5.0 FIELD INVESTIGATION

5.1 Preparation and Mobilization Efforts

5.1.1 Site Access and Subcontractor Coordination

Site access was coordinated with Mr. Angel Allas of C & C. ETC contracted ESN to perform DPT subsurface soil sampling activities and laboratory analyses of soil samples.

5.1.2 Initial Site Reconnaissance and Utilities Clearance

Prior to soil boring activities, ETC personnel contacted the Hawaii One Call Center to obtain underground utilities clearance from various utility companies. The project number for the Hawaii One Call Center was 580 and the ticket identification number given to ETC was 6003261. All appropriate utility companies were contacted and identified their respective underground utility lines in the area.

5.2 Sampling Methodology

5.2.1 Field Sampling Objectives

The purpose of the project was to fully delineate the extent of diesel-impacted soil. ETC selected three (3) boring locations based on their proximity to the diesel impacted soil area and accessibility for the DPT drill rig. Boring B-1 was located along the northern portion of the Power Plant structure, approximately 9.5 feet from the northwest corner of the structure. Boring B-2 was located adjacent to the east of the Power Plant structure approximately fifteen (15) feet south of the limit of the previous excavation. Boring B-3 was located adjacent to the west of the Power Plant structure, directly across from the previous excavation (Appendix I, Figure II).

Soil samples were collected and analyzed for TPH-D, BTEX, and PAHs. The analytical results were compared to Hawaii Department of Health (DOH) Tier 1 Soil Action Levels (SALs) for soil in areas where a drinking water source is threatened and rainfall amounts to less than 200 cm/year.

5.2.2 Field Screening Procedures

Based on the UST Closure and Release Response Report, boring locations were pre-determined based on their proximity to the known area of contamination. Direct-push technology (DPT) sampling was selected since it offers rapid screening and collection of soil samples while minimizing investigation derived waste (IDW). In addition to using visual and olfactory observations to screen for petroleum impacts, a RAE Systems MiniRAE 2000 Portable VOC Monitor (Model PGM-7600) photoionization detector (PID) was used to field screen soil samples for volatile organic compounds (VOCs) in the soil vapor headspace.

5.2.3 Field Equipment Calibration

All field instruments were calibrated at the beginning of the work day or as recommended by the manufacturer. Calibration served as a quality assurance (QA) check on the equipment. Instruments that failed calibration standards were not used. Calibration procedures for the field equipment were performed according to specifications provided in the equipment operation manuals.

ETC used the following field equipment for this investigation:

- RAE Systems MiniRAE 2000 Portable VOC Monitor (Model PGM-7600) photoionization detector calibrated using 100-ppm isobutylene standard.

5.3 Soil Sampling Activities

Three (3) soil borings were advanced at the Property. The boring locations were selected based on their proximity to the known area of contamination. The boring locations are shown in Figure 2, Appendix I.

ESN collected continuous soil cores with 4-foot long core samplers with acetate sleeve from ground surface to 20 feet bgs. ETC personnel screened the soil for visual and olfactory indications of hydrocarbon contamination. Soil headspace readings were collected with the PID at various depths, typically every 2 feet. Since field screening did not indicate the presence of petroleum hydrocarbons soil samples were collected from ten and twenty feet bgs.

The soil samples were collected directly from the 4-foot long core samplers with acetate sleeve and placed into 4-ounce glass jars. The glass jars were sealed with plastic caps. The glass jars were then labeled with the client name, sample ID number, date/time of sampling and analysis. The samples were placed in a designated sample cooler with chemical ice pending delivery to the laboratory.

Soil stockpile samples were collected at a depth of at least 18 inches below the stockpile surface. ETC personnel collected five discrete soil samples from areas where PID readings were the highest and/or soil appeared stained. The soil samples were placed into 4-ounce glass jars and sealed with plastic caps. The glass jars were then labeled with the client name, sample ID number, date/time of sampling and analysis. The samples were placed in a designated sample cooler with chemical ice pending delivery to the laboratory.

Each sample was submitted to ESN for laboratory analysis of TPH-D via EPA Method 8015 Modified, BTEX via EPA Method 8021b, and PAHs via EPA Method 8100 on a 5 day turn around time

Each sample was extracted and analyzed within the recommended maximum allowable holding time. The chain-of-custody together with the corresponding laboratory reports are presented in Appendix III.

Soil was analyzed for VOCs in the soil vapor headspace using a PID during boring advancement. In addition, visual and olfactory observations were made to determine the

presence or absence of petroleum hydrocarbons in the subsurface soils. Table 1 presents the results of field screening data. The boring log(s) are presented in Appendix II.

