ENGINEERING-SCIENCE, INC.

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13 May 1994
Ref:723090.05010

East Bay Regional Parks District
Parklands Design Department
P.O. Box 5381
Oakland, California 94605-0381
Attention: Mr. Warren Gee

Subject: Creek Surface Water Sampling at Redwood Regional Park, Oakland, California

Dear Mr. Gee:

INTRODUCTION

This letter summarizes recent sampling activities conducted by Engineering-Science, Inc. (ES) at the East Bay Regional Park District (EBRPD) Redwood Regional Park Service Yard underground fuel storage tank (UFST) site in Oakland, California (project site). Figure 1 shows the location of the project site. The activities discussed herein follow previous site characterization and remediation activities associated with the former UFSTs conducted by ES at the project site, that were summarized in the ES reports dated 16 December 1993 (ES 1993) and 2 March 1994 (ES 1994b). The recent sampling was in accordance with the 29 March 1994 ES letter describing proposed sampling and analysis activities (ES 1994c).

PREVIOUS FINDINGS

An area of discolored soil with petroleum odor was observed by ES personnel in the eastern bank of Redwood Creek during the September and October 1993 initial site characterization (Figure 2) (ES 1993). At that time, field organic vapor analysis of a sample of the discolored soil indicated 42 and 37 parts per million per volume (ppmv) total ionizable and hydrocarbon vapors as measured by a photoionization detector (PID) and a total hydrocarbon vapor analyzer (THVA), respectively.

In accordance with a 10 January 1994 ACHCSA letter request (ACHCSA 1994a), ES collected on 9 February 1994 for laboratory analysis one soil sample and one "grab" surface water sample in the immediate vicinity of the area of discolored soil (Figure 2). Proposed sampling and analysis protocols were summarized in a 27 January 1994 ES letter to ACHCSA (ES 1994a). The soil sample contained 3 mg/kg total petroleum hydrocarbons as diesel (TPH-D); no aromatic hydrocarbons (including benzene, toluene, ethylbenzene and total xylenes [BTEX]) were detected (Figure 2 and Table 1). The "grab" surface water contained 130 μg/L TPH as gasoline (TPH-G); TPH-D was not detected. In addition, the "grab" surface water sample contained 1.9 μg/L benzene, 4.4 μg/L ethylbenzene and 3.2 μg/L total xylenes (Figure 2 and Table

1). The results of that sampling and analysis event were summarized in the ES letter report dated 2 March 1994 (ES 1994b).

CURRENT SURFACE WATER SAMPLING ACTIVITIES

In accordance with a 23 March 1994 ACHCSA letter request (ACHCSA 1994b), on 28 March 1994 ES collected for laboratory analysis two "grab" surface water samples upstream and downstream of the area of discolored soil (Figure 2). The upstream "grab" surface water sampling location (approximately 500 feet north of the discolored soil) was such that it should be not be impacted by detected soil and groundwater contamination associated with the former leaking UFSTs, based on the inferred direction of groundwater flow (Figure 2 and ES 1993). In addition, the upstream sampling location is adjacent to and downstream of vehicular parking and traffic areas that may contribute surface runoff potentially containing petroleum compounds. The downstream "grab" surface water sampling location was the same as that sampled 9 February 1994 (Figure 2 and ES 1994b).

At the time of sampling, water in the creek at both locations was approximately eight inches deep and three feet wide, and was flowing at a rate of approximately 0.3 feet per second. There was no visibly discolored soil at either sampling location. However, at sampling location CW-3 (Figure 2), sediments below the creek water line were discolored (blue grey) and had a noticeable petroleum odor. The lateral and vertical extent of discolored soil below the creek waterline is not known.

The two "grab" surface water samples were collected in clean glass containers appropriate to the laboratory analyses (1-500 ml amber glass for TPH-D and TPH-K and 2-40 ml glass volatile organic analysis [VOA] vials for TPH-G and BTEX. The water sampling containers were labeled, placed in a cooler with "blue ice" and transported under chain-of-custody the same day to an analytical laboratory certified by the State of California Environmental Protection Agency (CalEPA) Environmental Laboratory Accreditation Program (ELAP).

