LETTER OF TRANSMITTAL

PARSONS ENGINEERING SCIENCE, INC.
2101 Webster Street
Suite 700
Oakland, CA 94612
Phone: (510) 891-9085
Fax: (510) 835-4355

DATE: 3 February 1997

PARSONS ES PROJECT: 729457

TO:
Alameda County Health Care Services Agency
Division of Hazardous Materials
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

ATTN: Ms. Madhulla Logan

RE: Redwood Regional Park Site Investigation, Oakland, California

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WE ARE SENDING YOU:

ATTACHED XXX UNDER SEPARATE COVER ____.

DOCUMENTS XXX OTHER:_____.

VIA MAIL XXX EXPRESS MAIL ___ FED EX ___ OTHER: _____.

QUANTITY	DATE	ITEM
1	1/31/97	Quarterly Progress Report 7, Groundwater Characterization Program at Redwood Regional Park Service Yard Site, Oakland, California

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REMARKS:

cc: W. Gee, East Bay Regional Parks District

SIGNED: B.M. Rucker

Bruce M. Rucker, Project Manager

PARSONS ENGINEERING SCIENCE, INC.

1301 Marina Village Parkway, Suite 200 • Alameda, California 94501 • (510) 769-0100 • Fax: (510) 769-9244

24 September 1996
Ref: 729457.05000

Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Materials Division
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Attention: Ms. Madhulla Logan

Subject: Quarterly Progress Report 6, Groundwater Characterization Program at Redwood Regional Park Service Yard, Oakland, California

Dear Ms. Logan:

INTRODUCTION

This report presents the results of the August 1996 groundwater monitoring event conducted by Parsons Engineering Science, Inc. (Parsons ES) (formerly Engineering-Science, Inc. [ES]) at the East Bay Regional Park District (EBRPD) Redwood Regional Park Service Yard in Oakland, California. This report presents the results of the sixth quarterly groundwater monitoring event for the site Groundwater Characterization Program, which is designed to evaluate the extent and magnitude of groundwater contamination associated with two former leaking underground fuel storage tanks (UFSTs). A summary of previous site characterization and remedial activities associated with the former UFSTs is presented in the first quarterly progress report (Parsons ES 1994c). An annual summary assessment report was presented for the first four quarterly monitoring events, November 1994 through August 1995 (Parsons ES 1995), and a second annual summary assessment report will be presented following the initial quarterly monitoring event of 1997 (scheduled for March 1997). That summary report will summarize the second year of quarterly groundwater monitoring activities, analyze hydrochemical trends, and evaluate regulatory agency criteria governing detected groundwater contaminants.

Site Description

The project site is located at 7867 Redwood Road in Oakland, Alameda County, California. Figure 1 shows the location of the project site. The project site is a service yard for Redwood Regional Park that utilized two UFSTs (one 2,000-gallon diesel fuel and one 5,000-gallon unleaded gasoline) from the mid-1960's until their removal in 1993. Figure 2 is a site plan which shows the limits of the former UFST remedial excavation and the groundwater monitoring wells which were installed in October 1994 to monitor groundwater impacts associated with the former UFSTs.

Site Stratigraphy and Hydrogeology

Shallow soil stratigraphy beneath the project site consists of a surficial 3 to 10 foot thick clayey silt unit underlain by a 5 to 15 foot thick silty clay unit. In all monitoring well borings, a 5- to 10-foot thick clayey coarse-grained sand and clayey gravel unit was encountered that laterally grades to a clay or silty clay. This unit overlies a weathered siltstone at the base of the observed soil profile. Soils in the vicinity of MW-1 are inferred to be landslide debris.

Groundwater at the site occurs under predominantly unconfined conditions, as evidenced by the equilibrated static water levels relative to the water level in Redwood Creek and the level of water seepage out of the north face of the former excavation. Groundwater seepage into Redwood Creek is indicated by historical observations of fuel-contaminated capillary fringe soils in the eastern bank of Redwood Creek (Parsons ES 1994c). Figure 2 shows groundwater elevations and inferred direction of groundwater flow during the August 1996 monitoring event. The August 1996 data indicate that the direction of local groundwater flow beneath the project site is approximately from northeast to southwest. This groundwater flow direction is consistent with previously recorded measurements made in site wells since November 1994 (Parsons ES 1995).

PROCEDURES AND CURRENT ACTIVITIES

The current groundwater monitoring program is in accordance with the Workplan for Groundwater Characterization Program (ES 1994b). The Alameda County Health Care Services Agency (ACHCSA) approved discontinuation of hydrochemical monitoring of site wells MW-1, MW-3 and MW-6 following the August 1995 event due to the absence of significant groundwater contamination in these wells over the first four quarters of monitoring (ACHCSA 1996). Creek surface water sampling procedures are in accordance with the 29 March 1994 Parsons ES letter to ACHCSA (ES 1994a).