Table 1: Field Screening Results – Soil

Sample Location	Depth (feet)	PID (ppm)	Visual Observation	Olfactory Observation	Soil Description
B1	2.0	16.8	no staining	no odor	Reddish Brown Silty Clay
B1	4.0	19.2	no staining	no odor	Reddish Brown Silty Clay
B1	6.0	15.6	no staining	no odor	Reddish Brown Silty Clay
B1	8.0	16.8	no staining	no odor	Reddish Brown Silty Clay
B1	10.0	16.7	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B1	12.0	16.4	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B1	14.0	2.4	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B1	16.0	3.4	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B1	18.0	15.7	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B1	20.0	5.5	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	2.0	8.8	no staining	no odor	Reddish Brown Silty Clay
B2	4.0	9.5	no staining	no odor	Reddish Brown Silty Clay
B2	6.0	19.5	no staining	no odor	Reddish Brown Silty Clay
B2	8.0	19.9	no staining	no odor	Reddish Brown Silty Clay
B2	10.0	9.5	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	12.0	2.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	14.0	0.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	16.0	0.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	18.0	0.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B2	20.0	0.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B3	2.0	8.5	no staining	no odor	Reddish Brown Silty Clay
B3	4.0	9.1	no staining	no odor	Reddish Brown Silty Clay
B3	6.0	17.3	no staining	no odor	Reddish Brown Silty Clay
B3	8.0	18.3	no staining	no odor	Reddish Brown Silty Clay
B3	10.0	18.0	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B3	12.0	18.6	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B3	14.0	16.2	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B3	16.0	19.3	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt

Sample Location	Depth (feet)	PID (ppm)	Visual Observation	Olfactory Observation	Soil Description
B3	18.0	10.9	no staining	no odor	90 % Reddish Brown Silty Clay 10% weathered basalt
B3	20.0	10.8	no staining	no odor	Reddish Brown Silty Clay

5.4 Decontamination

All sample collection equipment (i.e., 4-foot sampler) were decontaminated between samples by washing with a brush and Alconox™ solution and triple rinsing with potable water. Sample containers were new or precleaned by the laboratory, and were kept in their original packaging to avoid contamination prior to use.

5.5 Investigation-Derived Waste (IDW)

IDW included soil excavated during direct push sampling, disposable personal protective equipment (PPE), disposable sampling equipment, decontamination fluids, and any other material that may have come in contact with potentially contaminated materials. IDW generated on-site were handled as follows:

- Used PPE and disposable sampling equipment (i.e., latex gloves) were disposed as solid waste.
- Soils from borings were returned to the source after sampling.
- Decontamination fluids were left to evaporate on-site.

6.0 FINDINGS AND CONCLUSIONS

6.1 Analytical Data – Soil

Eleven (11) soil samples were analyzed for TPH-D, BTEX, and PAHs on a 5 day turn around time.

Analytical results indicated that TPH-D, BTEX, and PAHs were not detected above reporting limits in the six subsurface soil samples collected from the borings. Furthermore, soil samples collected from the soil stockpile had constituent concentrations below DOH Tier 1 SALs. Results are presented in Table 4.

Table 2: Analytical Data – Soil

Sample ID	Depth (feet)	TPH-D	Benzene	Toluene	Ethylbenzene	Xylenes	PAHs
02.6011.1.10	10	ND	ND	ND	ND	ND	ND
02.6011.1.20	20	ND	ND	ND	ND	ND	ND
02.6011.2.10	10	ND	ND	ND	ND	ND	ND
02.6011.2.20	20	ND	ND	ND	ND	ND	ND
02.6011.3.10	10	ND	ND	ND	ND	ND	ND
02.6011.3.20	20	ND	ND	ND	ND	ND	ND
Stock.1	1.5	42	ND	ND	ND	ND	ND
Stock.2	1.5	51	ND	ND	ND	ND	ND
Stock.3	1.5	32	ND	ND	ND	ND	ND
Stock.4	1.5	38	ND	ND	ND	ND	ND
Stock.5	1.5	35	ND	ND	ND	ND	ND
PQL		20	0.02	0.05	0.05	0.05	1.00
Method Detection Limit		20	0.02	0.05	0.05	0.05	0.08-0.15
Tier 1 SAL		5,000	0.05	16	0.50	23	various

Notes: Results reported in mg/kg
ND= not detected
NA= not applicable
PQL= practical quntitation limit
Tier 1 SAL = DOH Tier 1 Action Level for soil in areas where a drinking water source is threatened and rainfall amounts to less than 200 cm/year.

6.2 Conclusions

Analytical data from the subsurface soil samples collected from the three borings indicated that TPH-D, BTEX, and PAH concentrations were below laboratory reporting limits and DOH Tier 1 SALs. Therefore, ETC believes that the extent of contamination originating from the UST release has been sufficiently delineated.

In addition, analytical data from the soil stockpile samples indicated that TPH-D, BTEX, and PAH concentrations were below DOH Tier 1 SALs. Therefore, ETC believes that the petroleum contaminated soil stockpile has been sufficiently remediated through aeration and natural attenuation.

