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16 December 1993
Ref: NC367.05.05

Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

Attention: Ms. Juliet Shin

Dear Ms. Shin:

Enclosed is the report summarizing closure of the underground fuel storage tanks (UFSTs) and subsequent exploratory subsurface soil/groundwater "grab" sampling program at the Redwood Regional Park Service Yard in Oakland, California. Activities summarized in this report were conducted between June and October 1993.

We trust that this submittal meets your needs. Please call if you have questions or require further information. We will contact you in the near future to confirm your receipt of this report and to discuss the schedule for implementation of the recommended site characterization activities presented herein.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Bruce M. Rucker
Project Manager

REGISTERED GEOLOGIST
FREDERICK T. STANIN
No. 5248
Exp. 6/94
STATE OF CALIFORNIA

Frederick T. Stanin, R.G.
Technical Director

BMR/dka/49-04L2.R2
Enclosure

cc: W. Gee, EBRPD
L. Feldman, RWQCB

Closure of Underground Fuel Storage Tanks and Initial Site Characterization at REDWOOD REGIONAL PARK SERVICE YARD Oakland, California

Prepared for:

EAST BAY REGIONAL PARKS DISTRICT
Parklands Design Department

December 1993

Prepared by:

ENGINEERING-SCIENCE, INC.
PLANNING • DESIGN • CONSTRUCTION MANAGEMENT
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OFFICES IN PRINCIPAL CITIES
NC367.05.05/49-04

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EXECUTIVE SUMMARY

Engineering-Science, Inc. (ES) provided technical oversight and documentation associated with the removal of two underground fuel storage tanks (UFSTs) and subsequent remediation and characterization activities at the Redwood Regional Park Service Yard (RRPSY) in Oakland, California. The characterization and remediation activities conducted by ES, Petroleum Engineering, Inc. (PEI) and Powercore Soil Sampling, Inc. (PSSI) from June through October 1993 included: removal of the UFSTs and associated clean overburden and contaminated soil, excavation confirmation soil sampling and analysis; stockpiling and profile sampling of contaminated soil; partial backfilling of the excavation; and, conduct of an exploratory subsurface soil/groundwater "grab" sampling and analysis program.

Background and Previous Findings

The site is the service yard for Redwood Regional Park, which utilized one 2,000-gallon diesel UFST and one 5,000-gallon gasoline UFST from the mid-1960's to 1993. The tanks and piping underwent integrity testing in 1984, 1986, 1988 and 1989. The unleaded gasoline UFST failed the 1988 and 1989 tests.

Remedial Activities

The UFSTs were removed and transported off-site for disposal in April 1993. Initial soil samples collected beneath the UFSTs contained up to 2,200 mg/kg total petroleum hydrocarbons as gasoline (TPH-G) and elevated levels of aromatic hydrocarbons benzene, toluene, ethylbenzene and total xylenes (BTEX). Maximum concentrations of total lead and total petroleum hydrocarbons as diesel (TPH-D) were 10 and 4 mg/kg, respectively.

Approximately 600 cubic yards of contaminated soil associated with the former UFSTs were removed in June 1993. Five excavation confirmation soil samples were collected for laboratory analysis; TPH-G was detected up to 12,000 mg/kg and total BTEX was detected up to 1,800 mg/kg. Total lead was detected at a maximum concentration of 8 mg/kg. Excavated, contaminated soil was stockpiled at an adjacent location on site, and baseline soil sampling and analysis was conducted prior to aeration of the soil. The excavation was partially backfilled in June 1993 using excavated, clean overburden soil.

Characterization Activities

Following submittal and regulatory agency approval of a workplan for site characterization activities, an exploratory subsurface soil/groundwater "grab" sampling and analysis program was conducted in the vicinity of the excavation during September and October 1993. A total of 17 boreholes were advanced, geologically logged, sampled, backfilled and surveyed. Temporary well points were constructed in five of the boreholes, from which "grab" water samples were collected and static water levels were

measured. Twenty-seven soil samples and five "grab" water samples were submitted for laboratory analysis.

Geology and Hydrogeology

The shallow soil profile at the site consists of a surficial 3 to 10 foot clayey silt unit underlain by a 5 to 15 foot thick silty clay unit. All boreholes were terminated in a locally occurring siltstone or a clay with variable amounts of silt and gravel. Groundwater at the site occurs under unconfined to semi-confined or confined conditions. First occurrence of groundwater during drilling was encountered from 3 to 25 feet below ground surface. Equilibrated water levels ranged from 3 to 18 feet. The difference between first occurrence of groundwater and equilibrated water level ranged from 0 to 13 feet. The surface of the water table generally follows topography. The direction of groundwater flow in the vicinity of the excavation is northeast to southwest.

Magnitude and Extent of Soil and Groundwater Contamination

No soil contamination was detected above regulatory agency action cleanup levels in boreholes immediately north, east or south of the excavation. Significant soil contamination (up to 1,900 mg/kg TPH-G; 1,300 mg/kg total petroleum hydrocarbons as kerosene [TPH-K] and 198 mg/kg total BTEX) was detected in boreholes southwest of the excavation. Soil contamination was detected up to 90 feet southwest of the excavation and an area of discolored soil with noticeable fuel odor was observed in the east wall of Redwood Creek (130 feet southwest of the excavation) approximately one foot above the creekbed. This suggests that UFST-sourced soil and/or water contamination may extend at least to the creek, and that this contamination may have been discharging and may continue to discharge into that surface body. Soil contamination is inferred to result from lateral transport with groundwater and vertical desorption in the capillary fringe during periods of groundwater fluctuation.

Groundwater contamination by TPH and BTEX was detected in all of the five temporary well points at the site. Several BTEX compounds were detected above regulatory agency action levels. Groundwater contamination extends at least 100 feet southwest of the excavation.

The lateral and vertical extent of soil and groundwater contamination have not been fully defined.

Recommendations

Three to five groundwater monitoring wells should be installed and monitored on a quarterly basis to evaluate impacts to groundwater associated with the former UFSTs and to verify the direction of groundwater flow. Soil sampling should also be conducted during well installations to evaluate the vertical extent of contamination.

SECTION 1

INTRODUCTION AND SITE DESCRIPTION

SCOPE OF WORK AND OBJECTIVES

Engineering-Science, Inc. (ES) was initially retained by the East Bay Regional Parks District (EBRPD) to collect and analyze confirmation soil samples beneath two underground fuel storage tanks (UFSTs) at the Redwood Regional Park Service Yard (RRPSY) located in Oakland, California (project site). Following tank removals, ES was subsequently retained to provide technical oversight of contaminated soil excavation and stockpiling, and to collect excavation confirmation soil samples for laboratory analysis. The results of those tasks were summarized in a letter from ES to EBRPD dated 25 June 1993 (ES 1993a), and are discussed in Section 2 of this report.

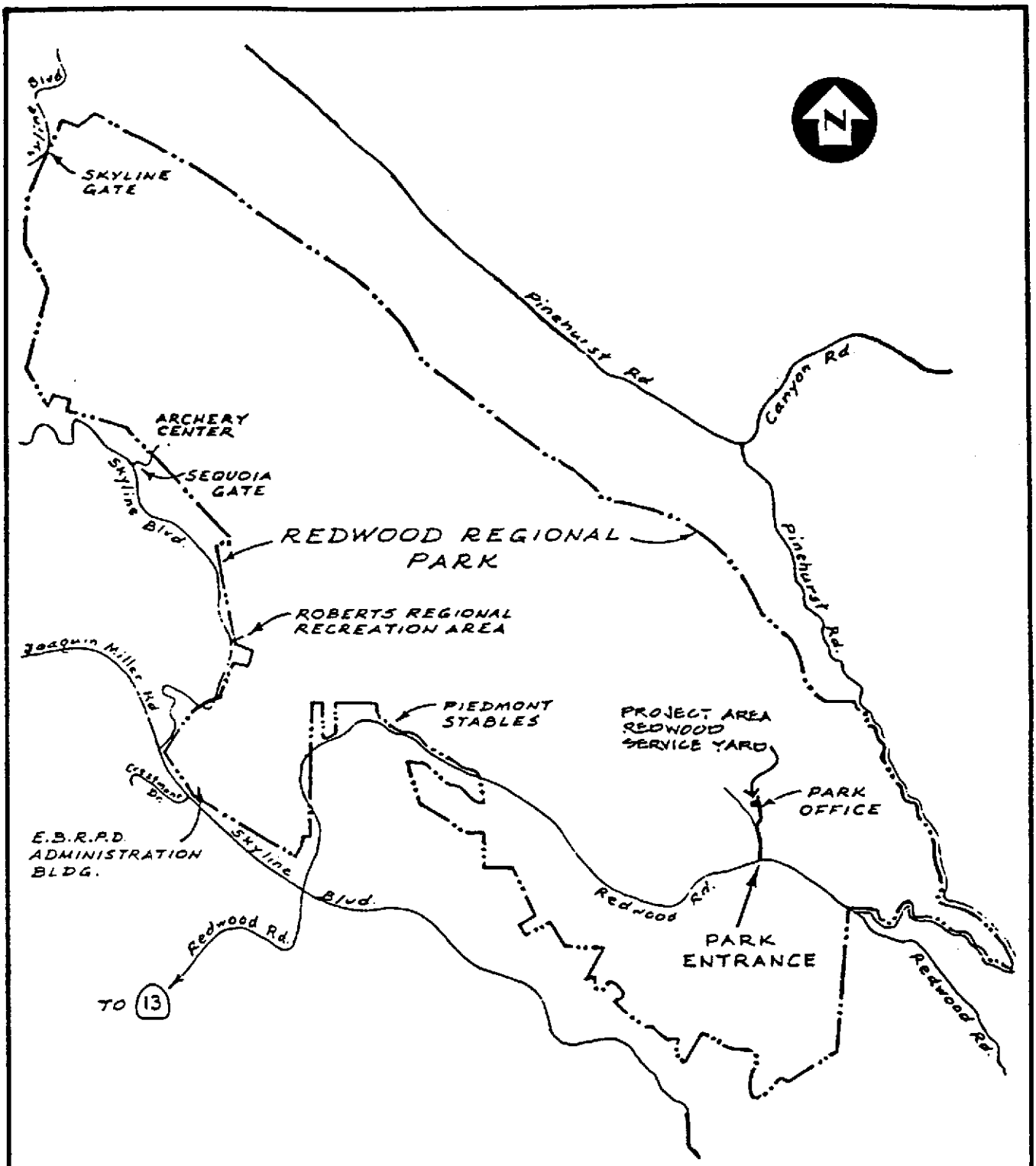
The most recent investigative phase at the project consisted of an exploratory borehole drilling, sampling and analysis program in the vicinity of the former UFSTs. The objectives of this program were to evaluate the extent and magnitude of residual soil and groundwater contamination associated with the former UFSTs, and to evaluate the local lithology and hydrogeology in the context of potential pathways for contaminant transport. Results of this phase of investigation are discussed in Sections 3 and 4 of this report.

SITE DESCRIPTION

The project site is located at 7867 Redwood Road in Oakland, Alameda County, California. Figure 1.1 shows the location of the project site.

The project site is the service yard for the Redwood Regional Park. Figure 1.2 is a site plan of the project site and vicinity. The project site is located adjacent to and east of the park entrance road. There are currently two permanent buildings at the project site as well as several metal storage containers. A wooden equipment shed was removed during soil excavation activities. The service yard is essentially flat, gravel surfaced, and is located at the eastern foot of a hillside. The service yard is at an elevation approximately 10 - 13 feet above the park access road. Redwood Creek is located approximately 80 feet west of the project site.

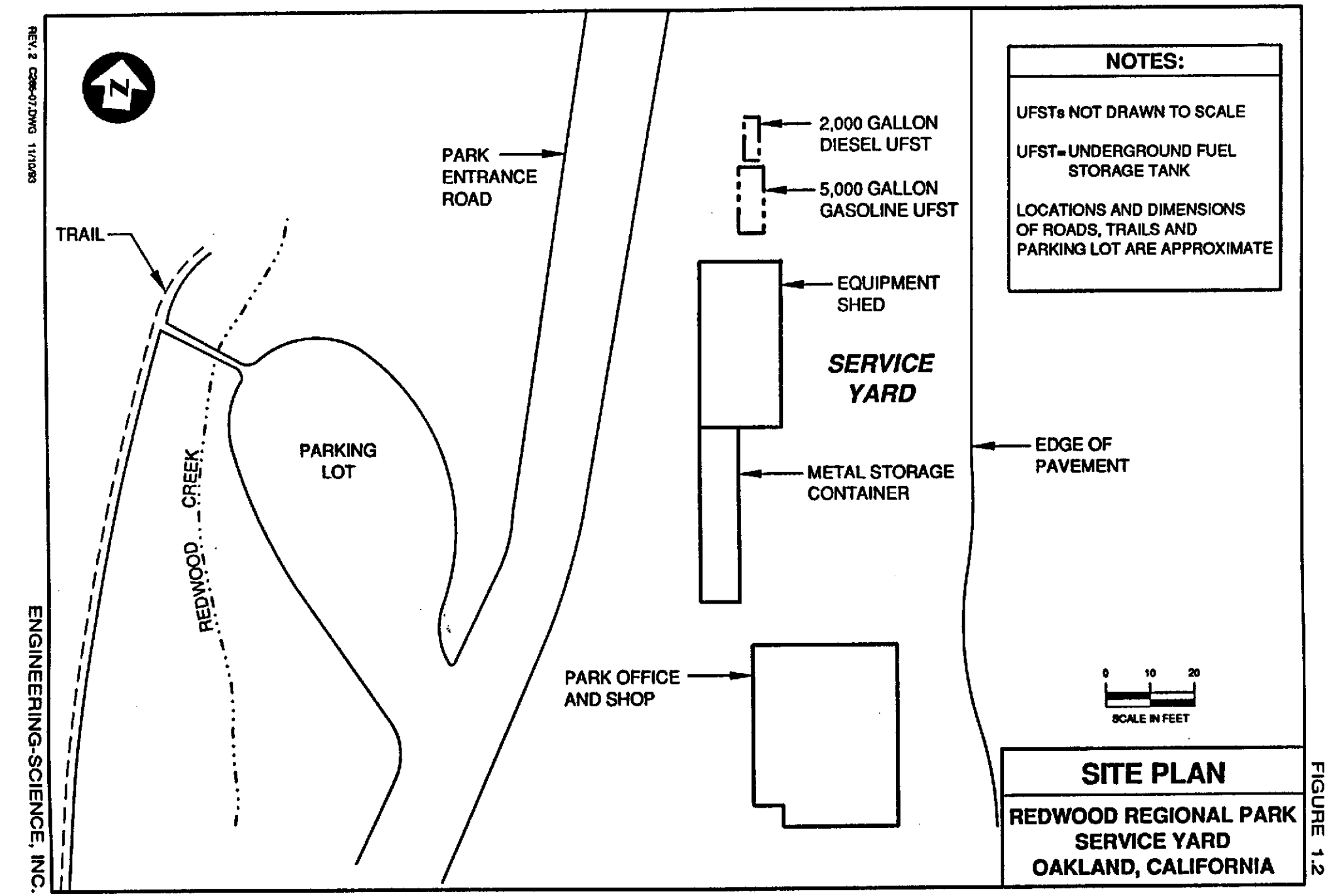
FIGURE 1.1



LOCATION MAP

REDWOOD REGIONAL PARK
CORPORATION YARD SITE

ENGINEERING-SCIENCE


N
PARK ENTRANCE ROAD
TRAIL
REDWOOD CREEK
PARKING LOT
2,000 GALLON DIESEL UFST
5,000 GALLON GASOLINE UFST
EQUIPMENT SHED
SERVICE YARD
METAL STORAGE CONTAINER
EDGE OF PAVEMENT
PARK OFFICE AND SHOP
NOTES:
UFSTs NOT DRAWN TO SCALE
UFST= UNDERGROUND FUEL STORAGE TANK
LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE
0 10 20
SCALE IN FEET
SITE PLAN
REDWOOD REGIONAL PARK
SERVICE YARD
OAKLAND, CALIFORNIA
FIGURE 1.2
ENGINEERING-SCIENCE, INC.
REV. 2 C286-07.DWG 11/10/93

PHYSICAL SETTING

The following is a summary of relevant aspects of climate, physiography, geology and hydrogeology.

Climate

The project area has a climate characterized by mild, wet winters and dry summers. Precipitation is seasonal, falling mostly between November and March. Average annual precipitation in the upland area of the Oakland/Berkeley Hills is approximately 26 inches (Alameda County Flood Control and Water Conservation District [ACFCWCD] 1988).

Physiography

The project area is located on the west facing slope of Redwood Creek canyon in the Oakland/Berkeley Hills. The canyon is an area of medium to high topographic relief. A landslide deposit occurs on the eastern edge of the site and the slope stability of the area is classified as moderately stable to unstable (Nilsen 1975). Surface elevations at the project site range from 564.8 feet above mean sea level (msl) on the north (boring B1) to 531.49 feet in the streambed of Redwood Creek.

Geology

The site is located approximately seven miles east of the southeastern shoreline of San Francisco Bay, within the Coast Ranges physiographic province of California. The San Francisco Bay Area is an elongate structural depression bounded by the Santa Cruz Mountains on the west and the Diablo Range on the east. The Berkeley Hills are encompassed by the Diablo Range.

The San Francisco Bay Area is a seismically active region. The area's main geologic structures are associated with two major faults: the San Andreas Fault in the Santa Cruz Mountains and the Hayward Fault which forms the western boundary of the Diablo Range. The Diablo Range has been uplifted and the bay has gradually subsided over the last three million years. The site is located approximately 2.5 miles east of the Hayward Fault (Norris and Webb 1990) (Nilsen et. al. 1979).

The bedrock in these mountain ranges is composed of sedimentary, metamorphic and volcanic rocks of Jurassic through Tertiary age (Borcherdt et. al. 1975). Overlying the bedrock in Redwood Creek canyon is Quaternary alluvium consisting of silt, sand and gravel. Borings advanced to a maximum depth of 25 feet below ground surface (bgs) during this investigation indicate surficial deposits at the site consist of clays, silty clays, clayey silts, silts and siltstone to fine sandstone.

Hydrology

Redwood Creek borders the site on the southwest and is a seasonal creek known for the occurrence of Rainbow Trout. A spring was observed on the east side of the site. The site lies approximately one mile upstream of Upper San Leandro Reservoir to the southeast (USGS 1959).

The occurrence of groundwater in upland areas is unpredictable. However where it occurs it is generally hydraulically associated with some nearby surface water body such as a spring or stream. There is no comprehensive groundwater data in this area (ACFCWCD 1988). **Groundwater at this site appears to discharge into Redwood Creek and eventually into Upper San Leandro Reservoir.**

TANK HISTORY

Both UFSTs were reportedly installed between 1965 and 1968 (Gee 1993a). **The 5,000-gallon steel UFST contained unleaded gasoline and was reportedly a converted channel buoy purchased from the Navy** (Gee 1993a). The 2,000 gallon UFST contained diesel fuel. California State Water Resources Control Board (SWRCB) Underground Storage Tank Permit Applications (from 1984 and from 1992) for the two UFSTs are included in Appendix A. The 1984 documents state for each UFST that the "tank has been tested per regulations" although no tank integrity testing data were available prior to 1986. The two UFSTs passed integrity tests in August 1986. **The two UFSTs were tested again in February 1988. At that time a piping leak in the unleaded gasoline UFST system was detected.** An Underground Storage Tank Unauthorized Release (Leak)/Contamination Site Report was filed on 4 March 1988. **There was no information available regarding UFST repair associated with this integrity test.** Tank integrity testing was conducted in October 1989 for the two site UFSTs. **The unleaded gasoline UFST again failed to pass the test.** Copies of the UFST integrity testing and Leak Report are included in Appendix A. There was no information available regarding UFST installation, construction, repairs or historical inventory.

SECTION 2

BACKGROUND AND PREVIOUS FINDINGS

INTRODUCTION

The remedial tasks described in this section were performed between 23 April and 14 July 1993. Those tasks include excavation and removal of the two underground fuel storage tanks (UFSTs); collection and laboratory analysis of soil samples beneath the UFSTs; transport and disposal of the UFSTs; excavation and stockpiling of contaminated soil; confirmation sampling of the excavation; partial backfilling of the excavation; and confirmation sampling of the stockpiled, contaminated soil.

Permitting, integrity testing, leak report, and closure plan information associated with the UFSTs is included as Appendix A. Appendix B contains hazardous waste manifests and certificates of destruction for the UFSTs and associated piping and pumps. A full discussion of field investigative protocols and methodologies is included as Appendix C. Appendix D contains the initial and excavation confirmation soil sampling certified analytical laboratory reports and associated chain-of-custody records. Appendix E contains the stockpiled soil confirmation sampling certified analytical laboratory reports and associated chain-of-custody records. Photodocumentation of the remedial work is contained in Appendix F.

EXCAVATION AND REMOVAL OF UFSTs

The two project site UFSTs (one 2,000-gallon diesel and one 5,000-gallon unleaded gasoline) were uncovered by Petroleum Engineering Inc. (PEI) on 29 April 1993. The UFSTs were found positioned with their long axes oriented north-south with the diesel tank north of the gasoline tank (Figure 2.1). The UFSTs were oriented with their long axes parallel to ground surface with the top of each tank approximately 4 feet bgs. Dry ice (solid carbon dioxide) was subsequently placed in each UFST and the UFSTs were allowed to inert until the oxygen level was measured to be less than 20 percent of the lower explosive limit (LEL) for each UFST.

Removal of the UFSTs and all associated underground utilities (including compressed air and electric lines, vent and fill pipes) occurred on 3 May 1993. The diesel UFST was removed first followed by removal of the gasoline UFST. The diesel UFST was removed by a Case 580B backhoe and the gasoline UFST was removed with a crane. The UFSTs and associated piping were visually inspected upon removal. Although both UFSTs and the associated piping appeared in good shape, discolored soil was observed in the

excavation pit below the gasoline UFST location. The UFSTs and associated piping were loaded on a flatbed truck and transported under hazardous waste manifest by H&H Ship Service Company, where they were steam cleaned, cut and sent to a scrapping facility for disposal (Appendix B). The United States Environmental Protection Agency (USEPA) identification number for the waste generator (EBRPD) is CAC000364904.

COLLECTION OF INITIAL SOIL SAMPLES

Two soil samples were collected from beneath each UFST, one near each end of each tank, on 3 May 1993 by ES. The locations of those soil samples were approved in the field by Mr. Jeff Shapiro and Ms. Eva Chu of the Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Materials Division (ACHCSA-HMD), and are shown on Figure 2.1. Analytical results of those samples are summarized in Table 2.1. Soil sampling procedures are discussed in Appendix C. The analytical laboratory report and chain-of-custody record for those samples is included in Appendix D.

EXCAVATION OF CONTAMINATED SOIL AND CONFIRMATION SOIL SAMPLING

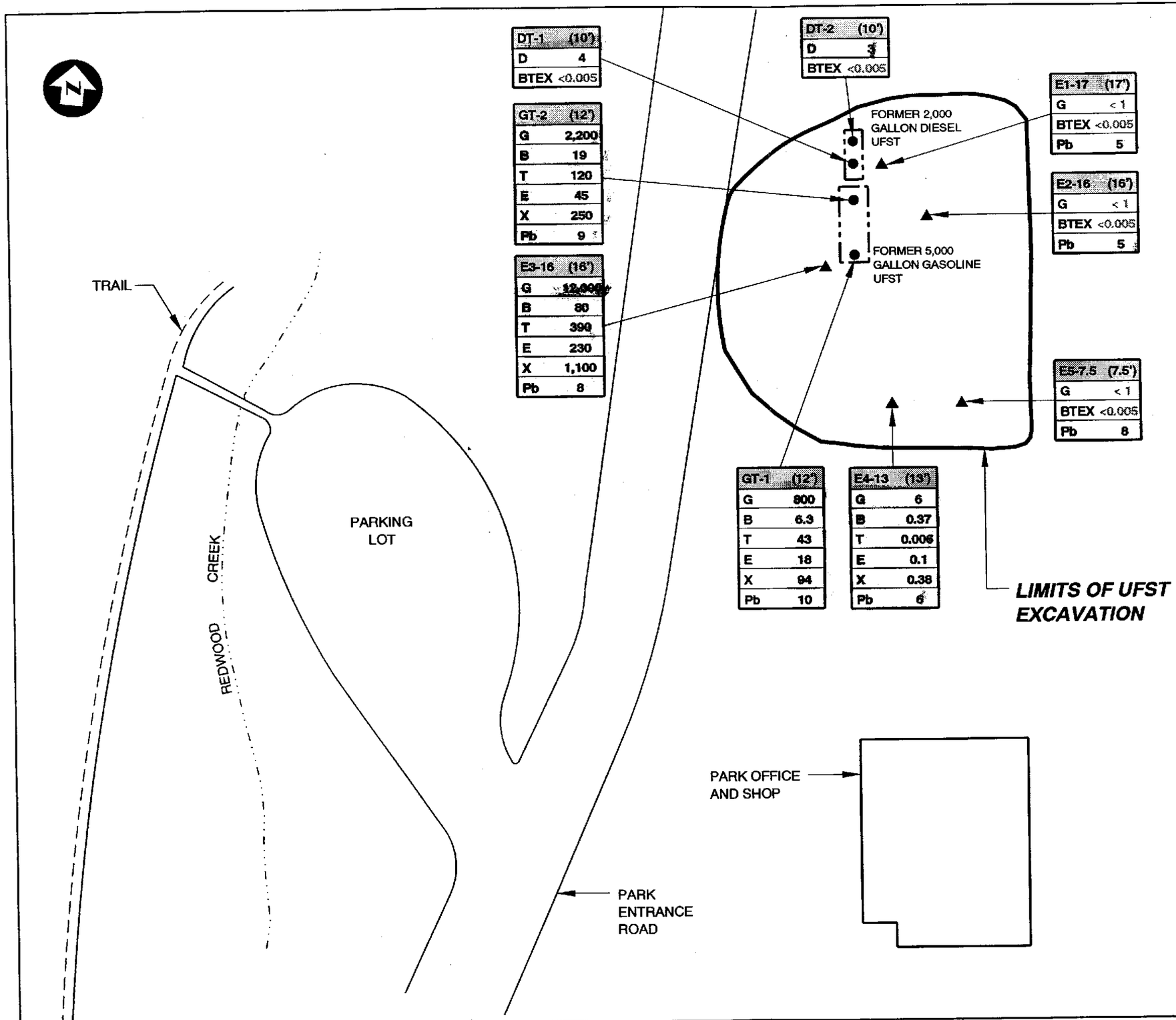
Excavation of contaminated soil associated with the former UFSTs was conducted on 10, 11 and 14 June 1993. Approximately 600 cubic yards of contaminated soil were excavated and stockpiled on site for aeration (see the following subsection). Excavated soil was screened by ES by a photoionization detector (PID) and total hydrocarbon vapor analyzer (THVA) for total ionizable vapors as an indicator of contamination. The excavation covered a surface area of approximately 1,200 square feet, and had a maximum depth of approximately 25 feet (below grade relative to the eastern edge of the excavation) (Figure 2.1). Soil excavation activities were halted due to the potential for landslides, the presence of significant facility constraints (roads and buildings) and the infiltration of spring water into the excavation.

Five confirmation excavation soil samples were collected by ES on 15 June 1993 (Figure 2.1, Table 2.1 and Appendix D). Excavation confirmation soil sample locations were approved in the field by ACHCSA-HMD. Discolored soil was noted only in the eastern wall of the excavation. However, confirmation soil samples from other areas contained up to 1,700 parts per million by volume (ppmv) total ionizable vapors as measured with the PID and THVA.

EXCAVATION BACKFILLING

The excavation was partially backfilled on 18 June 1993 with previously excavated clean overburden (estimated 270 yards) to an elevation approximately equal to that of the park entrance road (see following Figure 4.1). The ACHCSA-HMD criterion for "clean" overburden eligible for re-use as backfill was established to be 10 ppmv to be verified by ionizable vapors concentrations from PID readings collected approximately every 5 to 10 cubic yards (Chu 1993). Excavated soil was screened with the PID (Appendix C) and

Not quite.



LEGEND

- ● — INITIAL SOIL SAMPLE COLLECTED 3 MAY 1993 FROM BENEATH UFST
- ▲ E4-13 — EXCAVATION CONFIRMATION SOIL SAMPLE COLLECTED AT DEPTH OF 13 FEET BELOW GRADE OF SERVICE YARD
- E1-17 (17') — SOIL SAMPLE I.D. AND DEPTH BELOW GROUND SURFACE
- G,D,K 4 — TPH ANALYTICAL RESULTS (mg//kg)
- BTEX 0.2 — BTEX ANALYTICAL RESULTS (mg/Kg)
- Pb 8 — TOTAL LEAD ANALYTICAL RESULTS (mg/Kg)
- <0.005 — NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 0.005 mg/kg
- G — TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE
- K — TPH AS KEROSENE
- D — TPH AS DIESEL
- B — BENZENE
- T — TOLUENE
- E — ETHYLBENZENE
- X — TOTAL XYLENES

NOTES:

UFSTs NOT DRAWN TO SCALE

UFST=UNDERGROUND FUEL STORAGE TANK

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

0 10 20
SCALE IN FEET

UFST EXCAVATION PLAN AND SOIL SAMPLE LOCATIONS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

REV. 2 C266-08.DWG 11/10/93

ENGINEERING-SCIENCE, INC.