Laboratory Analyses

All laboratory analyses were conducted by a laboratory certified by the California Environmental Protection Agency (Cal/EPA) Environmental Laboratory Accreditation Program (ELAP) for each required analytical method. All groundwater and surface water samples were analyzed for the following constituents:

- Total petroleum hydrocarbons - gasoline, diesel and kerosene ranges (TPH-G, -D, and -K) by the State of California Department of Toxic Substances Control (DTSC) Leaking Underground Fuel Tank (LUFT) Manual Method (equivalent to modified EPA Method 8015)
- Aromatic hydrocarbons (including benzene, toluene, ethylbenzene, and total xylenes [BTEX]) by EPA Method 8020

Groundwater Monitoring and Sampling

Parsons ES personnel measured static water levels (Table 1 and Attachment A) in all six site wells on 15 August 1996. Water level measurements were made using an electric water level indicator. Initial water level measurements were collected immediately upon removal of the well casing caps. If either a positive or negative air pressure was observed in the well at the time the casing caps were removed, then water levels were then remeasured after a period no less than one-half hour to allow dissipation of air pressure and equilibration of static water levels. No wells displayed an observable pressure release during this event.

Groundwater sampling of monitoring wells MW-2, MW-4 and MW-5 was conducted on 15 August 1996 in accordance with Cal/EPA guidelines (Cal/EPA 1994). Prior to collection of groundwater samples, a pre-cleaned Teflon™ bailer or submersible pump was used to purge a minimum of three casing volumes from each well. Electrical conductivity, pH, and temperature of purge water were measured during well purging, to document the presence of stabilized formation-water in the wells. Attachment A includes water level data and groundwater monitoring field notes from the current groundwater monitoring event.

Sample containers were filled with sample water from the pre-cleaned bailer. To prevent cross-contamination, groundwater sampling equipment was decontaminated prior to use and between each monitoring well with an Alconox™ wash followed by three deionized water rinses. Following sample collection, sample containers were labeled, placed in a cooler packed with "blue ice," and transported under chain-of-custody the same day to a Cal/EPA ELAP-certified laboratory. Chain-of-custody records for the groundwater samples are included in Attachment B.

Creek Surface Water Sampling

Surface water samples were collected from three locations within Redwood Creek (Figure 2) by immersing the sample containers just under the water surface, and immediately capping the containers, which were then labeled, chilled and transported under chain-of-custody the same day to the analytical laboratory. At the time of surface water sampling, the majority of the creekbed was dry, and the sample locations had only several inches of stagnant water.

No petroleum sheen or odor was noted in either upstream (SW-1) or downstream (SW-3) creek water samples. At the SW-2 location, discolored soil was evident in the capillary fringe exposed in the creekbed, just above the creek water surface. A petroleum sheen was observed on the surface of the creek beginning at the area of discolored soil and extending approximately 2 feet downstream. Co-located with the sheen was a reddish-orange bloom of presumably algae on the surface water, suggesting that the petroleum is serving as a carbon source for the organisms.

Analytical Results

Groundwater Samples

Analytical results of the August 1996 monitoring event are presented in Table 2. Fuel hydrocarbons (gasoline- and diesel-ranges) were detected in MW-4, as were all four BTEX constituents. Gasoline-range hydrocarbons only (no diesel or BTEX) were detected in MW-5. No contaminants of concern were detected in well MW-2. Detectable groundwater contaminant concentrations reported for the current quarter are within the same order of magnitude compared to concentrations reported since November 1994 (Parsons ES 1995).

Creek Surface Water Samples

Surface water samples collected from Redwood Creek (SW-1, -2 and -3 locations on Figure 2) were analyzed for TPH-G, TPH-D/K and BTEX. Gasoline-range hydrocarbons, benzene and ethylbenzene were detected in sample SW-2 (at the location with noticeable petroleum sheen on surface water). The downstream sample SW-3 had a reported concentration of 69 µg/L gasoline-range hydrocarbons, however that sample's chromatogram exhibited a peak not attributable to gasoline. No contaminants of concern were detected in upstream sample SW-1. Detectable surface water contaminant concentrations reported for the current quarter are within the same order of magnitude compared to concentrations reported since November 1994 (Parsons ES 1995).

Quality Control Samples

Two types of field quality control (QC) samples were used to assess whether field or laboratory procedures affected analytical results of the current groundwater sampling event. One equipment rinsate blank (MW-0B) was collected from the decontaminated bailer following sampling and decontamination activities at well MW-4 to monitor potential cross-contamination in the field due to inadequate decontamination of sampling equipment and/or sample contamination during transport. That sample was analyzed for TPH-G and BTEX. The equipment rinsate blank sample had a reported concentration of 59 µg/L gasoline-range hydrocarbons (just above the method reporting limit); however that sample's chromatogram exhibited a peak not attributable to gasoline. The source(s) of the unknown peak in this QC sample and surface water sample SW-3 is not known. However, the absence of the unknown peak in other field samples suggests that the validity of those analytical results is not compromised by potential cross-contamination or other non-site-sourced inputs.

One field duplicate sample (MW-0A) was collected from well MW-4 and analyzed for TPH-G and BTEX to assess whether field procedures produced reproducible results (Table 2). The relative percent differences (RPDs) between the field and field duplicate samples are as follows: gasoline (34.9%); benzene (35.5%); toluene (5.1%); ethylbenzene (42.4%); and total xylenes (40.8%).

Laboratory QC samples (e.g., method blanks, matrix spikes, surrogate spikes, etc.) were analyzed by the laboratory in accordance with the requirements of each analytical method. All laboratory QC sample results and sample holding times were within the acceptance limits of the methods (Attachment B).

