Facility
Joint-Base Pearl Harbor-Hickam, Oahu, Hawaii

Prepared for:
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ACRONYMS AND ABBREVIATIONS

ACRONYMS/ ABBREVIATIONS	DEFINITION/MEANING
%	percent
COPC	Contaminant of Potential Concern
DLNR	State of Hawaii Department of Land and Natural Resources
DOH	State of Hawaii Department of Health
DON	Department of the Navy
EAL	Environmental Action Level
EPA	Environmental Protection Agency
ESI	Environmental Science International
F-76	Marine Diesel Fuel
ID	Identification
JBPHH	Joint Base Pearl Harbor-Hickam
JP-5	Jet Fuel Propellant-5
JP-8	Jet Fuel Propellant-8
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
µg/L	micrograms per liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAVFAC	Naval Facilities Engineering Command
NAVSUP FLC	Naval Supply Systems Command Fleet Logistics Center
N.D.	Not Detected
PAH	Polycyclic Aromatic Hydrocarbons
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
pH	hydrogen activity
QC	Quality Control
RHSF	Red Hill Bulk Fuel Storage Facility
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
TEC	The Environmental Company, Inc.
TPH-d	Total Petroleum Hydrocarbons as diesel
TPH-g	Total Petroleum Hydrocarbons as gasoline
U.S.	United States of America
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WP	Work Plan

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EXECUTIVE SUMMARY

This quarterly monitoring report presents the results of the second quarter 2013 groundwater sampling event conducted on April 24, 2013, at the outside tunnel wells of the Red Hill Bulk Fuel Storage Facility [RHSF], Joint Base Pearl Harbor-Hickam [JBPHH], Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. There are 18 active and 2 inactive underground storage tanks [USTs] located at the RHSF. The State of Hawaii Department of Health [DOH] Facility Identification [ID] number is 9-102271. The DOH Release ID numbers are 990051, 010011, and 020028.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF, under Naval Facilities Engineering Command [NAVFAC] Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved Work Plan [WP]/Sampling and Analysis Plan [SAP] prepared by Environmental Science International [ESI].

On April 24, 2013, ESI personnel collected groundwater samples from two outside tunnel monitoring wells (wells HDMW2253-03 and OWDFMW01). A summary of the analytical results is provided below.

- **HDMW2253-03** – Total Petroleum Hydrocarbons as diesel [TPH-d] (45 micrograms per liter [µg/L]), naphthalene (0.16 µg/L), and lead (0.102 µg/L) were detected. None of the Contaminants of Potential Concern [COPCs] were detected at concentrations above the DOH Environmental Action Levels [EALs] for drinking water toxicity or gross contamination.

- **OWDFMW01** – TPH-d (1,900 µg/L), acetone (84 µg/L), naphthalene (0.063 µg/L), and benzene (0.82 µg/L) were detected. TPH-d was detected at a concentration above the DOH EALs for both drinking water toxicity and gross contamination.

Since the wells were last sampled (January 2013), with the exception of TPH-d, groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. TPH-d concentrations decreased in well HDMW2253-03 and increased in well OWDFMW01 since the last sampling event in January 2013. TPH-d detected in HDMW2253-03 decreased to a concentration below the DOH EAL for both drinking water toxicity and gross contamination. The TPH-d concentration decreased from 600 µg/L during the last round of sampling to 45 µg/L during this round of sampling. TPH-d concentrations in well OWDFMW01 increased from 1,000 µg/L during the last round of sampling to 1,900 µg/L.

Based on the results of the assessment, continued groundwater monitoring at the RHSF is recommended. If the TPH-d concentrations significantly increase, the monitoring frequency should be increased to monthly, even though the two outside wells are not included in the RHSF Groundwater Protection Plan.

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SECTION 1 – INTRODUCTION

This quarterly monitoring report presents the results of the second quarter 2013 groundwater sampling event conducted on April 24, 2013, at the outside tunnel wells of the RHSF, JBPHH, Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. The purpose of the sampling is to (1) assess the condition of groundwater beneath and in the vicinity of the RHSF with respect to chemical constituents associated with jet fuel propellant and marine diesel fuel, and (2) to ensure the Navy remains in compliance with DOH UST release response requirements as described in Hawaii Administrative Rules 11-281 Subchapter 7, Release Response Action (DOH, 2000). The DOH Facility ID number for the RHSF is 9-102271. The DOH Release ID numbers are 990051, 010011, and 020028.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF, under NAVFAC Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved WP/SAP prepared by ESI (ESI, 2012).

1.1 SITE DESCRIPTION

The RHSF is located on federal government land (zoned F1- Military and Federal), located in Halawa Heights, approximately 2.5 miles northeast of Pearl Harbor (Figure 1). It is located on a low ridge on the western edge of the Koolau Mountain Range that divides Halawa Valley from Moanalua Valley. The RHSF is bordered on the north by Halawa Correctional Facility and private businesses, on the west by the United States of America [U.S.] Coast Guard reservation, on the south by residential neighborhoods, and on the east by Moanalua Valley. A quarry is located less than a quarter mile away to the northwest. The RHSF occupies 144 acres of land and the majority of the site is at an elevation of approximately 200 to 500 feet above mean sea level.

The RHSF contains 18 active and 2 inactive USTs, which are operated by Naval Supply Systems Command Fleet Logistics Center [NAVSUP FLC] Pearl Harbor (formerly Fleet and Industrial Supply Center). Each UST has a capacity of approximately 12.5 million gallons. The RHSF is located approximately 100 feet above the basal aquifer. The USTs contain Jet Fuel Propellant-5 [JP-5], Jet Fuel Propellant-8 [JP-8], and Marine Diesel Fuel [F-76]. The current status of each of the USTs is summarized in Table 1.1.

Two groundwater monitoring wells (well HDMW2253-03 and OWDFMW01) are located outside of the RHSF tunnel system (Figure 2). Well HDMW2253-03 is located at the Halawa Correctional Facility (outside the RHSF) and well OWDFMW01 is located at the Oily Waste Disposal Facility near Adit 3. Five groundwater monitoring wells (wells RHMW01, RHMW02, RHMW03, RHMW05, and RHMW2254-01) are located within the RHSF lower access tunnel. Monitoring data for the five wells located inside the tunnel are included in a separate report.

Monitoring wells RHMW01, RHMW02, RHMW03, and RHMW05 are located inside the underground tunnels. Monitoring well RHMW2254-01 is located inside the infiltration gallery of

the Department of the Navy [DON] Well 2254-01. DON Well 2254-01 is located approximately 2,400 feet downgradient of the USTs and provides approximately 24 percent [%] of the potable water to the Pearl Harbor System, which serves approximately 52,200 military customers. NAVFAC Public Works Department operates the infiltration gallery and DON Well 2254-01.

TABLE 1.1
Current Status of the USTs
Red Hill Bulk Fuel Storage Facility
April 2013 Quarterly Monitoring Report

Tank Identification	Fuel Type	Status	Capacity
F-1	None	Inactive	12.5 million gallons
F-2	JP-8	Active	12.5 million gallons
F-3	JP-8	Active	12.5 million gallons
F-4	JP-8	Active	12.5 million gallons
F-5	JP-8	Active	12.5 million gallons
F-6	JP-8	Active	12.5 million gallons
F-7	JP-5	Active	12.5 million gallons
F-8	JP-5	Active	12.5 million gallons
F-9	JP-5	Active	12.5 million gallons
F-10	JP-5	Active	12.5 million gallons
F-11	JP-5	Active	12.5 million gallons
F-12	JP-5	Active	12.5 million gallons
F-13	F-76	Active	12.5 million gallons
F-14	F-76	Active	12.5 million gallons
F-15	F-76	Active	12.5 million gallons
F-16	F-76	Active	12.5 million gallons
F-17	JP-5	Active	12.5 million gallons
F-18	JP-5	Active	12.5 million gallons
F-19	None	Inactive	12.5 million gallons
F-20	JP-5	Active	12.5 million gallons

F-76 Marine Diesel Fuel
JP-5 Jet Fuel Propellant-5
JP-8 Jet Fuel Propellant-8

1.2 PHYSICAL SETTINGS

Climatological conditions in the area of the RHSF consist of warm to moderate temperatures and low to moderate rainfall. The RHSF is leeward of the prevailing northeasterly trade winds. The average annual precipitation is approximately 40 inches, which occurs mainly between November and April (State of Hawaii Department of Land and Natural Resources [DLNR], 1986). Annual pan evaporation is approximately 75 inches (DLNR, 1985). Average temperatures range from the low 60's to high 80's (degrees Fahrenheit) (Atlas of Hawaii, 1983).

Oahu consists of the eroded remnants of two shield volcanoes, Waianae and Koolau. The RHSF is located on the southwest flank of the Koolau volcanic shield. Lavas erupted during the shield-building phase of the volcano belong to the *Koolau Volcanic Series* (Stearns and Vaksvik, 1935). Following formation of the Koolau shield, a long period of volcanic quiescence occurred, during which the shield was deeply eroded. Following this erosional period, eruptive activity resumed. Lavas and pyroclastic material erupted during this period belong to the *Honolulu Volcanic Series* (Stearns and Vaksvik, 1935).

In the immediate area of the RHSF, Koolau Volcanic Series lavas dominate, although there are consolidated and unconsolidated non-calcareous deposits in the vicinity that consist of alluvium generated during erosion of the Koolau volcanic shield. South-southwest of the Site, and in isolated exposures to the west, are pyroclastic deposits formed during eruptions from three Honolulu Volcanic Series vents, Salt Lake, Aliamanu, and Makalapa (Stearns and Vaksvik, 1935). Based on established geology and records of the drilled wells (Stearns and Vaksvik, 1938), the RHSF is underlain by Koolau Volcanic Series basalts. The area of the RHSF is classified as *Rock Land*, where 25 to 90% of the land surface is covered by exposed rock and there are only shallow soils (Foote, et al., 1972).

Groundwater in Hawaii exists in two principal types of aquifers. The first and most important type, in terms of drinking water resources, is the basal aquifer. The basal aquifer exists as a lens of fresh water floating on and displacing seawater within the pore spaces, fractures, and voids of the basalt that forms the underlying mass of each Hawaiian island. In parts of Oahu, groundwater in the basal aquifer is confined by the overlying caprock and is under pressure. Waters that flow freely to the surface from wells that tap the basal aquifer are referred to as *artesian*.

The second type of aquifer is the caprock aquifer, which consists of various kinds of unconfined and semi-confined groundwater. Commonly, the caprock consists of a thick sequence of nearly impermeable clays, coral, and basalt, which separates the caprock aquifer from the basal aquifer. The impermeable nature of these materials and the artesian nature of the basal aquifer severely restrict the downward migration of groundwater from the upper caprock aquifer. In the area of the RHSF, there is no discernible caprock.

Groundwater in the area of the RHSF is part of the *Waimalu Aquifer System* of the *Pearl Harbor Aquifer Sector.* The aquifer is classified as a basal, unconfined, flank-type; and is currently used as a drinking water source. The aquifer is considered fresh with less than 250 milligrams per liter of chloride and is considered an irreplaceable resource with a high vulnerability to contamination (Mink and Lau, 1990).

The nearest drinking water supply well is the DON Well 2254-01, located in the infiltration gallery within the RHSF. DON Well 2254-01 is located approximately 2,400 feet downgradient of the USTs (Figure 2).

1.3 BACKGROUND

The RHSF was constructed by the U.S. Government in the early 1940s. Twenty USTs and a series of tunnels were constructed to supply fuel to the Navy. The USTs were constructed of steel and they currently contain JP-5, JP-8, and F-76. Several tanks in the past have stored DON special fuel oil, DON distillate, aviation gasoline, and motor gasoline (Environet, 2010). The fueling system is a self-contained underground unit that was installed into native rock comprised primarily of basalt with some interbedded tuffs and breccias (Environet, 2010). Each

UST measures approximately 245 feet in height and 100 feet in diameter. The upper domes of the tanks lie at depths varying between 100 feet and 200 feet below ground surface.

In response to increasing concentrations of COPCs in the groundwater monitoring wells within the facility (specifically RHMW02) during the 2008 sampling events, quarterly groundwater monitoring was initiated in 2009 at the outside tunnel wells.

In 2009, groundwater samples were collected from wells RHMW04, OWDFMW01, and HDMW2253-03. Samples were collected in August and October 2009. None of the COPCs were detected at concentrations exceeding the gross contamination or drinking water toxicity DOH EALs.

In 2010, groundwater samples were collected from wells RHMW04, OWDFMW01, and HDMW2253-03. Samples were collected from well RHMW04 in January and April 2010. Samples were collected from well OWDFMW01 in January, April, and October 2010. Samples were collected from well HDMW2253-03 in January, April, July and October 2010. The COPCs concentrations exceeding DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the gross contamination and drinking water toxicity DOH EAL in January 2010 (The Environmental Company, Inc. [TEC], 2010a).
- **OWDFMW01** – TPH-d was detected at a concentration above the gross contamination and drinking water toxicity DOH EALs in January and April 2010 (TEC, 2010a; TEC, 2010b).

In 2011, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03. Samples were collected in January, April, July, and October 2011. None of the COPCs were detected at concentrations exceeding the gross contamination or drinking water toxicity DOH EALs.

In 2012, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03. Samples were collected in January, April, July, and November 2012. TPH-d was detected at a concentration above the DOH EALs in samples collected from wells HDMW2253-03 and OWDFMW01 (Environet, 2012; ESI, 2013a). The COPCs concentrations exceeding DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in April and November 2012.
- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in April 2012.

In January 2013, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03 (ESI 2013b). TPH-d was detected at a concentration above the DOH EALs in samples collected from wells HDMW2253-03 and OWDFMW01. The COPCs concentrations exceeding DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in January 2013.
- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in January 2013.

1.3.1 Previous Reports

The following groundwater monitoring reports were previously submitted to the DOH:

1. Groundwater Monitoring Report, August 2009 (submitted September 2009).
2. Groundwater Monitoring Report, October 2009 (submitted December 2009).
3. Groundwater Monitoring Report, January, 2010 (submitted April 2010).
4. Groundwater Monitoring Report, April 2010 (submitted May 2010).
5. Groundwater Monitoring Report, July 2010 (submitted August 2010).
6. Groundwater Monitoring Report, October 2010 (submitted December 2010).
7. Groundwater Monitoring Report, January 2011 (submitted March 2011).
8. Groundwater Monitoring Report, April 2011 (submitted June 2011).
9. Groundwater Monitoring Report, July 2011 (submitted September 2011).
10. Groundwater Monitoring Report, October 2011 (submitted December 2011).
11. Groundwater Monitoring Report, January 2012 (submitted March 2012).
12. Groundwater Monitoring Report, April 2012 (submitted July 2012).
13. Groundwater Monitoring Report, July 2012 (submitted August 2012).
14. Groundwater Monitoring Report, November 2012 (submitted January 2013).
15. Groundwater Monitoring Report, January 2013 (submitted April 2013).

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SECTION 2 – GROUNDWATER SAMPLING

On April 24, 2013, ESI personnel collected groundwater samples from two monitoring wells (wells OWDFMW01 and HDMW2253-03). The samples were collected in accordance with DOH UST release response requirements and the RHSF Groundwater Protection Plan (TEC, 2008). Prior to purging and sampling, the depth to groundwater and the depth to the bottom of the wells were measured. Well OWDFMW01 was measured by ESI using a Geotech oil/water interface probe. Well HDMW2253-03 was measured by the DLNR using their Geotech oil/water interface probe. The measurements are included in the groundwater sampling logs. No measurable product, sheen, or petroleum hydrocarbon odor was observed in either well.