LABORATORY ANALYTICAL RESULTS

The "grab" surface water samples were analyzed for contaminants of concern identified in previous site characterization/remediation activities, including:

- TPH-G, TPH-D and TPH as kerosene (TPH-K) by the State of California Department of Toxic Substances Control (DTSC)/Leaking Underground Fuel Tank (LUFT) Field Manual method (modified EPA Method 8015)
- BTEX by EPA Method 8020

Table 1 summarizes the laboratory analytical results of the "grab" surface water samples collected on 28 March 1994, as well as the soil and "grab" surface water samples collected on 9 February 1994. The certified analytical laboratory report and the associated chain-of-custody record for the 28 March 1994 samples are included as Attachment A.

Discussion of Current Analytical Results

The creek "grab" water sample collected approximately 500 feet upgradient of the area of discolored soil (Sample CW-2) contained 50 μg/L TPH-G; neither TPH-D, TPH-K nor BTEX were detected. The creek "grab" water sample collected creek approximately three feet downstream of the area of discolored soil (Sample CW-3) contained 80 μg/L TPH-G, 1.8 μg/L benzene, 1.7 μg/L ethylbenzene and 1.1 μg/L total xylenes; neither TPH-D, TPH-K nor toluene were detected (Table 1 and Figure 2).

These data suggest that surface water in Redwood Creek has been impacted by the former leaking UFSTs and also by an as yet unidentified, upgradient source(s) (possibly surface water runoff from vehicle parking areas and/or roads). There are two potential sources of the UFST-sourced creek water contamination, including contaminated groundwater flowing directly into the creek, and/or desorption of contaminants from the contaminated soil by the flowing creek water. The relative contributions from each possible source are not known.

The only contaminant detected in the "grab" creek water samples in excess of published regulatory agency guidelines is benzene at 1.8 μg/L. The California maximum contaminant level (MCL) for benzene in drinking water is 1 μg/l. In addition, the water quality objective (WQO) for benzene in inland surface waters that are existing or potential sources of drinking water is 0.34 μg/L and for "other waters" is 21 μg/L (California State Water Resources Control Board [SWRCB] 1991). These WQOs are based on 30-day average concentrations, however the current analytical results do not represent an average concentration over a 30-day period.

Beneficial uses of surface water quality in California are used to establish water quality standards and discharge probibitions (California Regional Water Quality Control Board - San Francisco Bay Region [RWQCB] 1992). There are no listed beneficial uses for Redwood Creek. However, there are listed beneficial uses for Upper San Leandro Reservoir (located approximately 4,000 feet south [downstream] of the project site), into which Redwood Creek flows. Existing beneficial uses for Upper San Leandro Reservoir include: water contact recreations; municipal and domestic supply; warm and cold fresh water habitats; wildlife habitat; and fish spawning. Potential beneficial uses include non-contact water recreation.

RECOMMENDATIONS

The following recommendations are based on the results of data collected by ES during the current and previous investigations at the site.

- Implement the groundwater characterization and monitoring program previously recommended (ES 1993). The purpose of that investigation is to evaluate the magnitude, spatial extent and any temporal variation of groundwater contamination associated with the former UFSTs.

- Implement a periodic sampling and analysis program of Redwood Creek surface water from locations upstream and downstream of the area of discolored soil. The purpose of that task is to monitor impacts to surface water quality resulting from leakage of the former USTs and any other potential sources. (ES recommends monthly creek water sampling and analysis for the first quarter of groundwater monitoring, if sufficient streamflows are available). **Based on the results of the creek surface water sampling, the implementation of a human health and/or ecological risk assessment may be appropriate to evaluate potential risks associated with the detected contamination.** The detected contaminant concentrations in creek surface water are relatively low. Therefore, "immediate efforts...to prevent further impacts to the creek by the observed soil and groundwater contamination adjacent to and beneath the creek" (ACHCSA 1994b) are not warranted at this time, and any remedial efforts should only follow a risk assessment.
- Submit the results of this investigation to ACHCSA, RWQCB and the California Department of Fish and Game for their review.

We trust that this submittal meets your needs. Please call if you have questions or require further information.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Bruce M. Rucker