Based on the analytical data, ETC recommends that no further action be required to address the release since 1) The lateral and vertical extents of contamination have been delineated; 2) TPH-D was the only constituent detected at concentrations exceeding its DOH Tier 1 SAL; and 3) Residual petroleum-impacted soil exists beneath a structure used exclusively for storage.

ETC also recommends that the stockpiled soil be deemed acceptable for use as fill material either on-site or at an alternative location.

7.0 REFERENCES

- EnviroServices & Training, LLC. April 2003. *Underground Storage Tank Closure and Release Response Report.*
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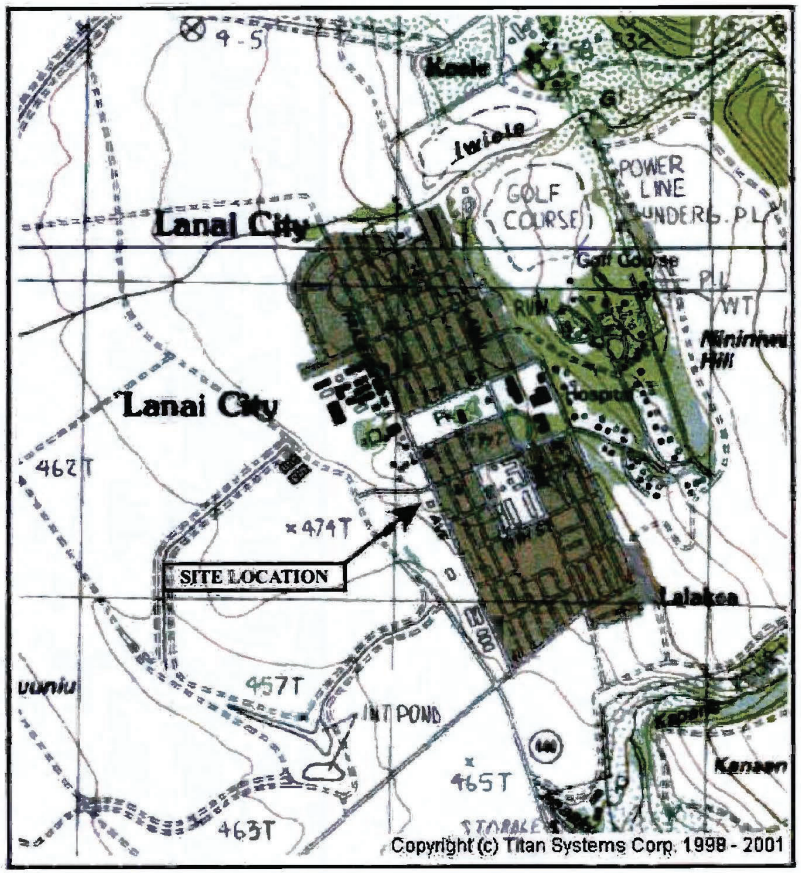
- United States Department of Agriculture, Soil Conservation Service. August 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.*
- US Department of Interior Geological Survey. 1983. Lanai City Quadrangle, Island of Lanai, 7.5 Minute Series (Topographic Map).

APPENDIX I

FIGURES



U.S. Department of Geological Services
Lanai South Quadrangle
Island of Lanai, 7.5 Minute Series