2.1 GROUNDWATER SAMPLING

Prior to collecting groundwater samples, disposable bailers were used to purge groundwater from the monitoring wells. Wells OWDFMW01 and HDMW2253-03 were purged at a rate of 0.25 and 0.29 liters per minute, respectively.

Water quality parameters were monitored on a periodic basis during well purging. The water quality parameters that were measured included hydrogen activity [pH], temperature, conductivity, dissolved oxygen, and oxidation reduction potential. The water quality parameters were evaluated to demonstrate that the natural characteristics of the aquifer formation water were present within the monitoring well before collecting the sample. At least four readings were collected during the purging process. Purging was considered complete when at least three consecutive water quality measurements stabilized within approximately 10%. The readings were recorded on groundwater monitoring logs which are included in Appendix A. The field notes are included in Appendix B.

When the water quality parameters stabilized, groundwater samples were collected from the wells. The disposable bailers were used to collect the groundwater samples from the monitoring wells. For each monitoring well, the groundwater samples were collected no more than two hours after purging was completed to prevent groundwater interaction with the monitoring well casing and atmosphere. Samples collected for dissolved lead were filtered in the field using a peristaltic pump and a 0.45 micron filter.

2.2 ANALYTICAL RESULTS

The samples were analyzed for TPH-d using U.S. Environmental Protection Agency [EPA] Method 8015M, Total Petroleum Hydrocarbons as gasoline [TPH-g] and Volatile Organic Compounds [VOCs] using EPA Method 8260B, Polycyclic Aromatic Hydrocarbons [PAHs] using EPA Method 8270C SIM, and dissolved lead using EPA Method 6020. The analytical results are summarized below and in Table 2.1. A copy of the laboratory report is included in Appendix C.

- **HDMW2253-03** – TPH-d (45 µg/L), naphthalene (0.16 µg/L), and lead (0.102 µg/L) were detected. None of the COPCs were detected at concentrations above the DOH EALs for drinking water toxicity or gross contamination.

- **OWDFMW01** – TPH-d (1,900 µg/L), acetone (84 µg/L), naphthalene (0.063 µg/L), and benzene (0.82 µg/L) were detected. TPH-d was detected at a concentration above the DOH EALs for both drinking water toxicity and gross contamination.

2.2.1 Groundwater Contaminant Trends

Historical groundwater contaminant concentration trends of COPCs that exceed the DOH EALs are presented in Appendix D. A summary of groundwater contaminant trends are provided below.

- **HDMW2253-03** – TPH-d detected during this round of quarterly sampling decreased to concentrations below the DOH EALs for both drinking water toxicity and gross contamination. TPH-d concentrations last exceeded the DOH EALs for both drinking water toxicity and gross contamination in January 2013 (600 µg/L). Naphthalene and lead were also detected but remained at low concentrations below DOH EALs, consistent with historical results.

- **OWDFMW01** – With the exception of TPH-d, groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. TPH-d concentrations detected during this round of sampling were above the DOH EALs for both drinking water toxicity and gross contamination, and remained between the concentrations detected in November 2012 and January 2013.

Historical groundwater contaminant concentrations above the DOH EALs for both drinking water toxicity and gross contamination are presented in Appendix D.

2.3 WASTE DISPOSAL

The purged groundwater and decontamination water generated during sampling of the wells was stored in a 55-gallon drum along with the purged water and decontamination water from the inside tunnel wells. The drum was stored onsite at Adit 3. On June 5, 2013, the drum of water was picked up by Pacific Commercial Services, LLC and disposed at Unitek Solvent Services, Inc. The waste disposal manifest is included in Appendix E.

TABLE 2.1
Analytical Results for Groundwater Sampling (April 24, 2013)
Red Hill Bulk Fuel Storage Facility
April 2013 Quarterly Monitoring Report

Method	Chemical	DOH EALs		OWDFMW01 (ES025)					OWDFMW01 (ES026) (Dup)					HDMW2253-03 (ES027)				
		Drinking Water Toxicity	Gross Contamination	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL
EPA 8015B	TPH-d	190	100	**1,900**	HD	50	20	15	**1,600**	HD	50	20	15	45	J	50	20	15
EPA 8260B	TPH-g	100	100	N.D.	U	50	30	13	N.D.	U	50	30	13	N.D.	U	50	30	13
EPA 8270C SIM	Acenaphthene	370	20	N.D.	U	0.2	0.051	0.021	N.D.	U	0.2	0.050	0.021	N.D.	U	0.21	0.052	0.021
	Acenaphthylene	240	2,000	N.D.	U	0.2	0.051	0.018	N.D.	U	0.2	0.050	0.018	N.D.	U	0.21	0.052	0.019
	Anthracene	1,800	22	N.D.	U	0.2	0.051	0.035	N.D.	U	0.2	0.050	0.034	N.D.	U	0.21	0.052	0.035
	Benzo[a]anthracene	0.092	4.7	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.050	0.024	N.D.	U	0.21	0.052	0.025
	Benzo[g,h,i]perylene	1,500	0.13	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.050	0.022	N.D.	U	0.21	0.052	0.023
	Benzo[a]pyrene	0.2	0.81	N.D.	U	0.2	0.051	0.037	N.D.	U	0.2	0.050	0.037	N.D.	U	0.21	0.052	0.038
	Benzo[b]fluoranthene	0.092	0.75	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	N.D.	U	0.21	0.052	0.026
	Benzo[k]fluoranthene	0.92	0.4	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.050	0.024	N.D.	U	0.21	0.052	0.024
	Chrysene	9.2	1	N.D.	U	0.2	0.051	0.019	N.D.	U	0.2	0.050	0.019	N.D.	U	0.21	0.052	0.020
	Dibenzo[a,h]anthracene	0.0092	0.52	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.050	0.027	N.D.	U	0.21	0.052	0.028
	Fluoranthene	1,500	130	N.D.	U	0.2	0.051	0.028	N.D.	U	0.2	0.050	0.027	N.D.	U	0.21	0.052	0.028
	Fluorene	240	950	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	N.D.	U	0.21	0.052	0.025
	Indeno[1,2,3-cd]pyrene	0.092	0.095	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.050	0.022	N.D.	U	0.21	0.052	0.023
	1,-Methylnaphthalene	4.7	10	N.D.	U	0.2	0.051	0.029	N.D.	U	0.2	0.050	0.029	N.D.	U	0.21	0.052	0.029
	2,-Methylnaphthalene	24	10	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.050	0.027	N.D.	U	0.21	0.052	0.027
	Naphthalene	17	21	0.063	J	0.2	0.051	0.023	0.068	J	0.2	0.050	0.023	0.16	J	0.21	0.052	0.024
	Phenanthrene	240	410	N.D.	U	0.2	0.051	0.031	N.D.	U	0.2	0.050	0.031	N.D.	U	0.21	0.052	0.032
	Pyrene	180	68	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	N.D.	U	0.21	0.052	0.026
EPA 8260B	1,1,1-Trichloroethane	200	970	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30
	1,1,2-Trichloroethane	5	50,000	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38
	1,1-Dichloroethane	2.4	50,000	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28
	1,1-Dichloroethylene	7	1,500	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43
	1,2,3-Trichloropropane	0.6	50,000	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64
	1,2,4-Trichlorobenzene	70	3,000	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5
	1,2-Dibromo-3- chloropropane	0.04	10	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2
	1,2-Dibromoethane	0.04	50,000	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36
	1,2-Dichlorobenzene	600	10	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46
	1,2-Dichloroethane	0.15	7,000	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24
	1,2-Dichloropropane	5	10	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42
	1,3-Dichlorobenzene	180	5	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4
	1,3-Dichloropropene (total of cis/trans)	0.43	50,000	N.D.	U	2.0	1.0	0.25	N.D.	U	2.0	1.0	0.25	N.D.	U	2.0	1.0	0.25
	1,4-Dichlorobenzene	75	5	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43
	Acetone	22,000	20,000	84	ICH	20	10	6.0	86	ICH	20	10	6.0	N.D.	ICH, U	20	10	6.0
	Benzene	5	170	0.82	J	1.0	0.5	0.14	0.67	J	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14
	Bromodichloromethane	0.12	50,000	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21
	Bromoform	80	510	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50
	Bromomethane	8.7	50,000	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9
	Carbon Tetrachloride	5	520	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23
	Chlorobenzene	100	50	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17
	Chloroethane	21,000	16	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3
	Chloroform	70	2,400	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46
	Chloromethane	1.8	50,000	N.D.	IJ, U	10	2.0	1.8	N.D.	IJ, U	10	2.0	1.8	N.D.	IJ, U	10	2.0	1.8
	cis-1,2-Dichloroethylene	70	50,000	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48
	Dibromochloromethane	0.16	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25
	Ethylbenzene	700	30	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14
	Hexachlorobutadiene	0.86	6	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32
	Methyl ethyl ketone (2-Butanone)	7,100	8,400	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2
	Methyl isobutyl ketone (4-Methyl-2-Pentanone)	2,000	1300	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4
	Methyl tert-butyl Ether	12	5	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31
	Methylene chloride	4.8	9,100	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64
	Styrene	100	10	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17
	Tetrachloroethane, 1,1,1,2-	0.52	50,000	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40
	Tetrachloroethane, 1,1,2,2-	0.067	500	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41
	Tetrachloroethylene	5	170	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39
	Toluene	1,000	40	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24
	trans-1,2- Dichloroethylene	100	260	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37
	Trichloroethylene	5	310	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37
	Vinyl chloride	2	3,400	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30
	Xylenes	10,000	20	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23
EPA 6020	Dissolved Lead	15	50,000	N.D.	U	1.0	0.2	0.0898	N.D.	U	1	0.2	0.0898	0.102	J	1	0.2	0.0898

The data are in micrograms per liter (µg/L). Shaded values exceeded the DOH EALs.

DOH EALs DOH Tier 1 Environmental Action Levels for groundwater where groundwater is a current drinking water source and surface water is greater than 150 meters from the site (DOH, Fall 2011).
DL Detection Limit or Method Detection Limit (MDL)
EPA Environmental Protection Agency
HD The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
ICH Initial calibration verification recovery above method control limit for this analyte.
IJ Calibration verification recovery above method control limit for this analyte.
J Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
LOD Limit of Detection
LOQ Limit of Quantitation
N.D. Not Detected
Q Qualifiers
TPH-g Total Petroleum Hydrocarbons as gasoline
TPH-d Total Petroleum Hydrocarbons as diesel
U Undetected at DL and is reported as less than the LOD.

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SECTION 3 – DATA QUALITY ASSESSMENT

A data quality assessment, which consists of a review of the overall groundwater sample collection and analysis process, was performed in order to determine whether the analytical data generated meet the quality objectives for the project. The field Quality Control [QC] program consisted of standardized sample collection and management procedures, and the collection of field duplicate samples, matrix spike samples, and trip blank samples. The laboratory quality assurance program consisted of the use of standard analytical methods and the preparation and analyses of Matrix Spike [MS]/Matrix Spike Duplicate [MSD] samples, surrogate spikes, blanks, Laboratory Control Samples [LCS] and Laboratory Control Sample Duplicate [LCSD].

3.1 Data Validation and Assessment

The objective of data validation is to provide data of known quality for project decisions. Data quality is judged in terms of Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity [PARCCS]. A number of factors may affect the quality of data, including: sample collection methods, sample analysis methods, and adherence to established procedures for sample collection, preservation, management, shipment, and analysis.

Precision

Precision is defined as the reproducibility of replicate measurements. Precision is evaluated by Relative Percentage Difference [RPD] of field duplicates and laboratory LCS/LCSD or MS/MSD results. Field duplicate and MS/MSD samples were collected at a rate of approximately 10% of project samples. Field duplicates were sent to the laboratory along with the primary samples.

For this monitoring event, the RPDs for MS/MSD and LCS/LCSD pairs were all within the acceptable range except for 1,1-dichloroethylene (22%) and acetone (31%). As neither analyte was detected at a concentration within an order of magnitude of the EAL, this is unlikely to affect data usability. The RPDs of detected analytes for the primary and field duplicate samples (ES025 and ES026) are provided in Table 3.1. A precision of less than 50% for duplicate pairs is required by the DoN Project Procedures Manual to be considered acceptable (DoN 2007). The benzene and naphthalene concentrations detected in the samples were below the respective limits of quantitation [LOQs] implying a higher uncertainty for these results than for values detected above the LOQs (i.e. estimated, J-flagged). Consequently, the assigned RPDs signified the anticipated decrease in precision below the LOQs but were not indicative of a QC issue. Therefore the data precision is considered acceptable.

Accuracy

Accuracy is defined as the degree of conformity of a measurement to a standard or true value. Accuracy is evaluated through measurement of the percent recovery of an analyte in a reference standard or spiked sample. Accuracy limits for surrogates, laboratory control spike, MS, and MSD samples are established by the individual laboratory. The acceptance criteria for accuracy are dependent on the analytical method and are based on historical laboratory data.

Results for TPH-d in samples ES025 and ES026 were flagged “HD.” The laboratory indicated a mismatch between the calibration standard and the TPH-d chromatographic profile. Mismatches of this type are not uncommon. The chromatograms are not part of the standard laboratory package and were not reviewed by ESI.

All of the LCS and surrogate spike recoveries for analyzed constituents were within acceptable percent recovery limits. The MS and/or MSD recoveries were below the control limits for 1,1,2,2-tetrachloroethane and 1,1-dichloroethylene, and the associated sample results may be biased low. 1,1,2,2-Tetrachloroethane and 1,1-dichloroethylene were not detected in any of the groundwater samples. However the drinking water EAL for each contaminant is below the respective LODs. Because no HVOCs were detected in any sample, it is not likely that 1,1,2,2-tetrachloroethane or 1,1-dichloroethylene are present at concentrations above the EALs.

The MS and/or MSD recoveries were above the control limits for TPH-d, fluorene, phenanthrene, acetone, and trichloroethene. TPH-d was the only one of these contaminants detected at concentrations above the EAL. The LCS recovery for TPH-d was within control limits, so the high MS recoveries are likely due to matrix interference. The TPH-d concentrations detected in samples ES025 and ES026 exceeded the EALs by an order of magnitude, so it is unlikely that a slight high bias would be significant.

All other MS/MSD recoveries were within acceptable recovery limits; therefore, the data accuracy for this monitoring event is considered acceptable.

Representativeness

Representativeness is the degree that data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness was achieved by conducting sampling in compliance with the sample collection procedures described in the WP/SAP specifically written for this project (ESI, 2012).

Representativeness is also evaluated through the compliance with the sample holding time, sample preservation, and the analysis of blank samples, including method blank and trip blank samples. The sample holding time and sample preservation complied with the EPA criteria. For this sampling event, one trip blank was included in the cooler to assess contamination during sample transport for TPH-g and VOCs. There was no detection of TPH-g or VOCs in the method blank. Therefore, the groundwater sample data are considered representative of the groundwater quality on site.

Completeness

Completeness is defined as the overall percentage of valid analytical results (including estimated results) compared to the total number of analytical results reported by the laboratory. No data were rejected for this project, and therefore the completeness goal for this project (90%) was successfully met.

Comparability

Comparability expresses the confidence with which one data set can be compared to another data set. Comparability can be related to accuracy and precision because these quantities are measures of data reliability. Data, with acceptable precision and accuracy, are considered comparable if collection techniques, analytical procedures, methods and reporting are equivalent. For this monitoring event, the samples were collected using approaches consistent with those in the previous events, and the same analytical methods/procedures were used to measure the concentration of COPCs. Therefore, the results are considered comparable within this data set and with the data collected from previous sampling events. The field and laboratory personnel followed standard operation procedures.