TABLE 2.1
UFST INITIAL AND CONFIRMATION SOIL SAMPLE ANALYTICAL RESULTS
Redwood Regional Park Corporation Yard
Oakland, CA

	Depth (feet below grade)	TPH-G	TPH-K	TPH-D	Benzene	Toluene	Total Xylenes	Ethyl-benzene	Lead (total)
Initial Samples (a)		concentrations in mg/kg							
DT-1	10	NA	**	4	< 0.005	< 0.005	< 0.005	< 0.005	NA
DT-2	10	NA	< 1	3	< 0.005	< 0.005	< 0.005	< 0.005	NA
GT-1	12	800	NA	NA	6.3	46	94	18	10
GT-2	12	2,200	NA	NA	19	120	280	45	9
Confirmation Excavation Samples (b)									
E1-17	17	< 1	NA	NA	< 0.005	< 0.005	< 0.005	< 0.005	5
E2-16	16	< 1	NA	NA	< 0.005	< 0.005	< 0.005	< 0.005	5
E3-16	16	12,000	NA	NA	80	390	1,100	230	8
E4-13	13	6*	NA	NA	0.37	0.006***	0.36	0.1	6
E5-7.5	7.5	< 1	NA	NA	< 0.005	< 0.005	< 0.005	< 0.005	8

Notes:
TPH-G: Total Petroleum Hydrocarbons as Gasoline
TPH-D: Total Petroleum Hydrocarbons as Diesel Fuel
TPH-K: Total Petroleum Hydrocarbons as Kerosene
UFST: Underground Fuel Storage Tank
< 1 : Not detected above method reporting limit of 1 mg/kg
NA : Not Analyzed
* : Pattern does not match gasoline standard.
** : Kerosene Range not reported due to overlap of hydrocarbon range.
*** : Presence of this compound confirmed by second column;
however, the confirmation differed from the reported result by more than a factor of two.
(a) : Samples collected 3 May 1993 from directly beneath the UFSTs
(b) : Samples collected 15 June 1993 from excavation base and sidewalls

tab21.wk1*
11/10/93

soil which met the established re-use criterion was placed in the excavation in approximately 6-inch lifts and tamped with the excavator bucket.

CONTAMINATED SOIL STOCKPILING, AERATION AND CONFIRMATION SAMPLING

Contaminated soil was stockpiled on plastic sheeting, covered with plastic, and barricaded after each day's work. Due to facility constraints, the approximately 600 cubic yards of contaminated soil were subsequently transported to an open area behind the Redwood Park Fire Station #2 located on Redwood Road approximately 500 feet east of the project site. All contaminated, stockpiled soil was kept covered until confirmation soil sampling was conducted.

Confirmation soil samples were collected from the stockpiled soil on 12 July 1993. The objective of the confirmation sampling was to determine baseline contamination of the stockpiled soil prior to soil aeration. Stockpile soil sampling was conducted in accordance with the San Francisco Bay Area Air Quality Management District (BAAQMD) Regulation 8 Rule 40 sampling protocol for contaminated soil resulting from UFST releases. The laboratory analytical report and chain-of-custody record for that sampling is included as Appendix E.

The results of contaminated stockpiled soil confirmation sampling were summarized in a 3 August 1993 ES letter to the BAAQMD. Aeration of the stockpiled, contaminated soil was begun on 23 August 1993 (Gee 1993c) (Appendix G). Contaminated soil was spread to an average depth of approximately four feet, and was turned approximately three times per week with an excavator to stimulate aeration. Confirmation screening of the contaminated soil was conducted by ES on 29 September 1993. Total ionizable vapors as measured by a PID and THVA were detected up to 1,216 ppmv. The wet weather contingency plan for the stockpiled soil includes fully covering the stockpile with plastic sheeting, and constructing an earthern berm around the stockpile. It is proposed by EBRPD that aeration of the stockpile will re-commence after the rainy season (Gee 1993b).

SECTION 3

FIELD PROGRAM

This section describes the implementation of the workplan for site characterization (ES 1993b and 1993c). The field activities described in this section were conducted on 29 and 30 September and 1 and 4 October 1993.

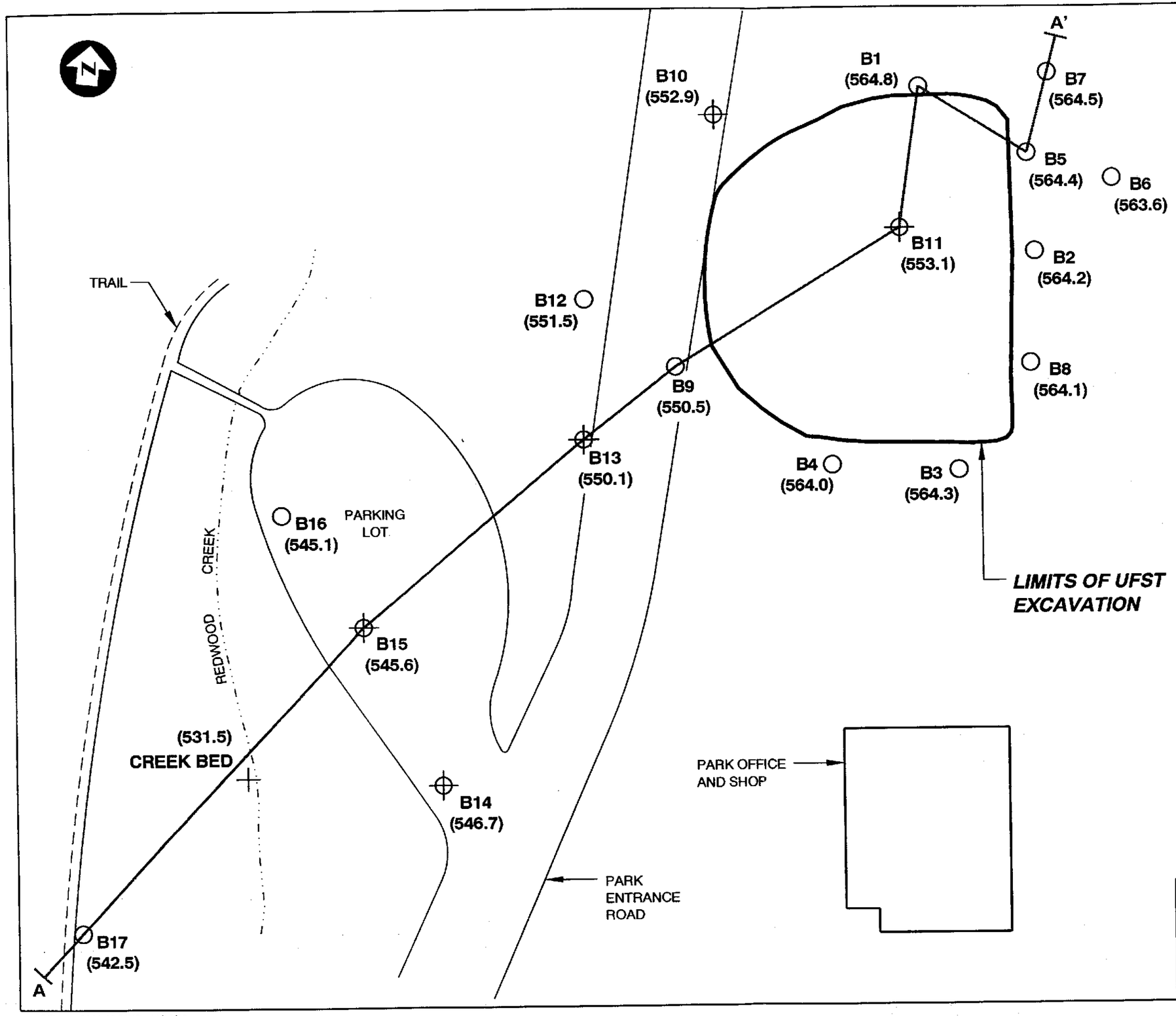
The ACFCWCD drilling permit number 93524 is contained in Appendix A. Appendix C contains a discussion of field investigative methodology and protocols. Appendix H contains the exploratory borehole geologic logs and "grab" groundwater sampling field notes. Appendix I contains the laboratory analytical reports and chain-of-custody records for exploratory borehole soil and groundwater samples.

WORKPLAN PREPARATION

On behalf of EBRPD, ES submitted to ACHCSA-HMD a Workplan For Site Characterization dated 3 September 1993 (ES 1993b). That workplan summarized previous site characterization and remedial actions and discussed the proposed protocols and methodologies for the borehole drilling and sampling program. Comments by ACHCSA-HMD to the workplan were summarized in a 16 September 1993 ACHCSA-HMD letter. On behalf of EBRPD, ES submitted to ACHCSA-HMD a response to comments dated 20 September 1993 (ES 1993c).

BOREHOLE DRILLING AND SAMPLING

A total of 17 exploratory boreholes were advanced by Powercore Soil Sampling Inc. (PSSI) in the vicinity of the UFST excavation using a hydraulic sampler. The boreholes were continuously logged by an ES field geologist and screened for ionizable and hydrocarbon vapors using a PID and THVA (Appendix C). During borehole advancement, discolored soil was observed on the east bank of Redwood Creek (Figure 3.1). Soil samples showing the highest PID and THVA readings and/or located immediately above groundwater were selected for laboratory analysis. Temporary well points were installed in five of the boreholes, from which "grab" groundwater samples were collected and static water levels were measured (Appendix C).



LEGEND

- B7 (564.4) — EXPLORATORY BOREHOLE B7 AND ELEVATION OF ADJACENT GROUND SURFACE
- B11 (553.1) — EXPLORATORY BOREHOLE B11 WITH TEMPORARY WELL POINT, AND ELEVATION OF ADJACENT GROUND SURFACE
- (531.5) — SURVEYED ELEVATION AT BED OF REDWOOD CREEK
- A — A' — CROSS SECTION A-A' (SEE FIGURES 4.1 AND 4.4)

NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

UFST=UNDERGROUND FUEL STORAGE TANK

ALL ELEVATIONS SURVEYED BY EBRPD RELATIVE TO UNITED STATES GEOLOGICAL SURVEY (USGS) SURVEY BENCHMARK NO. JHF-49 AND ARE EXPRESSED AS FEET ABOVE MEAN SEA LEVEL (MSL)

0 10 20
SCALE IN FEET

EXPLORATORY BOREHOLE AND CROSS SECTION LOCATIONS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

REV. 3 C266-09.DWG 11/10/93

ENGINEERING-SCIENCE, INC.

Soil and water samples collected during the borehole sampling program were analyzed by the following analytical methods, as specified in the workplan:

- Total petroleum hydrocarbons (TPH) as gasoline (TPH-G), TPH as diesel fuel (TPH-D), and TPH as kerosene (TPH-K) by the Department of Toxic Substances Control (DTSC) Leaking Underground Fuel Tank (LUFT) Manual Method.
- Benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Method 8020.

Table 3.1 summarizes exploratory borehole drilling and sampling summary, including: borehole total depths; soil and "grab" water sample identification numbers, depths and date of collection; and PID/THVA readings.

SURVEYING OF BOREHOLE LOCATIONS

The horizontal locations and elevations of ground surface at each borehole were surveyed by EBRPD, and are shown on Figure 3.1. All elevations are reported relative to United States Geological Survey (USGS) mean sea level (msl).

TABLE 3.1

EXPLORATORY BOREHOLE DRILLING AND SAMPLING DATA SUMMARY
REDWOOD REGIONAL PARK CORPORATION YARD
OAKLAND, CALIFORNIA

Borehole I.D.	Borehole Total Depth	Borehole Soil Sample Depth	Date Soil Sample Collected	PID/THVA Readings (ppmv)	Water Sample I.D.	Water Sample Depth	Date Water Sample Collected
B1	28	5		2.2 / 1			
		11 *	09/29/93	3.1 / 1			
		15		1 / 1			
		20		0 / 0			
		27 *	09/29/93	2 / 6			
B2	19	5		5.2 / 0			
		11 *	09/29/93	7 / 0			
		15 *	09/29/93	9.6 / 0			
B3	20.5	5		0 / 4			
		12 *	09/29/93	0 / 7			
		18 *	09/29/93	2.4 / 15			
B4	23	5		2 / 6			
		10		2.7 / 6			
		18 *	09/29/93	7.8 / 32			
		23 *	09/29/93	NR / 7			
B5	20	5		2 / 6			
		11 *	09/30/93	2 / 6			
		15		0.1 / 1			
		20		0 / 0			
B6	9	5		1.3 / 2			
B7	14.5	5		1.2 / 1			
		10		2 / 6			
		12 *	09/30/93	2 / 12			
B8	14.5	4 *	09/30/93	0.2 / 6			
		10 *	09/30/93	2.3 / 35			
B9	28	5		3.2 / 16			
		11 *	09/30/93	108 / 122			
		15		101 / 110			
		21 *	09/30/93	74 / 46			
		28 *	09/30/93	37 / 22			
B10	26	6 *	09/30/93	3 / 5			
		10		1.2 / 2			
		15	09/30/93	0.9 / 0	B10-GW	~16.5	10/04/93
		21 *	09/30/93	1 / 18			
		25		0 / 0			
B11	13.5	5	10/01/93	1.8 / 0	B11-GW	~12	10/01/93
		11.5 *	10/01/93	1.6 / 0			
B12	21	5		0.3 / 0			
		10		3.8 / 12			
		14.5 *	10/01/93	56 / 68			
		15 *	10/01/93	NR			
		21 *	10/01/93	117 / 110			

TABLE 3.1

EXPLORATORY BOREHOLE DRILLING AND SAMPLING DATA SUMMARY
REDWOOD REGIONAL PARK CORPORATION YARD
OAKLAND, CALIFORNIA

Borehole I.D.	Borehole Total Depth	Borehole Soil Sample Depth	Date Soil Sample Collected	PID/THVA Readings (ppmv)	Water Sample I.D.	Water Sample Depth	Date Water Sample Collected
B13	19.5	5		1.8 / 0			
		12 *	10/01/93	988 / 1,600			
		15 *	10/01/93	1,269 / 2,200	B13-GW	~19.5	10/04/93
		20		1,620 / 915			
B14	21	5		0.2 / 1			
		10		0.2 / 6			
		18 *	10/04/93	43 / 24	B14-GW	~21	10/04/93
B15	19	5		0.2 / 0			
		10		10 / 38	B15-GW	~19	10/04/93
		17 *	10/04/93	1,152 / 2,000			
B16	20.5	5		0.3 / 0			
		10		13 / 8			
		17.5 *	10/04/93	47 / 35			
B17	14.5	5		0.2 / 0			
		10		0.3 / 0			
		12.5 *	10/04/93	0.3 / 0			

Notes:
NR = Not Recorded
* Soil sample submitted for laboratory analysis
ppmv = parts per million per volume

TABLE 31.wk1
11/10/93

SECTION 4

INVESTIGATIVE RESULTS

GEOLOGIC PROFILE

Subsurface stratigraphy in the study area is illustrated in geologic cross section A-A' (Figures 3.1 and 4.1) based on soil boring data acquired during the current investigation. Exploratory borehole geologic logs are included as Appendix H.

As shown on Figure 4.1 and the borehole geologic logs, the shallow soil stratigraphy consists of a surficial 3 to 10 foot thick clayey silt unit underlain by a 5 to 15 foot thick silty clay unit. All boreholes were terminated in a locally occurring siltstone or a clay with variable amounts of silt and gravel.

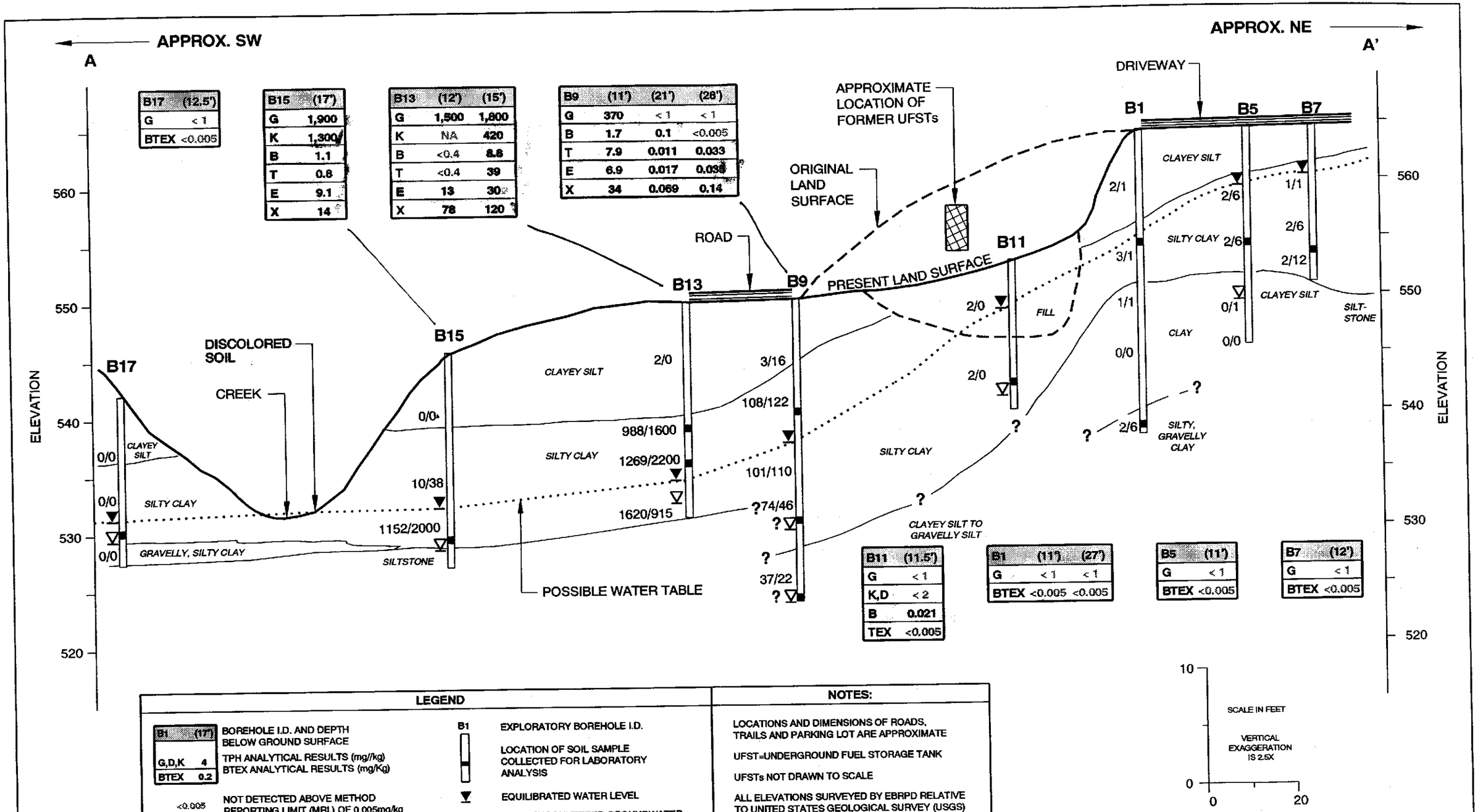
HYDROLOGIC CONDITIONS

Groundwater at the site occurs under unconfined or possibly partially confined conditions, as evidenced by the equilibration of static water levels relative to the first occurrence of groundwater encountered during drilling. First occurrence of groundwater during drilling was encountered from 3 to 25 feet bgs, and equilibrated water levels ranged from 3 to 18 feet bgs (Figure 4.1). The difference between first occurrence of groundwater and equilibrated water level ranged from 0 to 13 feet. These differences were the greatest in areas east of the road and were much less west of the road.

Figure 4.1 shows the inferred water table surface, as evidenced by static water level measurements collected 4 October 1993 in the temporary well points and by the water level in the creek. As indicated in Figure 4.1, the inferred water table surface generally follows local topography and occurs within the silty clay unit. Figure 4.2 is a groundwater elevation map constructed from those temporary well point static water levels. The direction of local groundwater flow in the study area is from northeast to southwest.

As discussed above, the materials encountered in the water-bearing zone in boreholes in the vicinity of the former UFSTs are predominantly clayey silt and silty clay. A hydraulic conductivity value of approximately 0.05 ft/day and an effective porosity value of 35 percent are representative values of these parameters for this soil type (Fetter 1988). Given a groundwater gradient of 0.2 feet per feet as estimated from static water

FIGURE 4.1



LEGEND

B1 (17') / G,D,K 4 / BTEX 0.2	BOREHOLE I.D. AND DEPTH BELOW GROUND SURFACE; TPH ANALYTICAL RESULTS (mg//kg) BTEX ANALYTICAL RESULTS (mg/Kg)
<0.005	NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 0.005mg/kg
G	TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE
K	TPH AS KEROSENE
D	TPH AS DIESEL
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
B1	EXPLORATORY BOREHOLE I.D.
	LOCATION OF SOIL SAMPLE COLLECTED FOR LABORATORY ANALYSIS
	EQUILIBRATED WATER LEVEL
	FIRST ENCOUNTERED GROUNDWATER DURING DRILLING
10/40	PHOTOIONIZATION DETECTOR (PID)/ TOTAL HYDROCARBON VAPOR ANALYZER (THVA) READINGS IN PARTS PER MILLION (ppm)
NA	NOT ANALYZED

NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

UFST=UNDERGROUND FUEL STORAGE TANK

UFSTs NOT DRAWN TO SCALE

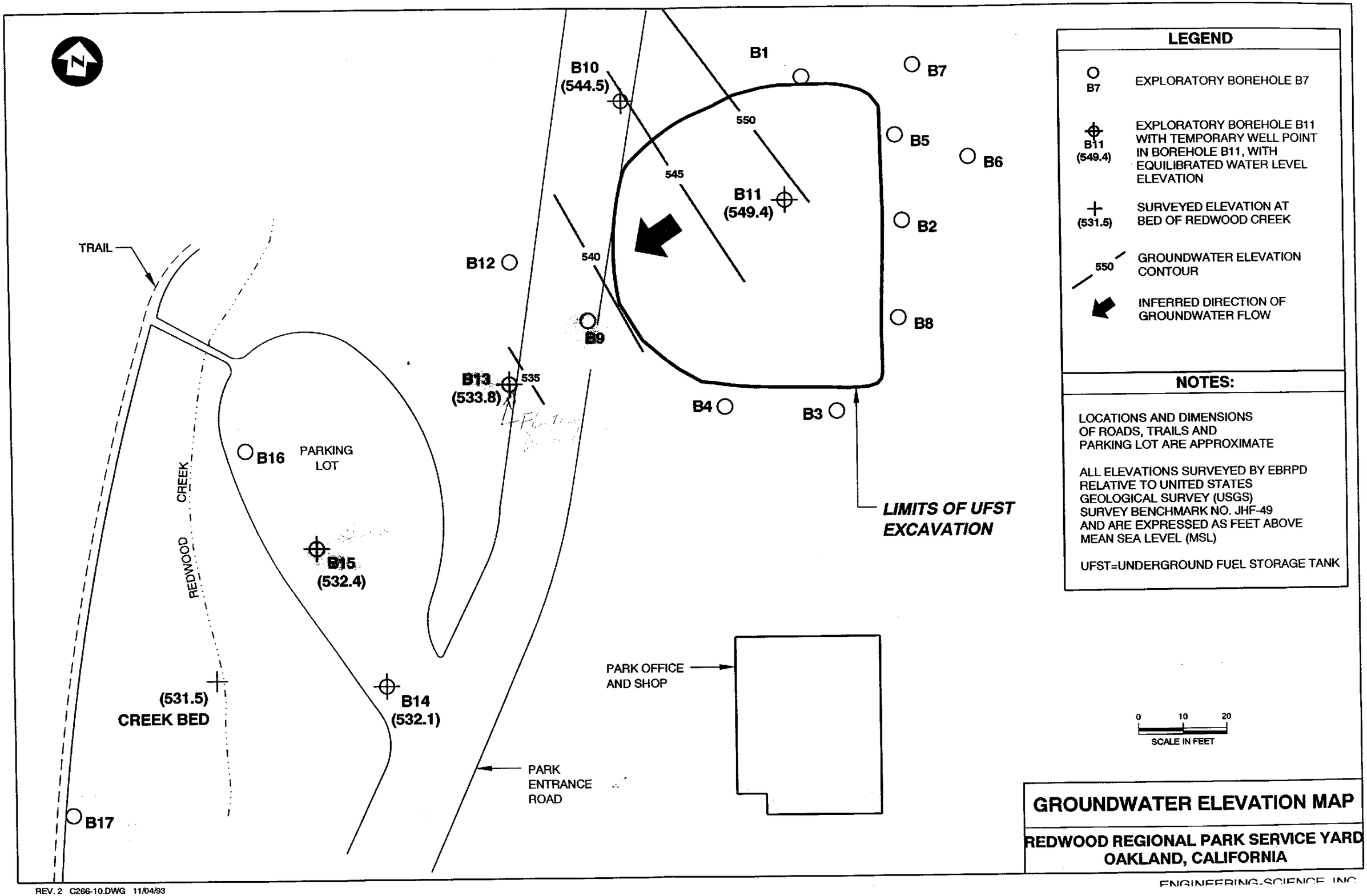
ALL ELEVATIONS SURVEYED BY EBRPD RELATIVE TO UNITED STATES GEOLOGICAL SURVEY (USGS) SURVEY BENCHMARK NO. JHF-49 AND ARE EXPRESSED AS FEET ABOVE MEAN SEA LEVEL (MSL)

HYDROGEOLOGIC CROSS SECTION WITH SOIL SAMPLE ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

ENGINEERING-SCIENCE, INC.

REV. 4 C266-13.DWG 11/05/93



LEGEND

- B7 — EXPLORATORY BOREHOLE B7
- B11 (549.4) — EXPLORATORY BOREHOLE B11 WITH TEMPORARY WELL POINT IN BOREHOLE B11, WITH EQUILIBRATED WATER LEVEL ELEVATION
- (531.5) — SURVEYED ELEVATION AT BED OF REDWOOD CREEK
- 550 — GROUNDWATER ELEVATION CONTOUR
- INFERRED DIRECTION OF GROUNDWATER FLOW

NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

ALL ELEVATIONS SURVEYED BY EBRPD RELATIVE TO UNITED STATES GEOLOGICAL SURVEY (USGS) SURVEY BENCHMARK NO. JHF-49 AND ARE EXPRESSED AS FEET ABOVE MEAN SEA LEVEL (MSL)

UFST=UNDERGROUND FUEL STORAGE TANK

GROUNDWATER ELEVATION MAP

REDWOOD REGIONAL PARK SERVICE YARD
OAKLAND, CALIFORNIA

REV. 2 C266-10.DWG 11/04/93

ENGINEERING-SCIENCE, INC.

level measurements, the average linear groundwater velocity would be approximately 7 feet per year. These values are approximations only, and actual groundwater velocities could vary substantially.

SOIL SAMPLING ANALYTICAL RESULTS

Table 4.1 summarizes the analytical results of exploratory borehole soil samples. The location and analytical results of those soil samples are shown on Figures 4.1 and 4.3. Appendix I contains the analytical laboratory reports and chain-of-custody records for those soil samples.

WATER SAMPLING ANALYTICAL RESULTS

Table 4.2 summarizes the analytical results of temporary well point "grab" water samples. Figures 4.4 and 4.5 show the location and analytical results of those "grab" water samples. Appendix I contains the analytical laboratory reports and chain-of-custody records for those water samples. During water sampling, possible floating petroleum product (up to one-quarter inch) was observed in the temporary well point at Borehole B13; petroleum odor and sheen was noted in the temporary well point at Borehole B15.

EXTENT AND MAGNITUDE OF SOIL CONTAMINATION

As indicated in Table 4.1 and on Figures 4.1 and 4.3, boreholes immediately to the north, east and south of the excavation (B1-B8, B10 and B11) did not contain TPH-G, TPH-K or TPH-D above the method reporting limit (MRL) of 1 mk/kg (with the exception of sample B10-21 which contained TPH-D at 7 mg/kg). Similarly, BTEX components were not detected in these boreholes above the MRL of 0.005 mg/kg (with the exception of sample B11-11.5 which contained benzene at 0.021 mg/kg). These data indicate that soil excavation activities were effective in removing soil contamination in the immediate vicinity of the former UFSTs.

Significant soil contamination by TPH and BTEX was detected in boreholes to the west and southwest of the excavation (boreholes B9, B12-B16). Maximum contaminant concentrations detected in those boreholes include: 1,900 mg/kg TPH-G and 1,300 mg/kg TPH-K (sample B15-17); 8.8 mg/kg benzene, 39 mg/kg toluene, 30 mg/kg ethylbenzene and 120 mg/kg total xylenes (sample B13-15). As shown on Figure 4.1, soil contamination appears to be confined primarily to the silty clay unit. Those soil samples with elevated TPH and BTEX concentrations were collected from just above first occurrence of groundwater (i.e. within the capillary fringe of the unsaturated zone and/or the uppermost portion of the saturated zone), and are located along the axis of inferred groundwater flow direction (northeast to southwest) and downgradient of the excavation. This correlates to noticeable odorous soil samples in this area. This spatial distribution of soil contamination suggests that TPH and BTEX contamination moved laterally from the source area through groundwater, and was desorbed onto capillary fringe soils during periods of water level fluctuation.

