A Report Prepared for

Shell Oil Company
1390 Willow Pass Road, Suite 900
P. O. Box 4023
Concord, California 94524

QUARTERLY TECHNICAL REPORT
FIRST QUARTER OF 1991
SHELL SERVICE STATION
5755 BROADWAY
OAKLAND, CALIFORNIA

1 OF 3618

HLA Job No. 4022,218.03
SHELL WIC No. 204-5510-0303

by

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April 8, 1991

INTRODUCTION

This Quarterly Technical Report by Harding Lawson Associates (HLA) describes the status of our continuing evaluation of the presence of petroleum hydrocarbons in soil and groundwater in the vicinity of the Shell Oil Company (Shell) service station at 5755 Broadway in Oakland, California (Plate 1). This report discusses the site history and investigation progress through the first quarter of 1991, and summarizes activities we plan to undertake in the second quarter of 1991.

SITE HISTORY

HLA understands that this facility was a Thrifty service station prior to 1972, when Shell leased the parcel for its current facilities, which consist of three underground storage tanks (USTs), four canopy-covered dispenser islands, and a combined office building and cashier booth (Plate 2). The current USTs, each of 10,000-gallon capacity and double-wall fiberglass construction, were installed in late 1985 and are used for the storage of gasoline (regular leaded, unleaded, and super).

As part of a soil and groundwater assessment in June 1985, Gettler-Ryan Inc. (GRI) installed one soil boring (S-A) and a separate 4-inch-diameter monitoring well (S-1) on the site to depths of approximately 12 feet. Boring logs, well construction details, and results of analyses on samples were presented in a

letter from EMCON Associates (subcontractor to GRI) dated August 1, 1985. Low concentrations (up to 3 parts per million [ppm]) of total petroleum hydrocarbons (TPH) as gasoline were detected in soil samples from 5 to 10 feet deep in S-A, although a deeper soil sample (about 11.5 feet below grade) contained no detectable concentrations of TPH as gasoline. Table 1 shows these results, along with results of subsequent soil sampling and analyses.

A groundwater sample from the monitoring well (S-1) had TPH as gasoline at 2,400 parts per billion (ppb), and benzene at 240 ppb (Table 2). These data indicated that petroleum hydrocarbons had entered the soil and groundwater on site.

On August 10, 1989, Shell retained HLA to complete the site assessment and evaluate the need for remediation. On August 15, 1989, HLA obtained a groundwater sample from S-1. That sample contained concentrations of TPH as gasoline and benzene (Table 2) in respective concentrations of 170 and 0.6 ppb.

In September 1989, HLA drilled two soil borings, S-2 and S-3. Drilling was performed under the direction of an HLA field engineer, who obtained soil samples and converted the borings to groundwater monitoring wells in the manner outlined in HLA's work plan dated October 13, 1989. HLA has monitored the wells quarterly since November 1989, including collection and analysis of water samples. Results of analyses on soil and groundwater samples are summarized in Tables 1 and 2, respectively.

ACCOMPLISHMENTS DURING THE FIRST QUARTER OF 1991

Groundwater Sampling

On January 25, 1991, HLA collected groundwater samples from S-1 through S-3. Before sampling, we purged at least three casing volumes of water from each well while monitoring temperature, pH, and conductivity. After these parameters stabilized, groundwater samples were collected with a clean stainless steel bailer, and decanted directly into laboratory-prepared volatile organic analysis (VOA) vials. Between wells, all purging and sampling equipment was cleaned with an Alconox solution and rinsed with deionized water. The samples were labeled and placed into an ice-chilled cooler and delivered under chain-of-custody to Sequoia Analytical Laboratory in Concord, California, a state-certified chemical testing laboratory. Samples were analyzed for TPH as gasoline (USEPA Test Method 8015, modified) and for benzene, toluene, ethylbenzene, and total xylenes (BTEX) (USEPA Test Method 8020).

Chemical Test Results

The results of chemical analyses on groundwater samples are shown in Table 2; the laboratory report is in the appendix. The water samples from S-1 and S-3 showed non-detectable concentrations of all compounds tested. Results from S-2 indicated 450 ppb TPH as gasoline and 140 ppb benzene. As shown in Table 2, the concentrations of these two components in S-2 have fluctuated since the well was installed, with a slight

increase in the most recent quarter. Data for S-1 show that TPH and benzene concentrations have also fluctuated, but have shown a decreasing trend since April 1990. Data for S-3 have consistently shown non-detectable concentrations of all components since well installation.