All TPH-g data through July 2010 was analyzed by EPA Method 8015; beginning in October 2010, EPA Method 8260B was used. There was no event where both methods were used, and so there is no way to directly compare the results using each method and determine if one method produces biased results. However, there is no reason to believe that using either method should bias the data, and the TPH-g data for all events should be comparable.

Between August 2009 and July 2010, naphthalene was analyzed for by both EPA Methods 8260B and 8270C, and both results were reported. Beginning in October 2010, only results using EPA Method 8270C were reported. Naphthalene was not detected in any well until November 2012, so comparability with older results should not be a concern. However, the low bias associated with EPA Method 8270C must be considered when making project decisions.

Sensitivity

The LOQs are established by the laboratory based on the LODs or instrument detection limits, historical data, and EPA limits established for the methods. The LOQs for samples may require adjustment due to matrix interference or if high levels of target analytes necessitate dilution before analysis. Matrix interference and sample dilutions have the effect of increasing the LOQs. Laboratory LODs and LOQs for several analytes differed from the LODs and LOQs in the WP/SAP because the laboratory updates them quarterly. LODs and LOQs for several analytes were greater than the DOH EALs (as stated in the WP/SAP) and therefore it is not possible to determine whether the analytes are present at concentrations greater than or equal to the DOH EALs. As suggested by the DOH Technical Guidance Manual, the project action level will be the LOQ for these analytes.

3.2 Data Assessment and Usability Conclusions

The PARCCS criteria were evaluated, and with a few exceptions, all criteria were met. These exceptions include the exceedances of recovery criteria for MS/MSDs for several VOCs and PAHs. Since the surrogate recoveries and the recoveries of the VOCs and PAHs in the LCS/LCSD are all within recovery criteria, the MS/MSD exceendaces are not considered to affect the usability of the data, but may indicate some matrix heterogeneity. TPH-d concentrations exceeded DOH EALs in well OWDFMW01, and may be biased slightly high;

however, since the data are consistent with data from previous events, it appears that the effect of this QC exceedance is not substantial, and the data is usable. The data assessment concludes that all data generated during this event are usable for their intended purpose.

TABLE 3.1
Quality Control Results for Groundwater Sampling (April 24, 2013)
Red Hill Bulk Fuel Storage Facility
April 2013 Quarterly Monitoring Report

Method	Chemical Constituent	DOH EALs		OWDFMW01 (ES025)					OWDFMW01 (ES026) (DUP)					RPD Duplicate (%)	ES Trip				
		Drinking Water Toxicity	Gross Contamination	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL		Results	Q	LOQ	LOD	DL
EPA 8015B	TPH-d	190	100	**1,900**	HD	50	20	15	**1,600**	HD	50	20	15	17.14	-	-	-	-	-
EPA 8260B	TPH-g	100	100	N.D.	U	50	30	13	N.D.	U	50	30	13	NA	N.D.	U	50	30	13
EPA 8270C SIM	Acenaphthene	370	20	N.D.	U	0.2	0.051	0.021	N.D.	U	0.2	0.050	0.021	NA	-	-	-	-	-
	Acenaphthylene	240	2,000	N.D.	U	0.2	0.051	0.018	N.D.	U	0.2	0.050	0.018	NA	-	-	-	-	-
	Anthracene	1,800	22	N.D.	U	0.2	0.051	0.035	N.D.	U	0.2	0.050	0.034	NA	-	-	-	-	-
	Benzo[a]anthracene	0.092	4.7	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.050	0.024	NA	-	-	-	-	-
	Benzo[g,h,i]perylene	1,500	0.13	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.050	0.022	NA	-	-	-	-	-
	Benzo[a]pyrene	0.2	0.81	N.D.	U	0.2	0.051	0.037	N.D.	U	0.2	0.050	0.037	NA	-	-	-	-	-
	Benzo[b]fluoranthene	0.092	0.75	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	NA	-	-	-	-	-
	Benzo[k]fluoranthene	0.92	0.4	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.050	0.024	NA	-	-	-	-	-
	Chrysene	9.2	1	N.D.	U	0.2	0.051	0.019	N.D.	U	0.2	0.050	0.019	NA	-	-	-	-	-
	Dibenzo[a,h]anthracene	0.0092	0.52	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.050	0.027	NA	-	-	-	-	-
	Fluoranthene	1,500	130	N.D.	U	0.2	0.051	0.028	N.D.	U	0.2	0.050	0.027	NA	-	-	-	-	-
	Fluorene	240	950	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	NA	-	-	-	-	-
	Indeno[1,2,3-cd]pyrene	0.092	0.095	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.050	0.022	NA	-	-	-	-	-
	1,-Methylnaphthalene	4.7	10	N.D.	U	0.2	0.051	0.029	N.D.	U	0.2	0.050	0.029	NA	-	-	-	-	-
	2,-Methylnaphthalene	24	10	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.050	0.027	NA	-	-	-	-	-
	Naphthalene	17	21	0.063	J	0.2	0.051	0.023	0.068	J	0.2	0.050	0.023	7.63	-	-	-	-	-
	Phenanthrene	240	410	N.D.	U	0.2	0.051	0.031	N.D.	U	0.2	0.050	0.031	NA	-	-	-	-	-
	Pyrene	180	68	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.050	0.025	NA	-	-	-	-	-
EPA 8260B	1,1,1-Trichloroethane	200	970	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30	NA	N.D.	U	5.0	0.5	0.30
	1,1,2-Trichloroethane	5	50,000	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38	NA	N.D.	U	1.0	0.5	0.38
	1,1-Dichloroethane	2.4	50,000	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28	NA	N.D.	U	5.0	0.5	0.28
	1,1-Dichloroethylene	7	1,500	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	NA	N.D.	U	1.0	0.5	0.43
	1,2,3-Trichloropropane	0.6	50,000	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	NA	N.D.	U	5.0	1.0	0.64
	1,2,4-Trichlorobenzene	70	3,000	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5	NA	N.D.	U	5.0	1.0	0.5
	1,2-Dibromo-3- chloropropane	0.04	10	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2	NA	N.D.	U	10	2.0	1.2
	1,2-Dibromoethane	0.04	50,000	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36	NA	N.D.	U	1.0	0.5	0.36
	1,2-Dichlorobenzene	600	10	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46	NA	N.D.	U	1.0	0.5	0.46
	1,2-Dichloroethane	0.15	7,000	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	NA	N.D.	U	1.0	0.5	0.24
	1,2-Dichloropropane	5	10	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42	NA	N.D.	U	5.0	0.5	0.42
	1,3-Dichlorobenzene	180	5	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4	NA	N.D.	U	1.0	0.5	0.4
	1,3-Dichloropropene (total of cis/trans)	0.43	50,000	N.D.	U	2.0	1.0	0.25	N.D.	U	2.0	1.0	0.25	NA	N.D.	U	2.0	1.0	0.25
	1,4-Dichlorobenzene	75	5	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	NA	N.D.	U	1.0	0.5	0.43
	Acetone	22,000	20,000	84	ICH	20	10	6.0	86	ICH	20	10	6.0	2.35	N.D.	ICH, U	20	10	6.0
	Benzene	5	170	0.82	J	1.0	0.5	0.14	0.67	J	1.0	0.5	0.14	20.13	N.D.	U	1.0	0.5	0.14
	Bromodichloromethane	0.12	50,000	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21	NA	N.D.	U	5.0	0.5	0.21
	Bromoform	80	510	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50	NA	N.D.	U	10	1.0	0.50
	Bromomethane	8.7	50,000	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9	NA	N.D.	U	20	5.0	3.9
	Carbon Tetrachloride	5	520	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23	NA	N.D.	U	1.0	0.5	0.23
	Chlorobenzene	100	50	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17	NA	N.D.	U	5.0	0.5	0.17
	Chloroethane	21,000	16	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3	NA	N.D.	U	10	5.0	2.3
	Chloroform	70	2,400	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46	NA	N.D.	U	5.0	0.5	0.46
	Chloromethane	1.8	50,000	N.D.	IJ, U	10	2.0	1.8	N.D.	IJ, U	10	2.0	1.8	NA	N.D.	IJ, U	10	2.0	1.8
	cis-1,2-Dichloroethylene	70	50,000	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48	NA	N.D.	U	1.0	0.5	0.48
	Dibromochloromethane	0.16	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	NA	N.D.	U	1.0	0.5	0.25
	Ethylbenzene	700	30	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	NA	N.D.	U	1.0	0.5	0.14
	Hexachlorobutadiene	0.86	6	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32	NA	N.D.	U	1.0	0.5	0.32
	Methyl ethyl ketone (2-Butanone)	7,100	8,400	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2	NA	N.D.	U	10	5.0	2.2
	Methyl isobutyl ketone (4-Methyl-2-Pentanone)	2,000	1300	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4	NA	N.D.	U	10	5.0	4.4
	Methyl tert-butyl Ether	12	5	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31	NA	N.D.	U	1.0	0.5	0.31
	Methylene chloride	4.8	9,100	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	NA	N.D.	U	5.0	1.0	0.64
	Styrene	100	10	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17	NA	N.D.	U	1.0	0.5	0.17
	Tetrachloroethane, 1,1,1,2-	0.52	50,000	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40	NA	N.D.	U	1.0	0.5	0.40
	Tetrachloroethane, 1,1,2,2-	0.067	500	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41	NA	N.D.	U	1.0	0.5	0.41
	Tetrachloroethylene	5	170	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39	NA	N.D.	U	5.0	0.5	0.39
	Toluene	1,000	40	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	NA	N.D.	U	1.0	0.5	0.24
	trans-1,2- Dichloroethylene	100	260	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	NA	N.D.	U	1.0	0.5	0.37
	Trichloroethylene	5	310	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	NA	N.D.	U	1.0	0.5	0.37
	Vinyl chloride	2	3,400	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30	NA	N.D.	U	1.0	0.5	0.30
	Xylenes	10,000	20	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23	NA	N.D.	U	11	1.5	0.23
EPA 6020	Dissolved Lead	15	50,000	N.D.	U	1.0	0.2	0.0898	N.D.	U	1	0.2	0.0898	NA	-	-	-	-	-

The data are in micrograms per liter (µg/L). Shaded values exceeded the DOH EALs.

DOH EALs DOH Tier 1 Environmental Action Levels for groundwater where groundwater is a current drinking water source and surface water is greater than 150 meters from the site (DOH, Fall 2011).
DL Detection Limit or Method Detection Limit (MDL)
EPA Environmental Protection Agency
ICH Initial calibration verification recovery above method control limit for this analyte.
IJ Calibration verification recovery above method control limit for this analyte.
J Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
LOD Limit of Detection
LOQ Limit of Quantitation
NA Both results for duplicate pair were non-detect, no RPD calculations
N.D. Not Detected
Q Qualifiers
TPH-g Total Petroleum Hydrocarbons as gasoline
TPH-d Total Petroleum Hydrocarbons as diesel
U Undetected at DL and is reported as less than the LOD.

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SECTION 4 – SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This quarterly monitoring report presents the results of groundwater sampling conducted on April 24, 2013, at the RHSF, JBPHH, Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. The DOH Facility ID number for the RHSF is 9-102271. The DOH Release ID numbers are 990051, 010011, and 020028.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF, under NAVFAC Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved WP/SAP prepared by ESI.

On April 24, 2013, ESI personnel collected groundwater samples from two monitoring wells (wells HDMW2253-03 and OWDFMW01). A summary of the analytical results is provided below.

- **HDMW2253-03** – TPH-d (45 µg/L), naphthalene (0.16 µg/L), and lead (0.102 µg/L) were detected. None of the COPCs were detected at concentrations above the DOH EALs for drinking water toxicity or gross contamination.

- **OWDFMW01** – TPH-d (1,900 µg/L), acetone (84 µg/L), naphthalene (0.063 µg/L), and benzene (0.82 µg/L) were detected. TPH-d was detected at a concentration above the DOH EALs for both drinking water toxicity and gross contamination.

Groundwater Contaminant Trends

Historical groundwater contaminant concentration trends of COPCs that exceed the DOH EALs are presented in Appendix D. A summary of groundwater contaminant trends are provided below.

- **HDMW2253-03** – Both TPH-d and naphthalene were detected. Naphthalene was last detected in July 2010. TPH-d concentrations detected during this round of quarterly sampling decreased to concentrations below the DOH EALs for both drinking water toxicity and gross contamination. TPH-d concentrations last exceeded the DOH EALs for both drinking water toxicity and gross contamination in January 2013 (600 µg/L).

- **OWDFMW01** – With the exception of TPH-d, groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. TPH-d concentrations detected during this round of sampling remained above the DOH EALs for both drinking water toxicity and gross contamination, and increased from the previous sampling event in January 2013 (1,000 µg/L).

Conclusions and Recommendations

Since the wells were last sampled (January 2013), with the exception of TPH-d, groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. TPH-d concentrations decreased in well HDMW2253-03 and increased in well OWDFMW01. TPH-d detected in HDMW2253-03 decreased to a concentration below the DOH EAL for both drinking water toxicity and gross contamination. The TPH-d concentration decreased from 600 µg/L during the last round of sampling to 45 µg/L during this round of sampling. TPH-d concentrations in well OWDFMW01 increased from 1,000 µg/L during the last round of sampling to 1,900 µg/L.

Based on the results of the assessment, continued groundwater monitoring at the RHSF is recommended. If the TPH-d concentrations significantly increase, the monitoring frequency should be increased to monthly, even though the two outside wells are not included in the RHSF Groundwater Protection Plan.

SECTION 5 – FUTURE WORK

GROUNDWATER SAMPLING

Future work includes the third quarter 2013 groundwater monitoring which is scheduled for July 2013. It is anticipated that the quarterly groundwater monitoring status report will be submitted in August 2013.