TABLE 4.1
EXPLORATORY BOREHOLE SOIL SAMPLE ANALYTICAL RESULTS
Redwood Regional Park Corporation Yard
Oakland, CA

Sample I.D.	Depth (ft bgs)	TPH–G	TPH–K	TPH–D	Benzene	Toluene	Ethyl–benzene	Total Xylenes
		concentrations in mg/kg						
B1–11	11	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B1–27	27	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B2–11	11	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B2–15	15	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B3–12	12	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B3–18	18	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B4–18	18	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B4–23	23	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B5–11	11	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B7–12	12	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B8–4	4	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B8–10	10	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B9–11	11	370	NA	NA	1.7	7.9	6.9	34
B9–21	21	<1	NA	NA	0.1	0.011	0.017	0.069
B9–28	28	<1	NA	NA	<0.005	0.033 **	0.005	0.14
B10–6	6	<1	NA	NA	<0.005	<0.005	<0.005	<0.005
B10–21	21	<1	<2	7	<0.005	<0.005	<0.005	<0.005
B11–11.5	11.5	<1	<2	<2	0.021	<0.005	<0.005	<0.005
B12–14.5 *	14.5	150	NA	NA	0.24	0.44 **	1.7	4.6
B12–15	15	77	NA	NA	0.15 **	0.24 **	0.9	2.7 **
B12–21	21	97	NA	NA	0.46	1.2	2	5.4
B13–12	12	1,500	NA	NA	<0.4	<0.4	13	78
B13–15	15	1,800	420	(a)	8.8	39	30	120
B14–18	18	210	50	(a)	0.17 **	0.1 **	0.34 **	0.63 **
B15–17	17	1,900	1,300	(a)	1.1 **	0.8 **	9.1	14 **
B16–17.5	17.5	50	NA	NA	<0.1	<0.1	0.2 **	0.2 **
B17–12.5	12.5	<1	NA	NA	<0.005	<0.005	<0.005	<0.005

Notes: TPH–G: Total Petroleum Hydrocarbons as Gasoline
TPH–D: Total Petroleum Hydrocarbons as Diesel Fuel
TPH–K: Total Petroleum Hydrocarbons as Kerosene
<1 : Not Detected above method reporting limit (MRL) of 1 mg/Kg
NA : Not Analyzed
(a) Diesel range not reported due to overlap of hydrocarbon ranges
* Field duplicate (quality control sample)
** Presence of this analyte confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two

table41.wk1
11/08/93

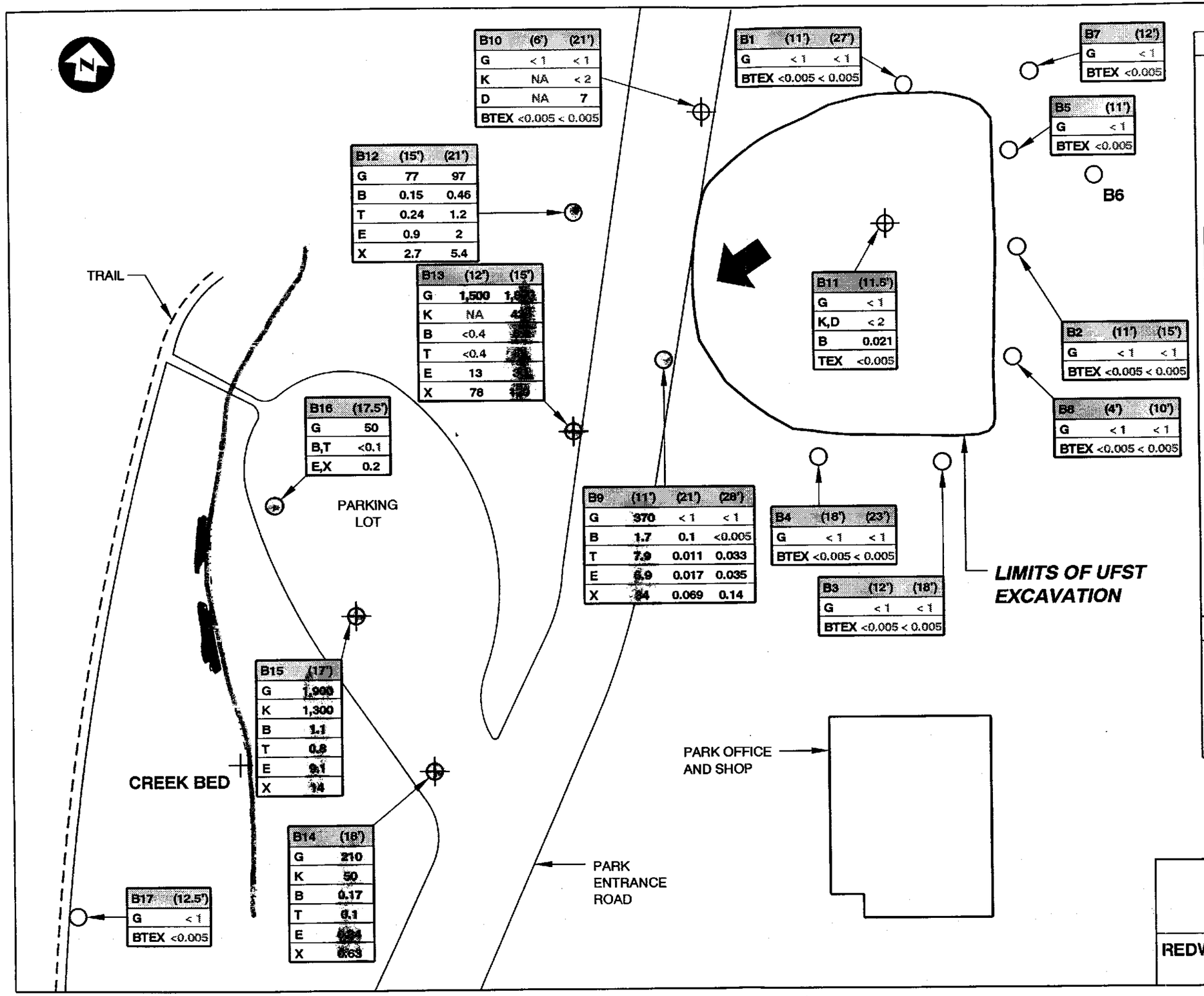
TABLE 4.2
TEMPORARY WELL POINT "GRAB" WATER SAMPLE ANALYTICAL RESULTS
Redwood Regional Park Corporation Yard
Oakland, CA

Sample I.D.	TPH-G	TPH-K	TPH-D	Benzene	Toluene	Ethyl-benzene	Total Xylenes
	concentrations in mg/L						
B10-GW	<0.05	(a)	0.57	<0.001	<0.001	<0.001	<0.001
B11-GW	1.4	1.3	(b)	0.016	0.042	0.033	0.17
B13-GW	810	2,300	(b)	12	18	22 *	73 *
B14-GW	19	4.5	(b)	0.03 *	<0.01	0.35	0.85
B15-GW	16	99	(b)	0.02 *	<0.01	0.33 *	0.81 *

TPH-G: Total Petroleum Hydrocarbons as Gasoline
TPH-D: Total Petroleum Hydrocarbons as Diesel Fuel
TPH-K: Total Petroleum Hydrocarbons as Kerosene

<0.05	: Not Detected above method reporting limit (MRL) of 0.05 mg/l
(a)	Quantitated as diesel due to overlap of hydrocarbon ranges
(b)	Quantitated as kerosene due to overlap of hydrocarbon ranges
*	Presence of this analyte confirmed by second column; however, confirmation concentration differed from reported concentration by more than a factor of two.

table42.wk1
11/10/93



LEGEND

- B7 — EXPLORATORY BOREHOLE B7
- B11 — EXPLORATORY BOREHOLE B11 WITH TEMPORARY WELL POINT
- INFERRED DIRECTION OF GROUNDWATER FLOW
- B10 (17') — SOIL SAMPLE I.D. AND DEPTH BELOW GROUND SURFACE
- G,D,K 4 — TPH ANALYTICAL RESULTS (mg//kg)
- BTEX 0.2 — BTEX ANALYTICAL RESULTS (mg/Kg)
- Pb 8 — TOTAL LEAD ANALYTICAL RESULTS (mg/Kg)
- <0.005 — NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 0.005 mg/kg
- < 1 — NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 1 mg/L
- G — TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE
- K — TPH AS KEROSENE
- D — TPH AS DIESEL
- B — BENZENE
- T — TOLUENE
- E — ETHYLBENZENE
- X — TOTAL XYLENES
- NA — NOT ANALYZED

NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

UFST=UNDERGROUND FUEL STORAGE TANK

0 10 20
SCALE IN FEET

SOIL SAMPLE ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

REV. 3 C266-11.DWG 11/10/93

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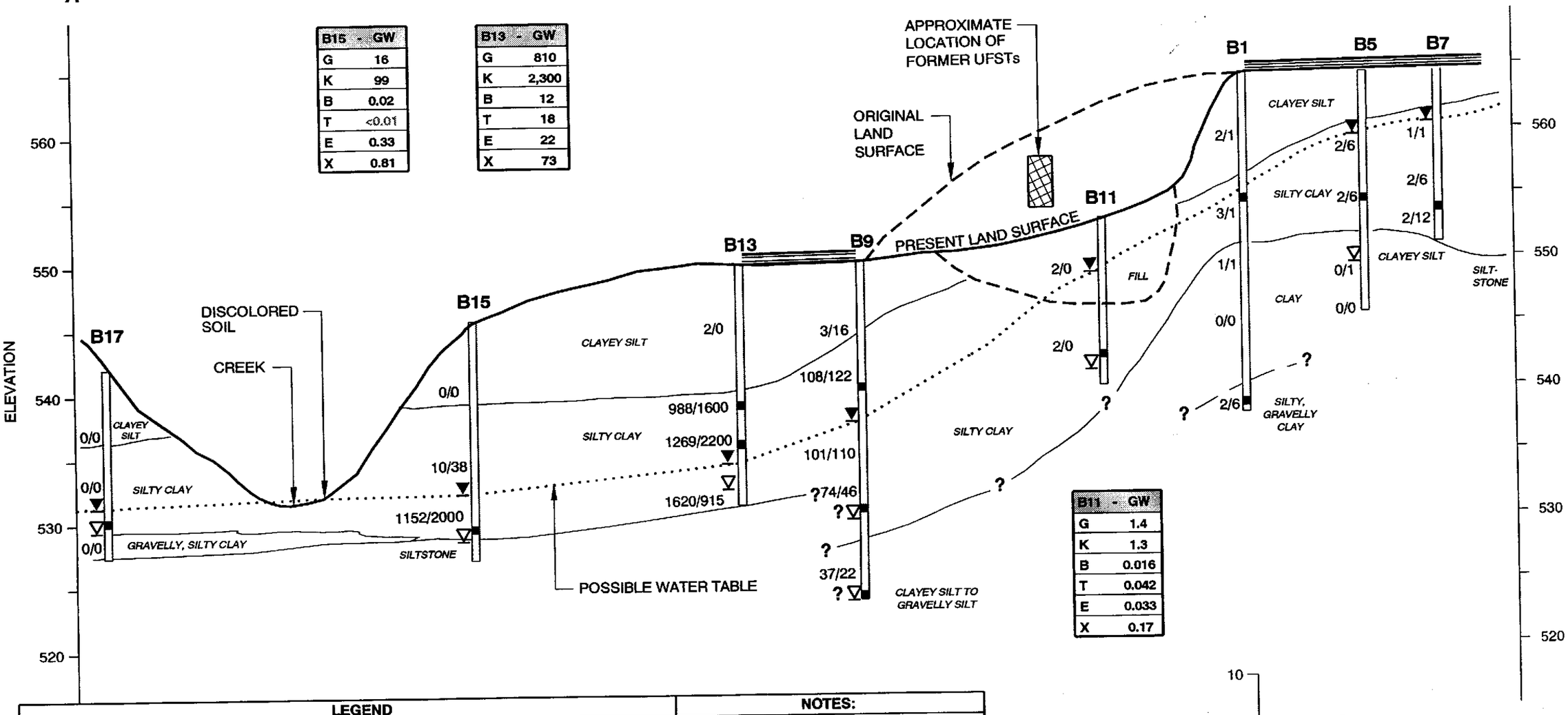
APPROX. SW — A

APPROX. NE — A'

B15 - GW	
G	16
K	99
B	0.02
T	<0.01
E	0.33
X	0.81

B13 - GW	
G	810
K	2,300
B	12
T	18
E	22
X	73

B11 - GW	
G	1.4
K	1.3
B	0.016
T	0.042
E	0.033
X	0.17



LEGEND

B10 - GW / G,D,K 4 / BTEX 0.2	SAMPLE I.D. — TPH ANALYTICAL RESULTS (mg/L) — BTEX ANALYTICAL RESULTS (mg/L)
< 1	NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 1 mg/L
G	TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE
K	TPH AS KEROSENE
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
B1	EXPLORATORY BOREHOLE I.D.
	LOCATION OF SOIL SAMPLE COLLECTED FOR LABORATORY ANALYSIS
▼	EQUILIBRATED WATER LEVEL
▽	FIRST ENCOUNTERED GROUNDWATER DURING DRILLING
10/40	PHOTOIONIZATION DETECTOR (PID)/ TOTAL HYDROCARBON VAPOR ANALYZER (THVA) READINGS IN PARTS PER MILLION (ppm)

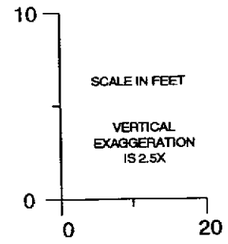
NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

UFST=UNDERGROUND FUEL STORAGE TANK

UFSTs NOT DRAWN TO SCALE

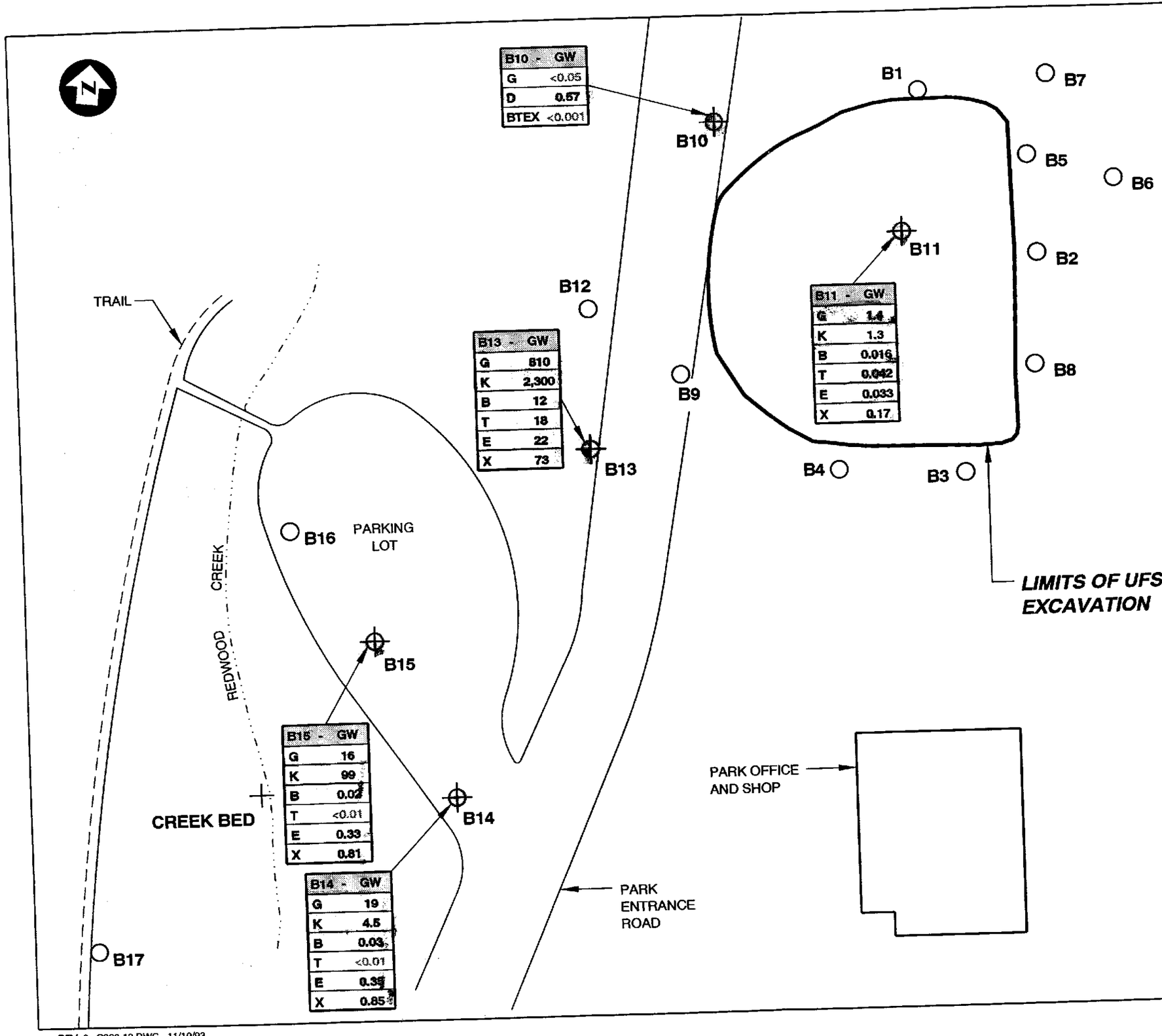
ALL ELEVATIONS SURVEYED BY EBRPD RELATIVE TO UNITED STATES GEOLOGICAL SURVEY (USGS) SURVEY BENCHMARK NO. JHF-49 AND ARE EXPRESSED AS FEET ABOVE MEAN SEA LEVEL (MSL)



HYDROGEOLOGIC CROSS SECTION WITH "GRAB" WATER SAMPLE ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

ENGINEERING-SCIENCE, INC.



LEGEND

- B7 — EXPLORATORY BOREHOLE B7
- B11 — EXPLORATORY BOREHOLE B11 WITH TEMPORARY WELL POINT
- INFERRED DIRECTION OF GROUNDWATER FLOW
- B10 - GW / G,D,K <0.005 / BTEX <0.001 — SAMPLE I.D. / TPH ANALYTICAL RESULTS (mg/L) / BTEX ANALYTICAL RESULTS (mg/L)
- <0.005 — NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 0.005 mg/kg
- < 1 — NOT DETECTED ABOVE METHOD REPORTING LIMIT (MRL) OF 1 mg/L

NOTES:

LOCATIONS AND DIMENSIONS OF ROADS, TRAILS AND PARKING LOT ARE APPROXIMATE

UFST=UNDERGROUND FUEL STORAGE TANK

ALL ELEVATIONS SURVEYED BY EBRPD RELATIVE TO UNITED STATES GEOLOGICAL SURVEY (USGS) SURVEY BENCHMARK NO. JHF-49 AND ARE EXPRESSED AS FEET ABOVE MEAN SEA LEVEL (MSL)

0 10 20
SCALE IN FEET

"GRAB" WATER SAMPLE ANALYTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

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REV. 3 C266-12.DWG 11/10/93

The lateral extent of soil contamination is well characterized by non-detectable or low concentrations of TPH and BTEX in the following boreholes: B10 (northwest of excavation), B1 and B7 (northeast of excavation); B5, B2, B6 and B8 (east of excavation); and B3 and B4 (south of excavation). The downgradient (southwest) limit of soil contamination appears to be defined by borehole B17, located west of the creek (Figures 4.1 and 4.2). The lateral limits of soil contamination are not fully characterized by the exploratory borehole soil samples collected during the current investigation; however, it appears that the soil contamination extends southwest of the excavation area in a linear zone to the creek bed. An approximately 6-inch high and 4-feet long area of discolored soil was observed in the east wall of the creek approximately 1 foot above the creekbed. A soil sample collected at that location had PID/FHVA readings of 42/37 ppmv and displayed fuel odor.

Quality Control Soil Sampling

Quality control (QC) soil sample B12-14.5 was collected from the brass tube just above soil sample B12-15. Both samples were analyzed for TPH-G and BTEX. As indicated in Table 4.1, the concentrations of TPH-G in B12-14.5 and B12-15 were 150 and 77 mg/kg, respectively. Total BTXE concentrations in those two samples were 6.98 and 3.99 mg/kg respectively. The observed differences in contaminant concentrations may be due in part or wholly to lateral differences in contamination between the two brass tube sample locations and/or to sample matrix effects.

EXTENT AND MAGNITUDE OF WATER CONTAMINATION

As indicated in Table 4.2 and on Figures 4.4 and 4.5, groundwater contamination by TPH and/or BTEX was detected in all five of the temporary well points installed at the site. Maximum contaminant concentrations were detected in the temporary well point installed in borehole B13, and include: 810 mg/L TPH-G; 2,300 mg/L TPH-K; 12 mg/L benzene; 18 mg/L toluene; 22 mg/L ethylbenzene; and 73 mg/L total xylenes. The lateral extent of groundwater contamination has not been defined by the temporary well points installed during the current investigation, but appears to extend at least 100 feet to the southwest (borehole B14). However, the concentrations are one to two orders of magnitude lower in the temporary well points furthermost downgradient compared with the maximum concentrations detected at B13.

Quality Control Water Sampling

Neither TPH-G nor BTEX were detected in either of the equipment rinse water samples collected during water sampling activities, verifying the effectiveness of water sampling equipment decontamination procedures.

REGULATORY ASSESSMENT

Relevant Criteria for Soil Contamination

In general, impacts of contamination on the environment by TPH, BTEX and lead are evaluated on a case-by-case basis (a detailed explanation of regulatory agency

considerations is included as Appendix J). The following is a discussion of action levels for each of those contaminants.

The Department of Toxic Substances Control (DTSC) uses 1,000 mg/kg TPH in soil (considered hazardous by virtue of its ignitability index) as a minimum criterion for remediation. The California Regional Water Quality Control Board (RWQCB) uses 100 mg/kg TPH in soil as a minimum criterion for assessing impacts to groundwater in investigations related to leaking underground fuel tanks (LUFTs) (Water Resources Control Board [WRCB] 1989). This LUFT guidance also discusses the Designated Level Methodology (DLM) which is used to evaluate the likelihood of impacts to groundwater from contaminated soil. The principal DLM factors to consider include: depth to groundwater; subsurface characteristics; and amount of precipitation (water availability). A possible scenario from using the DLM methodology is where the depth to groundwater is shallow, the soil TPH cleanup requirement could therefore be 10 mg/kg or less.

Action levels for contaminants detected in site soils are as follows: <10 mg/kg to 1,000 mg/kg (TPH-G); 10 mg/kg to 1,000 mg/kg (TPH-D and -K); 0.3 mg/kg to 1.0 mg/kg (benzene); 0.3 mg/kg to 50 mg/kg (toluene); and, 1.0 mg/kg to 50 mg/kg (toluene and total xylenes). All these action levels are evaluated on a case-by-case risk assessment basis using the DTSC/LUFT Manual guidance. The action level for lead is based on its total threshold limit concentration (TTLC) and soluble threshold limit concentration (STLC) (see Appendix A for explanation) which are used to define hazardous levels of lead. The TTLC for lead is 1,000 mg/kg and the STLC for lead is 5 mg/L.

Soil Contamination Regulatory Evaluation

Three of the exploratory borehole soil samples (B13-12, B13-15 and B15-17 contained TPH-G and/or TPH-K in excess of the DTSC remediation criterion of 1,000 mg/kg (Table 4.1). Soil samples with benzene (B), toluene (T), ethylbenzene (E) and/or total xylenes (X) concentrations in excess of their respective action levels include B9-11 (BTEX); B12-14.5 (TEX); B12-15 (X); B12-21 (BTEX); B13-12 (EX); B13-15 (BTEX); and, B15-17 (BTEX) (Table 4.1). None of the initial UFST excavation samples contained total lead equal to or in excess of ten times the STLC concentration of 5 mg/kg (Table 2.1).

Relevant Criteria for Groundwater Contamination

In general, impacts of contamination by TPH and BTEX are evaluated on a case-by-case risk assessment basis with consideration given to Maximum Contaminant Levels (MCLs) and Action Levels (ALs) when designated (a detailed explanation of regulatory considerations is included as Appendix J).

There are no designated MCLs or ALs for TPH-G, -K or -D. Therefore, potential environmental impacts for these contaminants are evaluated on a case-by-case risk assessment basis.

The designated MCLs for other compounds detected in site "grab" water samples are as follows: 0.001 mg/L (benzene); 0.68 mg/L (ethylbenzene); and, 1.75 mg/l (total

The designated MCLs for other compounds detected in site "grab" water samples are as follows: 0.001 mg/L (benzene); 0.68 mg/L (ethylbenzene); and, 1.75 mg/l (total xylenes). There is no designated MCL for toluene; however the AL for toluene is 0.1 mg/L.

Groundwater Contamination Regulatory Evaluation

Site "grab" groundwater samples with benzene (B), toluene (T), ethylbenzene (E) and/or total xylenes (X) concentrations in excess of their respective MCLs and/or ALs include: B11-GW (B); B13-GW (BTEX); B14-GW (B); and, B15-GW (B) (Table 4.2).

how about surface H_2O discharges?

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the data collected by ES during the recent UFST remedial program and subsequent site characterization activities.

CONCLUSIONS

- The excavation of approximately 600 cubic yards of contaminated soil was effective in reducing soil contamination in the immediate vicinity of the former UFSTs to concentrations less than regulatory agency action levels.
- Capillary fringe soils and groundwater contaminated with petroleum and aromatic hydrocarbons above regulatory agency action levels have been detected up to 100 feet southwest (downgradient) of the former UFSTs.
- Field observations suggest that UFST-sourced soil and/or water contamination may extend at least to Redwood Creek approximately 150 feet to the southwest, and that this contamination may have been and may continue to discharge into that surface water body.
- The lateral and vertical extent of soil and groundwater contamination have not been fully defined.

RECOMMENDATIONS

- In accordance with regulatory agency requirements and guidelines, ES recommends three to five permanent groundwater monitoring wells be installed and hydrochemically monitored on a quarterly basis to evaluate the impacts to groundwater associated with the former UFSTs.
- Soil sampling should also be conducted during installation of these wells to evaluate the vertical extent of contamination.
- Quarterly measurement of static water levels should be conducted to determine the direction of local groundwater flow.
- Evaluate options for remediation of contaminated soil and groundwater.
- All findings of this report should be reported to all concerned regulatory agencies for their assessment.

SECTION 6

REFERENCES

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APPENDIX A

PERMITS AND UFST TANK TESTING DOCUMENTATION

UFST Permit Applications

NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE AND OR LOCAL PERMITS ARE IN FORCE.

I Owner

Name: EAST BAY REGIONAL PARK DISTRICT			
Street Address: 11500 Skyline Blvd.	City: Oakland	State: CA	Zip: 94619

II Facility

Facility Name: Redwood Regional Park	Owner Foreman Supervisor: ~~Rachel MacDonald~~ [signature]		
Street Address: 7867 Redwood Rd.	Nearest Cross Street: Skyline Blvd.		
City: Oakland	County: Alameda		Zip: 94619
Mailing Address: Box 2957	City: Oakland	State: CA	Zip: 94618
Phone w/area code: (415) 531-9300 Ex. 279 or 287	Type of Business: ☐ 01 Motor Vehicle Fuel Station ☒ 02 Other: Maintenance Yard		
Number of Tanks at the Facility: 3	Rural Areas Only:	Township:	Range: / Section:

III 24 Hour Emergency Contact Person

Days: Name (last name first) and Phone w/area code: (415) 531-9300 Operator	Nights: Name (last name first) and Phone w/area code: (415) 881-1833 Dispatcher

COMPLETE THE FOLLOWING ON A SEPARATE FORM FOR EACH CONTAINER

IV Description

A. ☒ 01 Tank ☐ 02 Sump ☐ 03 Lagoon, Pit or Pond ☐ 04 Other: ________ Container Number: 8

B. Manufacturer (if appropriate): ________ Year of Mfg.: ________ C. Year Installed: ________ ☒ Unknown

D. Container Capacity: 5,000 gallons ☐ Unknown E. Container Repairs: ☐ 01 None ☒ 02 Unknown ☐ 03 Yes Year: ________

F. Is Container currently used? ☒ 01 Yes ☐ 02 No If No, year of last use: ________ ☐ 03 Unknown

G. Does the Container Store (Check One): ☐ 01 Waste ☒ 02 Product

H. Does the Container Store Motor Vehicle Fuel or Waste Oil? ☒ 01 Yes ☐ 02 No If Yes, Check appropriate box(es):

☒ 01 Unleaded ☒ 02 Regular ☐ 03 Premium ☐ 04 Diesel ☐ 05 Waste Oil ☐ 06 Other (List): ________

V Container Construction

A. Thickness of Primary Containment: ________ ☐ Gauge ☐ Inches ☐ cm ☒ Unknown

B. ☐ 01 Vaulted (Located in an underground Vault.) ☐ 02 Non-vaulted ☒ 03 Unknown

C. ☐ 01 Double Walled ☐ 02 Single Walled ☐ 03 Lined ☐ 04 Wrapped ☒ 05 Unknown ☐ 06 None

D. ☐ 01 Carbon Steel ☐ 02 Stainless Steel ☐ 03 Fiberglass ☐ 04 Polyvinyl Chloride ☐ 05 Concrete ☐ 06 Aluminum

☐ 07 Steel Clad ☐ 08 Bronze ☐ 09 Composite ☐ 10 Non-metallic ☐ 11 Earthen Walls

☒ 12 Unknown ☐ 13 Other: ________

E. ☐ 01 Rubber Lined ☐ 02 Alkyd Lining ☐ 03 Epoxy Lining ☐ 04 Phenolic Lining ☐ 05 Glass Lining ☐ 06 Clay Lining

☐ 07 Unlined ☒ 08 Unknown ☐ 09 Other ________

F. ☐ 01 Polyethlene Wrap ☐ 02 Vinyl Wrapping ☐ 03 Cathodic Protection ☒ 04 Unknown ☐ None ☐ Other ________

9

VI Piping

A Associated Piping:	☐ 01 Above Ground	☒ 02 Underground	☐ 03 Vaulted	
B Underground Piping:	☐ 01 Gravity	☐ 02 Pressure	☒ 03 Suction	☐ 04 Unknown
C Piping Repairs	☐ 01 None	☒ 02 Unknown	☐ 03 Yes, Year of most recent repair:	

VII Leak Detection

☒ 01 Visual ☒ 02 Stock Inventory ☐ 03 Tile Drain ☐ 04 Vapor Sniff Wells ☐ 05 Sensor Instrument

☐ 06 Ground Water Monitoring Wells ☒ 07 Pressure Test ☐ 08 Internal Inspection ☐ 09 None

☐ 10 Other Tanks have been tested per regulations

VIII Chemical Composition of Materials *Currently* or *Previously* Stored in Underground Containers

If you checked yes to IV-H you are not required to complete this section

currently stored	previously stored	CAS # if known	Chemical Do Not Use Commercial name (Use separate paper for more room)
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		

Is Container located on an Agricultural Farm? ☐ 01 Yes ☒ 02 No

IX IMPORTANT! Read instructions before signing:

Signature: The form must be signed by 1) a principal executive officer at the level of vice-president or by an authorized representative. The representative must be responsible for the overall operation of the facility where the tank(s) are located 2) a general partner proprietor, or 3) a principal executive officer ranking elected official or authorized representative of a public agency

This form has been completed under the penalty of perjury and to the best of my knowledge, is true and correct.

Signature	Date
M. V. Lirey (ACTING CORP. YD. SUPT.)	11-15-84

Printed Name	Title	Phone w/ area code
Evan R. Meyer	Corp. Yd. Super.	(415) 843-2106

NOTE: ALL UNDERGROUND CONTAINERS MUST REGISTER EVEN IF STATE ...