Groundwater Gradient

Water-level measurements were obtained using a chalked steel tape accurate to 0.01 feet. Well survey and water-level data are presented in Table 3. Shallow groundwater, as measured in S-1 through S-3, was between 3 and 5 feet below grade. The direction of groundwater flow, as inferred from the calculated direction of the hydraulic gradient, is to the south. Except for the fluctuation in groundwater elevation, these data are consistent with those from previous quarters. The rate of groundwater movement was not determined in this study.

ANTICIPATED ACTIVITIES FOR THE SECOND QUARTER 1991

HLA plans to perform the following tasks in the second quarter of 1991:

- Obtain encroachment permit from the City of Oakland for two off-site groundwater monitoring wells;
- Install and sample two additional on-site and two off-site monitoring wells to evaluate the lateral and vertical extent of hydrocarbons in soil and groundwater;
- Reconstruct monitoring well S-1, which currently has an inadequate surface seal in the annular space between the casing and borehole wall;

- Conduct quarterly monitoring activities, including measurement of water levels, checking for free product, and sampling of groundwater from each of the monitoring wells.

- Submit soil and groundwater samples for TPH and BTEX analyses. Results will be presented in our next quarterly technical report.

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Table 1. Summary of Analyses on Soil Samples

Sample Number	Depth (ft)	Sampling Date	TPH as Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Xylenes (ppm)
S-A*	5.5	06/12/85	3	--	--	--	--
S-A*	10	06/12/85	2	--	--	--	--
S-A*	11.5	06/12/85	ND	--	--	--	--
S-2-1	3.0	09/18/89	92	.120	.800	.580	4.20
S-3-1	3.0	09/18/89	ND (10)	ND (.025)	.062 (.025)	ND (.025)	.120

Reporting Limits in parentheses
ND = Not detected
TPH = Total petroleum hydrocarbons
* From Emcon report dated 08/01/85
-- Not Tested

Table 2. Summary of Analyses on Groundwater Samples

Well Number	Sampling Date	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
S-1	07/03/85*	2,400	240	9.8	380**	--
	08/15/89	170	0.6	ND (.5)	ND (1.5)	ND (1.5)
	11/13/89	90	1.2	ND (.5)	ND (1.5)	ND (1.5)
	01/18/90	ND (50)	57	3.1	5.7	10
	04/11/90	520	120	2.2	.44	6.0
	07/27/90	ND (30)	2.7	0.31	ND (.3)	0.47
	10/17/90	ND (30)	0.99	ND (.3)	ND (.3)	ND (.3)
	01/25/91	ND (30)	ND (3)	ND (.3)	ND (.3)	ND (.3)
S-2	09/22/89	260	15	2	1	13
	11/13/89	910	64	5.8	13	84
	01/18/90	1,100	74	5.6	13	45
	04/11/90	2,900	510	6.5	29	120
	07/27/90	700	210	2.5	18	33
	10/17/90	320	44	0.75	7.9	4.6
	01/25/91	450	140	1.8	6.2	15
S-3	09/22/89	ND (50)	ND (.5)	ND (.5)	ND(1.5)	ND(1.5)
	11/13/89	ND (50)	ND (.5)	ND (.5)	ND(1.5)	ND(1.5)
	01/18/90	ND (50)	ND (.5)	ND (.5)	ND (.5)	ND (.5)
	04/11/90	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)
	07/27/90	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)
	10/17/90	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)
	01/25/91	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)