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SECTION 6 – REFERENCES

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FIGURES

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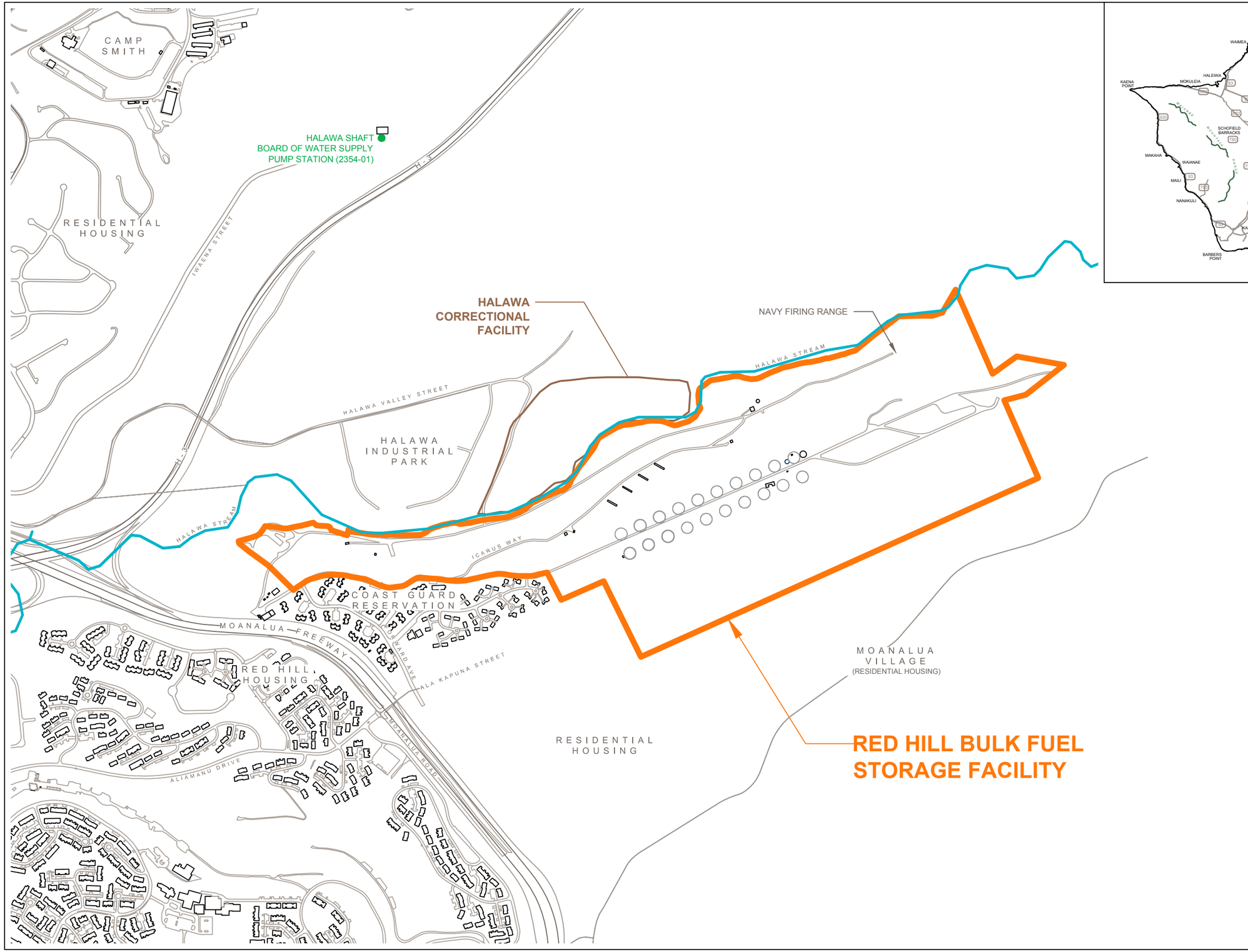

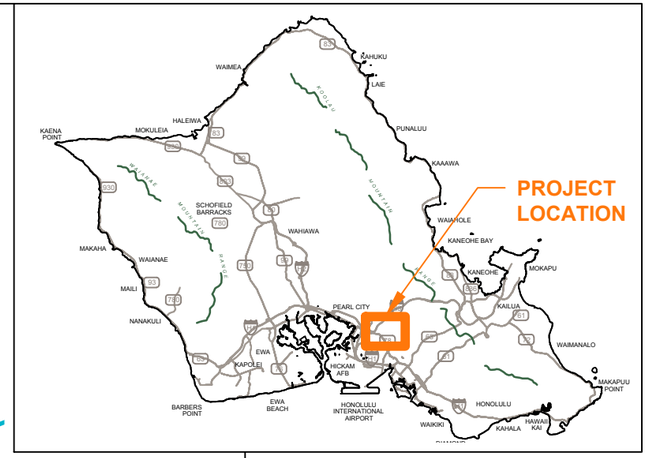

NOTES

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SOURCES

Pearl Harbor Base Map

Navy GIS files

NORTH

GRAPHIC SCALE

900 0 900

Scale in Feet

FIGURE 1

SITE LOCATION

GROUNDWATER MONITORING
RED HILL BULK FUEL STORAGE FACILITY
NAVAL SUPPLY SYSTEM COMMAND (NAVSUP)
FLEET LOGISTICS CENTER
JBPHH, OAHU, HAWAII

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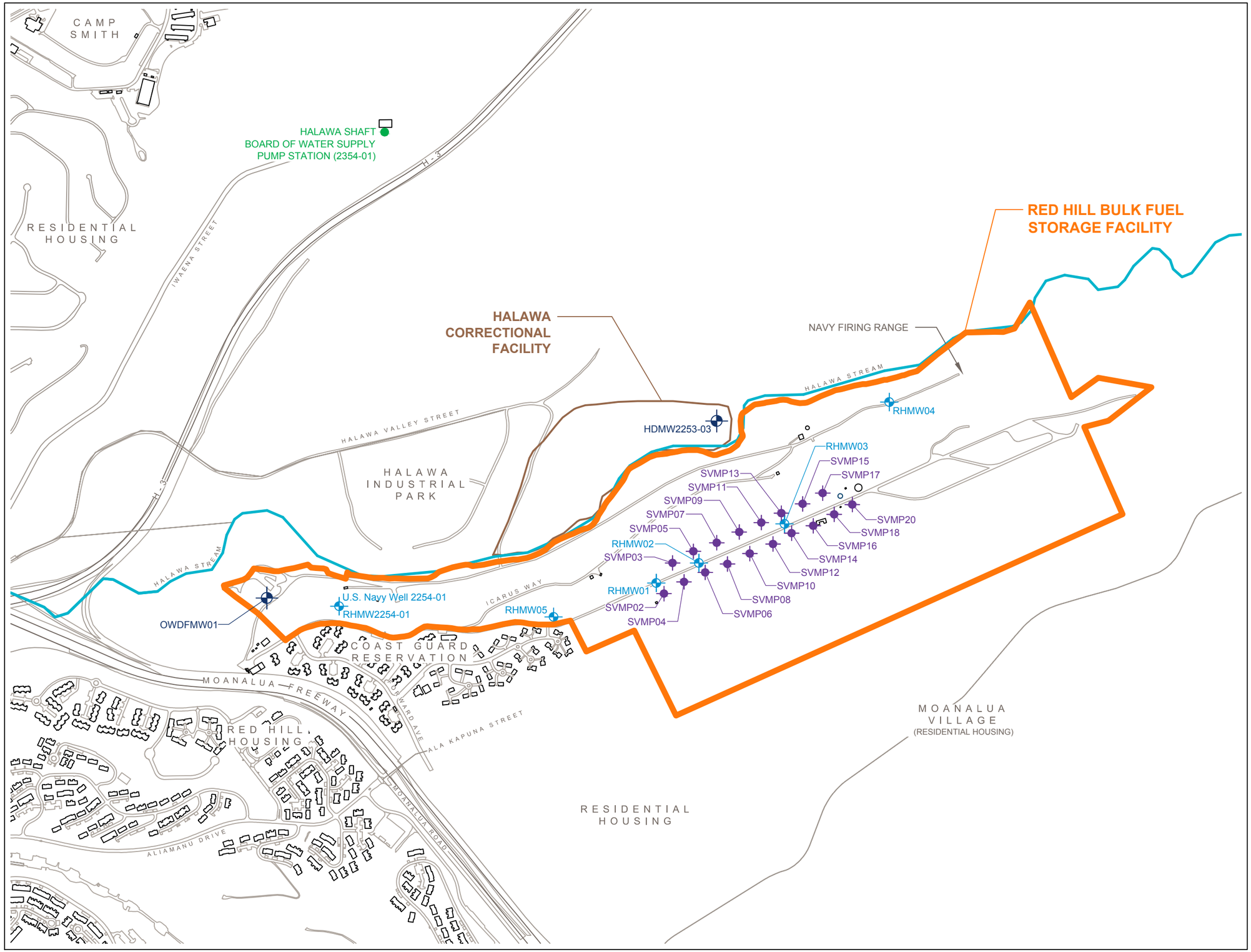

LEGEND

- RED HILL BULK FUEL STORAGE FACILITY
- HALAWA CORRECTIONAL FACILITY
- HALAWA STREAM
- BUILDING
- ROAD
- ABOVEGROUND STORAGE TANK
- WATER TANK
- SOIL VAPOR MONITORING POINT
- GROUNDWATER MONITORING WELL LOCATED INSIDE TUNNEL
- GROUNDWATER MONITORING WELL LOCATED OUTSIDE TUNNEL
- BOARD OF WATER SUPPLY PUMP STATION

NOTES

The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.

SOURCES

Pearl Harbor Base Map

Navy GIS files

NORTH

GRAPHIC SCALE

1,200 0 1,200

Scale in Feet

FIGURE 2

SITE LAYOUT

GROUNDWATER MONITORING
RED HILL BULK FUEL STORAGE FACILITY
NAVAL SUPPLY SYSTEM COMMAND (NAVSUP)
FLEET LOGISTICS CENTER
JBPHH, OAHU, HAWAII

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APPENDIX A

Groundwater Sampling Logs

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Groundwater Sampling Log

Well ID: OWDFMW01 Location: Red Hill Bulk Fuel Storage Facility Project No.: 112066

Initial Water Level: 120.15 ft Date: 4/24/2013 Time: 730

Total Depth of Well: 145.10 ft Personnel Involved: Justin Lam, Branden Ibara

Length of Saturated Zone: - Weather Conditions: Cloudy, Light Showers

Volume of Water to be Removed: 5.0 L Method of Removal: Disposable Hand Bailer

Water Level After Purging: 120.15 ft Pumping Rate: 0.29 L/min

Well Purge Data:

Time	Volume Removed	pH	Conductivity (mS/cm)	DO (mg/l)	Temperature	Salinity	Redox (ORP) (mV)
735	0.0 L	9.82	3.120	3.19	23.00	1.70	-288.9
737	1.0 L	9.90	3.167	2.84	23.25	1.71	-289.5
740	2.0 L	9.99	3.021	1.80	23.32	1.63	-289.2
744	3.0 L	10.01	3.026	1.75	23.32	1.64	-289.9
750	4.0 L	10.10	3.045	1.75	23.37	1.73	-279.2
752	5.0 L	10.15	3.052	1.76	23.40	1.73	-282.9

Sample Withdrawal Method: Disposable Hand Bailer

Appearance of Sample:

Color: Clear

Turbidity: Low

Sediment: None

Other: None

Laboratory Analysis Parameters and Preservatives: TPH-d - 8015; TPH-g, VOCs - 8260; PAHs - 8270c sim; lead - 6020

Number and Types of Sample Containers: 16 - 40ml VOAs, 6 - 1L amber jar, 4 - 500ml amber jar, 4 - 500ml HDPE

Sample Identification Numbers: ES025 [0800], ES025 MS/MSD [0800]; ES026 [0900]

Decontamination Procedures: Triple Rinsed

Notes: None

Sampled by: Justin Lam, Branden Ibara

Sampled Delivered to: Calscience Environmental Lab Transporters: FedEx

Date: 4/24/2013 Time: 1200

Capacity of Casing (Gallons/Linear Feet)

2"-0.16• 4"-0.65 • 8"-2.61 • 10"-4.08 • 12"-5.87

Groundwater Sampling Log

Well ID: HDMW2253-03 Location: Red Hill Bulk Fuel Storage Facility Project No.: 112066

Initial Water Level: 208.03 ft Date: 4/24/2013 Time: 915

Total Depth of Well: 1575 ft Personnel Involved: Justin Lam, Branden Ibara

Length of Saturated Zone: - Weather Conditions: Sunny

Volume of Water to be Removed: - Method of Removal: Disposable Hand Bailer

Water Level After Purging: - Pumping Rate: 0.25 L/min

Well Purge Data:

Time	Volume Removed	pH	Conductivity (mS/cm)	DO (mg/l)	Temperature	Salinity	Redox (ORP) (mV)
927	0.0 L	7.36	0.582	3.14	22.53	0.30	-130.5
931	1.0 L	7.20	0.487	2.50	22.45	0.25	-244.5
935	2.0 L	7.19	0.484	2.80	22.44	0.25	-168.5
939	3.0 L	7.17	0.474	2.67	22.38	0.24	-266.1
943	4.0 L	7.17	0.469	2.71	22.34	0.24	-259.3

Sample Withdrawal Method: Disposable Hand Bailer

Appearance of Sample:

Color: Clear

Turbidity: Low

Sediment: None

Other: None

Laboratory Analysis Parameters and Preservatives: TPH-d - 8015; TPH-g, VOCs - 8260; PAHs - 8270c sim; lead - 6020

Number and Types of Sample Containers: 6 - 40ml VOAs, 2 - 1L amber jar, 1 - 500ml amber jar, 1 - 250ml HDPE

Sample Identification Numbers: ES027 [0930]

Decontamination Procedures: Triple Rinsed

Notes: None

Sampled by: Justin Lam, Branden Ibara

Sampled Delivered to: Calscience Environmental Lab Transporters: FedEx

Date: 4/24/2013 Time: 1200

Capacity of Casing (Gallons/Linear Feet)

2"-0.16• 4"-0.65 • 8"-2.61 • 10"-4.08 • 12"-5.87

APPENDIX B

Field Notes

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Location RHBFSF Date 4/24/13

Project / Client NAVFAC 112066

purpose: gw monitoring outside wells

personnel: JL, BI

720: ESI get to RHSF go to adit 3.

730: OWDFMW01 gauged
DTW: 120.15
DTB: 145.10

735: begin purging well.

755: begin collecting sample. (ES025). sample time 800.

820: complete collecting sample. clean up.

845: go to HCF to meet DLNR.

850: meet DLNR at HCF.

858: go to HDMW2253-03.

915: HDMW2253-03
DTW: 208.03

925: DLNR needs additional equipment.
ESI begin purging well.

Location RHRFSF Date 4/24/13

Project / Client NAVFAC 112066

945: ESI collect (ES027) at HDMW2253-03.

1010: ESI finish at ~~HDMW~~ HDMW2253-03, clean up.

1030: go to adit 3 to dispose of water

1050: leave RHSF.

4/24/13 JL

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APPENDIX C

Laboratory Reports

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Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 13-04-1894

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Environmental Science International, Inc.

Client Project Name: Red Hill LTM 112066

Attention: Robert Chong
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Approved for release on 05/2/2013 by:
Richard Villafania
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories, Inc.

Contents

Client Project Name: Red Hill LTM 112066
Work Order Number: 13-04-1894

Calscience Environmental Laboratories, Inc.

Work Order Narrative

ACCREDITED IN ACCORDANCE WITH nelac

Condition Upon Receipt:

Samples were received under Chain of Custody (COC) on 04/26/2013. They were assigned to Work Order 13-04-1894.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with an immediate holding time (HT </= 15 minutes --40CFR-136.3 Table II footnote 4), is considered a "field" test and reported samples results are not flagged unless the analysis is performed beyond 24 hours of the time of collection.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontract Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Return to Contents

Calscience Environmental Laboratories, Inc.

The difference is service

ACCREDITED IN ACCORDANCE WITH nelac

Client:	Environmental Science International, Inc. 354 Uluniu Street, Suite 304 Kailua, HI 96734-2500	Work Order:	13-04-1894
		Project Name:	Red Hill LTM 112066
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-2 Client ID: ES 025 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 08:00

EPA 6020 ICP/MS Metals Extraction: EPA 3020A Total

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Lead	<0.200	U	0.0898	0.200	1.00	1	04/29/13 00:00	04/29/13 21:47	130429L05D

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

13-04-1894-3 Client ID: ES 026 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:00

EPA 6020 ICP/MS Metals Extraction: EPA 3020A Total

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Lead	<0.200	U	0.0898	0.200	1.00	1	04/29/13 00:00	04/29/13 21:50	130429L05D

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

13-04-1894-4 Client ID: ES 027 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:30

EPA 6020 ICP/MS Metals Extraction: EPA 3020A Total

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Lead	0.102	J	0.0898	0.200	1.00	1	04/29/13 00:00	04/29/13 21:53	130429L05D

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

099-14-497-27 Client ID: Method Blank Matrix: Aqueous Units: ug/L Sampled: 04/30/13 17:05

EPA 6020 ICP/MS Metals Extraction: EPA 3020A Total

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Lead	<0.200	U	0.0898	0.200	1.00	1	04/29/13 00:00	04/29/13 21:17	130429L05D

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Return to Contents

Calscience Environmental Laboratories, Inc.

