ES
ENGINEERING-SCIENCE, INC.

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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
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.

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

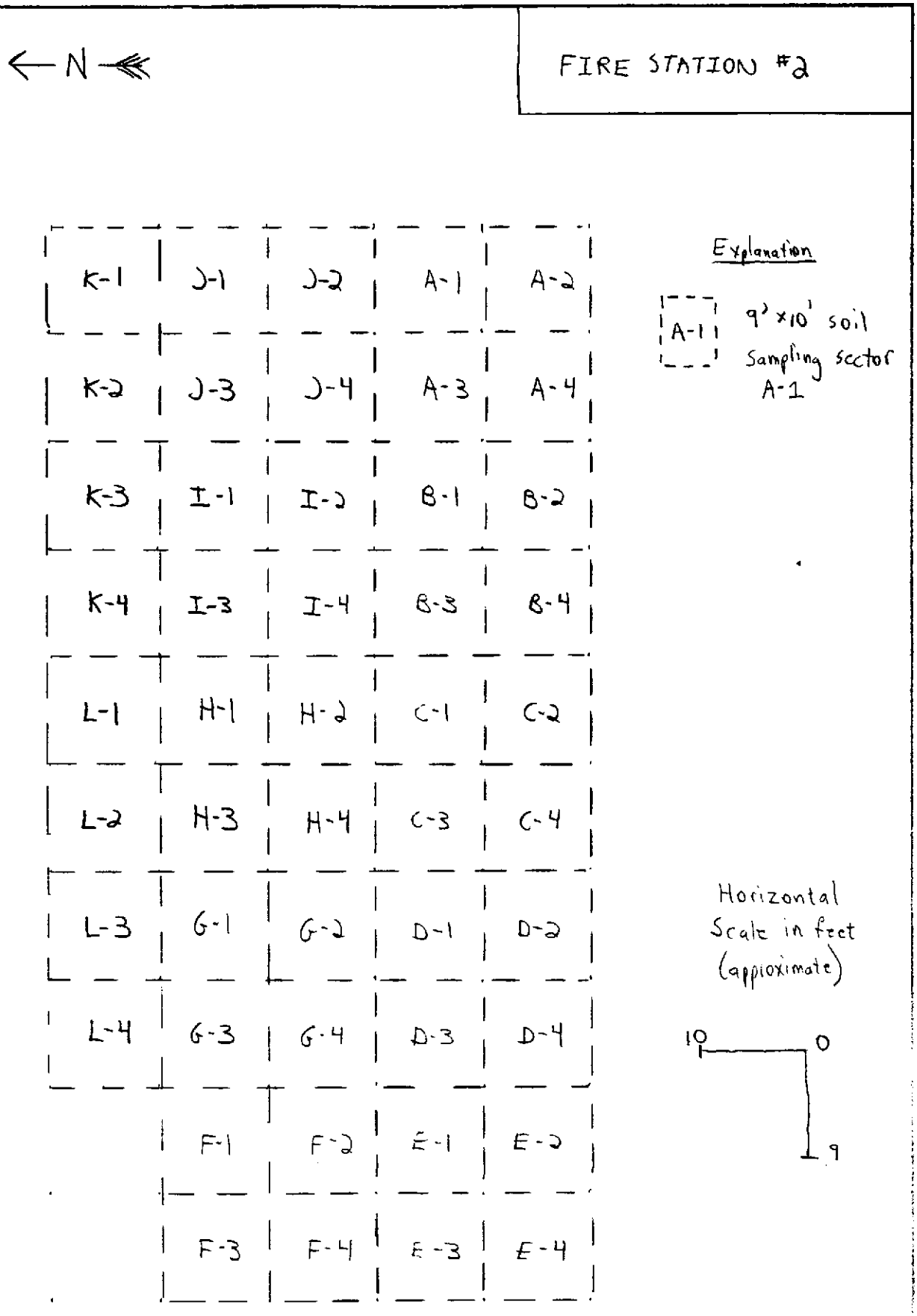


TABLE 1
STOCKPILE SOIL PROFILE ANALYTICAL RESULTS
REDWOOD REGIONAL PARK SITE, OAKLAND, CALIFORNIA
(all concentrations reported in mg/kg)

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

"aerate.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

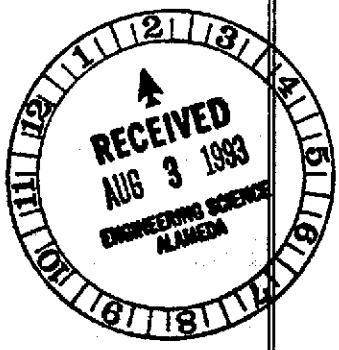
* MRL for benzene, toluene, xylenes and ethylbenzene was 0.4 due to required dilution

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:

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	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:
11557-1	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:
Bruce Rucker 7/12/93 1545 DATE/TIME	DATE/TIME
DATE/TIME	DATE/TIME
DATE/TIME	7/12/93 1545 DATE/TIME

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