I Owner

Name (Corporation, Individual or Public Agency): EAST BAY REGIONAL PARK DISTRICT			
Street Address: 11500 Skyline Blvd.	City: Oakland	State: CA	Zip: 94619

II Facility

Facility Name: Redwood Regional Park	Owner Foreman Supervisor: ~~Rachel MacDonald~~ for [signature]		
Street Address: 7867 Redwood Rd.	Nearest Cross Street: Skyline Blvd.		
City: Oakland	County: Alameda		Zip: 94619
Mailing Address: Box 2957	City: Oakland	State: CA	Zip: 94618
Phone w/area code: (415) 531-9300 Ext. 279 or 287	Type of Business: ☐ 01 Motor Vehicle Fuel Station ☒ 02 Other: Maintenance Yard		
Number of Tanks at this Facility: 3	Rural Areas Only: Township:	Range:	Section:

III 24 Hour Emergency Contact Person

Days: Name (last name first) and Phone w/area code: (415) 531-9300 Operator	Nights: Name (last name first) and Phone w/area code: (415) 881-1833 Dispatcher

COMPLETE THE FOLLOWING ON A SEPARATE FORM FOR EACH CONTAINER

IV Description

Container Number (if there is no number assign one): 9

A. ☒ 01 Tank ☐ 02 Sump ☐ 03 Lagoon, Pit or Pond ☐ 04 Other: ______

B. Manufacturer (if appropriate): ______ Year of Mfg.: ______

C. Year Installed: ______ ☐ Unknown

D. Container Capacity: 2000 gallons ☐ Unknown

E. Container Repairs: ☒ 01 None ☐ 02 Unknown ☐ 03 Yes Year: ______

F. Is Container currently used? ☒ 01 Yes ☐ 02 No If No, year of last use: ______ ☐ 03 Unknown

G. Does the Container Store (Check One): ☐ 01 Waste ☒ 02 Product

H. Does the Container Store Motor Vehicle Fuel or Waste Oil? ☒ 01 Yes ☐ 02 No If Yes, Check appropriate box(es):

☐ 01 Unleaded ☐ 02 Regular ☐ 03 Premium ☒ 04 Diesel ☐ 05 Waste Oil ☐ 06 Other (List): ______

V Container Construction

A. Thickness of Primary Containment: ______ ☐ Gauge ☐ Inches ☐ cm ☒ Unknown

B. ☐ 01 Vaulted (Located in an underground Vault.) ☒ 02 Non-vaulted ☐ 03 Unknown

C. ☐ 01 Double Walled ☐ 02 Single Walled ☐ 03 Lined ☐ 04 Wrapped ☒ 05 Unknown ☐ 06 None

D. ☐ 01 Carbon Steel ☐ 02 Stainless Steel ☐ 03 Fiberglass ☐ 04 Polyvinyl Chloride ☐ 05 Concrete ☐ 06 Aluminum

☒ 07 Steel Clad ☐ 08 Bronze ☐ 09 Composite ☐ 10 Non-metallic ☐ 11 Earthen Walls

☐ 12 Unknown ☐ 13 Other: ______

E. ☐ 01 Rubber Lined ☐ 02 Alkyd Lining ☐ 03 Epoxy Lining ☐ 04 Phenolic Lining ☐ 05 Glass Lining ☐ 06 Clay Lining

☐ 07 Unlined ☒ 08 Unknown ☐ 09 Other ______

F. ☐ 01 Polyethlene Wrap ☐ 02 Vinyl Wrapping ☐ 03 Cathodic Protection ☒ 04 Unknown ☐ 05 None ☐ 06 Other ______

9

08/06/1992 13:25 FROM TILDEN CORP YARD TO 5691432 P.01

VI Piping

A. Associated Piping:	☐ 01 Above Ground	☒ 02 Underground	☐ 03 Vaulted	
B. Underground Piping:	☐ 01 Gravity	☐ 02 Pressure	☒ 03 Suction	☐ 04 Unknown
C. Piping Repairs:	☐ 01 None	☒ 02 Unknown	☐ 03 Yes. Year of most recent repair: ______	

VII Leak Detection

☒ 01 Visual ☒ 02 Stock Inventory ☐ 03 Tile Drain ☐ 04 Vapor Sniff Wells ☐ 05 Sensor Instrument

☐ 06 Ground Water Monitoring Wells ☒ 07 Pressure Test ☐ 08 Internal Inspection ☐ 09 None

☐ 10 Other: Tank has been tested per regulations

VIII Chemical Composition of Materials *Currently* or *Previously* Stored in Underground Containers

If you checked yes to IV-H you are not required to complete this section

currently stored	previously stored	CAS # as known	Chemical: Do Not Use Commercial Name (Use additional pages for more space)
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		
☐ 01	☐ 02		

Is Container located on an Agricultural Farm? ☐ 01 Yes ☒ 02 No

IX IMPORTANT! Read instructions before signing:

Signature: The form must be signed by 1) a principal executive officer at the level of vice-president or by an authorized representative. The representative must be responsible for the overall operation of the facility where the tank(s) are located; 2) a general partner proprietor; or 3) a principal executive officer, ranking elected official or authorized representative of a public agency.

This form has been completed under the penalty of perjury and, to the best of my knowledge is true and correct.

Signature	Date
Gil Lopez (ACTING CORP YD. SUPT.)	11-15-84

Printed Name	Title	Phone w/ area code
Evan R. Meyer GIL LOPEZ	Corp. Yd. Super.	(415) 843-2106

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

UNDERGROUND STORAGE TANK PERMIT APPLICATION - FORM A

COMPLETE THIS FORM FOR EACH FACILITY/SITE

MARK ONLY ONE ITEM: [X] 1 NEW PERMIT [ ] 2 INTERIM PERMIT [ ] 3 RENEWAL PERMIT [ ] 4 AMENDED PERMIT [ ] 5 CHANGE OF INFORMATION [ ] 6 TEMPORARY SITE CLOSURE [ ] 7 PERMANENTLY CLOSED SITE

I. FACILITY/SITE INFORMATION & ADDRESS - (MUST BE COMPLETED)

DBA OR FACILITY NAME: EAST BAY REGIONAL PARK DISTRICT
NAME OF OPERATOR:
ADDRESS: REDWOOD REGIONAL PARK
NEAREST CROSS STREET:
PARCEL # (OPTIONAL):
CITY NAME: OAKLAND CA
STATE: CA ZIP CODE: 94619 SITE PHONE # WITH AREA CODE: 510-271-4320

✓ BOX TO INDICATE: [ ] CORPORATION [ ] INDIVIDUAL [ ] PARTNERSHIP [✓] LOCAL-AGENCY DISTRICTS [ ] COUNTY-AGENCY [ ] STATE-AGENCY [ ] FEDERAL-AGENCY

TYPE OF BUSINESS: [ ] 1 GAS STATION [ ] 2 DISTRIBUTOR [ ] 3 FARM [ ] 4 PROCESSOR [X] 5 OTHER
[ ] ✓ IF INDIAN RESERVATION OR TRUST LANDS
OF TANKS AT SITE: 2
E. P. A. I. D. # (optional): CAC000316404

EMERGENCY CONTACT PERSON (PRIMARY)
DAYS: NAME (LAST, FIRST): GEE, WARREN PHONE # WITH AREA CODE: 510-635-0135
NIGHTS: NAME (LAST, FIRST): PHONE # WITH AREA CODE:

EMERGENCY CONTACT PERSON (SECONDARY) - optional
DAYS: NAME (LAST, FIRST): BEARDON, CHRIS PHONE # WITH AREA CODE: 510-635-0135
NIGHTS: NAME (LAST, FIRST): PHONE # WITH AREA CODE:

II. PROPERTY OWNER INFORMATION - (MUST BE COMPLETED)

NAME: EAST BAY REGIONAL PARK DISTRICT
CARE OF ADDRESS INFORMATION:
MAILING OR STREET ADDRESS: 2950 PERALTA OAKS CT
✓ box to indicate: [ ] CORPORATION [ ] INDIVIDUAL [ ] PARTNERSHIP [X] COUNTY-AGENCY [ ] LOCAL-AGENCY [ ] STATE-AGENCY [ ] FEDERAL-AGENCY
CITY NAME: OAKLAND
STATE: CA ZIP CODE: 94605 PHONE # WITH AREA CODE: 510 635 0135

III. TANK OWNER INFORMATION - (MUST BE COMPLETED)

NAME OF OWNER: EAST BAY REGIONAL PARK DISTRICT
CARE OF ADDRESS INFORMATION:
MAILING OR STREET ADDRESS: 2950 PERALTA OAKS CT
✓ box to indicate: [ ] CORPORATION [ ] INDIVIDUAL [ ] PARTNERSHIP [X] COUNTY-AGENCY [ ] LOCAL-AGENCY [ ] STATE-AGENCY [ ] FEDERAL-AGENCY
CITY NAME: OAKLADN
STATE: CA ZIP CODE: 94605 PHONE # WITH AREA CODE: 510 635 0135

IV. BOARD OF EQUALIZATION UST STORAGE FEE ACCOUNT NUMBER - Call (916) 323-9555 if questions arise.

TY (TK) HQ 44-

V. PETROLEUM UST FINANCIAL RESPONSIBILITY - (MUST BE COMPLETED) - IDENTIFY THE METHOD(S) USED

✓ box to indicate: [✓] 1 SELF-INSURED [ ] 2 GUARANTEE [✓] 3 INSURANCE [ ] 4 SURETY BOND [ ] 5 LETTER OF CREDIT [ ] 6 EXEMPTION [ ] 99 OTHER

VI. LEGAL NOTIFICATION AND BILLING ADDRESS

Legal notification and billing will be sent to the tank owner unless box I or II is checked.

CHECK ONE BOX INDICATING WHICH ABOVE ADDRESS SHOULD BE USED FOR LEGAL NOTIFICATIONS AND BILLING: I. [ ] II. [X] III. [X]

THIS FORM HAS BEEN COMPLETED UNDER PENALTY OF PERJURY, AND TO THE BEST OF MY KNOWLEDGE, IS TRUE AND CORRECT

APPLICANT'S NAME (PRINTED & SIGNATURE): HAROLD DYE Harold Dye
APPLICANT'S TITLE: OPERATIONS
DATE MONTH/DAY/YEAR: 6-03-92

LOCAL AGENCY USE ONLY

COUNTY #:
JURISDICTION #:
FACILITY #:
LOCATION CODE - *OPTIONAL*
CENSUS TRACT # - *OPTIONAL*
SUPVISOR - DISTRICT CODE - *OPTIONAL*

THIS FORM MUST BE ACCOMPANIED BY AT LEAST (1) OR MORE PERMIT APPLICATION - FORM B, UNLESS THIS IS A CHANGE OF SITE INFORMATION ONLY.

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

UNDERGROUND STORAGE TANK PERMIT APPLICATION - FORM B

COMPLETE A SEPARATE FORM FOR EACH TANK SYSTEM.

MARK ONLY ONE ITEM: [X] 1 NEW PERMIT [ ] 2 INTERIM PERMIT [ ] 3 RENEWAL PERMIT [ ] 4 AMENDED PERMIT [ ] 5 CHANGE OF INFORMATION [ ] 6 TEMPORARY TANK CLOSURE [ ] 7 PERMANENTLY CLOSED ON SITE [ ] 8 TANK REMOVED

DBA OR FACILITY NAME WHERE TANK IS INSTALLED: EAST BAY REGIONAL PARK DISTRICT(REDWOOD)

I. TANK DESCRIPTION

COMPLETE ALL ITEMS - SPECIFY IF UNKNOWN OFF REDWOOD RD.,OAKLAND

A. OWNER'S TANK I.D. # UNKN.

B. MANUFACTURED BY:

C. DATE INSTALLED (MO/DAY/YEAR)

D. TANK CAPACITY IN GALLONS: 2000

II. TANK CONTENTS

IF A-1 IS MARKED, COMPLETE ITEM C.

A. [X] 1 MOTOR VEHICLE FUEL [ ] 2 PETROLEUM [ ] 3 CHEMICAL PRODUCT [ ] 4 OIL [X] 80 EMPTY [ ] 95 UNKNOWN

B. [X] 1 PRODUCT [ ] 2 WASTE

C. [ ] 1a REGULAR UNLEADED [ ] 1b PREMIUM UNLEADED [ ] 2 LEADED [X] 3 DIESEL [ ] 4 GASAHOL [ ] 5 JET FUEL [ ] 6 AVIATION GAS [ ] 7 METHANOL [ ] 99 OTHER (DESCRIBE IN ITEM D. BELOW)

D. IF (A.1) IS NOT MARKED, ENTER NAME OF SUBSTANCE STORED C. A. S. # :

III. TANK CONSTRUCTION

MARK ONE ITEM ONLY IN BOXES A, B, AND C, AND ALL THAT APPLIES IN BOX D AND E

A. TYPE OF SYSTEM: [ ] 1 DOUBLE WALL [ ] 2 SINGLE WALL [ ] 3 SINGLE WALL WITH EXTERIOR LINER [ ] 4 SECONDARY CONTAINMENT (VAULTED TANK) [X] 95 UNKNOWN [ ] 99 OTHER

B. TANK MATERIAL (Primary Tank): [ ] 1 BARE STEEL [ ] 2 STAINLESS STEEL [ ] 3 FIBERGLASS [ ] 4 STEEL CLAD W/ FIBERGLASS REINFORCED PLASTIC [ ] 5 CONCRETE [ ] 6 POLYVINYL CHLORIDE [ ] 7 ALUMINUM [ ] 8 100% METHANOL COMPATIBLE W/FRP [ ] 9 BRONZE [ ] 10 GALVANIZED STEEL [X] 95 UNKNOWN [ ] 99 OTHER

C. INTERIOR LINING: [ ] 1 RUBBER LINED [ ] 2 ALKYD LINING [ ] 3 EPOXY LINING [ ] 4 PHENOLIC LINING [ ] 5 GLASS LINING [ ] 6 UNLINED [X] 95 UNKNOWN [ ] 99 OTHER

IS LINING MATERIAL COMPATIBLE WITH 100% METHANOL ? YES ___ NO ___

D. CORROSION PROTECTION: [ ] 1 POLYETHYLENE WRAP [ ] 2 COATING [ ] 3 VINYL WRAP [ ] 4 FIBERGLASS REINFORCED PLASTIC [ ] 5 CATHODIC PROTECTION [ ] 91 NONE [X] 95 UNKNOWN [ ] 99 OTHER

E. SPILL AND OVERFILL: SPILL CONTAINMENT INSTALLED (YEAR) _____ OVERFILL PREVENTION EQUIPMENT INSTALLED (YEAR) _____

IV. PIPING INFORMATION

CIRCLE A IF ABOVE GROUND OR U IF UNDERGROUND, BOTH IF APPLICABLE

A. SYSTEM TYPE: A U 1 SUCTION A U 2 PRESSURE A U 3 GRAVITY A U 99 OTHER

B. CONSTRUCTION: A U 1 SINGLE WALL A U 2 DOUBLE WALL A U 3 LINED TRENCH A (U) 95 UNKNOWN A U 99 OTHER

C. MATERIAL AND CORROSION PROTECTION: A U 1 BARE STEEL A U 2 STAINLESS STEEL A U 3 POLYVINYL CHLORIDE (PVC) A U 4 FIBERGLASS PIPE A U 5 ALUMINUM A U 6 CONCRETE A U 7 STEEL W/ COATING A U 8 100% METHANOL COMPATIBLE W/FRP A U 9 GALVANIZED STEEL A U 10 CATHODIC PROTECTION A U (95) UNKNOWN A U 99 OTHER

D. LEAK DETECTION: [ ] 1 AUTOMATIC LINE LEAK DETECTOR [ ] 2 LINE TIGHTNESS TESTING [ ] 3 INTERSTITIAL MONITORING [ ] 99 OTHER

V. TANK LEAK DETECTION

[ ] 1 VISUAL CHECK [ ] 2 INVENTORY RECONCILIATION [ ] 3 VADOZE MONITORING [ ] 4 AUTOMATIC TANK GAUGING [ ] 5 GROUND WATER MONITORING [ ] 6 TANK TESTING [ ] 7 INTERSTITIAL MONITORING [ ] 91 NONE [X] 95 UNKNOWN [ ] 99 OTHER

VI. TANK CLOSURE INFORMATION

1. ESTIMATED DATE LAST USED (MO/DAY/YR) UNKN.

2. ESTIMATED QUANTITY OF SUBSTANCE REMAINING 0 GALLONS

3. WAS TANK FILLED WITH INERT MATERIAL ? YES [ ] NO [X]

THIS FORM HAS BEEN COMPLETED UNDER PENALTY OF PERJURY, AND TO THE BEST OF MY KNOWLEDGE, IS TRUE AND CORRECT

APPLICANT'S NAME (PRINTED & SIGNATURE) HAROLD DYE Harold Dye DATE 6-08-92

LOCAL AGENCY USE ONLY

THE STATE I.D. NUMBER IS COMPOSED OF THE FOUR NUMBERS BELOW

STATE I.D.# COUNTY # JURISDICTION # FACILITY # TANK #

PERMIT NUMBER | PERMIT APPROVED BY/DATE | PERMIT EXPIRATION DATE

FORM B (7-91) THIS FORM MUST BE ACCOMPANIED BY A PERMIT APPLICATION - FORM A, UNLESS A CURRENT FORM A HAS BEEN FILED.

FOR00018-R5

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

UNDERGROUND STORAGE TANK PERMIT APPLICATION - FORM B

COMPLETE A SEPARATE FORM FOR EACH TANK SYSTEM.

MARK ONLY ONE ITEM: [X] 1 NEW PERMIT [ ] 2 INTERIM PERMIT [ ] 3 RENEWAL PERMIT [ ] 4 AMENDED PERMIT [ ] 5 CHANGE OF INFORMATION [ ] 6 TEMPORARY TANK CLOSURE [ ] 7 PERMANENTLY CLOSED ON SITE [ ] 8 TANK REMOVED

DBA OR FACILITY NAME WHERE TANK IS INSTALLED: EAST BAY REGIONAL PARK DISTRICT (REDWOOD)

I. TANK DESCRIPTION

COMPLETE ALL ITEMS – SPECIFY IF UNKNOWN OFF REDWOOD RD., OAKLAND CA.

A. OWNER'S TANK I. D. # UNKN.

B. MANUFACTURED BY:

C. DATE INSTALLED (MO/DAY/YEAR)

D. TANK CAPACITY IN GALLONS: 5000

II. TANK CONTENTS

IF A-1 IS MARKED, COMPLETE ITEM C.

A. [ ] 1 MOTOR VEHICLE FUEL [ ] 2 PETROLEUM [ ] 3 CHEMICAL PRODUCT [ ] 4 OIL [X] 80 EMPTY [ ] 95 UNKNOWN

B. [X] 1 PRODUCT [ ] 2 WASTE

C. [X] 1a REGULAR UNLEADED [ ] 1b PREMIUM UNLEADED [ ] 2 LEADED [ ] 3 DIESEL [ ] 4 GASAHOL [ ] 5 JET FUEL [ ] 6 AVIATION GAS [ ] 7 METHANOL [ ] 99 OTHER (DESCRIBE IN ITEM D. BELOW)

D. IF (A.1) IS NOT MARKED, ENTER NAME OF SUBSTANCE STORED C. A. S. # :

III. TANK CONSTRUCTION

MARK ONE ITEM ONLY IN BOXES A, B, AND C, AND ALL THAT APPLIES IN BOX D AND E

A. TYPE OF SYSTEM: [ ] 1 DOUBLE WALL [ ] 2 SINGLE WALL [ ] 3 SINGLE WALL WITH EXTERIOR LINER [ ] 4 SECONDARY CONTAINMENT (VAULTED TANK) [X] 95 UNKNOWN [ ] 99 OTHER

B. TANK MATERIAL (Primary Tank): [ ] 1 BARE STEEL [ ] 2 STAINLESS STEEL [ ] 3 FIBERGLASS [ ] 4 STEEL CLAD W/ FIBERGLASS REINFORCED PLASTIC [ ] 5 CONCRETE [ ] 6 POLYVINYL CHLORIDE [ ] 7 ALUMINUM [ ] 8 100% METHANOL COMPATIBLE W/FRP [ ] 9 BRONZE [ ] 10 GALVANIZED STEEL [X] 95 UNKNOWN [ ] 99 OTHER

C. INTERIOR LINING: [ ] 1 RUBBER LINED [ ] 2 ALKYD LINING [ ] 3 EPOXY LINING [ ] 4 PHENOLIC LINING [ ] 5 GLASS LINING [ ] 6 UNLINED [X] 95 UNKNOWN [ ] 99 OTHER
IS LINING MATERIAL COMPATIBLE WITH 100% METHANOL ? YES ___ NO ___

D. CORROSION PROTECTION: [ ] 1 POLYETHYLENE WRAP [ ] 2 COATING [ ] 3 VINYL WRAP [ ] 4 FIBERGLASS REINFORCED PLASTIC [ ] 5 CATHODIC PROTECTION [ ] 91 NONE [X] 95 UNKNOWN [ ] 99 OTHER

E. SPILL AND OVERFILL: SPILL CONTAINMENT INSTALLED (YEAR) _____ OVERFILL PREVENTION EQUIPMENT INSTALLED (YEAR) _____

IV. PIPING INFORMATION

CIRCLE A IF ABOVE GROUND OR U IF UNDERGROUND, BOTH IF APPLICABLE

A. SYSTEM TYPE: A U 1 SUCTION; A (U) 2 PRESSURE; A U 3 GRAVITY; A U 99 OTHER

B. CONSTRUCTION: A U 1 SINGLE WALL; A U 2 DOUBLE WALL; A U 3 LINED TRENCH; A (U) 95 UNKNOWN; A U 99 OTHER

C. MATERIAL AND CORROSION PROTECTION: A U 1 BARE STEEL; A U 2 STAINLESS STEEL; A U 3 POLYVINYL CHLORIDE (PVC); A U 4 FIBERGLASS PIPE; A U 5 ALUMINUM; A U 6 CONCRETE; A U 7 STEEL W/ COATING; A U 8 100% METHANOL COMPATIBLE W/FRP; A U 9 GALVANIZED STEEL; A U 10 CATHODIC PROTECTION; (U) 95 UNKNOWN; A U 99 OTHER

D. LEAK DETECTION: [ ] 1 AUTOMATIC LINE LEAK DETECTOR [ ] 2 LINE TIGHTNESS TESTING [ ] 3 INTERSTITIAL MONITORING [ ] 99 OTHER

V. TANK LEAK DETECTION

[ ] 1 VISUAL CHECK [ ] 2 INVENTORY RECONCILIATION [ ] 3 VADOZE MONITORING [ ] 4 AUTOMATIC TANK GAUGING [ ] 5 GROUND WATER MONITORING [ ] 6 TANK TESTING [ ] 7 INTERSTITIAL MONITORING [ ] 91 NONE [X] 95 UNKNOWN [ ] 99 OTHER

VI. TANK CLOSURE INFORMATION

1. ESTIMATED DATE LAST USED (MO/DAY/YR): unkn

2. ESTIMATED QUANTITY OF SUBSTANCE REMAINING: 0 GALLONS

3. WAS TANK FILLED WITH INERT MATERIAL ? YES [ ] NO [X]

THIS FORM HAS BEEN COMPLETED UNDER PENALTY OF PERJURY, AND TO THE BEST OF MY KNOWLEDGE, IS TRUE AND CORRECT

APPLICANT'S NAME (PRINTED & SIGNATURE): HAROLD DYE Harold Dye DATE: 6-28-91

LOCAL AGENCY USE ONLY

THE STATE I.D. NUMBER IS COMPOSED OF THE FOUR NUMBERS BELOW

STATE I.D.# COUNTY # [ ][ ] JURISDICTION # [ ][ ][ ] FACILITY # [ ][ ][ ][ ][ ][ ] TANK # [ ][ ][ ][ ][ ][ ]

PERMIT NUMBER | PERMIT APPROVED BY/DATE | PERMIT EXPIRATION DATE

FORM B (7-91) THIS FORM MUST BE ACCOMPANIED BY A PERMIT APPLICATION - FORM A, UNLESS A CURRENT FORM A HAS BEEN FILED.

FORM0018-RS

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS DIVISION
80 SWAN WAY, ROOM 200
OAKLAND, CA 94621
PHONE NO. 510/271-4320

UNDERGROUND TANK CLOSURE PLAN
*** * * Complete according to attached instructions * * ***

1. Business Name EAST BAY REGIONAL PARK DISTRICT

   Business Owner EAST BAY REGIONAL PARK DISTRICT

2. Site Address REDWOOD REGIONAL PARK, OFF REDWOOD ROAD

   City NEAR OAKLAND CA Zip 94619 Phone _____

3. Mailing Address EAST BAY REGIONAL PARK DISTRICT

   City 2950 PERALTA OAKS CT. OAKLAND CA Zip 94605 Phone 510 635 0135

4. Land Owner EAST BAY REGIONAL PARK DISTRICT

   Address 2950 PERALTA OAKS CT. OAKLAND CA City, State CA Zip 94605

5. Generator name under which tank will be manifested

   EAST BAY REGIONAL PARK DISTRICT

   EPA I.D. No. under which tank will be manifested CAC 000364904

6. Contractor PETROLEUM ENGINEERING INC

Address 11 WEST 9TH ST

City SANTA ROSA CA 95401 Phone 707 545 0360

License Type* A/B-1/SC-61 SC45/SC-10 ID# 224358

*Effective January 1, 1992, Business and Professional Code Section 7058.7 requires prime contractors to also hold Hazardous Waste Certification issued by the State Contractors License Board. Indicate that the certificate has been received, in addition, to holding the appropriate contractors license type.

HAZARDOUS SUBSTANCES REMOVAL & REMEDIAL ACTIONS CERTIFICATION
LICENSE NO. 224358

7. Consultant

Address

City Phone

8. Contact Person for Investigation

Name HAROLD DYE Title OPERATIONS

Phone 707 545 0360

9. Number of tanks being closed under this plan 2 (1-5000 UNLEADED,1-2000DSL)

Length of piping being removed under this plan UNKN.

Total number of tanks at facility 2

10. State Registered Hazardous Waste Transporters/Facilities (see instructions).

** Underground tanks are hazardous waste and must be handled ** as hazardous waste

a) Product/Residual Sludge/Rinsate Transporter

Name H&H ENVIROMENTAL SERVICES EPA I.D. No. CAD.004771168

Hauler License No. 0334 License Exp. Date 31 93

Address 220 CHINA BASIN

City SAN FRANCISCO State CA Zip 94107

b) Product/Residual Sludge/Rinsate Disposal Site

Name H&H ENVIROMENTAL SERVICES EPA I.D. No. CAD.004771168

Address 220 CHINA BASIN

City SAN FRANCISCO State CA Zip 94107

c) Tank and Piping Transporter

Name H&H ENVIROMENTAL SERVICES EPA I.D. No. CAD.00471168

Hauler License No. 0334 License Exp. Date 1/31/93

Address 220 CHINA BASIN

City SAN FRANCISCO State CA Zip 94107

d) Tank and Piping Disposal Site

Name H&H ENVIROMENTAL SERVICES EPA I.D. No. CAD.00471168

Address 220 CHINA BASIN

City SAN FRANCISCO State CA Zip 94107

11. Experienced Sample Collector

Name NEAL SILER

Company ENGINEERING - SCIENCE, INC.

Address 1301 MARINA VILLAGE PARKWAY, SUITE 200

City ALAMEDA State CA Zip 94501 Phone (510)769-0100

12. Laboratory

Name CHROMALAB, INC.

Address 2239 OMEGA ROAD, NO.1

City SAN RAMON State CA Zip 94583

State Certification No. E 694 (1094)

13. Have tanks or pipes leaked in the past? Yes [ ] No [X]

If yes, describe.

14. Describe methods to be used for rendering tank inert

30 LBS.OF DRY ICE WILL BE USED FOR EVERY 1000 GALLONS OF CAPACITY

Before tanks are pumped out and inerted, all associated piping must be flushed out into the tanks. All accessible associated piping must then be removed. Inaccessible piping must be plugged.

The Bay Area Air Quality Management District (771-6000), along with local Fire and Building Departments, must also be contacted for tank removal permits. Fire departments typically require the use of explosion proof combustible gas meters to verify tank inertness. **It is the contractor's responsibility to bring a working combustible gas meter on site to verify tank inertness.**

15. Tank History and Sampling Information

Tank		Material to be sampled (tank contents, soil, ground-water, etc.)	Location and Depth of Samples
Capacity	Use History (see instructions)		
5,000	UNLEADED	TPHG BTX&E	-BELOW FILL MATL IF NO WATER IN EXCAVATION
2,000	DIESEL	TPH & BTX & E	-IF WATER IN EXCAVATION, SAMPLE WILL BE TAKEN IN SIDEWALL AT CAPPILLARY FRINGE

One soil sample must be collected for every 20 feet of piping that is removed. A ground water sample must be collected should any ground water be present in the excavation.

Excavated/Stockpiled Soil	
Stockpiled Soil Volume (Estimated) 10YARDS	Sampling Plan PENDING ORGINAL SAMPLE

Stockpiled soil must be placed on bermed plastic and must be completely covered by plastic sheeting.

16. Chemical methods and associated detection limits to be used for analyzing samples

The Tri-Regional Board recommended minimum verification analyses and practical quantitation reporting limits should be followed. See attached Table 2.

Contaminant Sougnt	EPA, DHS, or Other Sample Preparation Method Number	EPA, DHS, or Other Analysis Method Number	Method Detection Limit
TPH G btx & E	GCFID 5030 8020 or 8240		
TPH & BTX&e	8260		
TPH D(DSL)	gcfid 3550		

17. Submit Site Health and Safety Plan (See Instructions)

PRODUCER:WOODRUFF-SAWYE
220 BUSH ST
7TH FLOOR
SAN FRANCISCO
CA.94104

18. Submit Worker's Compensation Certificate copy

Name of Insurer FAIRMONT INSRANCE

19. Submit Plot Plan (See Instructions)

20. Enclose Deposit (See Instructions)

21. **Report any leaks or contamination to this office within 5 days of discovery.** The report shall be made on an Underground Storage Tank Unauthorized Leak/Contamination Site Report form. (see Instructions)

22. Submit a closure report to this office within 60 days of the tank removal. This report must contain all the information listed in item 22 of the instructions.

I declare that to the best of my knowledge and belief the statements and information provided above are correct and true.

I understand that information in addition to that provided above may be needed in order to obtain an approval from the Department of Environmental Health and that no work is to begin on this project until this plan is approved.

I understand that any changes in design, materials or equipment will void this plan if prior approval is not obtained.

I understand that all work performed during this project will be done in compliance with all applicable OSHA (Occupational Safety and Health Administration) requirements concerning personnel health and safety. I understand that site and worker safety are solely the responsibility of the property owner or his agent and that this responsibility is not shared nor assumed by the County of Alameda.

Once I have received my stamped, accepted closure plan, I will contact the project Hazardous Materials Specialist at least three working days in advance of site work to schedule the required inspections.