Management of Investigation-Derived Waste

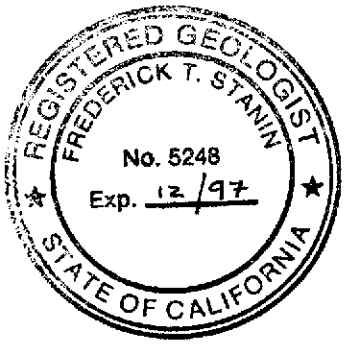
A total of approximately 75 gallons of wastewater (including monitoring well purge water and equipment decontamination rinsate) from the current quarter's groundwater sampling event was containerized on site in a plastic storage tank. It is anticipated that this waste water will be transported for off-site treatment and disposal following the May 1997 monitoring event.

We trust that this submittal meets the needs of your agency. Please call us at our Alameda office (510-769-0100) if you have any questions or require clarification.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Bruce M. Rucker
Project Manager



Frederick T. Stanin, C.E.G.
Principal Geologist

REFERENCES

Alameda County Health Care Services Agency (ACHCSA) 1996, letter from Madhulla Logan, Hazardous Materials Specialist to Ken Berger of EBRPD. 9 January

ES 1994a, letter to Alameda County Health Care Services Agency (ACHCSA) summarizing proposed sampling activities at Redwood Creek, Redwood Regional Park Service Yard, Oakland, California. 27 January

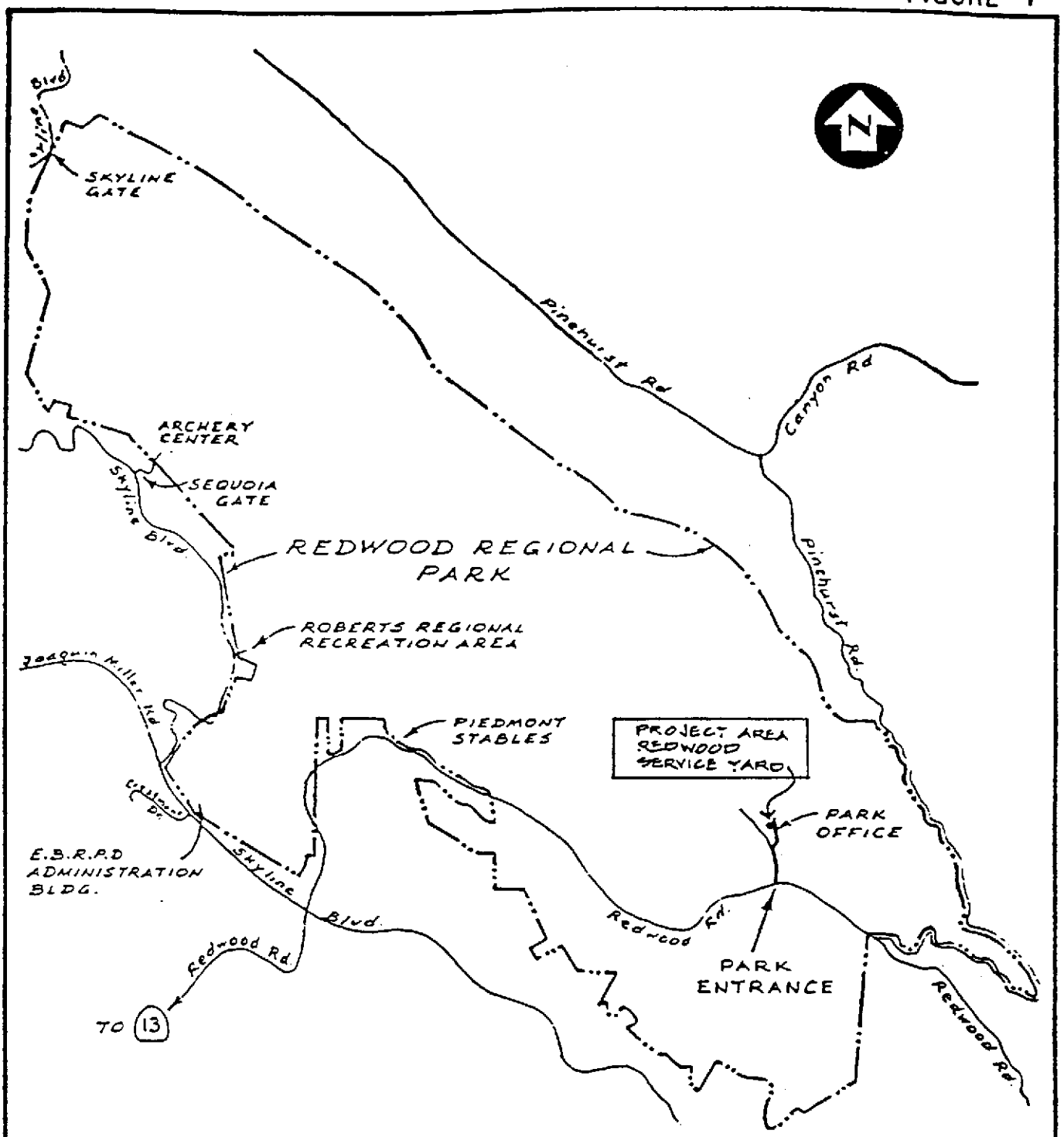
ES 1994b, Workplan for Groundwater Characterization Program at Redwood Regional Park Service Yard, Oakland, California. 17 August

Parsons ES 1994c, Quarterly Progress Report 1 (October - December 1994), Redwood Regional Park Service Yard, Oakland, California. 28 December

Parsons ES 1995, Quarterly Progress Report 4 and Annual Summary Assessment (November 1994 - August 1995), Redwood Regional Park Service Yard, Oakland, California. 13 November