Bruce M. Rucker
Project Manager

Frederick T. Stanin, R.G.
Technical Director

cc: J. Shin, ACHCSA-DHM
L. Feldman, RWQCB

REFERENCES

- Alameda County Health Care Services Agency - Department of Environmental Health - Division of Hazardous Materials (ACHCSA) 1994a, letter requesting sampling of creek water at Redwood Regional Park Service Yard site, 10 January.
- ACHCSA 1994a, letter requesting additional sampling of creek water at Redwood Regional Park Service Yard site, 23 March.
- California State Water Resources Control Board (SWRCB) 1991, California Inland Surface Waters Plan - Water Quality Control Plan for Inland Surface Waters of California, 11 April.
- Engineering-Science, Inc. (ES) 1993, Closure of Underground Storage Tanks and Initial Site Characterization at Redwood Regional Park Service Yard, Oakland, California, 16 December.
- ES 1994a, letter to Alameda County Health Care Services Agency summarizing proposed sampling activities at Redwood Creek, Redwood Regional Park Service Yard, Oakland, California, 27 January.
- ES 1994b, Creek and Soil Sampling at Redwood Regional Park, Oakland, California, 2 March.
- ES 1994c, letter to Alameda County Health Care Services Agency summarizing proposed sampling activities at Redwood Creek, Redwood Regional Park Service Yard, Oakland, California, 29 March.
- Regional Water Quality Control Board - San Francisco Bay Region (RWQCB) 1992, Water Quality Control Plan for the San Francisco Basin, 17 January.

TABLE 1
SOIL AND "GRAB" SURFACE WATER SAMPLE ANALYTICAL RESULTS
REDWOOD CREEK

Redwood Regional Park Corporation Yard
Oakland, CA

	Sample I.D.	TPH–G	TPH–K	TPH–D	Benzene	Toluene	Ethyl–benzene	Total Xylenes
	Soil	concentrations in mg/kg						
2/9/94	CB–1 (a)	<1	(c)	3	<0.005	<0.005	<0.005	<0.005
	Water	concentrations in µg/L						
2/9/94	CW–1 (a)	130	<50	<50	1.9	<0.5	4.4	3.2
3/28/94	CW–2 (b)	50	<50	<50	<0.5	<0.5	<0.5	<0.5
" " "	CW–3 (b)	80	<50	<50	1.8	<0.5	1.7	1.1

Notes:

TPH–G: Total petroleum hydrocarbons (TPH) as gasoline by DTSC LUFT Manual method

TPH–D: TPH as diesel fuel by DTSC LUFT Manual method

TPH–K: TPH as kerosene by DTSC LUFT Manual method

BTEX analyzed by EPA Methods 602/8020

DTSC = California Department of Toxic Substances Control

LUFT = Leaking Underground Tank Manual

<0.5 : Not Detected above method reporting limit (MRL) of 0.5 µg/L or mg/kg

(a) Sampled 9 February 1994 (ES 1994b)

(b) Sampled 28 March 1994; analytical lab report included as Attachment A

(c) Kerosene range not reported due to overlap of hydrocarbon ranges

mg/L and mg/kg are equivalent to parts per million (ppm)