Signature of Contractor

Name (please type) PETROLEUM ENGINEERING INC, HAROLD DYE

Signature Harold Dye Harold Dye

Date 6-08-92

Signature of Site Owner or Operator

Name (please type) EAST BAY REGIONAL PARK DISTRICT

Signature

Date 6/17/92

ALAMEDA COUNTY HAZARDOUS MATERIALS DIVISION
Acknowledgement of Refund Recipient for Site Account

DEPOSITOR FILLS OUT PER SITE
-- REQUIRED --

The depositor will use this form to acknowledge that the property owner or his or her designee will receive any refund due at the completion of all deposit/refund projects at the site listed below.

SITE NUMBER/ADDRESS:

Site Number

Redwood Regional Park
Company Name

7867 Redwood Road
Street Address

Oakland, CA 94619
City Zip Code

REFUND RECIPIENT-PROPERTY OWNER

East Bay Regional Park District
Owner's Name

2950 Peralta Oaks Court
Owner's Address

Oakland, CA 94605
Owner's City State Zip

I have read the description of the project Deposit/Refund Procedure, and have had an opportunity to ask questions about it. I understand that regardless of who deposits money into the site account, <u>any deposit money remaining at the completion of all projects being conducted at this site will be refunded solely to the property owner or his or her designee</u>.

Signature of Depositor

6/17/92
Date

Mike Anderson
Depositor Name

East Bay Regional Park District
Company Name

2950 Peralta Oaks Court
Street Address

Oakland, CA 94605
City / Zip

RETURN FORM TO: Alameda County, Hazardous Materials Div.
80 Swan Way, Rm 200
Oakland, CA 94621-1439
Phone: (510) 271-4320

DR-ACKN; mfk; 8/14/91

1986 UFST Integrity Test Documentation

McLaren Environmental Engineering

August 25, 1986

Mr. Ted Krebs
East Bay Regional Park District
11500 Skyline Boulevard
Oakland, CA 94619-2443

Dear Mr. Krebs:

UNDERGROUND TANK TESTING

We have completed the Phase I work for underground tank testing for the East Bay Regional Park District. The tank test results are attached for your information and summarized below:

Location	Tank	Status
Sunol Park	1,000 gal. unleaded	Fail
	1,000 gal. regular	Fail
Del Valle Park	550 gal. diesel	Pass
	550 gal. regular	Pass
	1,000 gal. unleaded	Pass
Cull Canyon	2,000 gal. unleaded	Fail
Lake Chabot	2,000 gal. diesel	Pass
	8,000 gal. unleaded	Pass
	8,000 gal. unleaded	Pass
	500 gal. waste	Pass
Tilden Corp. Yard	1,500 gal. diesel	Pass
	3,500 gal. regular	Fail
	8,000 gal. unleaded	Pass
	500 gal. waste	Fail
Tilden Golf Course	1,000 gal. regular	Fail
	1,000 gal. regular	Fail
Redwood Park	2,000 gal. diesel	Pass
	5,000 gal. unleaded	Pass

3017 Kilgore Road Rancho Cordova, California 95670 (916) 638-3696

McLaren
Environmental
Engineering

OWNER Property ☒ Tank(s) ☒
East Bay Regional Park District — Tom Schmeer
Name — Address — Representative — Telephone
Redwood Park 11500 Skyline Blvd. Oakland, Ca — Ted Cubbs (415) 843-2106
Name — Address — Representative — Telephone

OPERATOR
Name — Address — Telephone

REASON FOR TEST (Explain Fully)
Per Regulations

WHO REQUESTED TEST AND WHEN
Tom Schmeer — Chief, Maint & Const. — E.B.R.P.D. — 8-1-86
Name — Title — Company or Affiliation — Date
11500 Skyline Blvd, Oakland, Ca — Telephone
Address

WHO IS PAYING FOR THIS TEST?
East Bay Regional Park District — Tom Schmeer — Chief — (415) 531-1813 ext. 6
Company, Agency or Individual — Person Authorizing — Title — Telephone
11500 Skyline Blvd, Oakland, Ca 94619
Billing Address — City — State — Zip

Attention of — Order No. — Other Instructions

TANK(S) INVOLVED

Identify by Direction	Capacity	Brand/Supplier	Grade	Approximate Age	Steel/Fiberglass
	2000	unk	diesel	unk	unk
	5000	"	unk.	"	"

INSTALLATION DATA

Location	Cover	Fills	Vents	Siphones	Pumps
Rear of yard	Concrete	3"	2"		Suction
North inside driveway, Rear of station, etc.	Concrete, Black Top, Earth, etc.	Size, Trefill make, Drop tubes, Remote Fills	Size, Manifolded	Which tanks?	Suction, Remote Make if known

UNDERGROUND WATER
Depth to the Water table _____ Is the water over the tank? ☐ Yes ☐ No

FILL-UP ARRANGEMENTS
Tanks to be filled 6800 hr. 8-14-86 Date — Arranged by Ted Cubbs — 843-2106
Name — Telephone
Extra product to "top off" and run TSTT. How and who to provide? Consider NO Lead.
McLaren gas can
Terminal or other contact
For notice or inquiry
Company — Name — Telephone

CONTRACTOR, MECHANICS, any other contractor involved

OTHER INFORMATION OR REMARKS
Unleaded tank was 5000 gals not 2000

TEST RESULTS
Tests were made on the above tank systems in accordance with test procedures prescribed for as detailed on attached test charts with results as follows:

Tank Identification	Tight	Leakage Indicated	Date Tested
2000 gal diesel	yes	+.047 gph	8-14-86
5000 gal unleaded	yes	-.021 gph	"

CERTIFICATION
8-14-86
Date
16666/16620
Serial No. of Thermal Sensor

This is to certify that these tank systems were tested on the date(s) shown. Those indicated as "Tight" meet the criteria established by the National Fire Protection Association Pamphlet 329. THE TEST PROCEDURES AND CONCLUSIONS ARE BASED ON AN ALLOWABLE TOLERANCE OF 0.05 GAL/HR AS DESCRIBED IN THE CALIFORNIA UNDERGROUND STORAGE TANK REGULATIONS. SECTION 2643, AUGUST 1985.

McLaren Engineering Co — Tim Hagan
Testing Contractor or Company — By: Signature
Chris LaRose
Technicians
3917 Kilgore Rd, Rancho Cordova, Ca 95670
Address
4148113 70
Certification No

McLaren
Environmental
Engineering

EEEPD REDWOOD [illegible] 5-14-86
Name of Supplier, Owner or Dealer | Address | Date of Test

TANK TO TEST ______

Position ______

Brand & Grade UNL

CAPACITY

Nominal 4000 gal.

By Most Accurate Chart Available ______ gal.

COMMENTS

TEST CAPACITY

Bottom Water Before Fill-Up 0 " 0 gal.

Tank Diameter [illegible]" Tank Depth [illegible]" [illegible]

Suspension Tube Extension [illegible] " Fill
(6" below tank top)

Discharge Tubing Needed ______

	Stick Readings	Gallons	Total Gallons
Inventory:			4000
	[illegible]		[illegible]
	[illegible]		[illegible]
Product in Full Tank			[illegible]

API GRAVITY/COEFFICIENT OF EXPANSION (Per °F) OF PRODUCT

Hydrometer Reading [illegible] 4 [illegible]

Corrected API Gravity [illegible]

Temperature °F [illegible]

Coefficient of Expansion Per °F .000[illegible] [illegible]

TEMPERATURE/VOLUME FACTOR (a) TO TEST THIS TANK

Temperature Air ______ °F, Tank Product ______ °F, Fill-up Product ______ °F, Expected Change (±) ______ °F

Thermal-Sensor reading after circulation [illegible] (digits) [illegible] (nearest) °F

Digits per °F in range of expected change [illegible] (digits)

[illegible] (total quantity in full tank) x .000[illegible] (coefficient of expansion for involved product) = [illegible] (volume change per F) gallons

[illegible] (volume change per °F) ÷ [illegible] (digits per °F in test range) = .003 [illegible] (volume change per digit (A Factor))

1988 UFST Integrity Test Documentation and Leak Report

TAT

TESTING AND TECHNOLOGY
1027 Alabama St. • P.O. Box 4570 • Suite 104
Vallejo, CA 94590 • (707) 648-5014
San Francisco Office • (415) 753-4464

March 3, 1988

Ted Krebs
EAST BAY REGIONAL PARKS DISTRICT
1500 Skyline Blvd.
Oakland, CA 94619

Dear Ted:

Enclosed are the test reports for the 15 East Bay Regional Park District underground storage tank system. The results are summarized below.

TILDEN PARK	1	8,000	UNLEAD	PASS	
	2	2,625	REG GAS	FAIL -	LEAK IN PIPING
	3	1,500	DIESEL	NO TEST -	PERMANENT DROP TUBE
	4	550	WASTE	PASS	
REDWOOD PARK	1	2,000	DIESEL	PASS	
	2	5,000	UNLEAD	FAIL -	LEAK IN PIPING
SUNOL PARK	1	1,000	REG GAS	PASS	
	2	~~5,000~~ 1,000	UNLEAD	FAIL -	LEAK IN TANK
SOUTH COUNTY EQUIP. MAINT.	1	8,000	REG GAS	PASS	
	2	8,000	UNLEAD	PASS	
	3	2,000	DIESEL	PASS	
	4	250	WASTE	PASS	
DEL VALLE PARK	1	1,000	UNLEAD	PASS	
	2	564	REG GAS	PASS	
	3	564	DIESEL	PASS	

I have sent copies of the Contra Costa County test results to Jan Lammer amd the Almeda County test results to Liz Rose.

Enclosed also is our invoice for these tests. If you have any questions, please call me at 415/472-0375.

Thanks for using TAT for your testing.

Sincerely,

Jack A. Wurts
Field Supervisor

JAW/stl

Enclosures
CC: Jan Lammer, Countra Costa County Health Department
Liz Rose, Alemeda County Health Department

TESTING AND TECHNOLOGY
1 7 Alabama Street, P. O. B 4570
Vallejo, CA 94590
(707) 648-5014

INVOICE # 2212 TEST DATE 2/5/88

COMPANY NAME REDWOOD PARK PHONE #

MAIL ADDRESS 11500 SKYLINE BLVD., OAKLAND

TANK ADDRESS REDWOOD ROAD

CONTACT NAME RON EMANULESON PHONE # 531-9300 EX. 279

PROPERTY OWNER EAST BAY REGIONAL PARK DISTRICT PHONE # 843-2106

MAILING ADDRESS 11500 SKYLINE BLVD., OAK. CA 94619 ATTN: TED KREBS

TANK INFORMATION

TANK #	ONE	TWO	TWO
PRODUCT	DIESEL	UNLEAD	RETEST
CAPACITY	2,000 GAL	5,000 GAL	2/16/88
CONSTRUCTION	STEEL	STEEL	
DIAMETER	54"	66"	
FILL PIPE	50"	41"	
TANK BOTTOM DEPTH	104"	137"	
PUMP TYPE	SUCTION	SUCTION	
VAPOR RECOVERY	NONE	NONE	
TANK WATER	TRACE	0	

TEST INFORMATION

TEST EQUIPMENT	AINLAY	AINLAY	
FULL SYST/TANK ONLY	FULL	FULL	
DATE/TIME FILLED	2-5	2-4	
GALLONS TO TOP OFF	500	UNKNOWN	
GROUND WATER DEPTH	12'+	12'+	

RESULTS

PASS - FAIL	PASS	FAIL	FAIL
LOSS RATE	-.0161	-.3619	-.6918

COMMENTS

RETEST CONFIRMS THAT THERE IS A LEAK IN TANK SYSTEM #2
APPROXIMATLEY 25" BELOW GRADE (15" ABOVE TANK TOP)

TESTING AND TECHNOLOGY

TEST REPORT AINLAY TANK 'TEGRITY TESTER

COMPANY REDWOOD PARK INVOICE # 2212 DATE 2/5/88

TANK # ONE PRODUCT DIESEL CAPACITY 2,000

FULL SYSTEM TEST HEIGHT +15" LOW LEVEL TEST HEIGHT

MEASURED API GRAVITY 35 TEMP 52 ADJUSTED API 35.6 COE .00046441

TEMP SHIFT FACTOR .9288 OTHER 3 GALLONS ADDED AT 13:30 TO OVERFILL TANK

1) VOLUME CHANGE DUE TO TEMPERATURE VARIATION

	START	15 MIN	30 MIN	45 MIN	END	SHIFT (+/-)	(X)	AVG SHIFT (+/-)
TIME	14:15	14:30	14:45	15:00	15:15			
TOP TEMP	50.81	50.82	50.81	50.81	50.80	-.01	(.25)	-.0025
MIDDLE T.	50.93	50.93	50.93	50.92	50.92	-.01	(.50)	-.0050
BOTTOM T.	51.01	51.00	50.98	50.98	50.98	-.03	(.25)	-.0075
					WEIGHTED AVERAGE TEMPERATURE SHIFT			-.0150

CALCULATIONS FOR VOLUME CHANGE DUE TO TEMPERATURE
TEMP SHIFT FACTOR .9288 (X) WEIGHTED SHIFT -.0150 = -.0139 GAL

2) VOLUME CHANGE DUE TO LEVEL VARIATIONS
EXACT AMOUNT OF LIQUID LOST & REPLACED (-) OR
GAINED & REMOVED (+) TO RESTORE ORIGINAL LEVEL = -.0300 GAL

3) NET VOLUME CHANGE
LEVEL CHANGE -.0300 (MINUS) TEMPERATURE CHANGE -.0139 = -.0161 GAL

4) RESULTS
CERTIFIED TIGHT YES AT TEST HEIGHT OF +15" LOSS RATE (GPH) -.0161 (+/-)

TESTED BY _____
FRANK T. PHELAN

(5) COMMENTS

THE DATA FOR THIS TEST MEETS NFPA 329 STANDARDS. THE EQUIPMENT USED TO GENERATE THIS DATA IS ABLE TO DETECT A PRODUCT LOSS AT THE RATE OF 0.05 GALLONS PER HOUR. THIS IS NOT TO BE CONSTRUED AS AN ALLOWABLE LEAK RATE, BUT RATHER AS AN ACCURACY TOLERANCE OF THE TESTING EQUIPMENT WHICH ALLOWS FOR THE MANY VARIABLES INVOLVED. TAT GUARANTEES ONLY THAT THE DATA FOR THIS REPORT MEETS NFPA CRITERIA ON THE DAY OF THIS TEST, TAT MAKES NO WARRANTY OF TANK AND/OR LINE FITNESS NOR DO WE ASSUME RESPONSIBILITY FOR ANY LEAKAGE WHICH MAY HAVE OCCURRED AS A RESULT OF THIS TEST.

TESTING AND TECHNOLOGY

TEST REPORT AINLAY TANK 'TEGRITY TESTER

COMPANY REDWOOD PARK INVOICE # 2212 DATE 2/5/88

TANK # TWO PRODUCT UNLEAD CAPACITY 5,000

FULL SYSTEM TEST HEIGHT +16" LOW LEVEL TEST HEIGHT

MEASURED API GRAVITY 53.5 TEMP 34 ADJUSTED API 56.6 COE .00066516

TEMP SHIFT FACTOR 3.325 OTHER 9 GALLONS ADDED AT 09:00 TO OVERFILL TANK

1) VOLUME CHANGE DUE TO TEMPERATURE VARIATION

	START	15 MIN	30 MIN	45 MIN	END	SHIFT (+/-)	(X)	AVG SHIFT (+/-)
TIME	09:45	10:00	10:15	10:30	10:45			
TOP TEMP	53.93	53.92	53.91	53.90	53.89	-.04	(.25)	-.0100
MIDDLE T.	54.05	54.04	54.03	54.02	54.01	-.04	(.50)	-.0200
BOTTOM T.	54.09	54.11	54.14	54.12	54.10	+.01	(.25)	+.0025
					WEIGHTED AVERAGE TEMPERATURE SHIFT			-.0275

CALCULATIONS FOR VOLUME CHANGE DUE TO TEMPERATURE
TEMP SHIFT FACTOR 3.325 (X) WEIGHTED SHIFT -.0275 = -.0914 GAL

2) VOLUME CHANGE DUE TO LEVEL VARIATIONS
EXACT AMOUNT OF LIQUID LOST & REPLACED (-) OR
GAINED & REMOVED (+) TO RESTORE ORIGINAL LEVEL = -.4533 GAL

3) NET VOLUME CHANGE
LEVEL CHANGE -.4533 (MINUS) TEMPERATURE CHANGE -.0914 = -.3619 GAL

4) RESULTS
CERTIFIED TIGHT NO AT TEST HEIGHT OF +15" LOSS RATE (GPH) -.3619 (+/-)

TESTED BY Frank Phelan
FRANK T. PHELAN

(5) COMMENTS

TEST INDICATES A LEAK IN THE PIPING SYSTEM

THE DATA FOR THIS TEST MEETS NFPA 329 STANDARDS. THE EQUIPMENT USED TO GENERATE THIS DATA IS ABLE TO DETECT A PRODUCT LOSS AT THE RATE OF 0.05 GALLONS PER HOUR. THIS IS NOT TO BE CONSTRUED AS AN ALLOWABLE LEAK RATE, BUT RATHER AS AN ACCURACY TOLERANCE OF THE TESTING EQUIPMENT WHICH ALLOWS FOR THE MANY VARIABLES INVOLVED. TAT GUARANTEES ONLY THAT THE DATA FOR THIS REPORT MEETS NFPA CRITERIA ON THE DAY OF THIS TEST, TAT MAKES NO WARRANTY OF TANK AND/OR LINE FITNESS NOR DO WE ASSUME RESPONSIBILITY FOR ANY LEAKAGE WHICH MAY HAVE OCCURRED AS A RESULT OF THIS TEST.

TESTING AND TECHNOLOGY

TEST REPORT HORNER 'EZY CHEK' LEAK DETECTOR

COMPANY REDWOOD PARK DATE 2/16/88 INVOICE 2212 TANK # 2

PRODUCT UNLEAD CAPACITY 5,000 MEASURED API 53.5 TEMPERATURE 51

ADJUSTED API 54.6 COEF OF EXPANSION .00065450 TEMP SHIFT FACTOR 3.240

CALIBRATING ROD .05 DIVIDED BY # LINES 16.6 = CHART CALIB FACTOR .0030

CALIBRATING ROD .05 DIVIDED BY # LINES 39.6 = CHART CALIB FACTOR .0012

OTHER X3 GALLONS ADDED AT 09:00 TO OVERFILL TANK FOR TEST

TIME	TEST HEIGHT	CHART #'S	GAIN LOSS	CHART FACTR	LEVEL RESLT	TEMP STRT	TEMP END	GAIN LOSS	TEMP FACTR	TEMP RESULT	15 MIN RESULT IN GAL	HOURLY RESULT GAL/HR
09:30	+13"	94 35	-59	.0030	-.1770	.866	.867	+.001	3.240	+.0032	-.1802	
09:45	+13"	92 40	-52		-.1560	.867	.870	+.003		+.0097	-.1657	-.6918
10:30	-8"	43-26	-69	.0012	-.0828	.871	.871	0		0	-.0828	
10:45	-8"	98 22	-76		-.0912	.871	.871	0		0	-.0912	-.3480
11:30	-18"	88 64	-24		-.0288	.866	.867	+.001		+.0032	-.0320	
11:45	-18"	64 38	-26		-.0312	.867	.867	0		0	-.0312	-.1264
12:30	-28"	44 57	+13		+.0156	.863	.867	+.004		+.0129	+.0027	
1245	-28"	57 66	+ 9		+.0108	.867	.868	+.001		+.0032	+.0076	+.0200

RETEST CONFIRMS TESTS FROM 2/5/88

RESULTS CERTIFIED TIGHT NO AT TEST HEIGHT OF +13" LOSS RATE (GPH) -.6918 (+/-

TESTED BY Frank Phelan
FRANK T. PHELAN

COMMENTS

THIS TEST INDICATES THAT THERE IS A LEAK IN TANK SYSTEM #2 APPROXIMATLEY 25" BELOW GRADE

THE DATA FOR THIS TEST MEETS NFPA 329 STANDARDS. THE EQUIPMENT USED TO GENERATE THIS DATA IS ABLE TO DETECT A PRODUCT LOSS AT THE RATE OF 0.05 GALLONS PER HOUR. THIS IS NOT TO BE CONSTRUED AS AN ALLOWABLE LEAK RATE, BUT RATHER AS AN ACCURACY TOLERANCE OF THE TESTING EQUIPMENT WHICH ALLOWS FOR THE MANY VARIABLES INVOLVED THAT GUARANTEES ONLY THAT THE DATA FOR THIS REPORT MEETS NFPA CRITERIA ON THE DAY OF THIS TEST, THAT MAKES NO WARRANTY OF TANK AND/OR LINE FITNESS NOR DO WE ASSUME RESPONSIBILITY FOR ANY LEAKAGE WHICH MAY HAVE OCCURRED AS A RESULT OF THIS TEST

ALAMEDA COUNTY
HEALTH CARE SERVICES
DAVID J. KEARS, AGENCY
XXXXXXXXXXXXX, Agency Director

470-27th Street, Third Floor
Oakland, California 94612
(415) 271-4320

March 23, 1988

East Bay Regional Park
1500 Skyline Blvd.
Oakland, CA 94619
Attn: Ted Krebs

SUBJECT: UNDERGROUND STORAGE TANK UNAUTHORIZED RELEASE (LEAK)/ CONTAMINATION SITE REPORT

Dear Mr. Krebs:

On March 4, 1988, our office received a report from Testing and Technology for the following East Bay Regional Parks which failed the underground storage tank and/or piping test:

1. Tilden Park
2. Redwood Park
3. Sunol Park

The California Administrative Code, Title 23, requires all unauthorized releases to be reported. Section 2652(b) requires within five (5) working days of detecting the release, the operator or permittee shall submit to the local agency (Alameda County Hazardous Materials Division) a full written report to include all of the following information which is known at the time of filing the report:

1. List of type and quantity of hazardous substances released.
2. The results of all investigations completed at that time to determine the extent of soil or groundwater or surface water contamination due to the release.
3. Method of clean-up implemented to date, proposed clean-up actions, and approximate cost of actions taken to date.
4. Method and location of disposal of the released hazardous substance and any contaminated soils or groundwater or surface water (indicate whether a hazardous waste manifest(s) is utilized).

5. Proposed method of repair or replacement of the primary and secondary containers.
6. Facility operator's name and telephone number.

Until clean-up is complete, the operator or permittee shall submit reports to the County and the Regional Water Quality Control Board (RWQCB) every three (3) months or at a more frequent interval if specified by either agency. The reports shall include the information requested in 2, 3 and 4 of the above. The report requested above shall be prepared in accordance with the San Francisco Regional Water Quality Control Board's "Guidelines for Addressing Fuel Leaks," September 1985. The initial investigation report shall be submitted within 30 days and shall include a site safety plan.

Soils contaminated at hazardous waste concentrations shall be transported by a licensed hazardous hauler and disposed of or treated at a California Department of Health Services approved facility. Soils contaminated below hazardous waste concentrations may be managed as non-hazardous but are subject to waste discharge requirements of the Regional Board.

Enclosed are three (3) "Underground Storage Tank Unauthorized Release (Leak)/Contamination Site Report" forms which should be completed and returned within five (5) working days. Should you have any questions regarding this letter, please contact Lizabeth Rose, Hazardous Materials Specialist at 271-4320.

Sincerely,

Rafat A. Shahid

Rafat A. Shahid, Chief
Hazardous Materials Division

RAS:LR:lr

cc: RWQCB
City of Oakland Fire Dept.
Alco Fire Dept.

Enclosure(s)

1989 UFST Integrity Test Documentation

TIMMERMAN
ENGINEERING
CONSTRUCTION

October 8, 1989

Ted Krebs
East Bay Regional Parks District
1500 Skyline Blvd.
Oakland, CA 94619

Ted:

Enclosed please find the test reports for the 13 tanks tested under our contract. The results are summarized below.

Tilden Park	1	8,000	U/L	Pass
	2	1,500	DIESEL	Unable to complete test due to permanent drop tube.
Redwood Park	1	2,000	DIESEL	Pass
	2	5,000	U/L	Fail
Sunol Park	1	1,000	REGULAR	Pass
	2	1,000	U/L	Pass
South Co.	1	8,000	REGULAR	Pass
Equip. Maint.	2	8,000	U/L	Pass
	3	2,000	DIESEL	Pass
	4	250	WASTE OIL	Pass
Del Valle Park	1	1,000	U/L	Pass
	2	564	REGULAR	Pass
	3	564	DIESEL	Pass

Copies have been sent to the appropriate agencies. Thanks for using Timmerman Engineering Construction for your testing.

Sincerely,

Peter D. Timmerman
Owner

PDT/eam

Enclosures
CC: Contra Costa County Health Services Division
Alameda County Dept. of Environmental Health

P.O. Box 4479 • Walnut Creek, CA 94596 • (415) 934-4157 • FAX (415) 934-1823 • Cal. Lic. No. 561795

Borehole Drilling Permit

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 . VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT Redwood Regional Park
Corporation Yard. Park entrance road off
Redwood Road, Oakland CA.

CLIENT
Name East Bay Regional Parks District - Warren Gee
Address P.O. Box 5381 Voice 510 635-0135
City Oakland CA. Zip 94605

APPLICANT
Name Engineering-Science, Inc. - Bruce Rucker
Address 1301 Marina Village Pkwy Fax 510 769-9344
Suite 300 Voice 510 769-0100
City Alameda CA 9 Zip 94501

TYPE OF PROJECT
Well Construction
Cathodic Protection ___
Water Supply ___
Monitoring ___
Geotechnical Investigation
General ___
Contamination X
Well Destruction ___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger ___
Cable ___ Other X- pneumatic hammer sampler, 2"-OD

DRILLER'S LICENSE NO. 662116

WELL PROJECTS
Drill Hole Diameter ~~2~~ 8 in. Maximum ~~8~~ 6
Casing Diameter ___ in. Depth ~~25~~ 25 ft.
Surface Seal Depth ___ ft. Number ~~15~~ 15

GEOTECHNICAL PROJECTS
Number of Borings 15
Hole Diameter 2 in. Maximum Depth 25 ft.

ESTIMATED STARTING DATE 29 September 1993
ESTIMATED COMPLETION DATE 1 October 1993

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Bruce M. Rucker Date 9/20/93

FOR OFFICE USE

PERMIT NUMBER 93524
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

A. GENERAL
(1.) A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well Projects, or drilling logs and location sketch for geotechnical projects.
(3.) Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

(C.) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 23 Sep 93
Wyman Hong

APPENDIX B

WASTE MANIFESTS AND CERTIFICATES OF UFST DESTRUCTION

Protection Agency
8020-0039 (Expires 9-30-94)
Form designed for use on elite (12-pitch) typewriter.

See Instructions on back of page 6.

Department of Toxic Substances Contr...
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

C A C 0 0 0 8 6 4 9 0 4 | 0 0 0 1

92217264

3. Generator's Name and Mailing Address
EAST BAY REGIONAL PARKS/REDWOOD REGIONAL PARK DISTRICT
7867 Redwood Road, Oakland, CA. 94619

4. Generator's Phone (510) 635-0135 Attn: Gene Mitchell

A. State Manifest Document Number: 92217264

B. State Generator's ID:

5. Transporter 1 Company Name | 6. US EPA ID Number
H & H Ship Service Company | C A D 0 0 4 7 7 1 1 6 8

C. State Transporter's ID: 401995

D. Transporter's Phone: (415) 543-4835

7. Transporter 2 Company Name | 8. US EPA ID Number

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address | 10. US EPA ID Number
H & H Ship Service Company
220 China Basin Street
San Francisco, CA. 94107 | C A D 0 0 4 7 7 1 1 6 8

G. State Facility's ID: C A D 0 0 4 7 7 1 1 6 8

H. Facility's Phone: (415) 543-4835

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Numbers
a. RESIDUE UNLEADED GASOLINE TANK NON-RCRA HAZARDOUS WASTE SOLID	0 0 1	T P	0 5 0 0 0	P	State 512
b. RESIDUE DIESEL TANK NON-RCRA HAZARDOUS WASTE SOLID	0 0 1	T P	0 2 0 0 0	P	State 512
c.					State / EPA/Other
d.					State / EPA/Other

RECEIVED OCT 15 1993 HAZARDOUS MATERIALS ALAMEDA

J. Additional Descriptions for Materials Listed Above
EMPTY 5,000 gallon and 2,000 gallon tanks last containing unleaded gasoline and diesel. Tanks inerted with dry ice for transport.
PROFILE #A2726

K. Handling Codes for Wastes Listed Above
a. 01 | b. 01 | c. | d.

15. Special Handling Instructions and Additional Information
JOB #12576
24 Hr. Emergency Contact: H & H #(415) 543-4835
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
Alan Wachter	Alan Wachter	0 5	0 3	9 3

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
NORMAN L. BERG	Norman L. Berg	0 5	0 3	9 3

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name	Signature	Month	Day	Year
LOURDES B. LOPEZ	Lourdes B. Lopez	0 5	0 3	9 3

DO NOT WRITE BELOW THIS LINE.

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802, WITHIN CALIFORNIA, CALL 1-800-852-7...

92217264

GENERATOR

TRANSPORTER

FACILITY

DTSC 8022A (12/91)
EPA 8700—22

White: TSDF SENDS THIS COPY TO DTSC WITHIN 30 DAYS.
To: P.O. Box 3000, Sacramento, CA 95812

ENVIRONMENTAL SERVICES
(DIVISION OF H&H SHIP SERVICE CO., INC.)

220 CHINA BASIN, SAN FRANCISCO, CA 94107 • DAY AND NIGHT: (415) 543-4835 FAX (415) 543-8265

CERTIFICATE OF DISPOSAL

APRIL 23, 1993

H & H Ship Service Company hereby certifies to *PETROLEUM ENGINEERIN* that:

1. The storage tank(s), size(s) *1-5,000 GALS. AND 1-2,000 GALS.*

   removed from the *EAST BAY REGIONAL PARKS*

   facility at *7867 REDWOOD ROAD*

   OAKLAND, CALIFORNIA

   were transported to H & H Ship Service Company, 220 China Basin St. San Francisco, California 94107.

2. The following tank(s), H & H Job Number *12576*

   have been steam cleaned, cut with approximately 2' X 2' holes, rendered harmless and disposed of as scrap metal.

3. Disposal site: *SCHNITZER STEEL, OAKLAND, CALIFORNIA.*

4. The foregoing method of destruction/disposal is suitable for th materials involved, and fully complies with all applicable regulatory and permit requirements.