The difference is service

ACCREDITED IN ACCORDANCE WITH nelac

Client:	Environmental Science International, Inc. 354 Uluniu Street, Suite 304 Kailua, HI 96734-2500	Work Order:	13-04-1894
		Project Name:	Red Hill LTM 112066
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-2 Client ID: ES 025 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 08:00

EPA 8015B (M) TPH Diesel Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
TPH as Diesel	1900	HD	15	20	50	1	04/29/13 00:00	04/30/13 12:42	130429B08
Surr: n-Octacosane (51-141%)	*134%*						*04/29/13 00:00*	*04/30/13 12:42*	*130429B08*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.
-TPH as Diesel is quantified in the carbon range C10-C28.

13-04-1894-3 Client ID: ES 026 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:00

EPA 8015B (M) TPH Diesel Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
TPH as Diesel	1600	HD	15	20	50	1	04/29/13 00:00	04/30/13 12:58	130429B08
Surr: n-Octacosane (51-141%)	*130%*						*04/29/13 00:00*	*04/30/13 12:58*	*130429B08*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.
-TPH as Diesel is quantified in the carbon range C10-C28.

13-04-1894-4 Client ID: ES 027 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:30

EPA 8015B (M) TPH Diesel Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
TPH as Diesel	45	J	15	20	50	1	04/29/13 00:00	04/30/13 14:20	130429B08
Surr: n-Octacosane (51-141%)	*140%*						*04/29/13 00:00*	*04/30/13 14:20*	*130429B08*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.
-TPH as Diesel is quantified in the carbon range C10-C28.

099-15-516-41 Client ID: Method Blank Matrix: Aqueous Units: ug/L Sampled: 05/01/13 17:52

EPA 8015B (M) TPH Diesel Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
TPH as Diesel	<20	U	15	20	50	1	04/29/13 00:00	04/30/13 11:21	130429B08
Surr: n-Octacosane (51-141%)	*131%*						*04/29/13 00:00*	*04/30/13 11:21*	*130429B08*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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ACCREDITED IN ACCORDANCE WITH nelac

Client:	Environmental Science International, Inc. 354 Uluniu Street, Suite 304 Kailua, HI 96734-2500	Work Order: Project Name:	13-04-1894 Red Hill LTM 112066
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-2 Client ID: ES 025 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 08:00

EPA 8270C SIM PAHs Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Naphthalene	0.063	J	0.023	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
2-Methylnaphthalene	<0.051	U	0.027	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
1-Methylnaphthalene	<0.051	U	0.029	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Acenaphthylene	<0.051	U	0.018	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Acenaphthene	<0.051	U	0.021	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Fluorene	<0.051	U	0.025	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Phenanthrene	<0.051	U	0.031	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Anthracene	<0.051	U	0.035	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Fluoranthene	<0.051	U	0.028	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Pyrene	<0.051	U	0.025	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Benzo (a) Anthracene	<0.051	U	0.024	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Chrysene	<0.051	U	0.019	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Benzo (k) Fluoranthene	<0.051	U	0.024	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Benzo (b) Fluoranthene	<0.051	U	0.025	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Benzo (a) Pyrene	<0.051	U	0.037	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Indeno (1,2,3-c,d) Pyrene	<0.051	U	0.022	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Dibenz (a,h) Anthracene	<0.051	U	0.027	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19
Benzo (g,h,i) Perylene	<0.051	U	0.022	0.051	0.20	1.02	04/29/13 00:00	04/30/13 17:20	130429L19

Surr: Nitrobenzene-d5 (28-139%)	*94%*	*04/29/13 00:00*	*04/30/13 17:20*	*130429L19*
Surr: 2-Fluorobiphenyl (33-144%)	*95%*	*04/29/13 00:00*	*04/30/13 17:20*	*130429L19*
Surr: p-Terphenyl-d14 (23-160%)	*100%*	*04/29/13 00:00*	*04/30/13 17:20*	*130429L19*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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ACCREDITED IN ACCORDANCE WITH nelac

Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-3 Client ID: ES 026 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:00

EPA 8270C SIM PAHs Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Naphthalene	0.068	J	0.023	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
2-Methylnaphthalene	<0.050	U	0.027	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
1-Methylnaphthalene	<0.050	U	0.029	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Acenaphthylene	<0.050	U	0.018	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Acenaphthene	<0.050	U	0.021	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Fluorene	<0.050	U	0.025	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Phenanthrene	<0.050	U	0.031	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Anthracene	<0.050	U	0.034	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Fluoranthene	<0.050	U	0.027	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Pyrene	<0.050	U	0.025	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Benzo (a) Anthracene	<0.050	U	0.024	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Chrysene	<0.050	U	0.019	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Benzo (k) Fluoranthene	<0.050	U	0.024	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Benzo (b) Fluoranthene	<0.050	U	0.025	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Benzo (a) Pyrene	<0.050	U	0.037	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Indeno (1,2,3-c,d) Pyrene	<0.050	U	0.022	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Dibenz (a,h) Anthracene	<0.050	U	0.027	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19
Benzo (g,h,i) Perylene	<0.050	U	0.022	0.050	0.20	1.01	04/29/13 00:00	04/30/13 17:47	130429L19

Surr: Nitrobenzene-d5 (28-139%)	*98%*	*04/29/13 00:00*	*04/30/13 17:47*	*130429L19*
Surr: 2-Fluorobiphenyl (33-144%)	*101%*	*04/29/13 00:00*	*04/30/13 17:47*	*130429L19*
Surr: p-Terphenyl-d14 (23-160%)	*108%*	*04/29/13 00:00*	*04/30/13 17:47*	*130429L19*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-4 Client ID: ES 027 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:30

EPA 8270C SIM PAHs Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Naphthalene	0.16	J	0.024	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
2-Methylnaphthalene	<0.052	U	0.027	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
1-Methylnaphthalene	<0.052	U	0.029	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Acenaphthylene	<0.052	U	0.019	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Acenaphthene	<0.052	U	0.021	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Fluorene	<0.052	U	0.025	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Phenanthrene	<0.052	U	0.032	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Anthracene	<0.052	U	0.035	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Fluoranthene	<0.052	U	0.028	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Pyrene	<0.052	U	0.026	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Benzo (a) Anthracene	<0.052	U	0.025	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Chrysene	<0.052	U	0.020	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Benzo (k) Fluoranthene	<0.052	U	0.024	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Benzo (b) Fluoranthene	<0.052	U	0.026	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Benzo (a) Pyrene	<0.052	U	0.038	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Indeno (1,2,3-c,d) Pyrene	<0.052	U	0.023	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Dibenz (a,h) Anthracene	<0.052	U	0.028	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19
Benzo (g,h,i) Perylene	<0.052	U	0.023	0.052	0.21	1.035	04/29/13 00:00	04/30/13 18:14	130429L19

Surr: Nitrobenzene-d5 (28-139%)	*100%*						*04/29/13 00:00*	*04/30/13 18:14*	*130429L19*
Surr: 2-Fluorobiphenyl (33-144%)	*104%*						*04/29/13 00:00*	*04/30/13 18:14*	*130429L19*
Surr: p-Terphenyl-d14 (23-160%)	*115%*						*04/29/13 00:00*	*04/30/13 18:14*	*130429L19*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	099-15-148
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

099-15-148-13 Client ID: Method Blank Matrix: Aqueous Units: ug/L Sampled: 04/30/13 17:15

EPA 8270C SIM PAHs Extraction: EPA 3510C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Naphthalene	<0.050	U	0.023	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
2-Methylnaphthalene	<0.050	U	0.026	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
1-Methylnaphthalene	<0.050	U	0.028	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Acenaphthylene	<0.050	U	0.018	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Acenaphthene	<0.050	U	0.021	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Fluorene	<0.050	U	0.024	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Phenanthrene	<0.050	U	0.031	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Anthracene	<0.050	U	0.034	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Fluoranthene	<0.050	U	0.027	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Pyrene	<0.050	U	0.025	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Benzo (a) Anthracene	<0.050	U	0.024	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Chrysene	<0.050	U	0.019	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Benzo (k) Fluoranthene	<0.050	U	0.023	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Benzo (b) Fluoranthene	<0.050	U	0.025	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Benzo (a) Pyrene	<0.050	U	0.036	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Indeno (1,2,3-c,d) Pyrene	<0.050	U	0.022	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Dibenz (a,h) Anthracene	<0.050	U	0.027	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19
Benzo (g,h,i) Perylene	<0.050	U	0.022	0.050	0.20	1	04/29/13 00:00	04/30/13 16:27	130429L19

Surr: Nitrobenzene-d5 (28-139%)	*96%*	*04/29/13 00:00*	*04/30/13 16:27*	*130429L19*
Surr: 2-Fluorobiphenyl (33-144%)	*103%*	*04/29/13 00:00*	*04/30/13 16:27*	*130429L19*
Surr: p-Terphenyl-d14 (23-160%)	*104%*	*04/29/13 00:00*	*04/30/13 16:27*	*130429L19*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc. 354 Uluniu Street, Suite 304 Kailua, HI 96734-2500	Work Order: Project Name:	13-04-1894 Red Hill LTM 112066
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-1 Client ID: ES Trip Matrix: Aqueous Units: ug/L Sampled: 04/24/13 07:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Acetone	<10	ICH,U	6.0	10	20	1	04/29/13 00:00	04/29/13 14:46	130429L01
Benzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Bromodichloromethane	<0.50	U	0.21	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Bromoform	<1.0	U	0.50	1.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
Bromomethane	<5.0	U	3.9	5.0	20	1	04/29/13 00:00	04/29/13 14:46	130429L01
2-Butanone	<5.0	U	2.2	5.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
Carbon Tetrachloride	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Chlorobenzene	<0.50	U	0.17	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Chloroethane	<5.0	U	2.3	5.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
Chloroform	<0.50	U	0.46	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Chloromethane	<2.0	IJ,U	1.8	2.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
Dibromochloromethane	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2-Dibromo-3-Chloropropane	<2.0	U	1.2	2.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2-Dibromoethane	<0.50	U	0.36	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2-Dichlorobenzene	<0.50	U	0.46	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,3-Dichlorobenzene	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,4-Dichlorobenzene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1-Dichloroethane	<0.50	U	0.28	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2-Dichloroethane	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1-Dichloroethene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
c-1,2-Dichloroethene	<0.50	U	0.48	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
t-1,2-Dichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2-Dichloropropane	<0.50	U	0.42	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
c-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
t-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Ethylbenzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Methylene Chloride	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
4-Methyl-2-Pentanone	<5.0	U	4.4	5.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
Styrene	<0.50	U	0.17	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1,1,2-Tetrachloroethane	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1,2,2-Tetrachloroethane	<0.50	U	0.41	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Tetrachloroethene	<0.50	U	0.39	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Toluene	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,2,4-Trichlorobenzene	<1.0	U	0.50	1.0	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1,1-Trichloroethane	<0.50	U	0.30	0.50	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Hexachloro-1,3-Butadiene	<0.50	U	0.32	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
1,1,2-Trichloroethane	<0.50	U	0.38	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Trichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-1 Client ID: ES Trip Matrix: Aqueous Units: ug/L Sampled: 04/24/13 07:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
1,2,3-Trichloropropane	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Vinyl Chloride	<0.50	U	0.30	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
p/m-Xylene	<1.0	U	0.30	1.0	10	1	04/29/13 00:00	04/29/13 14:46	130429L01
o-Xylene	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Methyl-t-Butyl Ether (MTBE)	<0.50	U	0.31	0.50	1.0	1	04/29/13 00:00	04/29/13 14:46	130429L01
Gasoline Range Organics	<30	U	13	30	50	1	04/29/13 00:00	04/29/13 14:46	130429L01

Surr: Dibromofluoromethane (80-126%)	*97%*	*04/29/13 00:00*	*04/29/13 14:46*	*130429L01*	
Surr: 1,2-Dichloroethane-d4 (80-134%)	*97%*	*04/29/13 00:00*	*04/29/13 14:46*	*130429L01*	
Surr: Toluene-d8 (80-120%)	*98%*	*04/29/13 00:00*	*04/29/13 14:46*	*130429L01*	
Surr: Toluene-d8-TPPH (88-112%)	*97%*	*04/29/13 00:00*	*04/29/13 14:46*	*130429L01*	
Surr: 1,4-Bromofluorobenzene (80-120%)	*100%*	*04/29/13 00:00*	*04/29/13 14:46*	*130429L01*	

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-2 Client ID: ES 025 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 08:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Acetone	84	ICH	6.0	10	20	1	04/29/13 00:00	04/29/13 15:13	130429L01
Benzene	0.82	J	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Bromodichloromethane	<0.50	U	0.21	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Bromoform	<1.0	U	0.50	1.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
Bromomethane	<5.0	U	3.9	5.0	20	1	04/29/13 00:00	04/29/13 15:13	130429L01
2-Butanone	<5.0	U	2.2	5.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
Carbon Tetrachloride	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Chlorobenzene	<0.50	U	0.17	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Chloroethane	<5.0	U	2.3	5.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
Chloroform	<0.50	U	0.46	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Chloromethane	<2.0	IJ,U	1.8	2.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
Dibromochloromethane	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2-Dibromo-3-Chloropropane	<2.0	U	1.2	2.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2-Dibromoethane	<0.50	U	0.36	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2-Dichlorobenzene	<0.50	U	0.46	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,3-Dichlorobenzene	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,4-Dichlorobenzene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1-Dichloroethane	<0.50	U	0.28	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2-Dichloroethane	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1-Dichloroethene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
c-1,2-Dichloroethene	<0.50	U	0.48	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
t-1,2-Dichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2-Dichloropropane	<0.50	U	0.42	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
c-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
t-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Ethylbenzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Methylene Chloride	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
4-Methyl-2-Pentanone	<5.0	U	4.4	5.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
Styrene	<0.50	U	0.17	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1,1,2-Tetrachloroethane	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1,2,2-Tetrachloroethane	<0.50	U	0.41	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Tetrachloroethene	<0.50	U	0.39	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Toluene	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,2,4-Trichlorobenzene	<1.0	U	0.50	1.0	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1,1-Trichloroethane	<0.50	U	0.30	0.50	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Hexachloro-1,3-Butadiene	<0.50	U	0.32	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
1,1,2-Trichloroethane	<0.50	U	0.38	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Trichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-2 Client ID: ES 025 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 08:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
1,2,3-Trichloropropane	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Vinyl Chloride	<0.50	U	0.30	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
p/m-Xylene	<1.0	U	0.30	1.0	10	1	04/29/13 00:00	04/29/13 15:13	130429L01
o-Xylene	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Methyl-t-Butyl Ether (MTBE)	<0.50	U	0.31	0.50	1.0	1	04/29/13 00:00	04/29/13 15:13	130429L01
Gasoline Range Organics	<30	U	13	30	50	1	04/29/13 00:00	04/29/13 15:13	130429L01