State of California Environmental Protection Agency (Cal/EPA) 1994, Guidance Manual for Ground Water Investigations. August

FIGURE 1

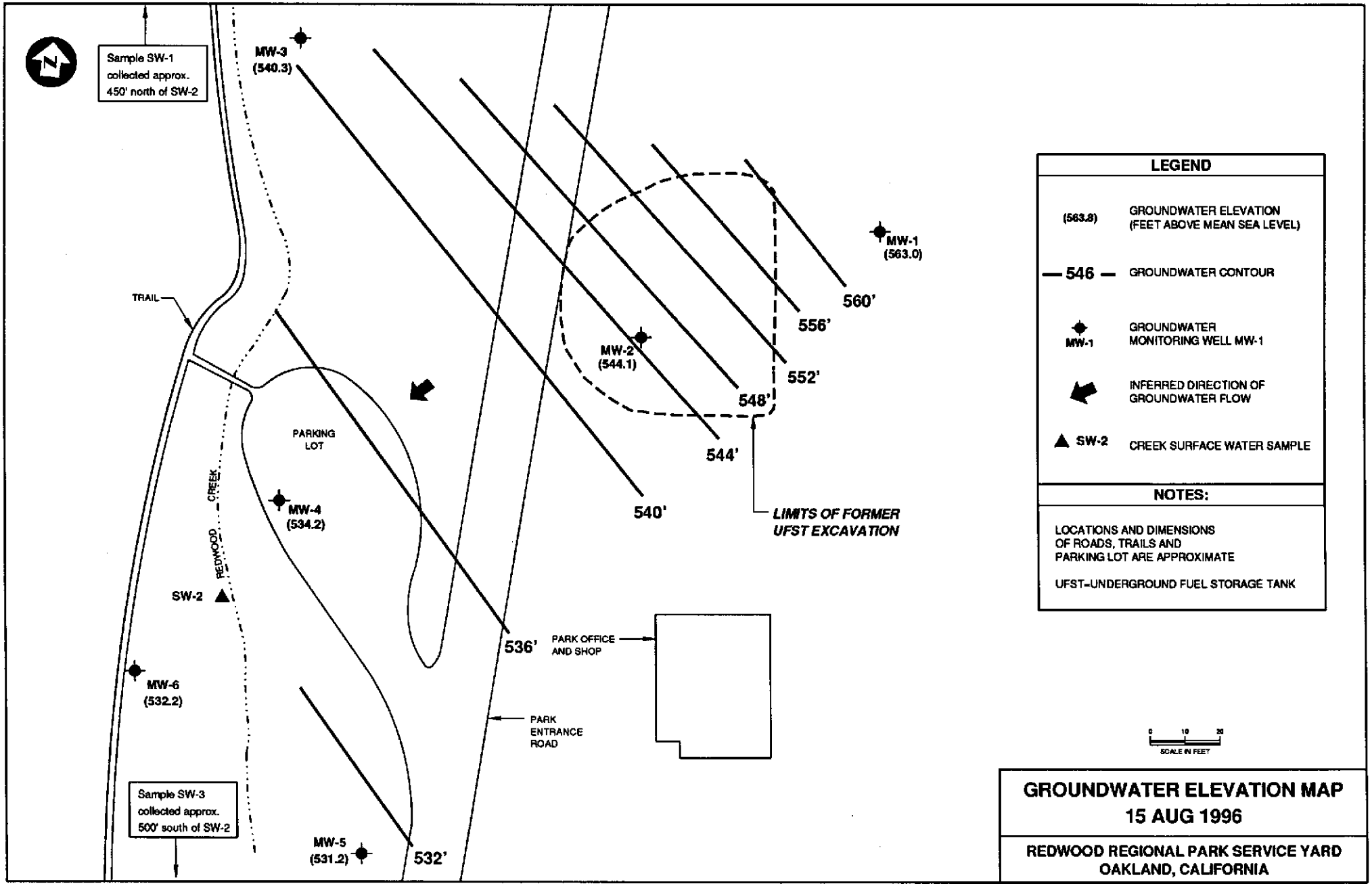


SITE LOCATION MAP

REDWOOD REGIONAL PARK
SERVICE YARD

OAKLAND, CALIFORNIA

FIGURE 2



GROUNDWATER ELEVATION MAP
15 AUG 1996

REDWOOD REGIONAL PARK SERVICE YARD
OAKLAND, CALIFORNIA

REV. 1 R400-06.DWG 08/21/96

PARSONS ENGINEERING SCIENCE, INC.

TABLE 1

WELL ELEVATIONS AND WATER LEVEL MEASUREMENTS 15 AUGUST 1996

Well		Well Elevation (TOC)	Water Levels
MW-1	Depth		2.95
	Elevation	565.9	563.0
MW-2	Depth		22.41
	Elevation	566.5	544.1
MW-3	Depth		20.56
	Elevation	560.9	540.3
MW-4	Depth		13.86
	Elevation	548.1	534.2
MW-5	Depth		16.27
	Elevation	547.5	531.2
MW-6	Depth		13.41
	Elevation	545.6	532.2

Remarks:

1) All water level depths are feet below top of well casing (TOC).
2) All elevations are feet above USGS mean sea level (MSL). Elevations were surveyed by EBRPD relative to USGS Survey Benchmark No. JHF-49.
3) Additional water level and well construction data are included in Attachment A.