5. Should you require further information, please call (415) 543-4835 or (415) 905-5510.

Very Truly Yours,

Lourdes B. Lopez
Operations Coordinator

APPENDIX C

FIELD INVESTIGATIVE PROTOCOLS

APPENDIX C

FIELD INVESTIGATIVE PROTOCOLS

SOIL SAMPLING

Soil samples from beneath the UFSTs and during excavation confirmation sampling were collected with the excavator at the sampling location. Soil samples were subsequently collected for laboratory analysis from the backhoe bucket by driving pre-cleaned, stainless-steel or brass sampling tubes (6-inches long and 2-inch outside diameter) into the excavated soil. The tubes were then sealed with Teflon (tradename) tape and non-reactive plastic caps, labelled, refrigerated and transported under chain-of-custody the same day to the analytical laboratory.

SOIL SCREENING

Soil samples were screened for ionizable vapors as an indicator of contamination using a photoionization detector (PID) and total hydrocarbon vapor analyzer (THVA). Soil samples were placed in new plastic bags, sealed and allowed to volatize for approximately 20 minutes. The probe of the PID/THVA was then inserted into the plastic bag and measurements were recorded.

EXPLORATORY BOREHOLE DRILLING, GEOLOGIC LOGGING AND SOIL SAMPLING

Exploratory boreholes were advanced and sampled using a portable, hydraulic, drive-sampler. This technique advances into undisturbed soil a split-spoon sampler containing 2-inch outside diameter stainless steel or brass sampling tubes. Borehole soil samples were screened for contamination at five foot intervals, and were sealed and transported as discussed in the previous subsections. For each borehole, the sampling tube adjacent to the one containing the highest PID/THVA readings and/or those collected immediately above first occurrence of groundwater were submitted for laboratory analysis.

All exploratory boreholes were geologically logged using the Unified Soils Classification System (USCS). Soil samples were collected for geologic logging on a continuous interval basis.

CONFIRMATION SAMPLING OF STOCKPILED CONTAMINATED SOIL

The methods and results of stockpiled soil sampling are discussed in Appendix G.

"GRAB" GROUNDWATER SAMPLING AND WATER LEVEL MEASUREMENT

"Grab" groundwater samples were collected from temporary well points constructed of 1-inch inside diameter (ID) Schedule 80 polyvinyl chloride (PVC) casing with 0.020-inch factory slots and threaded bottom plugs. Static water levels in the well points were allowed to equilibrate for a minimum of 48 hours. Static water levels were measured in each well point with an electric indicator at least three times over a 30 minute period to ensure that static water levels had equilibrated. All static water levels had reached equilibrium.

Prior to sampling, each well point was purged of approximately three well volumes using a 0.84-inch OD Teflon (tradename) bailer. For low yield well points (static water level equilibration requiring greater than 30 minutes recovery), "grab" groundwater samples were collected after the static water level had recovered to 80% of its pre-purging depth. Prior to sampling, physical characteristics of the water (including temperature, pH and electrical conductivity) were measured in the field to document the presence of stabilized formation water in the wells. "Grab" groundwater samples were immediately transferred from the bailer to the appropriate sampling containers (Department of Toxic Substances Control 1993) which were supplied by the analytical laboratory. These included: 40-ml glass VOA vials (TPH-G and BTEX analysis); and 1-liter amber glass bottles (TPH-D analysis).

BOREHOLE CLOSURE

Upon completion of all sampling activities, the total depth of each borehole was backfilled from the bottom up with neat cement grout.

DECONTAMINATION PROCEDURES

Prior to drilling each borehole, all drilling and sampling equipment was thoroughly decontaminated by steam cleaning or washing with a trisodium phosphate (TSP) detergent solution followed by a deionized water rinse.

WASTE STORAGE AND DISPOSAL

All soil cuttings generated during the exploratory borehole drilling program were placed in the contaminated soil stockpile. Well point development water and decontamination rinsate fluids were containerized on site in 55-gallon, Department of Transportation (DOT)-approved steel drums. These fluids were disposed of by another environmental contractor at an appropriate waste disposal facility based on analytical results (Gee 1993c).

FIELD QUALITY CONTROL PROCEDURES

Field Documentation

All field activities and information pertinent to sampling (e.g. sample numbers and locations) were documented on a daily basis in a bound field notebook. All entries were

filled out in ink. Standard field forms will utilized for tabulation and documentation of relevant field data (e.g. geologic logs, air monitoring data and groundwater sampling notes).

Sample labels were filled out in waterproof ink at the time of sample collection and before the samples were placed in the cooler. Label entries included: sample name; date and time of sample collection; sample location; analysis; and ES project number.

Sample Custody

Immediately after collection, soil and groundwater samples were labeled and placed in an iced cooler for delivery to the laboratory. A chain-of-custody record was completed as samples were collected. The chain-of-custody record was checked for completeness at the end of the day and was signed by the sampler. It was then delivered with the samples to the laboratory.

Quality Control (QC) Samples

One duplicate soil sample (B12-14.5) was collected in the sampling tube adjacent to the sampling tube submitted for laboratory analysis. Two equipment rinse blanks were collected from the bailer following decontamination. One trip blank was prepared by the laboratory, transported to the field and handled following the same protocols as field samples. That sample was not analyzed as no contaminants were detected in either equipment rinse blank. Sampling collection, labeling and handling for quality control samples followed the same protocols as for field samples, discussed previously.

APPENDIX D

INITIAL AND EXCAVATION CONFIRMATION SOIL SAMPLE ANALYTICAL LABORATORY REPORT AND CHAIN-OF-CUSTODY RECORDS

INITIAL UFST SOIL SAMPLES

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

DATE RECEIVED: 05/03/93
DATE REPORTED: 05/10/93

LABORATORY NUMBER: 110780

CLIENT: ENGINEERING SCIENCE

PROJECT ID: NC389.02

LOCATION: EBRPB, REDWOOD YARD

RESULTS: SEE ATTACHED

Reviewed by

Reviewed by

This report may be reproduced only in its entirety.

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110780
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC389.02
LOCATION: EBRPD, REDWOOD YARD

DATE SAMPLED: 05/03/93
DATE RECEIVED: 05/03/93
DATE ANALYZED: 05/07/93
DATE REPORTED: 05/10/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
110780-3	GT-1	800	6,300	43,000	18,000	94,000
110780-4	GT-2	2,200	19,000	120,000	45,000	250,000

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	96

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110780
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC389.02
LOCATION: REDWOOD CITY

DATE SAMPLED: 05/03/93
DATE RECEIVED: 05/03/93
DATE ANALYZED: 05/09/93
DATE REPORTED: 05/10/93

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	SAMPLE ID	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)	REPORTING LIMIT (ug/Kg)
110780-1	DT-1	ND	ND	ND	ND	5
110780-2	DT-2	ND	ND	ND	ND	5

ND = Not detected at or above reporting limit.

Reporting Limit applies to all analytes.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110780
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC389.02
LOCATION: EBRPD, REDWOOD YARD

DATE SAMPLED: 05/03/93
DATE RECEIVED: 05/03/93
DATE ANALYZED: 05/04/93
DATE REPORTED: 05/10/93

ANALYSIS: LEAD
ANALYSIS METHOD: EPA 7420

LAB ID	SAMPLE ID	RESULT	UNITS	REPORTING LIMIT
110780-3	GT-1	10	mg/Kg	3
110780-4	GT-2	9	mg/Kg	3

QA/QC SUMMARY:

RPD, %	2
RECOVERY, %	92

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110780
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC389.02
LOCATION: EBRPD, REDWOOD CITY

DATE SAMPLED: 05/03/93
DATE RECEIVED: 05/03/93
DATE EXTRACTED: 05/04/93
DATE ANALYZED: 05/07/93
DATE REPORTED: 05/10/93

Extractable Petroleum Hydrocarbons in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	SAMPLE ID	KEROSENE RANGE (mg/Kg)	DIESEL RANGE (mg/Kg)	REPORTING LIMIT* (mg/Kg)
110780-1	DT-1	**	4	1
110780-2	DT-2	ND	3	1

** Kerosene range not reported due to overlap of hydrocarbon ranges.

+ Pattern does not match standard. Heavier hydrocarbons may be affecting the quantation of diesel-range components.

ND = Not Detected at or above reporting limit.

* Reporting limit applies to all analytes.

QA/QC SUMMARY: Laboratory Control Sample

RECOVERY, %	94

ENGINEERING – SCIENCE, INC.
CHAIN OF CUSTODY RECORD

LAB:

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Rucker	NC 38902

PROJECT NAME / LOCATION: East Bay Regional Park, Redwood Yard

SAMPLER(S): (SIGNATURE) Henry Pietrzyk

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	TPH-diesel	TPH-gas + BTEX	BTEX	Total lead			PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
DT-1	5/3/93	1140	Soil	9'10" below groundsurface	1	✓		✓						5-day	110780-1
DT-2	5/3/93	1145	Soil	10'2" " " "	1	✓		✓						"	-2
GT-1	5/3/93	1200	Soil	12 feet " " "	1		✓		✓					"	-3
GT-2	5/3/93	1210	Soil	12 feet " " "	1		✓		✓					"	-4

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
Henry Pietrzyk	5/3/93 1422	Joanna Neath	5/3/93 1422	

ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

EXCAVATION CONFIRMATION SOIL SAMPLES

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

ANALYTICAL REPORT

Prepared for:

Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501

Date: 21-JUN-93
Lab Job Number: 111239
Project ID: NC367.02
Location: East Bay Regional Park

Reviewed by: Teresa K. Morrison

Reviewed by:

This package may be reproduced only in its entirety.

LABORATORY NUMBER: 111239
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC 367.02
LOCATION: EBRP - REDWOOD YARD

DATE SAMPLED: 6/15/93
DATE RECEIVED: 6/15/93
DATE ANALYZED: 6/21/93
DATE REPORTED: 6/21/93

ANALYSIS: LEAD
ANALYSIS METHOD: EPA 7420

LAB ID	SAMPLE ID	RESULT	UNITS	REPORTING LIMIT
111239-001	E1-17	5	mg/Kg	3
111239-002	E2-16	5	mg/Kg	3
111239-003	E3-16	8	mg/Kg	3
111239-004	E4-13	6	mg/Kg	3
111239-005	E5-7.5	8	mg/Kg	3

ND = Not detected at or above reporting limit.

QA/QC SUMMARY:

RPD, %	<1
RECOVERY, %	93

LABORATORY NUMBER: 111239
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC 367.02
LOCATION: EBRP - REDWOOD YARD

DATE SAMPLED: 6/15/93
DATE RECEIVED: 6/15/93
DATE ANALYZED: 6/16,17/93
DATE REPORTED: 6/21/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111239-001	E1-17	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111239-002	E2-16	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111239-004	E4-13	6+	370	6*	100	380
111239-005	E5-7.5	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)

+ Pattern does not match gasoline standard.

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY: MS/MSD	Spiked sample: 111239-001
RPD, %	2
RECOVERY, %	89

LABORATORY NUMBER: 111239
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC 367.02
LOCATION: EBRP - REDWOOD YARD

DATE SAMPLED: 6/15/93
DATE RECEIVED: 6/15/93
DATE ANALYZED: 6/17/93
DATE REPORTED: 6/21/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111239-003	E3-16	12,000	80,000	390,000	230,000	1,100,000

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY: BS/BSD

RPD, %	2
RECOVERY, %	98

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

LAB: Curtis + Tompkins

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	S. Rucker	NC367.02

PROJECT NAME / LOCATION: East Bay Regional Park, Redwood Yard

SAMPLER(S): (SIGNATURE) Henry Pietrzyszak

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH-GAS	BTEX	Total Lead					TURNAROUND TIME	REMARKS
E1-17	6/15/93	1540	Soil	17' below ground surface	1	✓	✓	✓					5-Day	111239-1
E2-16	"	1525	"	16' " " "	1	✓	✓	✓					"	-2
E3-16	"	1530	"	16 " " "	1	✓	✓	✓					"	-3
E4-13	"	1550	"	13 " " "	1	✓	✓	✓					"	-4
E5-7.5	6/15/93	1600	Soil	7.5 " " "	1	✓	✓	✓					"	-5

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
Henry Pietrzyszak	6/15/93 1805	Teresa L. Morrison	6/15/93 1805	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

APPENDIX E

CONTAMINATED SOIL STOCKPILE CONFIRMATION SAMPLE ANALYTICAL LABORATORY REPORT AND CHAIN-OF-CUSTODY RECORDS

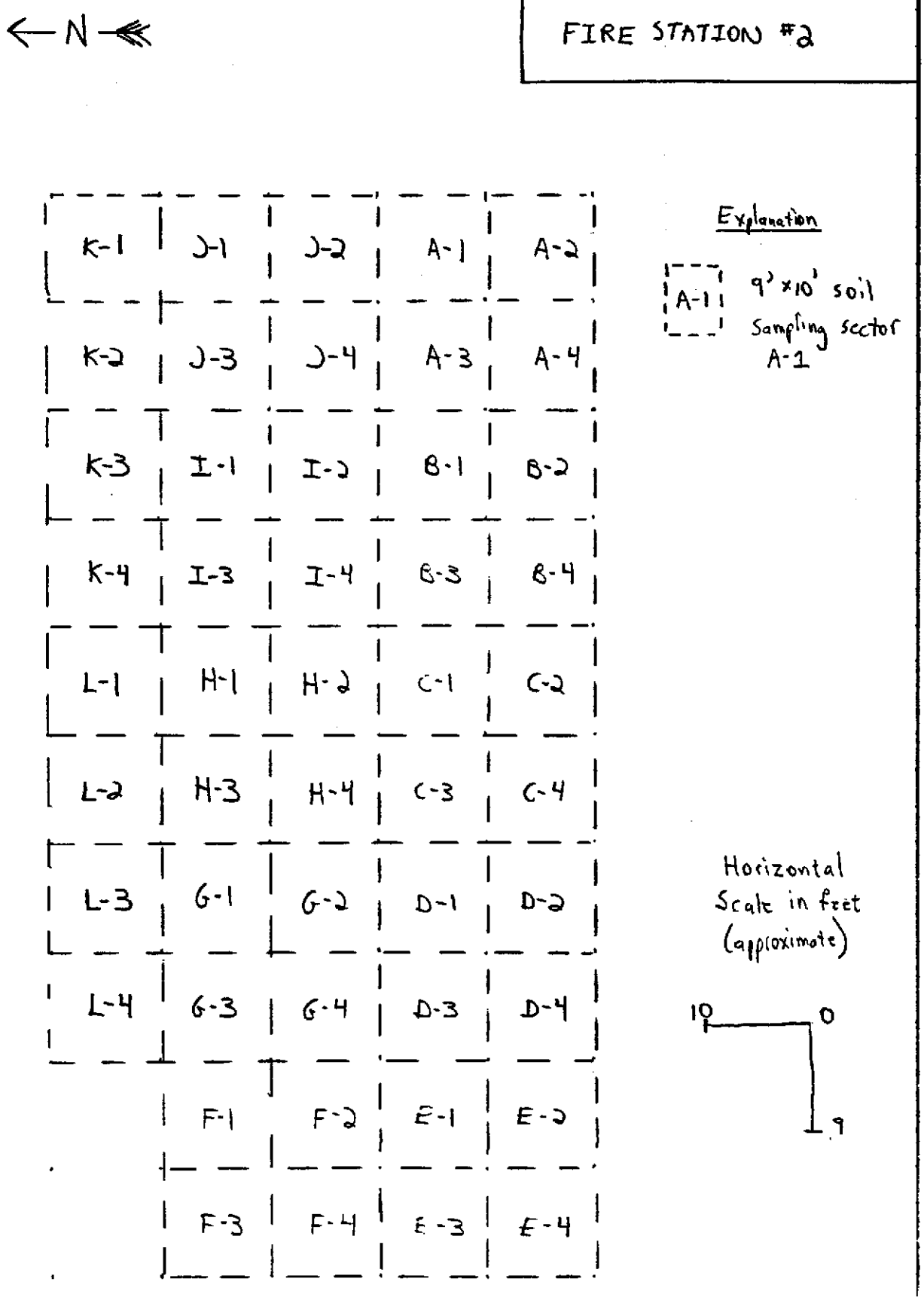
ES ENGINEERING-SCIENCE, INC.

Figure 1

Client East Bay Regional Parks District | Job No. NC367.04 | Sheet 1 of 1

Subject Redwood Regional Park UST Site - Contaminated Soil Stockpile Sampling | By Bruce Rucker | Date 7/13/93

Checked | Rev. Ø



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501

RECEIVED
AUG 3 1993
ENGINEERING SCIENCE
ALAMEDA

Date: 30-JUL-93
Lab Job Number: 111557
Project ID: NC367.04
Location: EBRPD/Redwood

Reviewed by:

Reviewed by:

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Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/25/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-1	RED-A1-4	17	ND(5)	13*	10	810
111557-4	RED-D1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-5	RED-E1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-6	RED-F1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-7	RED-G1-4	14	ND(5)	ND(5)	ND(5)	400
111557-8	RED-H1-4	36	18*	98	15*	1,000
111557-9	RED-I1-4	1	ND(5)	ND(5)	ND(5)	6
111557-10	RED-J1-4	7	ND(5)	17*	ND(5)	340

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

LCS RECOVERY, %	98

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/26/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-3	RED-C1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-12	RED-L1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	95

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/26/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-2	RED-B1-4	75	ND(400)	ND(400)	ND(400)	3,900
111557-2**	RED-B1-4	77	ND(30)	220*	130	3,000
111557-11	RED-K1-4	180	ND(400)	470	140	17,000

**Analyzed on 07/29/93

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	2
RECOVERY, %	96

CHAIN OF CUSTODY FORM

Curtis & Tompkins, Ltd.
2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900 Phone
(510) 486-0532 Fax

Sampler: Bruce Rucker

Report to:

Project No: NC3867.04 Company: Engineering-Science Inc.

Project Name: EBRPD\Redwood Telephone: (510) 769-0100

Turnaround Time: Fax:

Laboratory Number	Sample ID.	Sampling Date	Sampling Time	Matrix: Soil	Matrix: Water	Matrix: Waste	Matrix:	# of Containers	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: ICE	Preservative:	Field Notes	Analyses: TVH + BTXE by	Analyses: DTSC/LUFT + 8020
11557-1	Red-A1→4	7/10/93	1400	X				4							X	
-2	Red-B-1→4		1415	X				4							X	
-3	Red-C-1→4		1430	X				4							X	
-4	Red-D-1→4		1445	X				4							X	
-5	Red-E-1→4		1300	X				4							X	
-6	Red-F-1→4		1515	X				4							X	
-7	Red-G-1→4		1530	X				4							X	
-8	Red-H-1→4		1545	X				4							X	
-9	Red-I-1→4		1600	X				4							X	
-10	Red-J-1→4		1615	X				4							X	
-11	Red-K-1→4		1630	X				4							X	
-12	Red-L-1→4		1645	X				4							X	
								4								

NOTES:

RELINQUISHED BY:	RECEIVED BY:
Bruce Rucker 7/12/93 1545 DATE/TIME	DATE/TIME
DATE/TIME	DATE/TIME
DATE/TIME	7/12/93 1945 DATE/TIME

Signature on this form constitutes a firm purchase order for the services requested above.

APPENDIX F

PHOTODOCUMENTATION

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

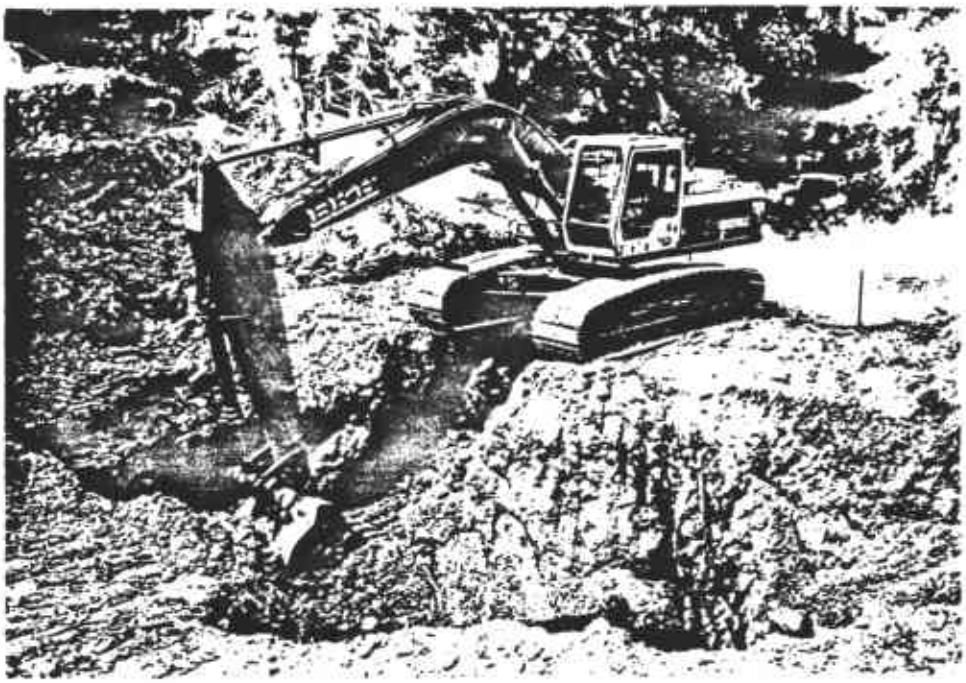
CLIENT East Bay Regional Parks District JOB NO. NC367.05 Sheet 1 of 6

DATE: *6/11/93*

TIME:

DESCRIPTION:

Excavation of contaminated soil on east side of excavation.



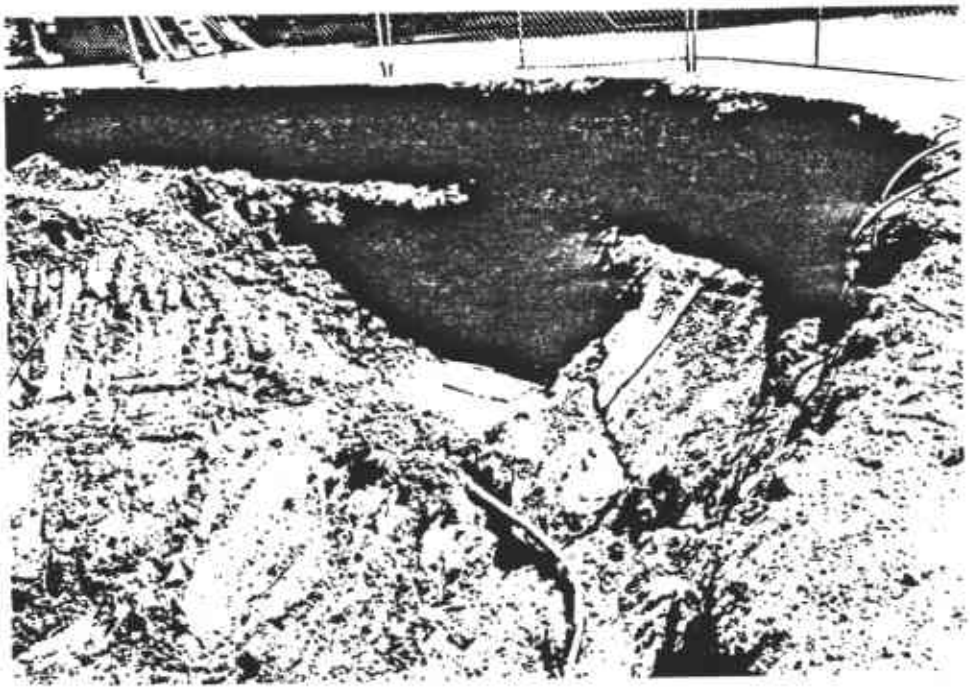
PHOTOGRAPHED BY: *HP*

DATE: *6/11/93*

TIME:

DESCRIPTION:

Spring in southeast area of excavation.



PHOTOGRAPHED BY: *HP*

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

CLIENT East Bay Regional Parks District JOB NO. NC367.05 Sheet 2 of 6

DATE: *6/14/93*

TIME:

DESCRIPTION:

Covered, stockpiled, contaminated soil.

PHOTOGRAPHED BY: *HP*

DATE: *6/11/93*

TIME:

DESCRIPTION:

Barricades around excavation during non-working hours.

PHOTOGRAPHED BY: *HP*

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

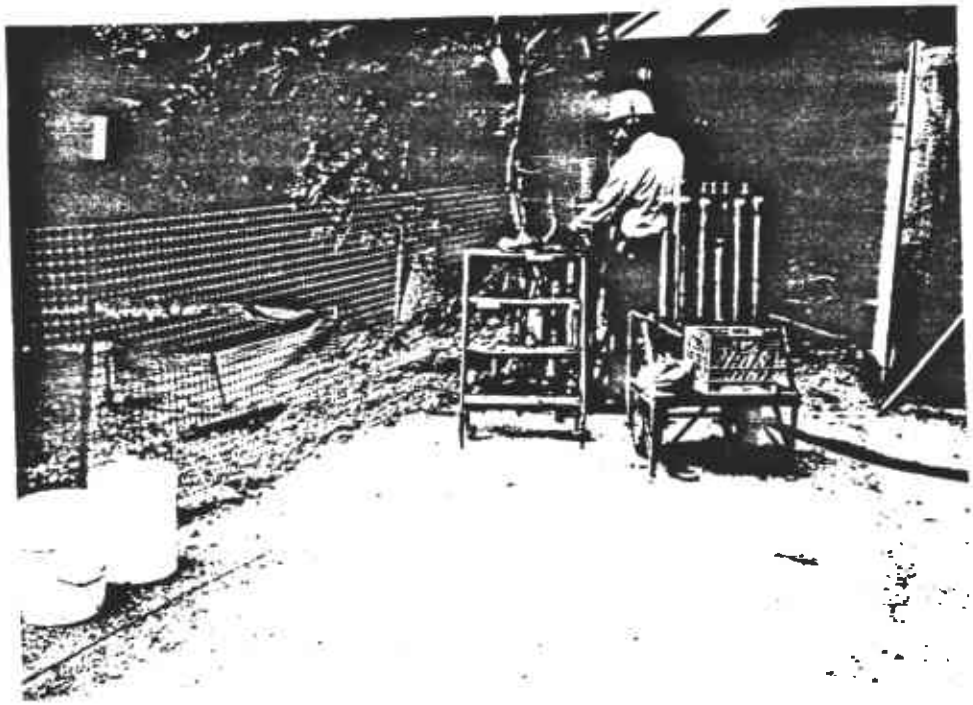
CLIENT East Bay Regional Parks District JOB NO. NC367.05 Sheet 3 of 6

DATE: *9/29/93*

TIME:

DESCRIPTION:

Advancing borehole B1.



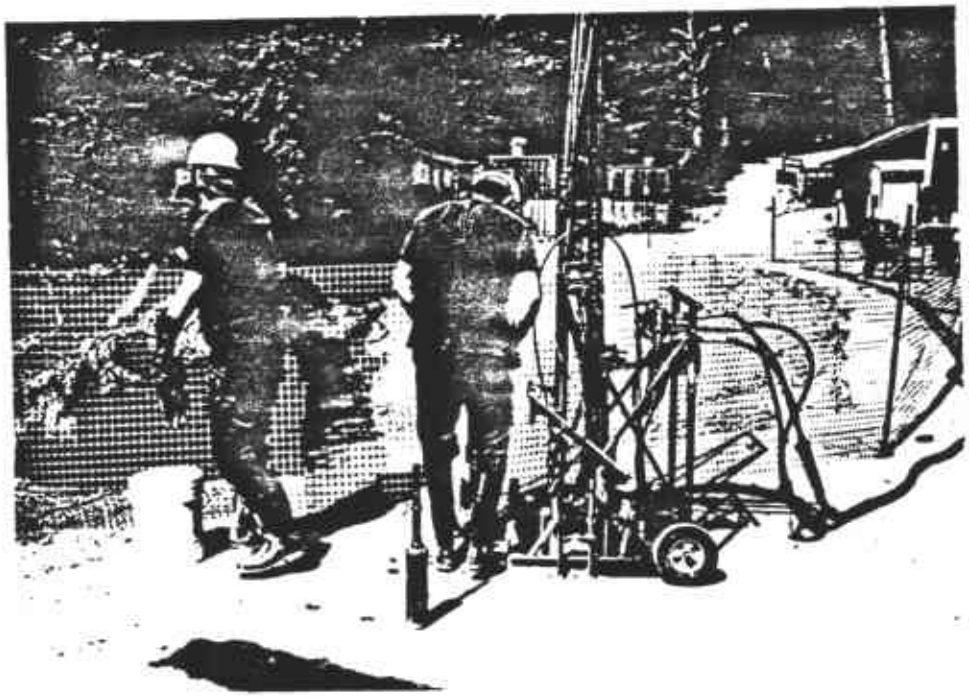
PHOTOGRAPHED BY: *HP*

DATE:

TIME:

DESCRIPTION:

Portable drive-samples at borehole B3.



PHOTOGRAPHED BY: *HP*

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

CLIENT East Bay Regional Parks District JOB NO. NC367.05 Sheet 4 of 6

DATE: *9/39/93*

TIME:

DESCRIPTION:

Advancing borehole B9.

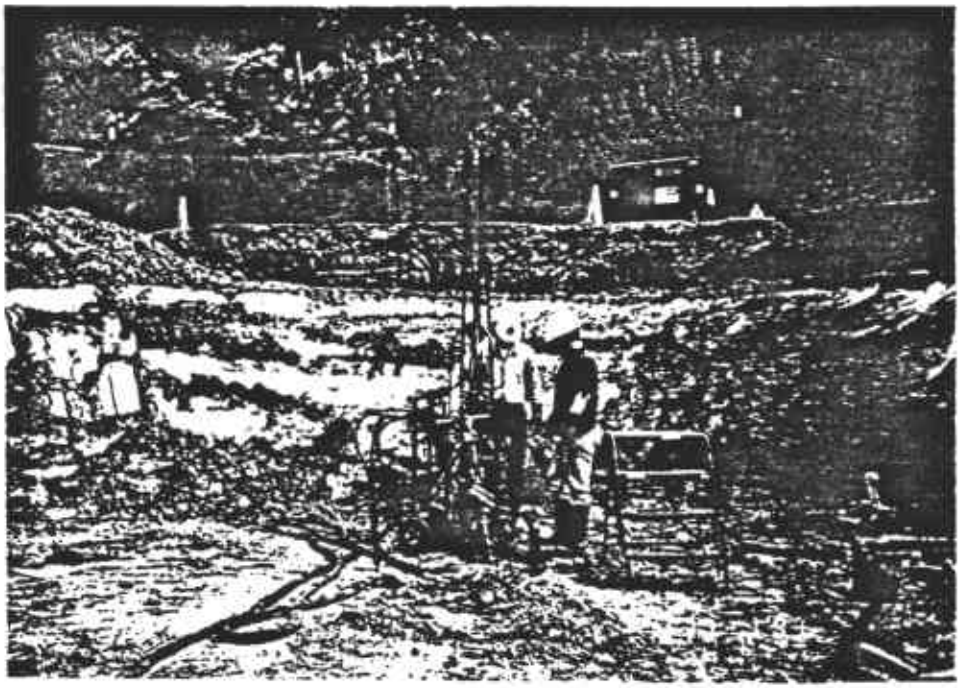
PHOTOGRAPHED BY: *HP*

DATE: *10/1/93*

TIME:

DESCRIPTION:

Advancing borehole B11 in excavation.