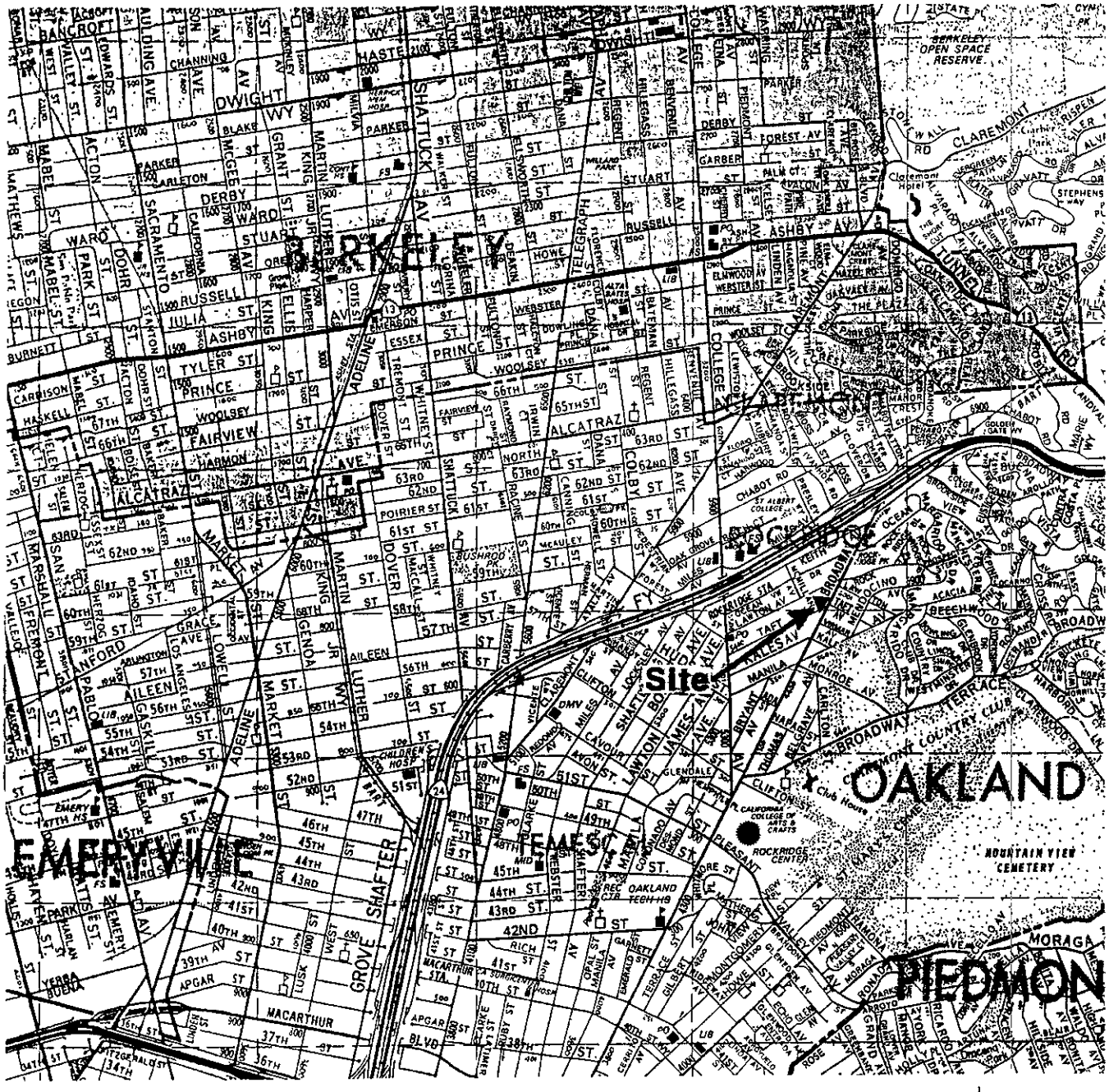
Reporting limits in parentheses
ND = Not Detected
TPH = Total petroleum hydrocarbons
* From EMCON report dated 08/01/85
-- Not Tested

Table 3. Well-survey and Water-level Data

Well Number	Date	Top of Casing (feet)	Depth to Groundwater (feet)	Relative Groundwater Elevation (feet)
S-1	10/05/89	*100.00	3.80	96.20
	11/13/89		3.72	96.12
	01/18/90		2.87	97.13
	02/20/90		2.71	97.29
	04/11/90		3.36	96.64
	07/27/90		3.60	96.40
	10/17/90		4.09	95.91
	01/25/91		3.88	96.12
S-2	10/05/89	98.92	4.44	94.48
	11/13/89		4.44	94.48
	01/18/90		3.41	95.51
	02/20/90		3.19	95.73
	04/11/90		3.94	94.98
	07/27/90		4.13	94.79
	10/17/90		4.57	94.35
	01/25/91		4.52	94.40
S-3	10/05/89	101.67	3.97	97.70
	11/13/89		3.76	97.91
	01/18/90		2.43	99.24
	02/20/90		2.27	99.40
	04/11/90		2.88	98.79
	07/27/90		3.55	98.12
	10/17/90		4.29	97.38
	01/25/91		3.84	97.83