TABLE 2

GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
15 August 1996
Redwood Regional Park Service Yard, Oakland, California

	Concentration (µg/L)					
Compound:	TPH-G	TPH-D/K	Benzene	Toluene	Ethylbenzene	Total Xylenes
Reporting Limit:	50	50	0.5	0.5	0.5	0.5
Monitoring Well Samples						
MW-2	ND	ND	ND	ND	ND	ND
MW-4[a]	2,600	NA	44	1.9	130	95.3
MW-4	3,700	120[b,e]	63	2	200	144.2
MW-5	80[b,d]	ND	ND	ND	ND	ND
Surface Water Samples						
SW-1	ND	ND	ND	ND	ND	ND
SW-2	200[b,d]	ND	7.5	ND	5.4	ND
SW-3	69[c]	ND	ND	ND	ND	ND

Notes:

TPH-G = Total petroleum hydrocarbons - gasoline range
TPH-D/K = Total petroleum hydrocarbons - diesel/kerosene ranges
NA = Not analyzed
ND = Not detected above method reporting limit
µg/L = Micrograms per liter, equivalent to parts per billion (ppb)
[a] = Quality control field duplicate sample designated MW-0A on the chain-of-custody and analytical laboratory report
[b] = Sample exhibits fuel pattern which does not resemble laboratory standard.
[c] = Sample exhibits unknown chromatogram peak(s).
Sample locations are shown on Figure 2.
[d] = Heavier hydrocarbons than indicated standard.
[e] = Lighter hydrocarbons than indicated standard.

ATTACHMENT A

WATER LEVEL DATA AND GROUNDWATER MONITORING NOTES

WATER LEVEL DATA

PARSONS ENGINEERING SCIENCE

DATE: 15 August 1996

PROJECT/LOCATION: Redwood Regional Park Service Yard, Oakland, California

PROJECT No.: 729457

PERSONNEL: Bruce Rucker

Well No	Water Level from T.O.C.	Well Depth From T.O.C	Depth to T.O.C	Water Level from G.S.	Well Casing Dia.	Gallons/ Casing Vol.	T.O.C. Elev. USGS	Water Level USGS
MW-1	2.95	18.0	-2.3	0.7	4	NS	565.9	562.95
MW-2	22.41	36.5	-2.4	20.0	4	9.2	566.5	544.09
MW-3	20.56	45.0	-2.8	17.8	4	NS	560.9	540.34
MW-4	13.86	26.0	-2.1	11.8	4	7.9	548.1	534.24
MW-5	16.27	26.0	-2.3	14.0	4	6.3	547.5	531.23
MW-6	13.41	27.0	-2.3	11.1	4	NS	545.6	532.19

NOTES:

T.O.C.: Top of Casing

Gallons/casing volume for 4" inner diameter casing = 0.65 gallons per linear foot

Negative value for "Depth to T.O.C." indicates that T.O.C. is above ground surface

G.S.: Ground Surface

USGS: U.S. Geological Survey mean sea level (MSL)

NS: Not Sampled

All elevations surveyed by East Bay Regional Parks District relative to USGS Survey Benchmark No. JHF-49

GROUNDWATER SAMPLING FIELD NOTES

PARSONS ENGINEERING SCIENCE

PROJECT/LOCATION REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CA **PERSONNEL:** Bruce Rucker

PROJECT NUMBER: 729457 **DATE:** 15 August 1996

Well ID	*Sampler Date Time*	*Water Level Before, Well Diameter and Depth**	*Water Level After **	*Gallons per Casing Volume*	*Well Purging Method ***	*Pump On*	*Pump Off*	*Temp. (o C)*	*Specific Cond (umhos/cm)*	*pH*	*Total Water Purged (gals)*	*Sample Coll. Method*	*Analysis & Number/type of Containers*	*Comments*
MW-1	NS	2.95 4" 18.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	
MW-2	BMR 8/15/96 1225	22.41 4" 36.5	24.61	9.2	G	NR	NR	19.7 23.0 21.5 21.1	320 410 415 410	8.01 7.70 7.61 7.64	1 9 18 27	B	(a) (b) & (c)	Sample sl. turbid; no sheen
MW-3	NS	20.56 4" 45.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	
MW-4	BMR 8/15/96 1015	13.26 4" 26.0	15.4	7.9	G	NR	NR	15.2 14.7 14.4 14.3	180 250 280 275	6.55 6.28 6.44 6.42	1 8 16 24	B	(a) (b) & (c)	Sample clear; no sheen.

NOTES

* Measured from top of casing in feet

** WW -- Well Wizard; G -- Grundfos Pump; B - Bailer

NA Not Applicable

NR Not Recorded

(a) Total Petroleum Hydrocarbons as diesel (TPH-D), unpreserved {1: 1L amber bottles}.

(b) BTEX, EPA Method 8020, HCl preserved {2: 40ml VOAs}.

(c) Total Petroleum Hydrocarbons as gasoline (TPH-G), HCl preserved {2: 40ml VOAs}.