PHOTOGRAPHED BY: *HP*

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

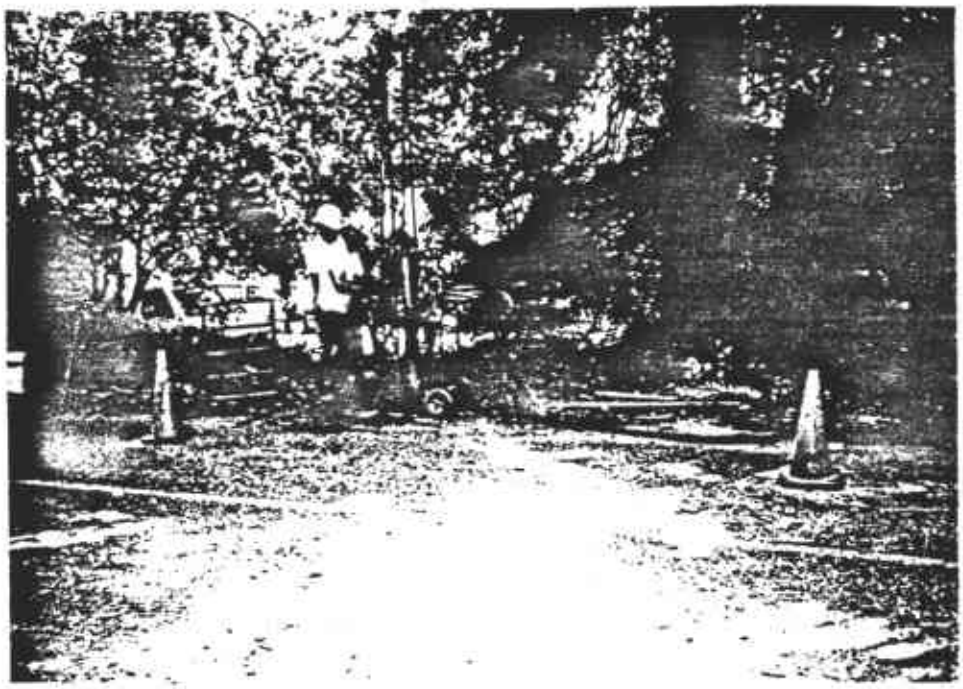
CLIENT East Bay Regional Parks District **JOB NO.** NC367.05 **Sheet 5 of 6**

DATE: *10/1/93*

TIME:

DESCRIPTION:

Advancing boring B12.



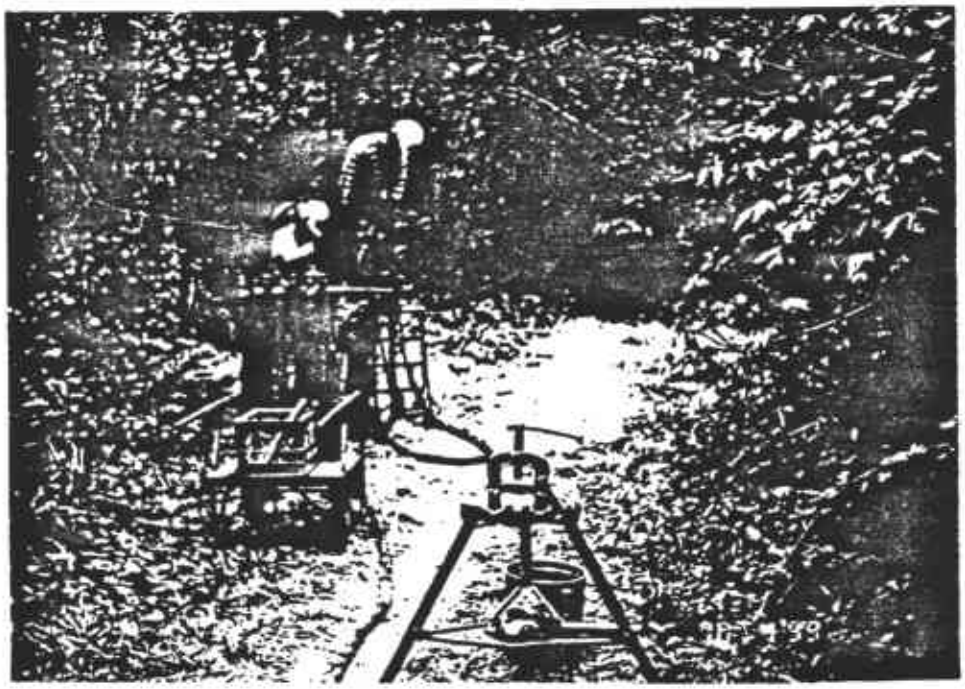
PHOTOGRAPHED BY: *HP*

DATE: *10/4/93*

TIME:

DESCRIPTION:

Advancing borehole B17 on west side of Redwood Creek.



PHOTOGRAPHED BY: *HP*

ENGINEERING-SCIENCE PHOTOGRAPHY LOG SHEET

CLIENT East Bay Regional Parks District JOB NO. NC367.05 Sheet 6 of 6

DATE: *10/4/93*

TIME:

DESCRIPTION:

Borehole B14 location.

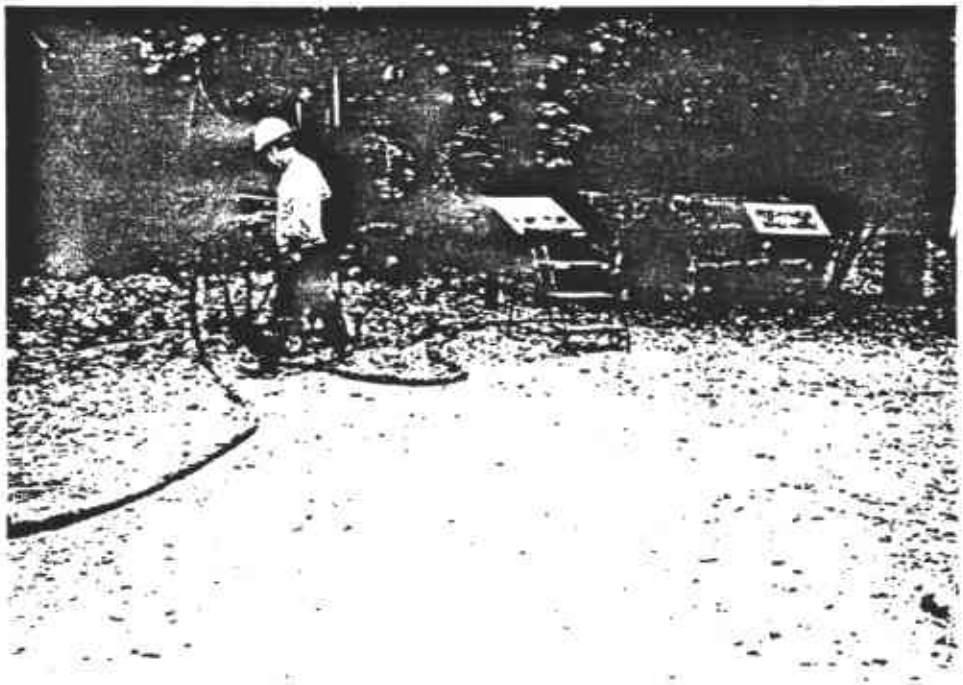
PHOTOGRAPHED BY: *HP*

DATE: *10/4/93*

TIME:

DESCRIPTION:

Advancing borehole B16.



PHOTOGRAPHED BY: *HP*

APPENDIX G

SAMPLING AND ANALYSIS OF STOCKPILED CONTAMINATED SOIL

ENGINEERING-SCIENCE, INC.

1301 MARINA VILLAGE PARKWAY
SUITE 200
ALAMEDA, CALIFORNIA 94501
TEL: (510) 769-0100
FAX: (510) 769-9244

6 August 1993
Ref: NC367.04

East Bay Regional Parks District
Parklands Design Department
P.O. Box 5381
Oakland, CA 94605

Attention: Mr. Warren Gee

Subject: Sampling of Contaminated Soil Stockpile,
Redwood Regional Park Site

Dear Mr. Gee:

INTRODUCTION

In accordance with your verbal request of 8 July 1993, Engineering-Science, Inc. (ES) conducted sampling and analysis of the contaminated soil stockpile at the Redwood Regional Park underground storage tank (UST) site. The scope of work for this task follows the ES proposal dated 9 July 1993, and was subsequently authorized by East Bay Regional Park District's (EBRPD) Purchase Order Number 31538 dated 12 July 1993 and ES's Change Order #3 dated 9 July 1993.

There are currently approximately 600 cubic yards of contaminated soil stockpiled behind Fire Station #2 on Redwood Road, which was generated during removal of a gasoline UST and subsequent excavation activities. This estimated volume is based on visual observation only.

Analytical results of excavation confirmation samples collected by ES indicate concentrations of up to 2,200 mg/Kg total volatile hydrocarbons (TVH) (gasoline range) and 434 mg/Kg aromatic hydrocarbons (including benzene, toluene, total xylenes and ethylbenzene, or BTXE). We further understand that Alameda County Health Care Services Agency - Division of Hazardous Materials (ACHCSA-DHM), the local implementing agency (LIA) for the investigation has indicated that aerated soil may be reused as on-site backfill once the soil TPH level is below 10 mg/kg. No residual contaminant levels for BTXE have been specified by ACHCSA-DHM.

In general, aeration of contaminated soil is regulated by the San Francisco Bay Area Air Quality Management District (BAAQMD) under Regulation 8 - Organic Compounds, Rule 40 - Aeration of Contaminated Soil and Removal of Underground Storage Tanks (adopted 16 July 1986). This regulation limits the emission of organic compounds from soil that has been contaminated by petroleum products, and specifies the procedures for sampling and analysis of contaminated soil stockpiles prior to aeration. The regulation also requires that all stockpiled, contaminated soil that is not currently aerating must be fully covered to minimize volatile emissions.

STOCKPILE SOIL SAMPLING

ES collected stockpile soil samples on 12 July 1993. Stockpile soil sampling was conducted in accordance with the BAAQMD Regulation 8 Rule 40 sampling protocol, which

requires one four-point composite soil sample per 50 cubic yards of stockpiled soil (total of 12 composite samples for the inferred 600 cubic yards at the site). The surface of the stockpile was subdivided into a grid consisting of 48 approximately 9-foot by 10-foot sectors. One discrete sample was collected from the center of each sector (total of 48 discrete samples). Figure 1 shows the stockpile sampling grid and sampling locations.

Soil samples were collected after removing at least the upper six inches of soil at each sector location. Stainless steel or brass sampling tubes (six-inches long and two-inches outside diameter) were then filled with soil, sealed with Teflon (tradename) tape and non-reactive plastic caps, labeled, refrigerated and transported under chain-of-custody to the analytical laboratory. Soil sampling protocols were documented in a bound field logbook, including a sketch map of the stockpile and soil sampling locations.

LABORATORY ANALYSES

Soil samples were analyzed by a laboratory that maintains current certification under the State of California Department of Toxic Substances Control (DTSC) Environmental Laboratory Accreditation Program (ELAP). The four discrete samples from each sector were composited into one sample (e.g. RED-A1-4). Each of the 12 composite samples were analyzed for the following:

- Total petroleum hydrocarbons as gasoline (TPH-g) by DTSC Leaking Underground Fuel Tank (LUFT) Manual method
- BTXE by EPA Method 8020

Table 1 summarizes the analytical results of the stockpile soil sampling. Certified analytical laboratory reports and chain-of-custody documentation are included as Attachment A.

The overall averages for all each of the analytes TPH-g, benzene, toluene, total xylenes and ethylbenzene were 22.25, 0.072, 0.086, 1.93 and 0.05 mg/kg, respectively (a sum total average of 24.39 mg/kg). Of the twelve composite soil samples, only one (RED-K1-4) contained TPH-g (detected at 180 mg/kg) in excess of 99 mg/kg which is the BAAQMD cut-off concentration for non-restriction of aeration of contaminated soil.

The analytical results indicate that the majority of the stockpiled soil (11 of the 12 composite soil samples) contained TPH-g + BTXE at concentrations less than the 50 mg/kg organic content limit for total exemption under Regulation 8 Rule 40. One soil sample (RED-K1-4) contained 198.01 mg/kg TPH-g + BTXE (Table 1).

On behalf of EBRPD, ES submitted to the BAAQMD a summary of stockpile soil sampling activities and analytical results (ES 1993). A BAAQMD compliance officer subsequently indicated to ES that he does not foresee a problem with initiating aeration of the entire stockpile in one day. However, this procedure is not in strict compliance with Regulation 8 Rule 40 as the 50 cubic yard portion of stockpiled soil represented by composite soil sample RED-K1-4 in excess of the "exempt" aeration limit of <50 mg/kg organic content (Gambardella 1993).

RECOMMENDATIONS

The following recommendations are based on the analytical data collected in the aforementioned program, and the requirements specified in the BAAQMD Regulation 8 Rule 40.

- Notification of proposed soil aeration should be made to BAAQMD a minimum of 24 hours prior to initiating aeration activites.
- The 50 cubic yards of stockpiled soil represented by composite soil sample RED-K1-4 should be aerated the first day, while the remaining stockpiled soil is covered. On the second day of aeration, the remaining stockpiled soil may be aerated.
- The aerating soil should be spread as thinly as space permits to minimize the duration of aeration. Tilling the soil may also minimize the duration of aeration.
- Confirmation soil samples of the aerated soil should be collected and analyzed at the conclusion of the aeration process to confirm that residual contamination levels are below the limits specified by ACHCSA-DHM for reuse as on-site backfill. ACHCSA-DHM should be consulted prior to stockpile confirmation sampling as to ACHCSA-DHM requirements regarding number of confirmation samples and sampling and analysis protocols/methodologies.
- All contaminated soil should be protected from precipitation to prevent desorption of contaminants and potential surface runoff.
- Due to the potential for respiratory exposure to documented volatile soil contaminants, ES recommends that air monitoring be conducted during aeration activities and that site workers wear appropriate respiratory protection.

We trust that this submittal meets your needs. Should you have questions or require additional information regarding this submittal, please call.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Bruce M. Rucker

Bruce M. Rucker
Project Manager

attachments

cc: N. Siler, ES

REFERENCES

ES 1993, Aeration of stockpiled contaminated soil at Redwood Regional Park Site, letter to BAAQMD, 3 August.

Gambardella, Tony, 1993, Compliance Officer - Bay Area Air Quality Management District, personal communication, 4 August.

TABLE 1
STOCKPILE SOIL PROFILE ANALYTICAL RESULTS
REDWOOD REGIONAL PARK SITE, OAKLAND, CALIFORNIA
(all concentrations reported in mg/kg)

Sample ID	Analyte					
	TPH–g	Benzene	Toluene	Xylenes	Ethylbenzene	Total Concentration
MRL	1.000	0.005	0.005	0.005	0.005	
RED–A1–4	17.000	0.005	0.013	0.810	0.010	17.838
RED–B1–4 *	7.000	0.400	0.400	3.900	0.400	12.100
RED–C1–4	1.000	0.005	0.005	0.005	0.005	1.020
RED–D1–4	1.000	0.005	0.005	0.005	0.005	1.020
RED–E1–4	1.000	0.005	0.005	0.005	0.005	0.204
RED–F1–4	1.000	0.005	0.005	0.005	0.005	1.020
RED–G1–4	14.000	0.005	0.005	0.400	0.005	14.415
RED–H1–4	36.000	0.018	0.098	1.000	0.015	37.131
RED–I1–4	1.000	0.005	0.005	0.006	0.005	1.021
RED–J1–4	7.000	0.005	0.017	0.034	0.005	7.061
RED–K1–4 *	180.000	0.400	0.470	17.000	0.140	198.010
RED–L1–4	1.000	0.005	0.005	0.005	0.005	1.020
Analyte Average	22.250	0.072	0.086	1.931	0.050	24.390

"acrate.wk1"

Notes:

MRL = Method Reporting Limit

TPH–g = Total petroleum hydrocarbons as gasoline

Calculations include a concentration equal to the method detection limit, when the analyte was not detected

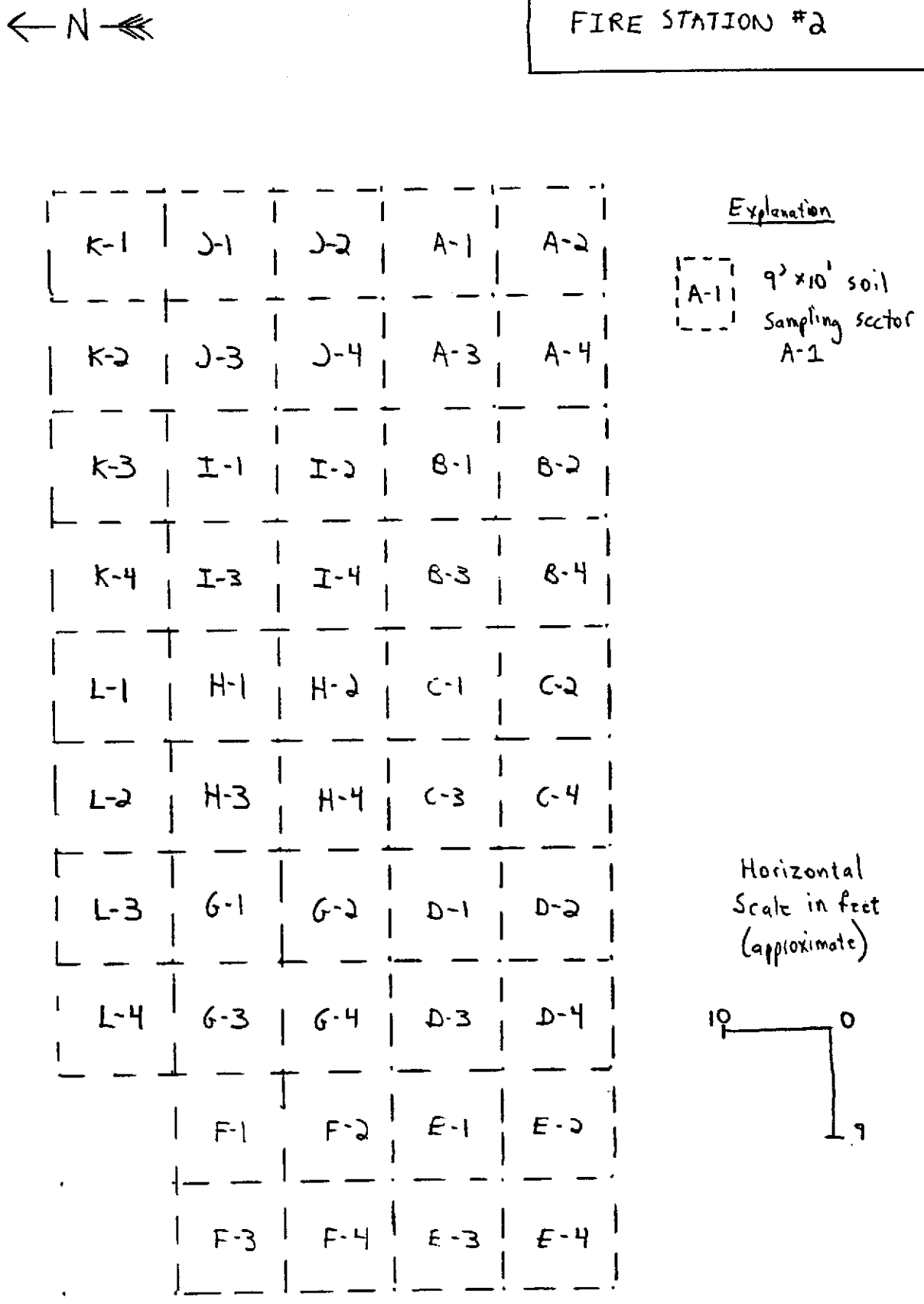
* MRL for benzene, toluene, xylenes and ethylbenzene was 0.4 due to required dilution

ES ENGINEERING-SCIENCE, INC.

Figure 1

Client East Bay Regional Parks District | Job No. NC367.04 | Sheet 1 of 1

Subject Redwood Regional Park UST Site - Contaminated Soil Stockpile Sampling | By Bruce Rucker | Date 7/13/93 | Checked | Rev. Ø



ATTACHMENT A

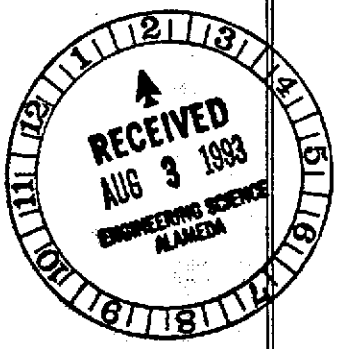
ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

ANALYTICAL REPORT

Prepared for:

Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501



Date: 30-JUL-93
Lab Job Number: 111557
Project ID: NC367.04
Location: EBRPD/Redwood

Reviewed by:

Reviewed by:

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Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/25/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-1	RED-A1-4	17	ND(5)	13*	10	810
111557-4	RED-D1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-5	RED-E1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-6	RED-F1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-7	RED-G1-4	14	ND(5)	ND(5)	ND(5)	400
111557-8	RED-H1-4	36	18*	98	15*	1,000
111557-9	RED-I1-4	1	ND(5)	ND(5)	ND(5)	6
111557-10	RED-J1-4	7	ND(5)	17*	ND(5)	340

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

LCS RECOVERY, %	98

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/26/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-3	RED-C1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
111557-12	RED-L1-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	95

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 111557
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: NC367.04
LOCATION: EBRPD\REDWOOD

DATE SAMPLED: 07/12/93
DATE RECEIVED: 07/12/93
DATE ANALYZED: 07/26/93
DATE REPORTED: 07/30/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
111557-2	RED-B1-4	75	ND(400)	ND(400)	ND(400)	3,900
111557-2**	RED-B1-4	77	ND(30)	220*	130	3,000
111557-11	RED-K1-4	180	ND(400)	470	140	17,000

**Analyzed on 07/29/93

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	2
RECOVERY, %	96

CHAIN OF CUSTODY FORM

Curtis & Tompkins, Ltd.
2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900 Phone
(510) 486-0532 Fax

Sampler: Bruce Rucker

Report to:

Company: Engineering-Science Inc.

Telephone: (510) 769-0100

Fax:

Project No: NC3867.04

Project Name: EBRPD\Redwood

Turnaround Time:

Laboratory Number	Sample ID.	Sampling Date	Sampling Time	Matrix: Soil	Matrix: Water	Matrix: Waste	Matrix:	# of Containers	Preservative: HCL	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: ICE	Preservative:	Field Notes	Analyses: TVH + BTXE by	Analyses: DTSC LUFT + 8020	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:
11572-1	Red-A 1→4	7/12/93	1400	X				4							X	X								
-2	Red-B-1→4		1415	X				4							X	X								
-3	Red-C-1→4		1430	X				4							X	X								
-4	Red-D-1→4		1445	X				4							X	X								
-5	Red-E-1→4		1500	X				4							X	X								
-6	Red-F-1→4		1515	X				4							X	X								
-7	Red-G-1→4		1530	X				4							X	X								
-8	Red-H-1→4		1545	X				4							X	X								
-9	Red-I-1→4		1600	X				4							X	X								
-10	Red-J-1→4		1615	X				4							X	X								
-11	Red-K-1→4		1630	X				4							X	X								
-12	Red-L-1→4		1645	X				4							X	X								
								4																

NOTES:

RELINQUISHED BY:	RECEIVED BY:
7/12/93 1545 DATE/TIME	DATE/TIME
DATE/TIME	DATE/TIME
DATE/TIME	7/12/93 1745 DATE/TIME

Signature on this form constitutes a firm purchase order for the services requested above.

APPENDIX H

EXPLORATORY BOREHOLE GEOLOGIC LOGS AND GROUNDWATER SAMPLING FIELD NOTES

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B1

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 1	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/29/93	TOTAL DEPTH: 28 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML			4" asphalt Medium brown clayey silt, dry, slightly plastic
		2.2	1		5		as above w/ yellow patches of silt (≤ 2")
B1-11	100	3.1	1	CL	10	■	Red brown silty clay, damp, plastic rust-red patches of silt (½"), common black inclusions
		1	1		15		Red brown clay, damp to moist, plastic, moderately stiff, black patches (½-1") abundant
				CL			common patches of blue-green discoloration
		0	0		20		as above w/ brown green color
					25		as above
B1-27	100	2	6			■	Green brown silty clay, damp, stiff rare gravel (½-1")
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B2

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 2	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/29/93	TOTAL DEPTH: 19 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML			4" asphalt, fuel odor medium brown clayey silt, damp slight plastic, yellow-red patches of silt moderately stiff
		5.2	0	CL	5		Dark green blue brown silty clay soft, moist, fuel odor, interbedded fine sand to silt (≤ 1/16)
B2-11	100	7	0		10	■	as above, moist to wet — very hard zone as above, blue gray
B2-15	100	9.6	0		15 ▽	■	as above, wet
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B3

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 3	DRILLING METHOD: Hydraulic hammer
	w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/29/93	TOTAL DEPTH: 20.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML			Asphalt yellow brown clayey silt, damp slight plastic, stiff, white silt patches
		0	4	CL	5		Dark green brown silty clay, damp, slight plastic, soft
				ML	10		yellow brown clayey silt, white patches
B3-12	100	0	7				as above
				CL	15		
B3-18	100	2.4	15				gray silty clay, stiff, angular gravel slight plastic, moist
					20		Brown and black laminated Siltstone, friable
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B4

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 4	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/29/93	TOTAL DEPTH: 23 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FIDVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
		2	6	ML	5		2" asphalt Medium brown clayey silt, damp, stiff, slight plastic — yellow brown clayey silt stiff, friable decomposing siltstone
		2.7	6	CL	10		Yellow brown silty clay, damp slight plastic, mod. stiff, red patches — gradational color change to black organic smell (sewer)
B4-18	100	7.8	32		15		as above — gradational color change to medium dark brown, red, yellow, blue gray patches
B4-23	100	—	7	ML	20		Yellow clayey silt — siltstone, dense friable
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B5

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 5	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 20 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML	0		4" asphalt, fuel odor Brown clayey silt w/ yellow patches damp, slight plastic, med dense
		2	6	CL	5		Brown clay to silty clay, damp soft, common black inclusions (1/8-1/4") blue green discoloration
B5-11	100	2	6		10	■	
		0.1	1	ML	15		blue green clayey silt with interbedded silt, wet
		0	0		20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B6

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 6	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 9 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML	0 ▼		Asphalt yellow brown clayey silt
		1.3	2		5		Discolored blue green clayey silt soft damp as above, wet
					10		
					15		
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B7

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 7	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 14.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML			Asphalt Brown clayey silt
					5		Brown silty clay, soft, damp, plastic -discolored blue-green
		1.2	1				as above
				CL			
		2	6		10		as above
B7-12	100	2	12				
					15		Hard siltstone to fine sandstone
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B8

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 14.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THNA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
B8-4	100	0.2	6	CL	5	■	Asphalt Yellow brown silty clay, damp, soft slight plastic as above w/ patchs of blue discoloration
				ML			Blue grey clayey silt
B8-10	100	2.3	35		10	■	Siltstone, hard dense Blue grey siltstone, laminations
					▼ 12		
					▽ 13		
					15		
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B9

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 9	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: H	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 28 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML	5		2" asphalt Dark brown clayey silt w/ red patches, damp, soft, slight plastic
		32	16				Dark brown silty clay, [redacted]
B9-11	100	108	122	CL	10	■	as above, [redacted]
		101	110		15		as above, [redacted]
B9-21	80	74	46		20 ▽	■	as above, [redacted], wet — possible groundwater level
				ML	25		green yellow clayey silt to silt damp to moist, [redacted], stiff, gravel (≤ 1") interbedded clay layer; wet
B9-28	50	37	22		▽	■	possible groundwater level
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B10

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 10	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 9/30/93	TOTAL DEPTH: 26 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
					0		3" asphalt, wet ground
							Brown silty clay
B10-6	100	3	5	CL	5	■	Dark brown grey clay
		1.2	2		10		as above
		0.9	0		15		
				CL			Dark brown clay with yellow patches (marbled) 50% discolored blue green
B10-21	100	1	18		20	■	
				CL			Dark brown clay, patches of discoloration
		0	0		25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B11

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 11	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: H	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/1/93	TOTAL DEPTH: 13.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
		1.8	0	CL	5		light yellow brown silty clay
							Base of excavation Fill
				CL	10		Dark brown silty clay, moist plastic, common blue-gray patches
B11-11.5	100	1.6	0			■	
					15		
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER B12

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 12	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/1/93	TOTAL DEPTH: 21 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THNA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
		0.3	0	ML	5		light brown clayey silt, dry to damp, loose, organics (roots)
		3.8	12		10		as above
B12-14.5	100	56	68	CL	15		medium brown silty clay damp, slightly plastic, soft fuel odor
B12-15	100						
B12-21	100	117	110		20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B13

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 13	DRILLING METHOD: Hydraulic hammer w/ Split-Spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/1/93	TOTAL DEPTH: 19.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FIHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
							Loose top soil w/ organics
							Medium brown clayey silt dry, loose, organics
		1.8	0	ML	5		as above
					10		
		988	1600				Blue green discolored clayey silt to silty clay, plastic, soft, damp, fuel odor
B13-12	100			ML/CL			
B13-15	100	1269	2200		15		
		1620	915		20		Siltstone
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B14

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 14	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/4/93	TOTAL DEPTH: 21 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML	5		light brown clayey silt, dry
		0.2	1				as above
							Red brown silty clay, yellow patches slight plastic, soft, damp
		0.2	6	CL	10		
					15		Brown silty clay w/ blue-green discoloration [illegible]
B14-18	100	43	24		20		Reddish-yellow siltstone w/ green patches, hard, dense
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B15

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 15	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/4/93	TOTAL DEPTH: 19 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
		0.2	0	ML	5		light brown clayey silt, dry
		10	3.8	CL	10		Medium brown silty clay w/ patches of silt, moderately stiff, plastic damp
					15		blue-green discoloration [illegible]
B15-17	100	1152	2000		▽	■	yellow siltstone, dense, hard, wet patches
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: [redacted]

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 16	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/4/93	TOTAL DEPTH: 20.5 feet

SAMPLE NUMBER	R (%)	PID (ppm)	THVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
				ML			Light brown clayey, silt, dry
		0.3	0		5		Red brown silty clay to clayey silt, damp, slight plastic
		13	8	CL/ML	10		as above
				ML	15		yellow siltstone decomposing to clayey silt, common gravel, damp [redacted]
B16-17.5	100	47	35	CL			green brown clay, soft, wet plastic
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

▮ - Brass tube sample submitted for laboratory analysis

jm2

ES ENGINEERING-SCIENCE

SITE I.D. NO.