* Temporary datum of 100.00 feet assigned to top-of-casing at well number S-1

ILLUSTRATIONS



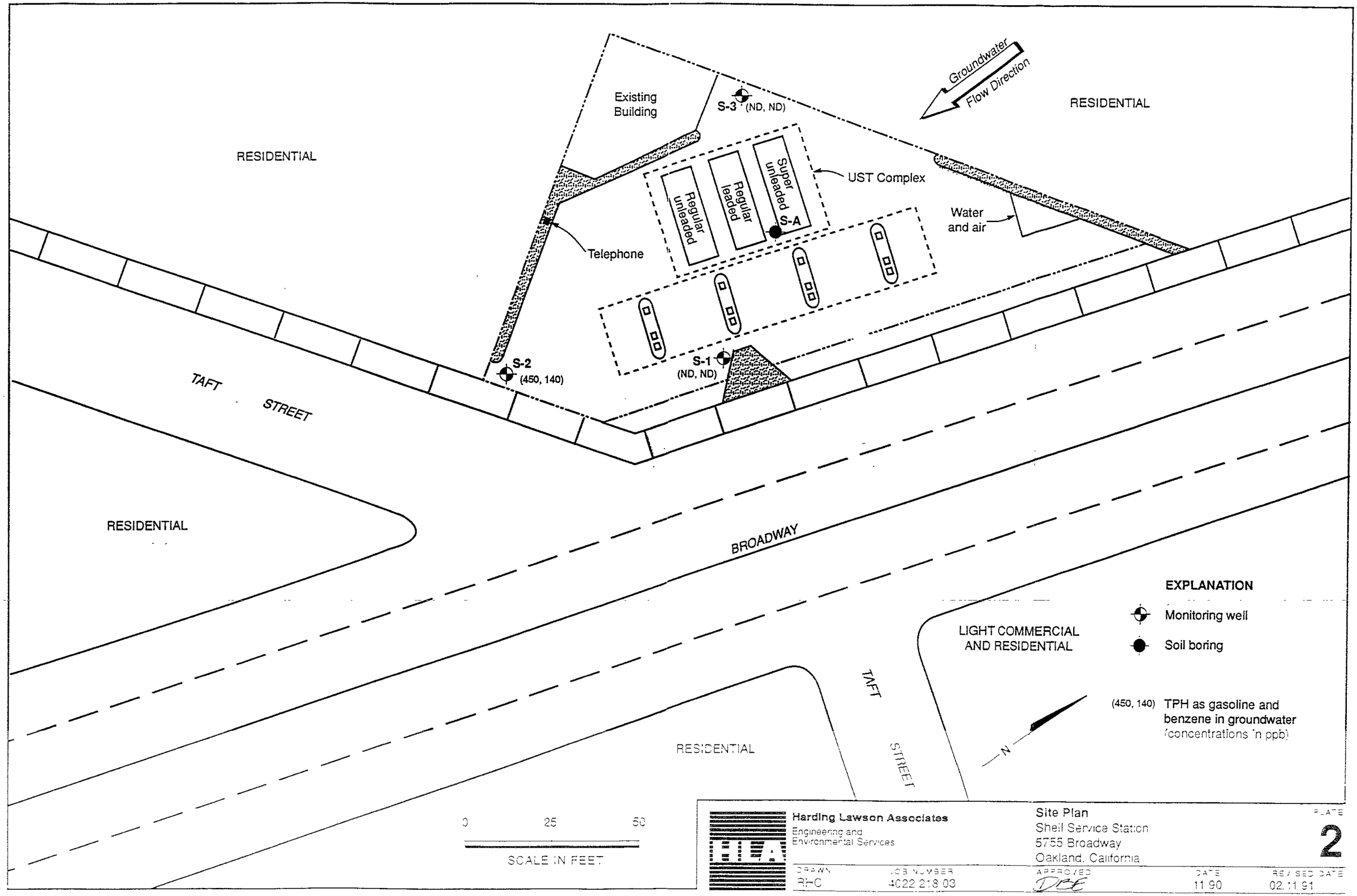
BASE MAP FROM THOMAS BROS. MAPS.