GROUNDWATER SAMPLING FIELD NOTES

PARSONS ENGINEERING SCIENCE

PROJECT/LOCATION REDWOOD REGIONAL PARK SERVICE YARD, OAKLAND, CA **PERSONNEL:** Bruce Rucker

PROJECT NUMBER: 729457 **DATE:** 15 August 1996

Well ID	*Sampler Date Time*	*Water Level Before, Well Diameter and Depth**	*Water Level After **	*Gallons per Casing Volume*	*Well Purging Method ***	*Pump On*	*Pump Off*	*Temp. (o C)*	*Specific Cond (umhos/ cm)*	*pH*	*Total Water Purged (gals)*	*Sample Coll. Method*	*Analysis & Number/type of Containers*	*Comments*
MW-5	BMR 8/15/96 1110	16.27 4" 26.0	18.1	6.3	G	NR	NR	16.9 14.7 15.1 15.0	300 260 280 275	7.01 7.24 7.54 7.51	1 7 14 21	B	(a) (b) & (c)	Sample clear; no sheen
MW-6	NS	13.41 4" 27.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	
MW-0A	BMR 8/15/96 1020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		(b) & (c)	Field duplicate collected at well MW-4
MW-0B	BMR 8/15/96 1025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	(b) & (c)	Equipment rinsate blank, collected after decon. at well MW-4

NOTES

* Measured from top of casing in feet

** WW -- Well Wizard; G -- Grundfos Pump; B - Bailer

NA Not Applicable

NR Not Recorded

(a) Total Petroleum Hydrocarbons as diesel (TPH-D), unpreserved {1: 1L amber bottles}.

(b) BTEX, EPA Method 8020, HCl preserved {2: 40ml VOAs}.

(c) Total Petroleum Hydrocarbons as gasoline (TPH-G), HCl preserved {2: 40ml VOAs}.

NS Not sampled

C:\ebrpd\Aug96gw.xls

ATTACHMENT B

CHAIN-OF-CUSTODY RECORDS AND ANALYTICAL LABORATORY REPORT

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

ANALYTICAL REPORT

Prepared for:

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

Date: 27-AUG-96
Lab Job Number: 126567
Project ID: 729457
Location: Redwood G.Water & Surface

Reviewed by: _____

Reviewed by: _____

TVH-Total Volatile Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-001	MW-4	29268	08/15/96	08/21/96	08/21/96	
126567-002	MW-5	29268	08/15/96	08/21/96	08/21/96	
126567-003	MW-2	29268	08/15/96	08/21/96	08/21/96	
126567-004	MW-0A	29352	08/15/96	08/25/96	08/25/96	

Matrix: Water

Analyte Diln Fac:	Units	126567-001 1	126567-002 1	126567-003 1	126567-004 2
Gasoline	ug/L	3700	80 YH	<50	2600
Surrogate					
Trifluorotoluene	%REC	87	99	100	95
Bromobenzene	%REC	120	86	86	97

Y: Sample exhibits fuel pattern which does not resemble standard
H: Heavier hydrocarbons than indicated standard

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-001	MW-4	29268	08/15/96	08/21/96	08/21/96	
126567-002	MW-5	29268	08/15/96	08/21/96	08/21/96	
126567-003	MW-2	29268	08/15/96	08/21/96	08/21/96	
126567-004	MW-0A	29352	08/15/96	08/25/96	08/25/96	

Matrix: Water

Analyte	Units	126567-001	126567-002	126567-003	126567-004
Diln Fac:		1	1	1	2
Benzene	ug/L	63	<0.5	<0.5	44
Toluene	ug/L	2	<0.5	<0.5	1.9
Ethylbenzene	ug/L	200	<0.5	<0.5	130
m,p-Xylenes	ug/L	140	<0.5	<0.5	92
o-Xylene	ug/L	4.2	<0.5	<0.5	3.3
Surrogate					
Trifluorotoluene	%REC	101	98	99	97
Bromobenzene	%REC	104	90	94	94

TVH-Total Volatile Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-005	MW-0B	29268	08/15/96	08/21/96	08/21/96	
126567-006	SW-1	29268	08/15/96	08/21/96	08/21/96	
126567-007	SW-2	29352	08/15/96	08/24/96	08/24/96	
126567-008	SW-3	29352	08/15/96	08/24/96	08/24/96	

Matrix: Water

Analyte Diln Fac:	Units	126567-005 1	126567-006 1	126567-007 1	126567-008 1
Gasoline	ug/L	59 Z	<50	200 YH	69 Z
Surrogate					
Trifluorotoluene	%REC	99	98	97	94
Bromobenzene	%REC	84	84	85	79

Y: Sample exhibits fuel pattern which does not resemble standard
Z: Sample exhibits unknown single peak or peaks
H: Heavier hydrocarbons than indicated standard

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-005	MW-0B	29268	08/15/96	08/21/96	08/21/96	
126567-006	SW-1	29268	08/15/96	08/21/96	08/21/96	
126567-007	SW-2	29352	08/15/96	08/24/96	08/24/96	
126567-008	SW-3	29352	08/15/96	08/24/96	08/24/96	

Matrix: Water

Analyte Diln Fac:	Units	126567-005 1	126567-006 1	126567-007 1	126567-008 1
Benzene	ug/L	<0.5	<0.5	7.5	<0.5
Toluene	ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/L	<0.5	<0.5	5.4	<0.5
m,p-Xylenes	ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	ug/L	<0.5	<0.5	<0.5	<0.5
Surrogate					
Trifluorotoluene	%REC	98	99	95	94
Bromobenzene	%REC	87	88	91	90

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TVH-Total Volatile Hydrocarbons