Surr: Dibromofluoromethane (80-126%)	*95%*						*04/29/13 00:00*	*04/29/13 15:13*	*130429L01*
Surr: 1,2-Dichloroethane-d4 (80-134%)	*95%*						*04/29/13 00:00*	*04/29/13 15:13*	*130429L01*
Surr: Toluene-d8 (80-120%)	*100%*						*04/29/13 00:00*	*04/29/13 15:13*	*130429L01*
Surr: Toluene-d8-TPPH (88-112%)	*99%*						*04/29/13 00:00*	*04/29/13 15:13*	*130429L01*
Surr: 1,4-Bromofluorobenzene (80-120%)	*99%*						*04/29/13 00:00*	*04/29/13 15:13*	*130429L01*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-3 Client ID: ES 026 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Acetone	86	ICH	6.0	10	20	1	04/29/13 00:00	04/29/13 16:59	130429L01
Benzene	0.67	J	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Bromodichloromethane	<0.50	U	0.21	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Bromoform	<1.0	U	0.50	1.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
Bromomethane	<5.0	U	3.9	5.0	20	1	04/29/13 00:00	04/29/13 16:59	130429L01
2-Butanone	<5.0	U	2.2	5.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
Carbon Tetrachloride	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Chlorobenzene	<0.50	U	0.17	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Chloroethane	<5.0	U	2.3	5.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
Chloroform	<0.50	U	0.46	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Chloromethane	<2.0	IJ,U	1.8	2.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
Dibromochloromethane	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2-Dibromo-3-Chloropropane	<2.0	U	1.2	2.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2-Dibromoethane	<0.50	U	0.36	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2-Dichlorobenzene	<0.50	U	0.46	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,3-Dichlorobenzene	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,4-Dichlorobenzene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1-Dichloroethane	<0.50	U	0.28	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2-Dichloroethane	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1-Dichloroethene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
c-1,2-Dichloroethene	<0.50	U	0.48	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
t-1,2-Dichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2-Dichloropropane	<0.50	U	0.42	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
c-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
t-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Ethylbenzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Methylene Chloride	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
4-Methyl-2-Pentanone	<5.0	U	4.4	5.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
Styrene	<0.50	U	0.17	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1,1,2-Tetrachloroethane	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1,2,2-Tetrachloroethane	<0.50	U	0.41	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Tetrachloroethene	<0.50	U	0.39	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Toluene	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,2,4-Trichlorobenzene	<1.0	U	0.50	1.0	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1,1-Trichloroethane	<0.50	U	0.30	0.50	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Hexachloro-1,3-Butadiene	<0.50	U	0.32	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
1,1,2-Trichloroethane	<0.50	U	0.38	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Trichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-3 Client ID: ES 026 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:00

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
1,2,3-Trichloropropane	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Vinyl Chloride	<0.50	U	0.30	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
p/m-Xylene	<1.0	U	0.30	1.0	10	1	04/29/13 00:00	04/29/13 16:59	130429L01
o-Xylene	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Methyl-t-Butyl Ether (MTBE)	<0.50	U	0.31	0.50	1.0	1	04/29/13 00:00	04/29/13 16:59	130429L01
Gasoline Range Organics	<30	U	13	30	50	1	04/29/13 00:00	04/29/13 16:59	130429L01

Surr: Dibromofluoromethane (80-126%)	*93%*						*04/29/13 00:00*	*04/29/13 16:59*	*130429L01*
Surr: 1,2-Dichloroethane-d4 (80-134%)	*97%*						*04/29/13 00:00*	*04/29/13 16:59*	*130429L01*
Surr: Toluene-d8 (80-120%)	*99%*						*04/29/13 00:00*	*04/29/13 16:59*	*130429L01*
Surr: Toluene-d8-TPPH (88-112%)	*98%*						*04/29/13 00:00*	*04/29/13 16:59*	*130429L01*
Surr: 1,4-Bromofluorobenzene (80-120%)	*99%*						*04/29/13 00:00*	*04/29/13 16:59*	*130429L01*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-4 Client ID: ES 027 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:30

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Acetone	<10	ICH,U	6.0	10	20	1	04/29/13 00:00	04/29/13 17:26	130429L01
Benzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Bromodichloromethane	<0.50	U	0.21	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Bromoform	<1.0	U	0.50	1.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
Bromomethane	<5.0	U	3.9	5.0	20	1	04/29/13 00:00	04/29/13 17:26	130429L01
2-Butanone	<5.0	U	2.2	5.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
Carbon Tetrachloride	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Chlorobenzene	<0.50	U	0.17	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Chloroethane	<5.0	U	2.3	5.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
Chloroform	<0.50	U	0.46	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Chloromethane	<2.0	IJ,U	1.8	2.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
Dibromochloromethane	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2-Dibromo-3-Chloropropane	<2.0	U	1.2	2.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2-Dibromoethane	<0.50	U	0.36	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2-Dichlorobenzene	<0.50	U	0.46	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,3-Dichlorobenzene	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,4-Dichlorobenzene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1-Dichloroethane	<0.50	U	0.28	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2-Dichloroethane	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1-Dichloroethene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
c-1,2-Dichloroethene	<0.50	U	0.48	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
t-1,2-Dichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2-Dichloropropane	<0.50	U	0.42	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
c-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
t-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Ethylbenzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Methylene Chloride	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
4-Methyl-2-Pentanone	<5.0	U	4.4	5.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
Styrene	<0.50	U	0.17	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1,1,2-Tetrachloroethane	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1,2,2-Tetrachloroethane	<0.50	U	0.41	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Tetrachloroethene	<0.50	U	0.39	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Toluene	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,2,4-Trichlorobenzene	<1.0	U	0.50	1.0	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1,1-Trichloroethane	<0.50	U	0.30	0.50	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Hexachloro-1,3-Butadiene	<0.50	U	0.32	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
1,1,2-Trichloroethane	<0.50	U	0.38	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Trichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01

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ACCREDITED IN ACCORDANCE WITH nelac

Client:	Environmental Science International, Inc.	Work Order:	13-04-1894
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

13-04-1894-4 Client ID: ES 027 Matrix: Aqueous Units: ug/L Sampled: 04/24/13 09:30

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
1,2,3-Trichloropropane	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Vinyl Chloride	<0.50	U	0.30	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
p/m-Xylene	<1.0	U	0.30	1.0	10	1	04/29/13 00:00	04/29/13 17:26	130429L01
o-Xylene	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Methyl-t-Butyl Ether (MTBE)	<0.50	U	0.31	0.50	1.0	1	04/29/13 00:00	04/29/13 17:26	130429L01
Gasoline Range Organics	<30	U	13	30	50	1	04/29/13 00:00	04/29/13 17:26	130429L01

Surr: Dibromofluoromethane (80-126%)	*98%*	*04/29/13 00:00*	*04/29/13 17:26*	*130429L01*
Surr: 1,2-Dichloroethane-d4 (80-134%)	*97%*	*04/29/13 00:00*	*04/29/13 17:26*	*130429L01*
Surr: Toluene-d8 (80-120%)	*101%*	*04/29/13 00:00*	*04/29/13 17:26*	*130429L01*
Surr: Toluene-d8-TPPH (88-112%)	*100%*	*04/29/13 00:00*	*04/29/13 17:26*	*130429L01*
Surr: 1,4-Bromofluorobenzene (80-120%)	*100%*	*04/29/13 00:00*	*04/29/13 17:26*	*130429L01*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Client:	Environmental Science International, Inc.	Work Order:	099-13-057
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

099-13-057-25 Client ID: Method Blank Matrix: Aqueous Units: ug/L Sampled: 04/30/13 10:13

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
Acetone	<10	U	6.0	10	20	1	04/29/13 00:00	04/29/13 14:20	130429L01
Benzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Bromodichloromethane	<0.50	U	0.21	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Bromoform	<1.0	U	0.50	1.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
Bromomethane	<5.0	U	3.9	5.0	20	1	04/29/13 00:00	04/29/13 14:20	130429L01
2-Butanone	<5.0	U	2.2	5.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
Carbon Tetrachloride	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Chlorobenzene	<0.50	U	0.17	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Chloroethane	<5.0	U	2.3	5.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
Chloroform	<0.50	U	0.46	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Chloromethane	<2.0	U	1.8	2.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
Dibromochloromethane	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2-Dibromo-3-Chloropropane	<2.0	U	1.2	2.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2-Dibromoethane	<0.50	U	0.36	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2-Dichlorobenzene	<0.50	U	0.46	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,3-Dichlorobenzene	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,4-Dichlorobenzene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1-Dichloroethane	<0.50	U	0.28	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2-Dichloroethane	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1-Dichloroethene	<0.50	U	0.43	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
c-1,2-Dichloroethene	<0.50	U	0.48	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
t-1,2-Dichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2-Dichloropropane	<0.50	U	0.42	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
c-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
t-1,3-Dichloropropene	<0.50	U	0.25	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Ethylbenzene	<0.50	U	0.14	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Methylene Chloride	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
4-Methyl-2-Pentanone	<5.0	U	4.4	5.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
Styrene	<0.50	U	0.17	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1,1,2-Tetrachloroethane	<0.50	U	0.40	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1,2,2-Tetrachloroethane	<0.50	U	0.41	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Tetrachloroethene	<0.50	U	0.39	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Toluene	<0.50	U	0.24	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,2,4-Trichlorobenzene	<1.0	U	0.50	1.0	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1,1-Trichloroethane	<0.50	U	0.30	0.50	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Hexachloro-1,3-Butadiene	<0.50	U	0.32	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
1,1,2-Trichloroethane	<0.50	U	0.38	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Trichloroethene	<0.50	U	0.37	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01

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Client:	Environmental Science International, Inc.	Work Order:	099-13-057
	354 Uluniu Street, Suite 304	Project Name:	Red Hill LTM 112066
	Kailua, HI 96734-2500		
Attn:	Robert Chong	Received:	04/26/13 10:30

ANALYTICAL REPORT

099-13-057-25 Client ID: Method Blank Matrix: Aqueous Units: ug/L Sampled: 04/30/13 10:13

GC/MS GRO/EPA 8260B Volatile Organics Extraction: EPA 5030C

Analyte	Result	Qual.	DL	LOD	LOQ	Dilution Factor	Preparation Date/Time	Analysis Date/Time	Batch
1,2,3-Trichloropropane	<1.0	U	0.64	1.0	5.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Vinyl Chloride	<0.50	U	0.30	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
p/m-Xylene	<1.0	U	0.30	1.0	10	1	04/29/13 00:00	04/29/13 14:20	130429L01
o-Xylene	<0.50	U	0.23	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Methyl-t-Butyl Ether (MTBE)	<0.50	U	0.31	0.50	1.0	1	04/29/13 00:00	04/29/13 14:20	130429L01
Gasoline Range Organics	<30	U	13	30	50	1	04/29/13 00:00	04/29/13 14:20	130429L01

Surr: Dibromofluoromethane (80-126%)	*96%*						*04/29/13 00:00*	*04/29/13 14:20*	*130429L01*
Surr: 1,2-Dichloroethane-d4 (80-134%)	*98%*						*04/29/13 00:00*	*04/29/13 14:20*	*130429L01*
Surr: Toluene-d8 (80-120%)	*100%*						*04/29/13 00:00*	*04/29/13 14:20*	*130429L01*
Surr: Toluene-d8-TPPH (88-112%)	*99%*						*04/29/13 00:00*	*04/29/13 14:20*	*130429L01*
Surr: 1,4-Bromofluorobenzene (80-120%)	*99%*						*04/29/13 00:00*	*04/29/13 14:20*	*130429L01*

-Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

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Quality Control - Spike/Spike Duplicate

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Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 04/26/13
Work Order No: 13-04-1894
Preparation: EPA 3020A Total
Method: EPA 6020

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES 025	**Aqueous**	**ICP/MS 03**	**04/29/13**	**04/29/13**	**130429S05**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Lead	ND	100.0	104.8	105	107.6	108	80-120	3	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Environmental Science International, Inc.	Date Received	04/26/13
354 Uluniu Street, Suite 304	Work Order No:	13-04-1894
Kailua, HI 96734-2500	Preparation:	EPA 3020A Total
	Method:	EPA 6020

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
ES 025	**Aqueous**	**ICP/MS 03**	**04/29/13**	**04/29/13**	**130429S05**

Parameter	SAMPLE_CONC	SPIKE_ADDED	PDS_CONC	PDS %REC	%REC CL	Qualifiers
Lead	ND	100.0	105.3	105	75-125	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 04/26/13
Work Order No: 13-04-1894
Preparation: EPA 3510C
Method: EPA 8015B (M)

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES 025	**Aqueous**	**GC 46**	**04/29/13**	**04/30/13**	**130429S08**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
TPH as Diesel	1852	4000	7715	147	7537	142	55-133	2	0-30	3

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 04/26/13
Work Order No: 13-04-1894
Preparation: EPA 3510C
Method: EPA 8270C SIM PAHs

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES 025	**Aqueous**	**GC/MS AAA**	**04/29/13**	**04/30/13**	**130429S19**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Naphthalene	ND	2.000	2.262	113	2.403	120	21-133	6	0-25	
2-Methylnaphthalene	ND	2.000	1.965	98	2.107	105	21-140	7	0-25	
1-Methylnaphthalene	ND	2.000	2.064	103	2.193	110	20-140	6	0-25	
Acenaphthylene	ND	2.000	2.211	111	2.349	117	33-145	6	0-25	
Acenaphthene	ND	2.000	2.273	114	2.404	120	49-121	6	0-25	
Fluorene	ND	2.000	2.300	115	2.434	122	59-121	6	0-25	3
Phenanthrene	ND	2.000	2.517	126	2.631	132	54-120	4	0-25	3
Anthracene	ND	2.000	2.013	101	2.202	110	27-133	9	0-25	
Fluoranthene	ND	2.000	2.409	120	2.576	129	26-137	7	0-25	
Pyrene	ND	2.000	2.408	120	2.515	126	18-168	4	0-25	
Benzo (a) Anthracene	ND	2.000	2.668	133	2.843	142	33-143	6	0-25	
Chrysene	ND	2.000	2.320	116	2.471	124	17-168	6	0-25	
Benzo (k) Fluoranthene	ND	2.000	2.504	125	2.661	133	24-159	6	0-25	
Benzo (b) Fluoranthene	ND	2.000	2.484	124	2.598	130	24-159	4	0-25	
Benzo (a) Pyrene	ND	2.000	2.384	119	2.530	127	17-163	6	0-25	
Indeno (1,2,3-c,d) Pyrene	ND	2.000	2.629	131	2.824	141	10-171	7	0-25	
Dibenz (a,h) Anthracene	ND	2.000	2.245	112	2.382	119	10-219	6	0-25	
Benzo (g,h,i) Perylene	ND	2.000	2.116	106	2.231	112	10-227	5	0-25	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 04/26/13
Work Order No: 13-04-1894
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES 025	**Aqueous**	**GC/MS OO**	**04/29/13**	**04/29/13**	**130429S01**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Acetone	84.03	50.00	126.4	85	172.6	177	40-140	31	0-20	3,4
Benzene	ND	50.00	46.76	94	52.28	105	80-120	11	0-20	
Bromodichloromethane	ND	50.00	45.41	91	52.48	105	75-120	14	0-20	
Bromoform	ND	50.00	49.00	98	54.95	110	70-130	11	0-20	
Bromomethane	ND	50.00	47.92	96	48.13	96	30-145	0	0-20	
2-Butanone	ND	50.00	53.60	107	56.72	113	30-150	6	0-20	
Carbon Tetrachloride	ND	50.00	46.86	94	50.96	102	65-140	8	0-20	
Chlorobenzene	ND	50.00	48.57	97	54.81	110	80-120	12	0-20	
Chloroethane	ND	50.00	47.94	96	51.43	103	60-135	7	0-20	
Chloroform	ND	50.00	47.46	95	52.64	105	65-135	10	0-20	
Chloromethane	ND	50.00	32.20	64	37.41	75	40-125	15	0-20	
Dibromochloromethane	ND	50.00	46.03	92	52.32	105	60-135	13	0-20	
1,2-Dibromo-3-Chloropropane	ND	50.00	43.05	86	46.53	93	50-130	8	0-20	
1,2-Dibromoethane	ND	50.00	47.22	94	53.21	106	80-120	12	0-20	
1,2-Dichlorobenzene	ND	50.00	47.91	96	54.34	109	70-120	13	0-20	
1,3-Dichlorobenzene	ND	50.00	48.59	97	54.78	110	75-125	12	0-20	
1,4-Dichlorobenzene	ND	50.00	45.64	91	51.63	103	75-125	12	0-20	
1,1-Dichloroethane	ND	50.00	44.90	90	49.63	99	70-135	10	0-20	
1,2-Dichloroethane	ND	50.00	46.45	93	52.02	104	70-130	11	0-20	
1,1-Dichloroethene	ND	50.00	33.44	67	41.75	84	70-130	22	0-20	3,4
c-1,2-Dichloroethene	ND	50.00	47.47	95	52.95	106	70-125	11	0-20	
t-1,2-Dichloroethene	ND	50.00	49.18	98	53.88	108	60-140	9	0-20	
1,2-Dichloropropane	ND	50.00	47.13	94	53.51	107	75-125	13	0-20	
c-1,3-Dichloropropene	ND	50.00	48.01	96	53.34	107	70-130	11	0-20	
t-1,3-Dichloropropene	ND	50.00	43.31	87	48.56	97	55-140	11	0-20	
Ethylbenzene	ND	50.00	48.07	96	53.56	107	75-125	11	0-20	
Methylene Chloride	ND	50.00	47.86	96	52.68	105	55-140	10	0-20	
4-Methyl-2-Pentanone	ND	50.00	46.00	92	53.30	107	60-135	15	0-20	
Styrene	ND	50.00	48.15	96	54.32	109	65-135	12	0-20	
1,1,1,2-Tetrachloroethane	ND	50.00	47.33	95	53.30	107	80-130	12	0-20	
1,1,2,2-Tetrachloroethane	ND	50.00	28.79	58	28.35	57	65-130	2	0-20	3