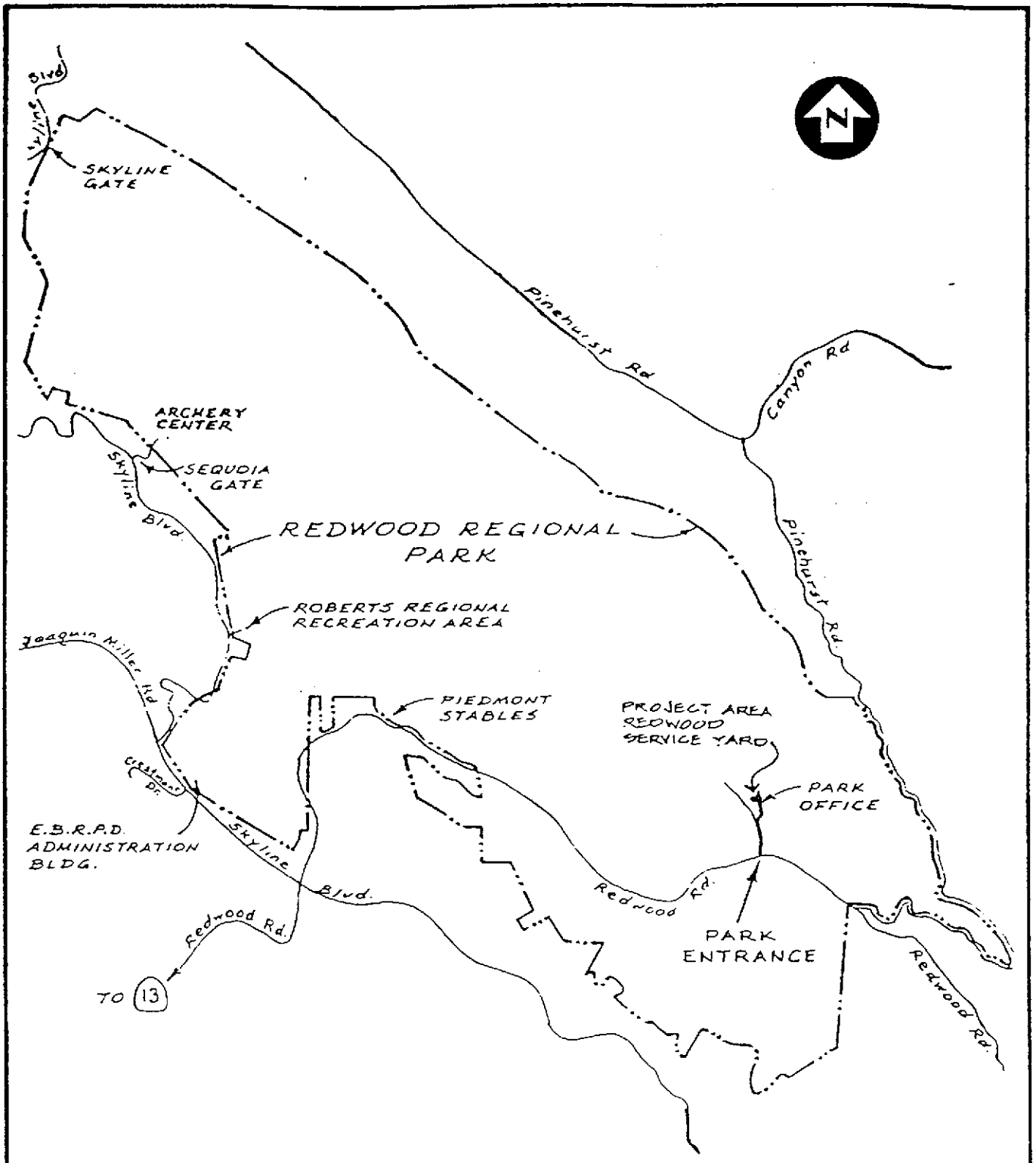
µg/L is equivalent to parts per billion (ppb)