Client:	Parsons Engineering Science, Inc.	Analysis Method:	CA LUFT (EPA 8015M)
Project#:	729457	Prep Method:	EPA 5030
Location:	Redwood G.Water & Surface		

METHOD BLANK

Matrix:	Water	Prep Date:	08/24/96
Batch#:	29352	Analysis Date:	08/24/96
Units:	ug/L		
Diln Fac:	1		

MB Lab ID: QC28811

Analyte	Result	
Gasoline	<50	
Surrogate	**%Rec**	**Recovery Limits**
Trifluorotoluene	94	69-120
Bromobenzene	75	70-122

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 29352
Units: ug/L
Diln Fac: 1

Prep Date: 08/24/96
Analysis Date: 08/24/96

MB Lab ID: QC28811

Analyte	Result
Benzene	<0.5
Toluene	<0.5
Ethylbenzene	<0.5
m,p-Xylenes	<0.5
o-Xylene	<0.5

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	95	58-130
Bromobenzene	86	62-131

Curtis & Tompkins, Ltd.

TVH-Total Volatile Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 29268
Units: ug/L
Diln Fac: 1

Prep Date: 08/21/96
Analysis Date: 08/21/96

MB Lab ID: QC28496

Analyte	Result	
Gasoline	<50	
Surrogate	**%Rec**	**Recovery Limits**
Trifluorotoluene	96	69-120
Bromobenzene	84	70-122

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 29268
Units: ug/L
Diln Fac: 1

Prep Date: 08/21/96
Analysis Date: 08/21/96

MB Lab ID: QC28496

Analyte	Result
Benzene	<0.5
Toluene	<0.5
Ethylbenzene	<0.5
m,p-Xylenes	<0.5
o-Xylene	<0.5

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	95	58-130
Bromobenzene	87	62-131

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TVH-Total Volatile Hydrocarbons			
Client:	Parsons Engineering Science, Inc.	Analysis Method:	CA LUFT (EPA 8015M)
Project#:	729457	Prep Method:	EPA 5030
Location:	Redwood G.Water & Surface		
LABORATORY CONTROL SAMPLE			
Matrix:	Water	Prep Date:	08/24/96
Batch#:	29352	Analysis Date:	08/24/96
Units:	ug/L		
Diln Fac:	1		

LCS Lab ID: QC28809

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	1935	2000	97	80-120
Surrogate	**%Rec**	**Limits**		
Trifluorotoluene	93	69-120		
Bromobenzene	98	70-122		

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

BTXE	
Client: Parsons Engineering Science, Inc.	Analysis Method: EPA 8020
Project#: 729457	Prep Method: EPA 5030
Location: Redwood G.Water & Surface	
LABORATORY CONTROL SAMPLE	
Matrix: Water	Prep Date: 08/24/96
Batch#: 29352	Analysis Date: 08/24/96
Units: ug/L	
Diln Fac: 1	

LCS Lab ID: QC28810

Analyte	Result	Spike Added	%Rec #	Limits
Benzene	19.1	20	96	80-120
Toluene	18.7	20	94	80-120
Ethylbenzene	18.4	20	92	80-120
m,p-Xylenes	38.1	40	95	80-120
o-Xylene	18.5	20	93	80-120

Surrogate	%Rec	Limits
Trifluorotoluene	95	58-130
Bromobenzene	88	62-131

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 5 outside limits

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TVH-Total Volatile Hydrocarbons			
Client:	Parsons Engineering Science, Inc.	Analysis Method:	CA LUFT (EPA 8015M)
Project#:	729457	Prep Method:	EPA 5030
Location:	Redwood G.Water & Surface		

LABORATORY CONTROL SAMPLE			
Matrix:	Water	Prep Date:	08/21/96
Batch#:	29268	Analysis Date:	08/21/96
Units:	ug/L		
Diln Fac:	1		

LCS Lab ID: QC28497

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	2135	2000	107	80-120
Surrogate	**%Rec**	**Limits**		
Trifluorotoluene	105	69-120		
Bromobenzene	103	70-122		

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 29268
Units: ug/L
Diln Fac: 1

Prep Date: 08/21/96
Analysis Date: 08/21/96

LCS Lab ID: QC28498

Analyte	Result	Spike Added	%Rec #	Limits
Benzene	18.1	20	91	80-120
Toluene	17.9	20	90	80-120
Ethylbenzene	18.2	20	91	80-120
m,p-Xylenes	37.5	40	94	80-120
o-Xylene	18.2	20	91	80-120

Surrogate	%Rec	Limits
Trifluorotoluene	98	58-130
Bromobenzene	89	62-131

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 5 outside limits

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TVH-Total Volatile Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: SW-3
Lab ID: 126567-008
Matrix: Water
Batch#: 29352
Units: ug/L
Diln Fac: 1

Sample Date: 08/15/96
Received Date: 08/15/96
Prep Date: 08/25/96
Analysis Date: 08/25/96

MS Lab ID: QC28812

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	2000	69	1938	94	75-125

Surrogate	%Rec	Limits
Trifluorotoluene	92	69-120
Bromobenzene	102	70-122

MSD Lab ID: QC28813

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	2000	1886	91	75-125	3	20

Surrogate	%Rec	Limits
Trifluorotoluene	91	69-120
Bromobenzene	102	70-122

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

BTXE

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: EPA 8020
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: MW-2
Lab ID: 126567-003
Matrix: Water
Batch#: 29268
Units: ug/L
Diln Fac: 1