BOREHOLE NUMBER: B17

PROJECT NUMBER: NC367	PROJECT NAME: RRPCY
CLIENT: EBRPD	DRILLER: Powercore Inc.
LOCATION: Boring 17	DRILLING METHOD: Hydraulic hammer w/ Split-spoon sampler
GEOLOGIST: HP	HOLE DIAMETER: 2-inch
COMPLETION DATE: 10/4/93	TOTAL DEPTH: 15 feet

SAMPLE NUMBER	R (%)	PID (ppm)	FIHVA (ppm)	SOIL CLASS	DEPTH feet	SAMPLE LOCATION	GEOLOGIC DESCRIPTION
		0.2	0	ML	5		light brown clayey silt, dry hard, organics
		0.3	0	CL	10		medium brown silty clay, moist moderately stiff, plastic
B17-12.5	100	0.3	0		▽	■	gravelly silty clay zone
					15		yellow siltstone, hard, medium dense, red, gray and yellow patches
					20		
					25		
					30		

▼ - Equilibrated waterlevel.

▽ - First encountered groundwater.

■ - Brass tube sample submitted for laboratory analysis

jm2

"GRAB" GROUNDWATER SAMPLING FIELD NOTES

ENGINEERING–SCIENCE, INCORPORATED

Project/Location: *East Bay Regional Parks/Redwood Regional Park Corp. Yard* *Personnel:* *H. Pietropaoli*

Project No.: *NC367* *Date:* *01, 04 October 1993*

Bore ID	Date Time	Bore Dia. (in) / Depth (feet bgs)	Initial Water Level* (feet bgs)	Sample Water Level** (feet bgs)	Well Purging Method	Temp. (°C)	Specific Conductance (µmhos/cm)	pH	Total Water Purged (gals)	Sample Collection Method	Analysis	No. & Type of Containers	Comments
B11	10/01/93 1500	1 / 12	3.72	4.68	Bailer	19 19	700 700	6.58 7.25	0.5	Bailer	TPH–g TPH–d BTEX	1–0.5l amber 2–40ml VOAs	Turbid. Bailed dry @1240 Casing w/7' screen
Rinsate Blank	10/01/93 1515	NA	NA	NA	(Rinsed Bailer)	NA	NA	NA	NA	(Rinsed Bailer)	TPH–g BTEX	2–40ml VOAs	Used bailer rinsate collected
Trip Blank	10/01/93 NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	TPH–g BTEX	2–40ml VOAs	Prepared by laboratory
B10	10/04/93 1230	1 / 16.5***	8.36	Dry	Bailer	15	600	7.38	1.5	Bailer	TPH–g TPH–d BTEX	1–0.5l amber 2–40ml VOAs	Turbid. Bailed dry @1105 Casing w/5' screen
B14	10/04/93 1545	1 / 21	14.56	17.82	Bailer	16 16	700 700	7.30 7.28	1	Bailer	TPH–g TPH–d BTEX	1–0.5l amber 2–40ml VOAs	Turbid. Bailed dry @1515 Casing w/5' screen
B15	10/04/93 1600	1 / 19	13.21	9.61	Bailer	16 16	700 700	7.01 7.08	2	Bailer	TPH–g TPH–d BTEX	1–0.5l amber 2–40ml VOAs	Fuel odor, sheen. Bailed dry @1540 Casing w/5' screen
B13	10/04/93 1640	1 / 19.5	16.26	12.28	Bailer	15 15 15	800 800 800	6.88 7.39 7.28	0 1 2	Bailer	TPH–g TPH–d BTEX	1–0.5l amber 2–40ml VOAs	Heavy fuel odor, sheen. 0.25" floating product
Rinsate Blank	10/04/93 1700	NA	NA	NA	(Rinsed Bailer)	NA	NA	NA	NA	(Rinsed Bailer)	TPH–g BTEX	2–40ml VOAs	Used bailer rinsate collected
Trip Blank	10/04/93 NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	TPH–g BTEX	2–40ml VOAs	Prepared by laboratory

Notes:

NA: Not Applicable
*: Groundwater level before purging
**: Groundwater level after purging
***: Borehole had partially collapsed at time of groundwater sampling.

TPH–g: Total Petroleum Hydrocarbons as gasoline
TPH–d: Total Petroleum Hydrocarbons as diesel
BTEX: Benzene, toluene, ethylbenzene, xylenes

APPENDIX I

EXPLORATORY BOREHOLE SOIL AND WATER SAMPLE ANALYTICAL LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

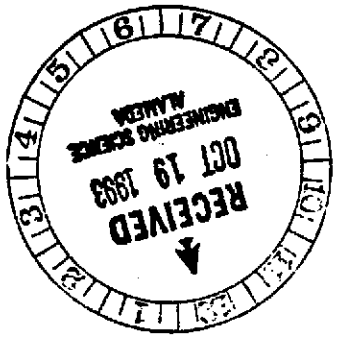
Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

ANALYTICAL REPORT

Prepared for:

Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501

Date: 15-OCT-93
Lab Job Number: 112570
Project ID: NC367
Location: EBRPD Redwood Corp. Yard



Reviewed by: _____

Reviewed by: _____

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Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 09/30-10/01/93
DATE RECEIVED: 10/01/93
DATE EXTRACTED: 10/12/93
DATE ANALYZED: 10/13/93
DATE REPORTED: 10/15/93

Extractable Petroleum Hydrocarbons in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	SAMPLE ID	KEROSENE RANGE (mg/Kg)	DIESEL RANGE (mg/Kg)	REPORTING LIMIT* (mg/Kg)
112570-17	B10-21	ND	7	2
112570-18	B11-11.5	ND	ND	2
112570-23	B13-15	420	***	10

*** Diesel range not reported due to overlap of hydrocarbon ranges.

ND = Not detected at or above reporting limit.

* Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD,%	7
RECOVERY, %	63

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWEED CORP. YARD

DATE SAMPLED: 10/01/93
DATE RECEIVED: 10/01/93
DATE EXTRACTED: 10/11/92
DATE ANALYZED: 10/11/93
DATE REPORTED: 10/15/93

Extractable Petroleum Hydrocarbons in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	REPORTING LIMIT* (ug/L)
112570-24	B11-GW	1,300	***	50

*** Diesel range not reported due to overlap of hydrocarbon ranges.

ND = Not detected at or above reporting limit.

* Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD, %	10
RECOVERY, %	93

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 09/29/93
DATE RECEIVED: 10/01/93
DATE ANALYZED: 10/06/93
DATE REPORTED: 10/15/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
112570-01	B1-11	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-02	B1-27	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-04	B2-15	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-05	B3-12	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-07	B4-18	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-08	B4-23	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	96

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 09/29,30/93
DATE RECEIVED: 10/01/93
DATE ANALYZED: 10/07,08/93
DATE REPORTED: 10/15/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
112570-03	B2-11	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-06	B3-18	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-09	B5-11	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-11	B8-4	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-14	B9-21	ND(1)	100	11	17	69
112570-17	B10-21	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RECOVERY, %	96

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 10/01/93
DATE RECEIVED: 09/30-10/01/93
DATE ANALYZED: 10/11/93
DATE REPORTED: 10/15/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
112570-10	B7-12	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-12	B8-10	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-15	B9-28	ND(1)	ND(5)	33*	35	140
112570-16	B10-6	ND(1)	ND(5)	ND(5)	ND(5)	ND(5)
112570-18	B11-11.5	ND(1)	21	ND(5)	ND(5)	ND(5)

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RECOVERY, %	72

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 09/30-10/01/93
DATE RECEIVED: 10/01/93
DATE ANALYZED: 10/13,14/93
DATE REPORTED: 10/15/93
DATE REVISED: 10/29/93

Total Volatile Hydrocarbons with BTXE in Soils & Wastes
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
112570-13	B9-11	370	1,700	7,900	6,900	34,000
112570-19	B12-14.5	150	240	440*	1,700	4,600
112570-20	B12-15	77	150*	240*	900	2,700*
112570-21	B12-21	97	460	1,200	2,000	5,400
112570-22	B13-12	1,500	ND(400)	ND(400)	13,000	78,000
112570-23	B13-15	1,800	8,800	39,000	30,000	120,000

* Presence of this compound confirmed by second column; however, the confirmation concentration differed from the reported result by more than a factor of two.

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

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QA/QC SUMMARY

RPD, %	1
RECOVERY, %	86

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112570
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC367
LOCATION: EBRPD REDWOOD CORP. YARD

DATE SAMPLED: 10/01/93
DATE RECEIVED: 10/01/93
DATE ANALYZED: 10/07/93
DATE REPORTED: 10/15/93

Total Volatile Hydrocarbons with BTXE in Aqueous Solutions
TVH by California DOHS Method/LUFT Manual October 1989
BTXE by EPA 5030/8020

LAB ID	SAMPLE ID	TVH AS GASOLINE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)
112570-24	B11-GW	1,400	16	42	33	170
112570-25	RINSATE	ND(50)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not detected at or above reporting limit; Reporting limit indicated in parentheses.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	98

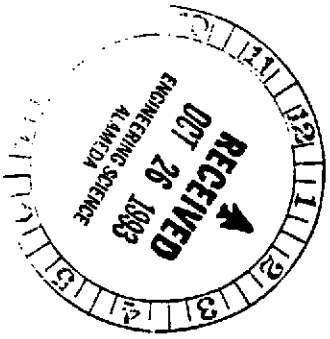
Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501

Date: 22-OCT-93
Lab Job Number: 112598
Project ID: NC367
Location: EBRPD Redwood Corp. Yard



Reviewed by: Teresa K. Morrison

Reviewed by:

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Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/15/93
DATE REPORTED: 10/20/93

Total Volatile Hydrocarbons as Gasoline in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	REPORTING LIMIT (mg/Kg)
112598-002	B15-17	1,900	500

ND = Not detected at or above reporting limit.

QA/QC SUMMARY: LABORATORY CHECK SAMPLE

RECOVERY, %	91

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/14/93
DATE REPORTED: 10/20/93

Total Volatile Hydrocarbons as Gasoline in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	REPORTING LIMIT (mg/Kg)
112598-004	B16-17.5	50	10
112598-005	B17-12.5	ND	1

ND = Not detected at or above reporting limit.

QA/QC SUMMARY: MS/MSD

RPD, %	2
RECOVERY, %	87

Spiked sample: 112631-005

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/13/93
DATE REPORTED: 10/20/93

Total Volatile Hydrocarbons as Gasoline in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	REPORTING LIMIT (mg/Kg)
112598-001	B14-18	210	30

ND = Not detected at or above reporting limit.

QA/QC SUMMARY: LABORATORY CHECK SAMPLE

RECOVERY, %	91

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/12,13/93
DATE REPORTED: 10/20/93

Total Volatile Hydrocarbons as Gasoline in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (ug/L)	REPORTING LIMIT (ug/L)
112598-003	B10-GW	ND	50
112598-006	B14-GW	19,000	500
112598-007	B15-GW	16,000	500
112598-008	RINSATE	ND	50
112598-010	B13-GW	810,000	5,000

ND = Not detected at or above reporting limit.

QA/QC SUMMARY: MS/MSD

RPD, %	8
RECOVERY, %	108

Spiked sample: 112637-001

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORPYARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE EXTRACTED: 10/11/93
DATE ANALYZED: 10/12,13/93
DATE REPORTED: 10/20/93

Extractable Petroleum Hydrocarbons in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	SAMPLE ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	REPORTING LIMIT (ug/L)	SURROGATE RECOVERY (Hexacosane)
112598-003	B10-GW	**	570	50	5 % (s)
112598-006	B14-GW	4,500	++	50	110 %
112598-007	B15-GW	99,000	++	500	D
112598-010	B13-GW	2,300,000	++	20,000	D

Surrogate recovery limits: 75% - 125%

** Quantitated as diesel due to overlap of hydrocarbon ranges.
++ Quantitated as kerosene due to overlap of hydrocarbon ranges. Lighter hydrocarbons are contributing to the quantitation of the kerosene range.

(s) - Surrogate recovery is low; diesel value should be considered a minimum value.
D - surrogate has been diluted out.

QA/QC SUMMARY: BS/BSD

RPD,%	10
RECOVERY,%	93

Curtis & Tompkins, Ltd.

October 22, 1992

Bruce Rucker
Engineering Science
1301 Marina Village Parkway
Suite 200
Alameda, CA 94501

Re: C&T # 112598 - EBRPD TPH/D analysis

Dear Mr. Rucker;

Curtis & Tompkins, Ltd. received samples for the above referenced project on October 4, for a variety of analyses.

The surrogate recoveries for the extractable hydrocarbon analyses were low for the samples and QC on the original extraction batch. The recoveries of the spiked compounds were also outside of contol limits for the blank spike and blank spike duplicate. These samples were re-extracted past the holding time and analyzed for comparison with the initial results. All QC for the second batch was within control limits, and the sample results were comparable to the first analysis of these samples. We have reported the original results which were obtained within the holding time and have presented both the original and the confirming data below.

C&T ID	ES ID	Original Results	Reanalysis
112598-001	B14-18	50 mg/kg kerosene	20 mg/kg kerosene
112598-002	B15-17	1,300 mg/kg kerosene	550 mg/kg kerosene

If you have any questions concerning this data, please call me at 510-486-0900.

Sincerely,

Teresa K. Morrison

Teresa K. Morrison
Project Manager

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE EXTRACTED: 10/15/93
DATE ANALYZED: 10/18/93
DATE REPORTED: 10/22/93

Extractable Petroleum Hydrocarbons in Soils & Wastes
California DOHS Method
LUFT Manual October 1989

LAB ID	SAMPLE ID	KEROSENE RANGE (mg/Kg)	DIESEL RANGE (mg/Kg)	REPORTING LIMIT* (mg/Kg)
112598-001	B14-18	50 +	**	10
112598-002	B15-17	1,300 +	**	10

* Reporting limit applies to all analytes.
** Quantitated as kerosene due to overlap of hydrocarbon ranges.
+ Lighter hydrocarbons (gasoline range) are contributing to the quantitation of the kerosene range.

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/13/93
DATE REPORTED: 10/25/93

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	SAMPLE ID	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)	REPORTING LIMIT (ug/Kg)
112598-001	B14-18	170*	100*	340*	630*	30
112598-002	B15-17	1,100*	800*	9,100	14,000*	100

ND = Not detected at or above reporting limit.
Reporting Limit applies to all analytes.

* Second column confirmation concentration differed from the reported result by more than a factor of two.

QA/QC SUMMARY: LABORATORY CHECK SAMPLE

RECOVERY, %	91

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/14/93
DATE REPORTED: 10/25/93

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	SAMPLE ID	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)	REPORTING LIMIT (ug/Kg)
112598-004	B16-17.5	ND	ND	200*	200*	100
112598-005	B17-12.5	ND	ND	ND	ND	5

ND = Not detected at or above reporting limit.
Reporting Limit applies to all analytes.

* Second column confirmation concentration differed from the reported result by more than a factor of two.

QA/QC SUMMARY

RPD, %	5
RECOVERY, %	94

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 112598
CLIENT: ENGINEERING SCIENCE
PROJECT ID: NC 367
LOCATION: EBRPD REDWOOD CORP YARD

DATE SAMPLED: 10/04/93
DATE RECEIVED: 10/04/93
DATE ANALYZED: 10/12,13/93
DATE REPORTED: 10/25/93

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)	REPORTING LIMIT (ug/L)
112598-003	B10-GW	ND	ND	ND	ND	1
112598-006	B14-GW	30*	ND	350	850	10
112598-007	B15-GW	20*	ND	330*	810*	10
112598-008	RINSATE	ND	ND	ND	ND	1
112598-010	B13-GW	12,000	18,000	22,000*	73,000*	200

ND = Not detected at or above reporting limit.
Reporting Limit applies to all analytes.

* Second column confirmation concentration differed from the reported result by more than a factor of two.

QA/QC SUMMARY

RPD, %	<1
RECOVERY, %	108

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

LAB:

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	B. Rucker	NC367

PROJECT NAME / LOCATION: East Bay Regional Park District Redwood Corp. Yard

SAMPLER(S): (SIGNATURE) Jerry Pietrzyk

	SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH-gas w/BTEX	TPH-diesel	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
1	B1-11	9/29/93	0857	Soil	11 feet below ground surface	1	✓				5-day	
2	B1-27	"	0953		27 feet below ground surface	1	✓					
3	B2-11	"	1053		11 "	1	✓					
4	B2-15	"	1108		15 "	1	✓					
5	B3-12	"	1310		12 "	1	✓					
6	B3-18	"	1356		18 "	1	✓					
7	B4-18	"	1518		18 "	1	✓					
8	B4-23	9/29/93	1525		23 "	1	✓					
9	B5-11	9/30/93	0827		11 "	1	✓					
10	B7-12	"	0950		12 "	1	✓					
11	B8-4	"	1056		4 "	1	✓					
12	B8-10	"	1130		10 "	1	✓					
13	B9-11	"	1356		11 "	1	✓					
14	B9-21	"	1422		21 "	1	✓					
15	B9-28	"	1451	Soil	28 "	1	✓					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Jerry Pietrzyk	10/1/93 1755	Kathy Ox			
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
				Call Bruce Rucker for Project Billing No.	

ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

LAB: Curtis & Tompkins

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	B. Rucker	NC367

PROJECT NAME / LOCATION: East Bay Regional Park Districts, Redwood Corp Yard

SAMPLER(S): (SIGNATURE) Henry Pietropaoli

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	TPH-gas w/ BTEX	TPH-diesel					PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
						ANALYSES REQUIRED									
B10-6	9/30/93	1610	Soil	6 feet below ground surface	1	✓								5 day	
B10-21	"	1645	"	21 "	1	✓	✓								X
B11-11.5	10/1/93	1356	"	11.5 "	1	✓	✓								TEH added 10-4
B12-14.5	"	1050	"	14.5 "	1	✓									
B12-15	"	1055	"	15 "	1	✓									
B12-21	"	1125	"	21 "	1	✓									
B13-12	"	1320	"	12 "	1	✓									
B13-15	"	1334	"	15 "	1	✓	✓								X
B11-GW	"	1500	Water	groundwater	3	✓	✓								2-40 ml VOA 1-500ml Amber
Rinsate	10/1/93	1515	"	01 rinse	2	✓									
Trip Blank	Lab Date	Lab Prep.	"	prepared by curtis + Tompkins	2	✓								↓	Hold unless rinsate is detectable

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Henry Pietropaoli	10/1/93 1758	Kelly Ob			
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				Call Bruce Rucker for project Billing No.	

ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ES ENGINEERING-SCIENCE

LETTER OF TRANSMITTAL

ALCO
HAZMAT
93 DEC 28 PM 2:13

DATE	12/22/93	JOB NO.	NC367
ATTENTION	Ms. Juliet Shin		
RE:			

TO Alameda County Health Care Services Agency
Hazardous Materials Division
80 Swan Way Room 200
Oakland CA 94621

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____
Dated _____

COPIES	DATE	NO.	DESCRIPTION
1	12/16/93		Closure of Underground Fuel Storage Tanks and Initial Site Characterization at Redwood Regional Park Service Yard, Oakland, CA

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ For checking ☐ Resubmit ____ copies for approval
☒ For your use ☐ Approved as submitted ☐ Design only, not for construction
☐ As requested ☐ Approved as noted ☐ Return ____ corrected prints
☐ For review and comment ☐ Returned for corrections ☐ _____
☐ For Your Action

REMARKS: _____

COPY TO _____

SIGNED: Bruce M. Rucker

If enclosures are not as noted, please notify us at once. Bruce M. Rucker, Proj. Mgr.

Curtis & Tompkins, Ltd.

VERBAL ADDITIONS/CANCELLATIONS TO ANALYSIS REQUEST SHEET

Client: Engineering Science Date: 10/4

Requested By: Henry P Time: ____ AM 12:10 PM

Recorded By: TCM

Current Lab ID (Previous Lab ID)	Client ID	Circle Matrix	Specify add or cancel	Analysis	Due Date
112570-18 ( )	B-11-11.5	water (soil) waste oil other	ADD	TEH	10/11
( )		water soil waste oil other			
( )		water soil waste oil other			
( )		water soil waste oil other			
( )		water soil waste oil other			
( )		water soil waste oil other			

ENGINEERING – SCIENCE, INC.
CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

LAB: Curtis + Tompkins

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	B. Rucker	NC367

PROJECT NAME / LOCATION: East Bay Regional Park District, Redwood Corp Yard

SAMPLER(S): (SIGNATURE) Henry Pietropaoli

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH-gas, BTEX	TPH-diesel				HCl PRESERVED by Lab	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
14-18	10/4/93	0925	Soil	18 feet below groundsurface	1	✓	✓						5-day	
15-17	10/4/93	1033	Soil	17 " " " "	1	✓	✓						5-day	
10-GW	"	1230	water	groundwater	3	✓	✓				✓		5-day	2-40 ml VOA 1 500ml Amber
17.5	"	1315	Soil	17.5 Feet below groundsurface	1	✓							"	
12.5	"	1405	Soil	12.5 " " " "	1	✓							"	
4-GW	"	1545	water	groundwater	3	✓	✓				✓		"	"
5-GW	"	1600	water	groundwater	3	✓	✓				✓		"	"
insate	"	1705	water	DI rinsate	1	✓							"	
Trip	Prepared by Lab		water		1	✓							"	Analyze if rinsate is detectable
13-GW	10/4/93	1640 HP	water	groundwater	3	✓	✓				✓		"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Henry Pietropaoli	10/4/93 1810				
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
			10/4/93 1910	Call Bruce Rucker for project Billing No.	

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APPENDIX J

REGULATORY AGENCY CONSIDERATIONS

APPENDIX J

REGULATORY AGENCY CONSIDERATIONS

HAZARDOUS WASTE CLASSIFICATION

Under California law, a "hazardous material or waste" is defined as ". . . a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics may either:

- Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
- Pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed" (22 California Code of Regulations [CCR], Section 66260.10).

Materials or wastes (including soil and groundwater) are classified as hazardous, depending on a property or combination of properties they potentially manifest. These properties include toxicity, corrosivity, ignitability, and/or reactivity. Under California law, approximately 800 substances are listed as potentially hazardous by virtue of these properties (22 CCR 66261.999). California law requires that the generator of a potentially hazardous waste determine if said material is in fact hazardous (22 CCR 66262.11) and stipulates the criteria and analytical methods for the determination of a waste as hazardous (22 CCR 66261.999 and 66261.20 et seq.).

Once a material is classified as a hazardous waste, it is subject to a myriad of local, state and federal regulations governing hazardous waste. For purposes of this investigation, soil and groundwater classified as hazardous waste and removed from the facility must be properly transported and disposed. Briefly, all hazardous waste must be transported under manifest by a licensed hazardous waste hauler to a permitted treatment, storage and disposal facility (TSDF). The generator of the waste is subject to record keeping and notification requirements, and is liable for perpetuity for that waste, regardless of its final disposition.

RELEVANT SOIL CONTAMINATION CLEANUP CRITERIA

Compound-specific concentration levels that have been established for compounds in soils by the State of California to evaluate toxicity are: Total Threshold Limit Concentrations (TTLCs) and Soluble Threshold Limit Concentrations (STLCs). TTLC is defined as "...the concentration of a solubilized, extractable, and nonextractable

bioaccumulative, or persistent toxic substance which, if equalled or exceeded in a waste, renders the waste hazardous" (22 CCR 66260.10). STLC is defined as "...the concentration of a solubilized and extractable bioaccumulative or persistent toxic substance which, if equalled or exceeded in a waste, renders the waste hazardous (22 CCR 66260.10). Presently, there are a total of 38 inorganic and organic substances for which there are published TTLC and STLC values (22 CCR 66261.24).

A waste or soil is considered hazardous by the State of California if it contains substances at levels exceeding the respective STLC or TTLC (22 CCR 66261.24). A waste or soil is also considered hazardous if it meets certain toxicity, ignitability, reactivity, or corrosivity criteria. A waste or a soil is classified as extremely hazardous if it contains substances at levels that exceed their TTLC (22 CCR 66261.104) or if it meets toxicity criteria (22 CCR 66261.103). If a contaminant in the soil is by itself considered hazardous or extremely hazardous by the State of California, a risk assessment is then needed to determine the magnitude of the risk and the appropriate cleanup level.

Contaminants which are not considered hazardous by the criteria explained above (including approximately 760 substances that are listed as potentially hazardous) may be considered a designated waste due to potential impact to groundwater on a case-by-case basis. The California Regional Water Quality Control Boards (RWQCBs) have developed a Designated Level Methodology (DLM) as a guide in determining if a waste at a given site should be classified as a designated waste, and if so, what cleanup level is needed (RWQCB 1989). The DLM calculations are site-specific and consider the depth to groundwater, type of soil, total pollutant load, and attenuation factors as well as water quality limits for specific constituents within the waste.

STLC criteria are based on leachate concentration and therefore total concentrations measured in soil are not comparable. California law states that samples with contaminant concentrations less than the TTLC but greater than the STLC cannot be classified as nonhazardous unless a waste-extraction test (WET) is performed (22 CCR 66261.999). In general, actual soluble concentrations of many compounds in soils are less than the total wet-weight compound concentrations, so that as a rule of thumb, a WET test is only performed if the contaminant of concern is detected at a concentration greater than or equal to 10 times the corresponding STLC. However, this can be evaluated by regulatory agencies on a case-by-case basis. Therefore, soils with contaminant concentrations between STLC and TTLC cannot be disposed at a Class III landfill until a WET analysis is performed to determine the contaminant's soluble concentration in soil.

In the case of TPH, the California Department of Health Services (DHS) uses the 1,000 mg/Kg TPH limit as a concentration above which soil is deemed hazardous - based on its flammability index - and must be remediated. In addition, the California Regional Water Quality Control Board (RWQCB) - the agency responsible for the protection of groundwater - has guidelines which use 100 mg/Kg TPH as a criterion for initiating groundwater investigations associated with leaking underground fuel tanks (LUFTs), and as the soil concentration above which soils should be excavated and/or remediated. This LUFT guidance also discusses application of the DLM. A possible scenario from using

the DLM methodology is, if depth to groundwater is shallow, the soil TPH cleanup requirement could be 10 mg/Kg or less.

GROUNDWATER CONTAMINATION CLEANUP CRITERIA

In California, groundwater contamination is evaluated on a case-by-case DLM basis. The DLM methodology considers such criteria as designated land use, sensitive biological receptors, depth to groundwater and beneficial uses of groundwater. The lead agency in California charged with overseeing the environmental protection of the waters of California is the RWQCB. Acceptable standards may vary between federal, state and local agencies and may be evaluated by multiple agencies. Thus, a number of different action or remediation levels can be applied to a groundwater contamination area.

There are several potential "action" standards for groundwater contamination in the State of California. The standard which is usually applied is the strictest of any applicable state or federal standard. Most of the groundwater quality standards, including Federal and California Maximum Contaminant Levels (MCLs) and State Action Levels (SALs) are applicable only where drinking water is concerned or endangered.

At present, the USEPA considers drinking water Maximum Contaminant Levels (MCLs), and Federal Ambient Water Quality Criteria (WQC). WQCs are considered Available Applicable or Relevant Appropriate Requirements (ARARs) for groundwater only if they reflect current scientific information and there are no Federal MCLs or State ARARs. The State of California limits the concentration of specified contaminants in the groundwater by state MCLs, SALs, and Proposition 65 (The Safe Drinking Water and Toxics Enforcement Act of 1986). Proposition 65 requires notification of exposure in any environmental media, above the "no significant risk level" (NSRL), to any chemical "known to the State of California to cause cancer or reproductive toxicity." Proposition 65 also prohibits the discharge of these chemicals into drinking water at concentrations above the NSRL. For chemicals known to cause cancer in drinking water, state MCLs are NSRLs. If a state MCL has not been adopted, drinking water action levels (SALs) are NSRLs. If no drinking water action levels have been adopted or the chemical is listed as a reproductive toxin only, and has no other NSRL, the detection limit is the NSRL. For chemicals in media other than drinking water, Proposition 65 provides NSRLs for multiple exposure routes; however, these levels are given in milligrams per day (mg/day), which does not facilitate comparisons by media. The Department of Health Services (DHS), Public Water Supply Branch administers MCLs and SALs. The Health and Welfare Agency administers Proposition 65.

Other standards may be evaluated for comparison if no promulgated standards exist for the given chemical; however, these are applied on a case-by-case basis. These criteria include federal Maximum Contaminant Level Goals (MCLGs), California Applied Action Levels (AAL) for water and air, SALs, state Recommended Drinking Water Action Levels, and STLCs.

Applied Action Levels (AALs) for water and air are determined by the Toxic Substances Control Division of the California Department of Health Services. Applied Action Levels are to be used in conjunction with the California Site Mitigation Decision

Tree document and are site specific. These can be used as ARARs in some circumstances. State Action Levels for groundwater can be used as standards on a site specific basis or in conjunction with Proposition 65 where an MCL is lacking. These values are also set by the Public Water Supply Branch of the DHS; however, they are in general not enforceable. Recommended Drinking Water Action levels, also determined by the Public Water Supply Branch, are health-based recommended levels. For purposes of this investigation, groundwater analytical data are evaluated in the context of federal or State of California enforceable "action" levels for groundwater (i.e. MCLs).