Harding Lawson Associates
Engineering and
Environmental Services

Vicinity Map
Shell Service Station
5755 Broadway
Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
KH	4022,218.03		8/89	



Harding Lawson Associates
Engineering and Environmental Services

Site Plan
Shell Service Station
5755 Broadway
Oakland, California

PLATE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RHC	4022.218.03	DCE	11/90	02/11/91

APPENDIX

LABORATORY REPORT

SEQUOIA ANALYTICAL
680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, CA 94520
Attention: Dan Erbes

Project: 4022, 218.03 / Shell, Broadway

Enclosed are the results from 3 water samples received at Sequoia Analytical on January 28,1991. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1013186	Water, S-1	1/25/91	EPA 5030/8015/8020
1013187	Water, S-2	1/25/91	EPA 5030/8015/8020
1013188	Water, S-3	1/25/91	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Maile A. McBirney
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Harding Lawson Associates	Client Project ID:	4022, 218.03 / Shell, Broadway	Sampled:	Jan 25, 1991
1355 Willow Way, Suite 109	Matrix Descript:	Water	Received:	Jan 28, 1991
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jan 30, 1991
Attention: Dan Erbes	First Sample #:	101-3186 A-B	Reported:	Feb 4, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
101-3186	S-1	N.D.	N.D.	N.D.	N.D.	N.D.
101-3187	S-2	450	140	1.8	6.2	15
101-3188	S-3	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. McBirney
Project Manager

SEQUOIA ANALYTICAL
680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, CA 94520
Attention: Dan Erbes

Client Project ID: 4022, 218.03 / Shell, Broadway

QC Sample Group: -

Reported: Feb 4, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	p & m Xylenes	o-Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	G. M. / E. G.	G. M. / E. G.	G. M. / E. G.	G. M. / E. G.	G. M. / E. G.
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jan 30, 1991	Jan 30, 1991	Jan 30, 1991	Jan 30, 1991	Jan 30, 1991
QC Sample #:	G1013243	G1013243	G1013243	G1013243	G1013243
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	100	100	100	200	100
Conc. Matrix Spike:	110	100	100	200	100
Matrix Spike % Recovery:	110	100	100	100	100
Conc. Matrix Spike Dup.:	110	100	100	200	100
Matrix Spike Duplicate % Recovery:	110	100	100	100	100
Relative % Difference:	0.94	0.0	0.0	0.0	0.97

SEQUOIA ANALYTICAL

Malle A. McBirney
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

Harding Lawson Associates
1355 Willow Way, Suite 109
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CHAIN OF CUSTODY FORM

Lab: Sequoia

Job Number: 4022,218.03
Name/Location: Shell Broadway
Project Manager: Dan Erbes

Samplers: Amy McTigue

Recorder: Amy McTigue
(Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCl	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	TPH GAS	BTEX
2	X							2	S-	1		90	01	25		✓ 1013188 6 A|B							X	X
23	X							2	S-	2		90	01	25		✓ ↓ 31887							X	X
23	X							2	S-	3		90	01	25		✓ ↓ 31988 ↓							X	X

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
						WIC# 204.5510-0303
						AFE # 986697
						Exp Code # 5441
						Standard T/A

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
Amy McTigue	[illegible signature]	1-25-90 16:30
V.G. Herrera	[illegible signature]	1-25-90 12:30 PM

DISPATCHED BY: (Signature)	DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
		K. Walters	1/28 2:45 p.

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Oakland, California 94607
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Health Department
80 Swan Way, Room 200
Oakland, California 94621
Attention: Mr. Ed Howell

DBE/DGG/bb 032029P/R44

QUALITY CONTROL REVIEWER

Terence J. McManus
Associate Environmental Scientist