Sample Date: 08/15/96
Received Date: 08/15/96
Prep Date: 08/21/96
Analysis Date: 08/21/96

MS Lab ID: QC28499

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Benzene	20	<0.5	20.1	101	75-125
Toluene	20	<0.5	18.2	91	75-125
Ethylbenzene	20	<0.5	18.3	92	75-125
m,p-Xylenes	40	<0.5	37.2	93	75-125
o-Xylene	20	<0.5	18.7	94	75-125

Surrogate	%Rec	Limits
Trifluorotoluene	99	58-130
Bromobenzene	98	62-131

MSD Lab ID: QC28500

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Benzene	20	19.9	100	75-125	1	20
Toluene	20	18.4	92	75-125	1	20
Ethylbenzene	20	18.7	94	75-125	2	20
m,p-Xylenes	40	37.5	94	75-125	1	20
o-Xylene	20	18.9	95	75-125	1	20

Surrogate	%Rec	Limits
Trifluorotoluene	100	58-130
Bromobenzene	98	62-131

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

TEH-Tot Ext Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-001	MW-4	29198	08/15/96	08/16/96	08/20/96	
126567-002	MW-5	29198	08/15/96	08/16/96	08/20/96	
126567-003	MW-2	29198	08/15/96	08/16/96	08/20/96	
126567-006	SW-1	29198	08/15/96	08/16/96	08/20/96	

Matrix: Water

Analyte Diln Fac:	Units	126567-001 1	126567-002 1	126567-003 1	126567-006 1
Diesel C12-C22	ug/L	120 YL	<51	<49	<48
Surrogate					
Hexacosane	%REC	91	99	101	93

Y: Sample exhibits fuel pattern which does not resemble standard
L: Lighter hydrocarbons than indicated standard

TEH-Tot Ext Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
126567-007	SW-2	29198	08/15/96	08/16/96	08/20/96	
126567-008	SW-3	29198	08/15/96	08/16/96	08/20/96	

Matrix: Water

Analyte	Units	126567-007	126567-008
Diln Fac:		1	1
Diesel C12-C22	ug/L	<48	<47
Surrogate			
Hexacosane	%REC	96	90

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TEH-Tot Ext Hydrocarbons			
Client:	Parsons Engineering Science, Inc.	Analysis Method:	CA LUFT (EPA 8015M)
Project#:	729457	Prep Method:	EPA 3520
Location:	Redwood G.Water & Surface		
METHOD BLANK			
Matrix:	Water	Prep Date:	08/16/96
Batch#:	29198	Analysis Date:	08/20/96
Units:	ug/L		
Diln Fac:	1		

MB Lab ID: QC28249

Analyte	Result	
Diesel C12-C22	<50	
Surrogate	%Rec	Recovery Limits
Hexacosane	99	60-140

Curtis & Tompkins, Ltd.

Lab #: 126567 BATCH QC REPORT

TEH-Tot Ext Hydrocarbons

Client: Parsons Engineering Science, Inc.
Project#: 729457
Location: Redwood G.Water & Surface

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
Batch#: 29198
Units: ug/L
Diln Fac: 1

Prep Date: 08/16/96
Analysis Date: 08/20/96

BS Lab ID: QC28250

Analyte	Spike Added	BS	%Rec #	Limits
Diesel C12-C22	2475	1685	68	60-140
Surrogate	%Rec	Limits		
Hexacosane	90	60-140		

BSD Lab ID: QC28251

Analyte	Spike Added	BSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	2475	1916	77	60-140	13	35
Surrogate	%Rec	Limits				
Hexacosane	100	60-140				

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

ES [illegible]ngin[illegible]-Scie[illegible]nc.
1301 Marina Village Parkway, Suite 200
Alameda, California 94501
Phone: (510) 769-0100 Fax: (510) 769-9244

CHAIN OF CUSTODY RECORD

1265 67

LABORATORY:	PROJECT MANAGER:	PROJ. #:
Curtis + Tompkins	Bruce Rucker	729457

PROJECT NAME/LOCATION: Redwood Park Service Yard / Oakland CA

SAMPLER(S): (SIGNATURE) B.M. Rucker (Bruce M. Rucker)

	SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSIS REQUIRED: METHOD PRESERVED — TPH-Gas → DTSC LUFT	TPH-diesel → DTSC LUFT	BTEX (only) EPA 8020	TO BE COMPOSITED BY LAB	TURN AROUND TIME	REMARKS
1	MW-4	9/15/96	1015	WATER	Monitoring well MW-4	3	X	X	X			
												SW-2 had petroleum sheen and may be significantly require dilution
2	MW-5	9/15/96	1110		" " MW-5	3	X	X	X			
3	MW-2	9/15/96	1255		" " MW-2	3	X	X	X			
4	MW-0A	9/15/96			" "	2	X		X			
5	MW-0B	9/15/96	1		" "	2	X		X			
6	SW-1		1220		Redwood Creek - downstream	3	X	X	X			STANDARD TAT
7	SW-2		1225		- central	3	X	X	X			
8	SW-3		1230		- upstream	3	X	X	X			

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY(SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)
Bruce M. Rucker	9/15/96	1530					

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	REMARKS:
			D Moore	9/15	3:40 pm	

DISTRIBUTION: WHITE: ACCOMPANIES SHIPMENT & RET'N WITH LAB REPORT, CANARY: LAB COPY, PINK: FIELD COPY

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