RPD - Relative Percent Difference , CL - Control Limit

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Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 04/26/13
Work Order No: 13-04-1894
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B

Project Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES 025	**Aqueous**	**GC/MS OO**	**04/29/13**	**04/29/13**	**130429S01**

Parameter	SAMPLE CONC	SPIKE ADDED	MS CONC	MS %REC	MSD CONC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrachloroethene	ND	50.00	67.27	135	74.63	149	45-150	10	0-20	
Toluene	ND	50.00	47.53	95	53.47	107	75-120	12	0-20	
1,2,4-Trichlorobenzene	ND	50.00	46.36	93	52.70	105	65-135	13	0-20	
1,1,1-Trichloroethane	ND	50.00	47.26	95	53.04	106	65-130	12	0-20	
Hexachloro-1,3-Butadiene	ND	50.00	46.97	94	51.59	103	50-140	9	0-20	
1,1,2-Trichloroethane	ND	50.00	46.64	93	52.02	104	75-125	11	0-20	
Trichloroethene	ND	50.00	60.74	121	72.09	144	70-125	17	0-20	3
1,2,3-Trichloropropane	ND	50.00	47.50	95	54.35	109	75-125	13	0-20	
Vinyl Chloride	ND	50.00	41.62	83	45.02	90	50-145	8	0-20	
p/m-Xylene	ND	100.0	92.75	93	103.6	104	75-130	11	0-20	
o-Xylene	ND	50.00	48.22	96	54.52	109	80-120	12	0-20	
Methyl-t-Butyl Ether (MTBE)	ND	50.00	45.66	91	51.39	103	65-125	12	0-20	

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

Environmental Science International, Inc.		Date Received:	N/A
354 Uluniu Street, Suite 304		Work Order No:	13-04-1894
Kailua, HI 96734-2500		Preparation:	EPA 3020A Total
		Method:	EPA 6020

Project: Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-14-497-27	**Aqueous**	**ICP/MS 03**	**04/29/13**	**130429-L-05__163.icp**	**130429L05D**

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Lead	100.0	97.92	98	80-120	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Environmental Science International, Inc.		Date Received:	N/A
354 Uluniu Street, Suite 304		Work Order No:	13-04-1894
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8015B (M)

Project: Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-516-41	**Aqueous**	**GC 46**	**04/29/13**	**04/30/13**	**130429B08**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
TPH as Diesel	4000	4373	109	4226	106	60-132	3	0-11	

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

ACCREDITED IN ACCORDANCE WITH nelac

Environmental Science International, Inc.		Date Received:	N/A
354 Uluniu Street, Suite 304		Work Order No:	13-04-1894
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs

Project: Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-15-148-13	**Aqueous**	**GC/MS AAA**	**04/30/13**	**30APR015.rr**	**130429L19**

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	ME_CL	Qualifiers
Naphthalene	2.000	2.307	115	21-133	2-152	
2-Methylnaphthalene	2.000	2.195	110	21-140	1-160	
1-Methylnaphthalene	2.000	2.314	116	20-140	0-160	
Acenaphthylene	2.000	2.235	112	33-145	14-164	
Acenaphthene	2.000	2.335	117	55-121	44-132	
Fluorene	2.000	2.322	116	59-121	49-131	
Phenanthrene	2.000	2.323	116	54-120	43-131	
Anthracene	2.000	2.332	117	27-133	9-151	
Fluoranthene	2.000	2.375	119	26-137	8-156	
Pyrene	2.000	2.431	122	45-129	31-143	
Benzo (a) Anthracene	2.000	2.521	126	33-143	15-161	
Chrysene	2.000	2.355	118	17-168	0-193	
Benzo (k) Fluoranthene	2.000	2.436	122	24-159	2-182	
Benzo (b) Fluoranthene	2.000	2.412	121	24-159	2-182	
Benzo (a) Pyrene	2.000	2.235	112	17-163	0-187	
Indeno (1,2,3-c,d) Pyrene	2.000	2.471	124	25-175	0-200	
Dibenz (a,h) Anthracene	2.000	2.042	102	25-175	0-200	
Benzo (g,h,i) Perylene	2.000	1.973	99	25-157	3-179	

Total number of LCS compounds : 18
Total number of ME compounds: 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: N/A
Work Order No: 13-04-1894
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B

Project: Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-13-057-25	**Aqueous**	**GC/MS OO**	**04/29/13**	**04/29/13**	**130429L01**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Acetone	50.00	63.27	127	57.80	116	40-140	23-157	9	0-20	
Benzene	50.00	51.79	104	49.87	100	80-120	73-127	4	0-20	
Bromodichloromethane	50.00	53.59	107	52.03	104	75-120	68-128	3	0-20	
Bromoform	50.00	57.99	116	56.74	113	70-130	60-140	2	0-20	
Bromomethane	50.00	50.23	100	42.26	85	30-145	11-164	17	0-20	
2-Butanone	50.00	55.79	112	60.24	120	30-150	10-170	8	0-20	
Carbon Tetrachloride	50.00	54.44	109	51.48	103	65-140	52-152	6	0-20	
Chlorobenzene	50.00	55.85	112	52.49	105	80-120	73-127	6	0-20	
Chloroethane	50.00	56.31	113	46.85	94	60-135	48-148	18	0-20	
Chloroform	50.00	54.98	110	51.34	103	65-135	53-147	7	0-20	
Chloromethane	50.00	39.82	80	37.13	74	40-125	26-139	7	0-20	
Dibromochloromethane	50.00	56.52	113	52.23	104	60-135	48-148	8	0-20	
1,2-Dibromo-3-Chloropropane	50.00	55.49	111	55.19	110	50-130	37-143	1	0-20	
1,2-Dibromoethane	50.00	56.16	112	53.50	107	80-120	73-127	5	0-20	
1,2-Dichlorobenzene	50.00	56.24	112	53.12	106	70-120	62-128	6	0-20	
1,3-Dichlorobenzene	50.00	55.14	110	52.47	105	75-125	67-133	5	0-20	
1,4-Dichlorobenzene	50.00	52.89	106	49.82	100	75-125	67-133	6	0-20	
1,1-Dichloroethane	50.00	52.77	106	49.65	99	70-135	59-146	6	0-20	
1,2-Dichloroethane	50.00	53.59	107	51.76	104	70-130	60-140	3	0-20	
1,1-Dichloroethene	50.00	48.95	98	44.00	88	70-130	60-140	11	0-20	
c-1,2-Dichloroethene	50.00	53.05	106	51.34	103	70-125	61-134	3	0-20	
t-1,2-Dichloroethene	50.00	55.19	110	51.89	104	60-140	47-153	6	0-20	
1,2-Dichloropropane	50.00	54.64	109	51.84	104	75-125	67-133	5	0-20	
c-1,3-Dichloropropene	50.00	56.56	113	53.61	107	70-130	60-140	5	0-20	
t-1,3-Dichloropropene	50.00	51.58	103	49.19	98	55-140	41-154	5	0-20	
Ethylbenzene	50.00	53.63	107	51.19	102	75-125	67-133	5	0-20	
Methylene Chloride	50.00	54.84	110	50.93	102	55-140	41-154	7	0-20	
4-Methyl-2-Pentanone	50.00	54.88	110	55.74	111	60-135	48-148	2	0-20	
Styrene	50.00	55.75	111	52.16	104	65-135	53-147	7	0-20	
1,1,1,2-Tetrachloroethane	50.00	55.56	111	53.06	106	80-130	72-138	5	0-20	
1,1,2,2-Tetrachloroethane	50.00	52.71	105	52.42	105	65-130	54-141	1	0-20	
Tetrachloroethene	50.00	50.86	102	46.43	93	45-150	28-168	9	0-20	

RPD - Relative Percent Difference , CL - Control Limit

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Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Environmental Science International, Inc.		Date Received:	N/A
354 Uluniu Street, Suite 304		Work Order No:	13-04-1894
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B

Project: Red Hill LTM 112066

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-13-057-25	**Aqueous**	**GC/MS OO**	**04/29/13**	**04/29/13**	**130429L01**

Parameter	SPIKE ADDED	LCS CONC	LCS %REC	LCSD CONC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Toluene	50.00	53.94	108	51.11	102	75-120	68-128	5	0-20	
1,2,4-Trichlorobenzene	50.00	57.24	114	53.94	108	65-135	53-147	6	0-20	
1,1,1-Trichloroethane	50.00	55.84	112	52.73	105	65-130	54-141	6	0-20	
Hexachloro-1,3-Butadiene	50.00	55.02	110	51.10	102	50-140	35-155	7	0-20	
1,1,2-Trichloroethane	50.00	53.99	108	52.64	105	75-125	67-133	3	0-20	
Trichloroethene	50.00	52.88	106	50.12	100	70-125	61-134	5	0-20	
1,2,3-Trichloropropane	50.00	54.53	109	55.98	112	75-125	67-133	3	0-20	
Vinyl Chloride	50.00	46.64	93	42.58	85	50-145	34-161	9	0-20	
p/m-Xylene	100.0	105.2	105	99.10	99	75-130	66-139	6	0-20	
o-Xylene	50.00	55.39	111	52.29	105	80-120	73-127	6	0-20	
Methyl-t-Butyl Ether (MTBE)	50.00	53.17	106	51.92	104	65-125	55-135	2	0-20	
Gasoline Range Organics	1000	996.5	100	825.8	83	80-120	73-127	19	0-20	

Total number of LCS compounds : 44
Total number of ME compounds : 0
Total number of ME compounds allowed : 2
LCS ME CL validation result : Pass

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RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Sample Analysis Summary Report

WORK ORDER #: 13-04-1894

Lab Sample Number	Client Sample ID	Method	Extraction	Date/Time Analyzed	Chemist ID	Instrument	Analytical Location
1-A	ES Trip	GC/MS / EPA 8260	EPA 5030C	04/29/2013 14:46	486	GC/MS OO	2
2-G	ES 025	EPA 6020	EPA 3020A T	04/29/2013 21:47	598	ICP/MS 03	1
2-I	ES 025	EPA 8270C SIM PA	EPA 3510C	04/30/2013 17:20	449	GC/MS AA	1
2-H	ES 025	EPA 8015B (M)	EPA 3510C	04/30/2013 12:42	847	GC 46	1
2-A	ES 025	GC/MS / EPA 8260	EPA 5030C	04/29/2013 15:13	486	GC/MS OO	2
3-G	ES 026	EPA 6020	EPA 3020A T	04/29/2013 21:50	598	ICP/MS 03	1
3-I	ES 026	EPA 8270C SIM PA	EPA 3510C	04/30/2013 17:47	449	GC/MS AA	1
3-H	ES 026	EPA 8015B (M)	EPA 3510C	04/30/2013 12:58	847	GC 46	1
3-A	ES 026	GC/MS / EPA 8260	EPA 5030C	04/29/2013 16:59	486	GC/MS OO	2
4-G	ES 027	EPA 6020	EPA 3020A T	04/29/2013 21:53	598	ICP/MS 03	1
4-I	ES 027	EPA 8270C SIM PA	EPA 3510C	04/30/2013 18:14	449	GC/MS AA	1
4-H	ES 027	EPA 8015B (M)	EPA 3510C	04/30/2013 14:20	847	GC 46	1
4-A	ES 027	GC/MS / EPA 8260	EPA 5030C	04/29/2013 17:26	486	GC/MS OO	2

Location	Description
1	7440 Lincoln Way, Garden Grove, CA 92841
2	7445 Lampson Avenue, Garden Grove, CA 92841

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Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 13-04-1894

Qualifier	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
DL	The Detection Limit (DL) is the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
ICH	Initial calibration verification recovery is above the control limit for this analyte.
ICJ	Initial calibration verification recovery is below the control limit for this analyte.
IH	Calibration verification recovery is above the control limit for this analyte.
IJ	Calibration verification recovery is below the control limit for this analyte.
J	Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
LOD	The Limit of Detection (LOD) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at 99% confidence level.
LOQ	The Limit of Quantitation (LOQ) is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
U	Undetected at Detection Limit (DL) and is reported as less than the Limit of Detection (LOD).
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

For any analysis identified as a "field" test with a holding time (HT) </= 15 minutes where the sample is received outside of HT, Calscience will adhere to its internal HT of 24 hours. In cases where sample analysis does not meet Calscience's internal HT, results will be appropriately qualified.

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Calscience Environmental Laboratories, Inc.

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494

Other CA office locations: Concord and San Luis Obispo

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

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **13-04-1894**

Date: 4/24/13

Page 1 of 1

LABORATORY CLIENT: Environmental Science International

ADDRESS: 354 Uluniu St. #304

CITY: Kailua STATE: Hi ZIP: 96734

TEL: 808-261-0740 E-MAIL: RCHENG@ESCIENCEI.com, DFEIHER@ESCIENCEI.com

CLIENT PROJECT NAME / NUMBER: Red Hill LTM 112066

PROJECT CONTACT: Robert Cheng

P.O. NO.:

SAMPLER(S): (PRINT) BI/JL

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH (g) or GRO 8260	TPH (d) or DRO or (C6-C36) or (C6-C44) 8015B	TPH ( )	BTEX / MTBE (8260) or ( )	VOCs (8260)	Oxygenates (8260)	En Core / Terra Core Prep (5035)	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PNAs (8340) or (8270) PAH	T22 Metals (6010B/747X)	Cr(VI) [7196 or 7199 or 218.6]	lead 6020
1	ES Trip	4/24/13	0700	water	3		X		X				X									
2	ES 025	4/24/13	0800	water	10	X	X	X	X	X			X						X			X
2	ES 025 MS/MSD	4/24/13	0800	water	10	X	X	X	X	X			X						X			X
3	ES 026	4/24/13	0900	water	10	X	X	X	X	X			X						X			X
4	ES 027	4/24/13	0930	water	10	X	X	X	X	X			X						X			X

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Brandon Ibara ESI		4/24/13	1200
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
		4/26/13	1030
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.

Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

01/01/12 Revision

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1894

IGIN ID:HNLA (714) 895-5494
LSCIENCE ENVIRONMENTAL LAB

40 LINCOLN WAY

RDEN GROVE, CA 928411427
ITED STATES US

SHIP DATE: 24APR13
ACTWGT: 79.8 LB
CAD: /POS1400
DIMS: 29x18x15 IN

BILL SENDER

AMPLE CONTROL
ALSCIENCE LABS
140 LINCOLN WAY

ARDEN GROVE CA 92841
) 895-5494 REF:
DEPT:

FedEx Express

2 of 2
7957 7574 5457
8531 6209 1620 0200

Z APVA

FRI - 26 APR AA
** 2DAY **

92841
CA-US SNA

ORIGIN ID:HNLA (714) 895-5494
CALSCIENCE ENVIRONMENTAL LAB

7440 LINCOLN WAY

GARDEN GROVE, CA 928411427
UNITED STATES US

SHIP DATE: 24APR13
ACTWGT: 51.9 LB
CAD: /POS1400
DIMS: 24x14x13 IN

BILL SENDER

TO SAMPLE CONTROL
CALSCIENCE LABS
7440 LINCOLN WAY

GARDEN GROVE CA 92841
(714) 895-5494 REF:
INV:
PO: DEPT:

FedEx Express

1 of 2
TRK# 0200 8531 6209 1620
MASTER

VZ APVA

FRI - 26 APR AA
** 2DAY **

92841
CA-US SNA

Align Open End of FedEx Pouch Here

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 13-04-1894

SAMPLE RECEIPT FORM

Cooler 1 of 2

CLIENT: ESI

DATE: 04/26/13

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 3.1 °C - 0.2 °C (CF) = 2.9 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter Initial: LP

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Initial: LP

☑ Sample ☐_____ ☐ No (Not Intact) ☐ Not Present Initial: SH

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	☑	☐	☐
☑ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☑	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Water: ☑VOA ☑VOAh (C-1) ☐VOA**na**$_2$ ☐125AGB ☐125AGB**h** ☐125AGB**p** ☑1AGB ☐1AGB**na**$_2$ ☐1AGB**s**

☐500AGB ☑500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☑250PB**n**$_{(4)}$ ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na**$_2$ ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** SH

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** PJ

Preservative: **h:** HCL **n:** HNO_3 **na**$_2$:$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** PJ

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 13-04-1894

SAMPLE RECEIPT FORM

Cooler 2 of 2

CLIENT: ESI DATE: 04/26/13

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 2.6 °C - 0.2 °C (CF) = 2.4 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ Received at ambient temperature, placed on ice for transport by Courier.

Ambient Temperature: ☐ Air ☐ Filter Initial: AP

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Initial: AP

☑ Sample ☐_____ ☐ No (Not Intact) ☐ Not Present Initial: SH

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	☑	☐	☐
☑ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☑	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Water: ☑VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☑1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☑500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☑250PB**n$_4$** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** SH

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** RS

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** RS

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APPENDIX D

Historical Groundwater Exceedance Trends

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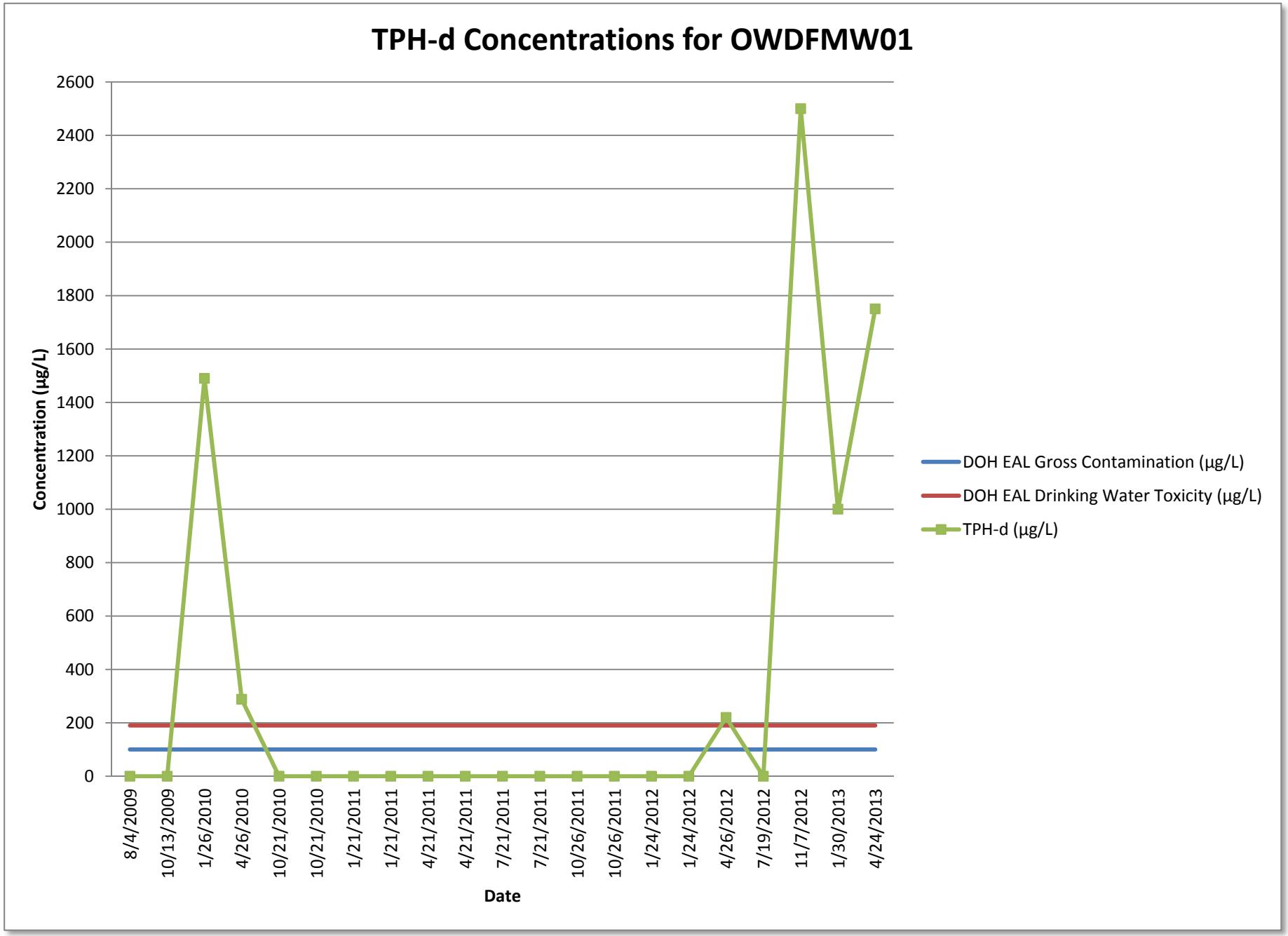
TPH-d Concentrations for OWDFMW01
Concentration (µg/L)
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
8/4/2009
10/13/2009
1/26/2010
4/26/2010
10/21/2010
10/21/2010
1/21/2011
1/21/2011
4/21/2011
4/21/2011
7/21/2011
7/21/2011
10/26/2011
10/26/2011
1/24/2012
1/24/2012
4/26/2012
7/19/2012
11/7/2012
1/30/2013
4/24/2013
Date
DOH EAL Gross Contamination (µg/L)
DOH EAL Drinking Water Toxicity (µg/L)
TPH-d (µg/L)

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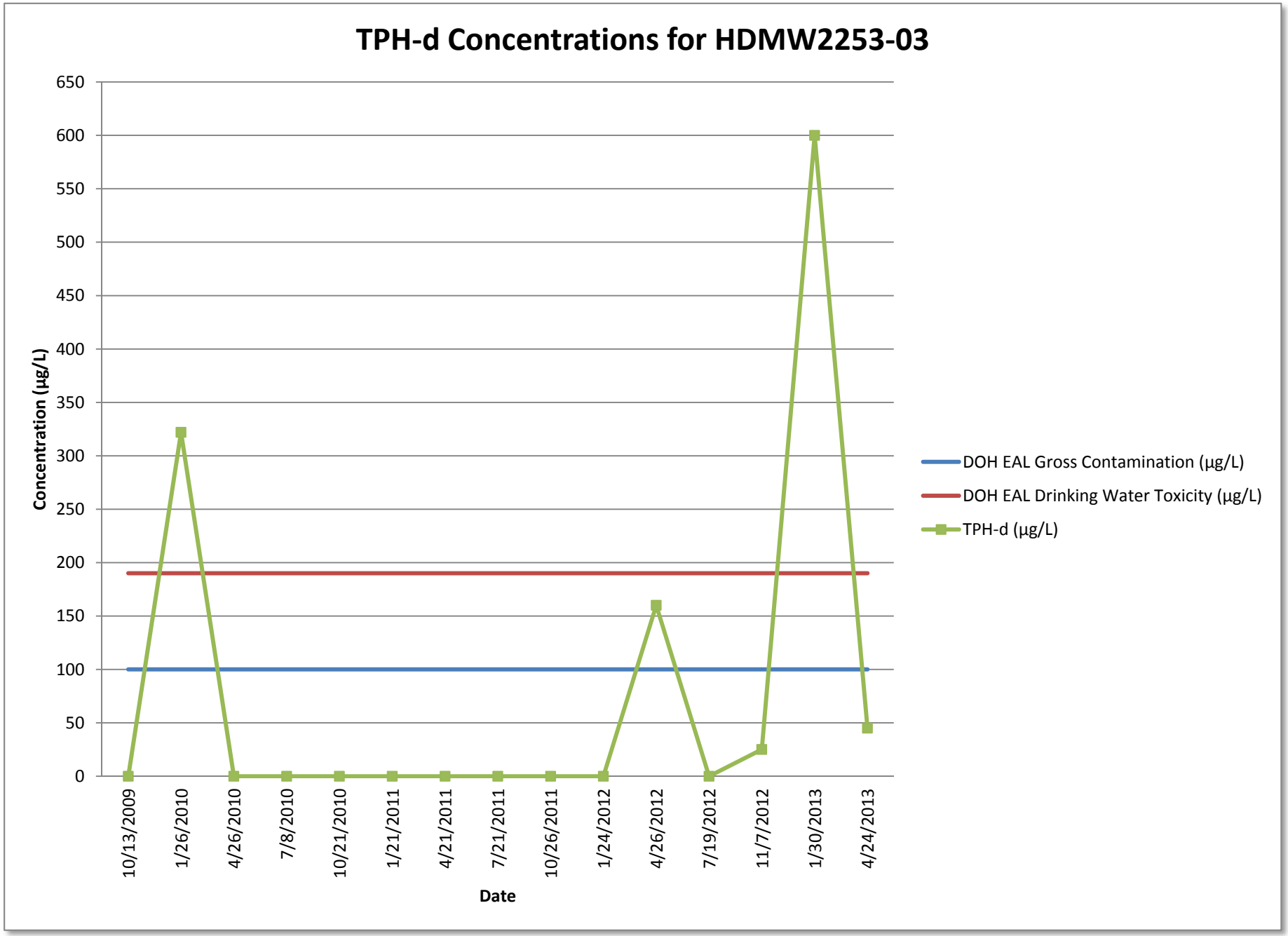
TPH-d Concentrations for HDMW2253-03
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Concentration (µg/L)
10/13/2009
1/26/2010
4/26/2010
7/8/2010
10/21/2010
1/21/2011
4/21/2011
7/21/2011
10/26/2011
1/24/2012
4/26/2012
7/19/2012
11/7/2012
1/30/2013
4/24/2013
Date
DOH EAL Gross Contamination (µg/L)
DOH EAL Drinking Water Toxicity (µg/L)
TPH-d (µg/L)

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APPENDIX E

Waste Disposal Manifest

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NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
HIR 000 050 401	1	808-206-9989	000019554

GENERATOR

5. Generator's Name and Mailing Address
COMNAVREG HAWAII, C/O NAVFAC HAWAII, CODE PRJ42
400 MARSHALL ROAD, ATTN: ESTRELITA HIGA
JBPHH, HI 96860-3139
Generator's Phone: 808-471-4216

Generator's Site Address (if different than mailing address)
HIC8553-03
RED HILL BULK FUEL STORAGE FACILITY
AIEA, HI 96701

6. Transporter 1 Company Name: PACIFIC COMMERCIAL SERVICES, LLC. 808-545-4599
U.S. EPA ID Number: H I R 0 0 0 0 9 7 8 2 4

7. Transporter 2 Company Name: UNITEK SOLVENT SERVICES, INC.-OAHU 808-682-8284
U.S. EPA ID Number: H I D 9 8 2 4 4 3 7 1 5

8. Designated Facility Name and Site Address
UNITEK SOLVENT SERVICES, INC.
91-125 KAOMI LOOP
KAPOLEI, HI 96707
Facility's Phone: 808-682-8284
U.S. EPA ID Number: H I D 9 8 2 4 4 3 7 1 5

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	MATERIAL NOT REGULATED BY DOT (WELL PURGE AND DECONTAMINATION WATER)	001	DM	00020	G	NON-RCRA
2.						
3.	<300 ppm HQ PH=6 PCS SUPPLY TEST.					
4.						

13. Special Handling Instructions and Additional Information
9b1: NR 2008 9b1: TOTAL HALOGEN ~~HDC TEST H~~ <300PPM ~~300PPM~~

GENERATOR'S CERTIFICATION: I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE BY PROPER SHIPPING NAME (WHERE APPLICABLE) AND ARE CLASSIFIED, PACKED, MARKED , AND LABELED AND ARE IN ALL RESPECTS IN PROPER CONDITION FOR TRANSPORT BY HIGHWAY ACCORDING TO APPLICABLE GOVERNMNET REGULATIONS. I FURTHER CERTIFY THAT IF THIS IS USED OIL IT IS SUBJECT TO REGULATION UNDER 40 CFR PART 279; THAT IT DOES NOT CONTAIN PCBS GREATER THAN OR EQUAL TO 2 PPM; AND THAT IT HAS NOT BEEN CONTAMINATED WITH CARBURATOR CLEANERS, BRAKE SPRAY, FREON, HALOGENATED SOLVENTS, OR OTHER HAZARDOUS MATERIALS AND/OR HAZARDOUS WASTES.

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Estrelita Higa
Signature: Estrelita Higa
Month 06 Day 05 Year 13

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Gradee G.
Signature:
Month 6 Day 5 Year 13

Transporter 2 Printed/Typed Name: ABB Auwa
Signature:
Month 6 Day 12 Year 13

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month Day Year

SEE CONSOLIDATED MANIFEST NUMBER

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: R. ~~ACHARYA~~
Signature:
Month 06 Day 14 Year 2013

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