Sampling locations are shown on Figure 2

creek2.wk1

04/18/94

FIGURE 1



0 2000 4000

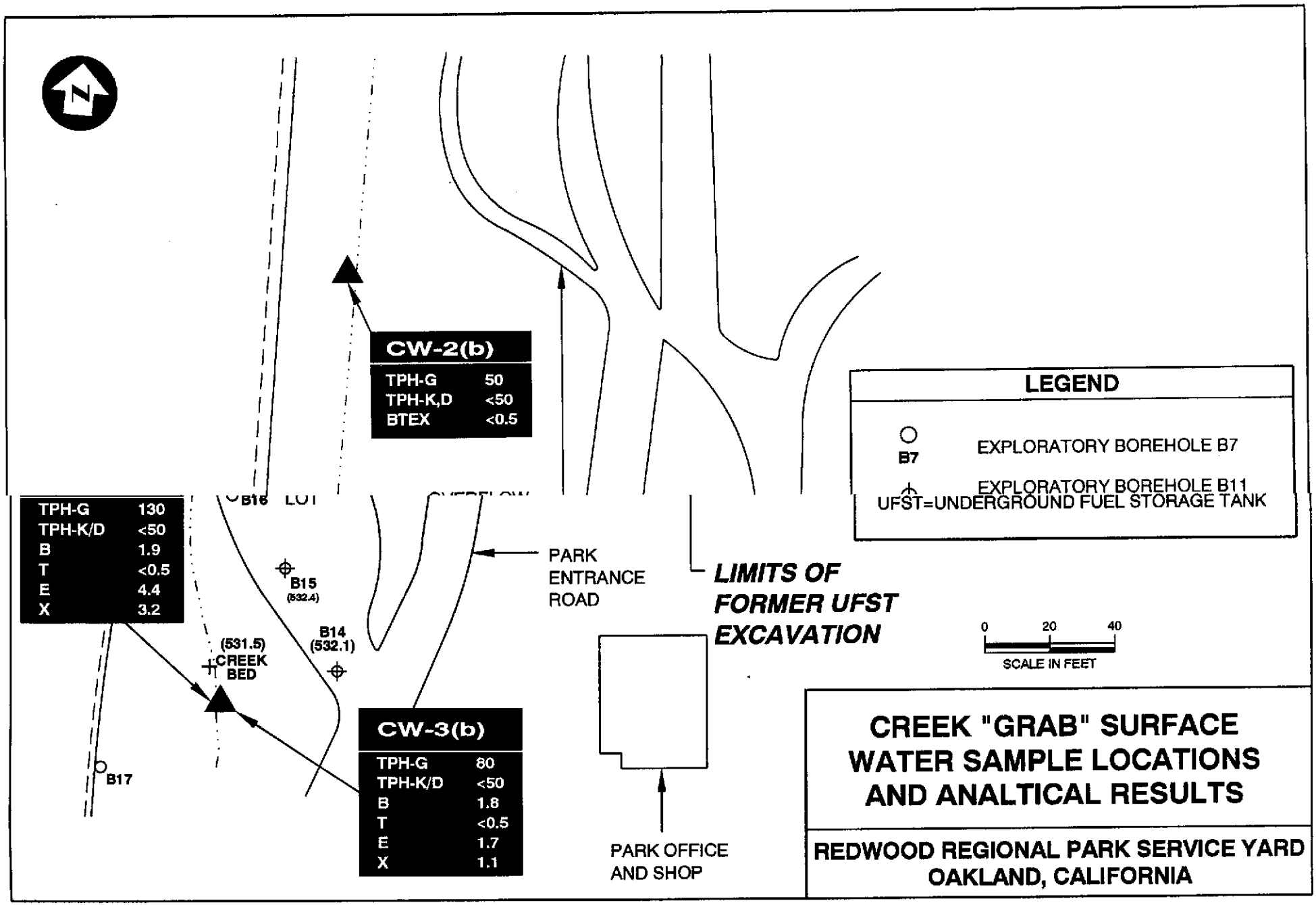
SCALE IN FEET

LOCATION MAP

REDWOOD REGIONAL PARK
CORPORATION YARD SITE

ENGINEERING-SCIENCE

FIGURE 2



CREEK "GRAB" SURFACE WATER SAMPLE LOCATIONS AND ANALTICAL RESULTS

REDWOOD REGIONAL PARK SERVICE YARD OAKLAND, CALIFORNIA

REV. 1 C276-11.DWG 05/04/94

ENGINEERING-SCIENCE, INC.

ATTACHMENT A

LABORATORY ANALYTICAL REPORT

AND CHAIN-OF-CUSTODY RECORD

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

ANALYTICAL REPORT

Prepared for:

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

Date: 05-APR-94
Lab Job Number: 114961
Project ID: 723090.05010
Location: EBRPD

Reviewed by: Teresa K Morrison

Reviewed by:

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 114961
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: 723090.05010
LOCATION: EAST BAY PARKS

DATE SAMPLED: 03/28/94
DATE RECEIVED: 03/28/94
DATE ANALYZED: 04/01/94
DATE REPORTED: 04/05/94

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)
114961-1	CW2-3/28/94	50	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
114961-2	CW3-3/28/94	80	1.8	ND(0.5)	1.7	1.1

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

QA/QC SUMMARY

RPD, %	1
RECOVERY, %	98

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 114961
CLIENT: ENGINEERING SCIENCE, INC.
PROJECT ID: 723090.05010
LOCATION: EAST BAY PARKS

DATE SAMPLED: 03/28/94
DATE RECEIVED: 03/28/94
DATE EXTRACTED: 04/01/94
DATE ANALYZED: 04/02/94
DATE REPORTED: 04/05/94

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)
114961-1	CW2-3/28/94	ND	ND	50
114961-2	CW3-3/28/94	ND	ND	50

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

QA/QC SUMMARY:

RPD, %	9
RECOVERY, %	99

CHAIN OF CUSTODY FORM

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

Sampler: Rucker

Report to:

Project No: 723090.05010 Company: Engineering Science

Project Name: East Bay Parks Telephone: 510 769-0100

Turnaround Time: 10 day Fax:

Laboratory Number	Sample ID.	Sampling Date	Sampling Time	Matrix: Soil	Matrix: Water	Matrix: Waste	# of Containers	Preservative: HCL	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: ICE	Field Notes	Analyses: TPH Gas (8015)	Analyses: TPH Diesel/Kerosene (8015)	Analyses: BTEX (602)
-1	CW2-3/28/94	3/28/94	1550		X		3						✓	✓	✓
-2	CW3-3/28/94	"	1610		X		3						✓	✓	✓

NOTES:

11961

RELINQUISHED BY:

Bruce M. Rucker 3/28/94 1650 DATE/TIME

DATE/TIME

DATE/TIME

RECEIVED BY:

DATE/TIME

DATE/TIME

3/28/94 1650 DATE/TIME