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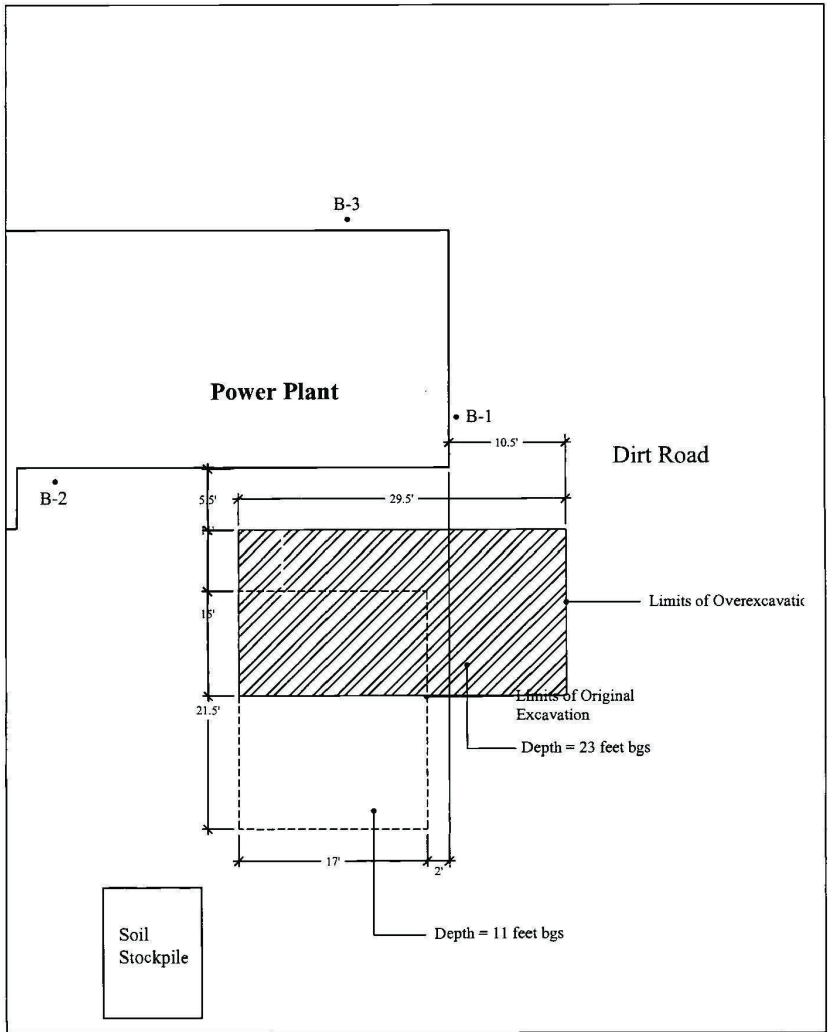
EnviroServices & Training Center, LLC	Site Location Map
	Work Plan for Additional Subsurface Investigation
	Client: Castle & Cooke Resorts, LLC
ETC Project No. 02-6011	Figure 1



EnviroServices & Training Center LLC	Project: 02-6011	Figure 2 Site Layout Additional Subsurface Investigation Lanai City Power Plant
	Scale: 1" = 10'	
	September 2006	

APPENDIX II

BORING LOGS

Time	Sample ID	PID (ppmv)	Sample Location	Boring Completion (B1)	Depth (feet)	Boring Log of B1 Lithological Description	Drilling Method: Direct Push Sample Method: Open Core Observations and Remarks
						Topsoil	
		16.8	2		2	Reddish Brown Silty Clay	
		19.2	4		4		
		15.6	6		6		
		16.8	8		8	90% Reddish Brown Silty Clay 10% Weathered Basalt	
	02.601 1.1.10	16.7	10		10	Location of Soil Sample	
		16.4	12		12		No visual/olfactory indications of petroleum
		2.4	14		14		
		3.4	16		16		
		15.7	18		18		
	02.601 1.1.20	5.5	20		20	Location of Soil Sample Boring depth: 20'	
					22		
					24		
					26		
					28		
					30		
					32		

EnviroServices & Training Center LLC

Location: 750 Fraser Avenue
ETC Project Number:02-6011
Drilled by: ESN
Date: 8/11/06

Boring Log of B2

Drilling Method: Direct Push

Sample Method: Open Core

Time	Sample ID	PID (ppmv)	Sample Location	Boring Completion (B2)	Depth (feet)	Lithological Description	Observations and Remarks
						Topsoil	
		8.8	2		2	Reddish Brown Silty Clay	
		9.5	4		4		
		19.5	6		6		
		19.9	8		8	90% Reddish Brown Silty Clay 10% Weathered Basalt	
	02.601 1.2.10	9.5	10		10	Location of Soil Sample	
		2.0	12		12		No visual/olfactory indications of petroleum
		0.0	14		14		
		0.0	16		16		
		0.0	18		18		
	02.601 1.2.20	0.0	20		20	Location of Soil Sample Boring depth: 20'	
					22		
					24		
					26		
					28		
					30		
					32		

EnviroServices & Training Center LLC

Location: 750 Fraser Avenue
ETC Project Number: 02-6011
Drilled by: ESN
Date: 8/11/06

Boring Log of B3

Drilling Method: Direct Push

Sample Method: Open Core

Time	Sample ID	PID (ppmv)	Sample Location	Boring Completion (B3)	Depth (feet)	Lithological Description	Observations and Remarks
						Topsoil	
		8.5	2		2	Reddish Brown Silty Clay	
		9.1	4		4		
		17.3	6		6		
		18.3	8		8	90% Reddish Brown Silty Clay 10% Weathered Basalt	
	02.601 1.3.10	18.0	10		10	Location of Soil Sample	
		18.6	12		12		No visual/olfactory indications of petroleum
		16.2	14		14		
		19.3	16		16		
		10.9	18		18		
	02.601 1.3.20	10.8	20		20	Location of Soil Sample Boring depth: 20'	
					22		
					24		
					26		
					28		
					30		
					32		

EnviroServices & Training Center LLC

Location: 750 Fraser Avenue
ETC Project Number: 02-6011
Drilled by: ESN
Date: 8/11/06