A Report Prepared for

Shell Oil Company
Environmental Engineering
P.O. Box 5278
Concord, California 94520

QUARTERLY TECHNICAL REPORT
THIRD QUARTER OF 1991
SHELL SERVICE STATION
5755 BROADWAY
OAKLAND, CALIFORNIA
SHELL WIC NO. 204-5510-0303

LOP 3618

HLA Job No. 4022,218.03

by

Michael J. Brink
Staff Engineer

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October 10, 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 third quarter of 1991, and summarizes activities we plan to undertake in the fourth 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 activities. The facility consists 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 unleaded).

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 to

Shell 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 performed by HLA.

A groundwater sample collected in 1985 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 THIRD QUARTER OF 1991

Groundwater Sampling

On August 30, 1991, HLA collected groundwater samples from S-1 through S-3. Before sampling, approximately three casing volumes of water was purged from each well while monitoring temperature, pH, and conductivity. After these parameters stabilized, groundwater samples were collected with a teflon 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 sample containers were labeled and placed into an ice-chilled cooler and delivered under chain-of-custody to Sequoia Analytical Laboratory, a state-certified chemical testing laboratory in Redwood City, California. 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 and chain-of-custody are in the appendix. The water samples from S-1 and S-3 showed non-detectable concentrations of all compounds tested. Results of analyses on groundwater from S-2 indicated 70 ppb TPH as gasoline and 0.37 ppb benzene; toluene, ethylbenzene and xylenes were below the analytical detection limits in this sample. As shown

in Table 2, the concentrations of gasoline and benzene in groundwater from S-2 have fluctuated since the well was installed, with a substantial decrease in the most recent quarter. Data for S-1 show that TPH and benzene concentrations have also fluctuated, but have shown non-detectable concentrations during the first three quarters of 1991. Data for S-3 have consistently shown non-detectable concentrations of all components since the well was installed in September, 1989.

Groundwater Gradient

Water-level measurements were obtained on August 30, 1991, 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 4 and 5 feet below grade. The direction of groundwater flow, as inferred from the calculated direction of the hydraulic gradient, is to the south (Plate 2). The groundwater elevation in S-1 and S-2 has dropped by approximately 3/4 of a foot during the last quarter; during that same period, groundwater has dropped by almost 1.5 feet in S-3. The rate of groundwater movement was not determined in this study.

ANTICIPATED ACTIVITIES FOR THE FOURTH QUARTER 1991

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

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

- Submit 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	ND (.025)	.120

Detection 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)
	06/03/91	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)
	08/30/91	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
	06/03/91	490	150	2.7	8.2	7.0
	08/30/91	70	0.37	ND (.3)	ND (.3)	ND (.3)
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)
	06/03/91	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)
	08/30/91	ND (30)	ND (.3)	ND (.3)	ND (.3)	ND (.3)

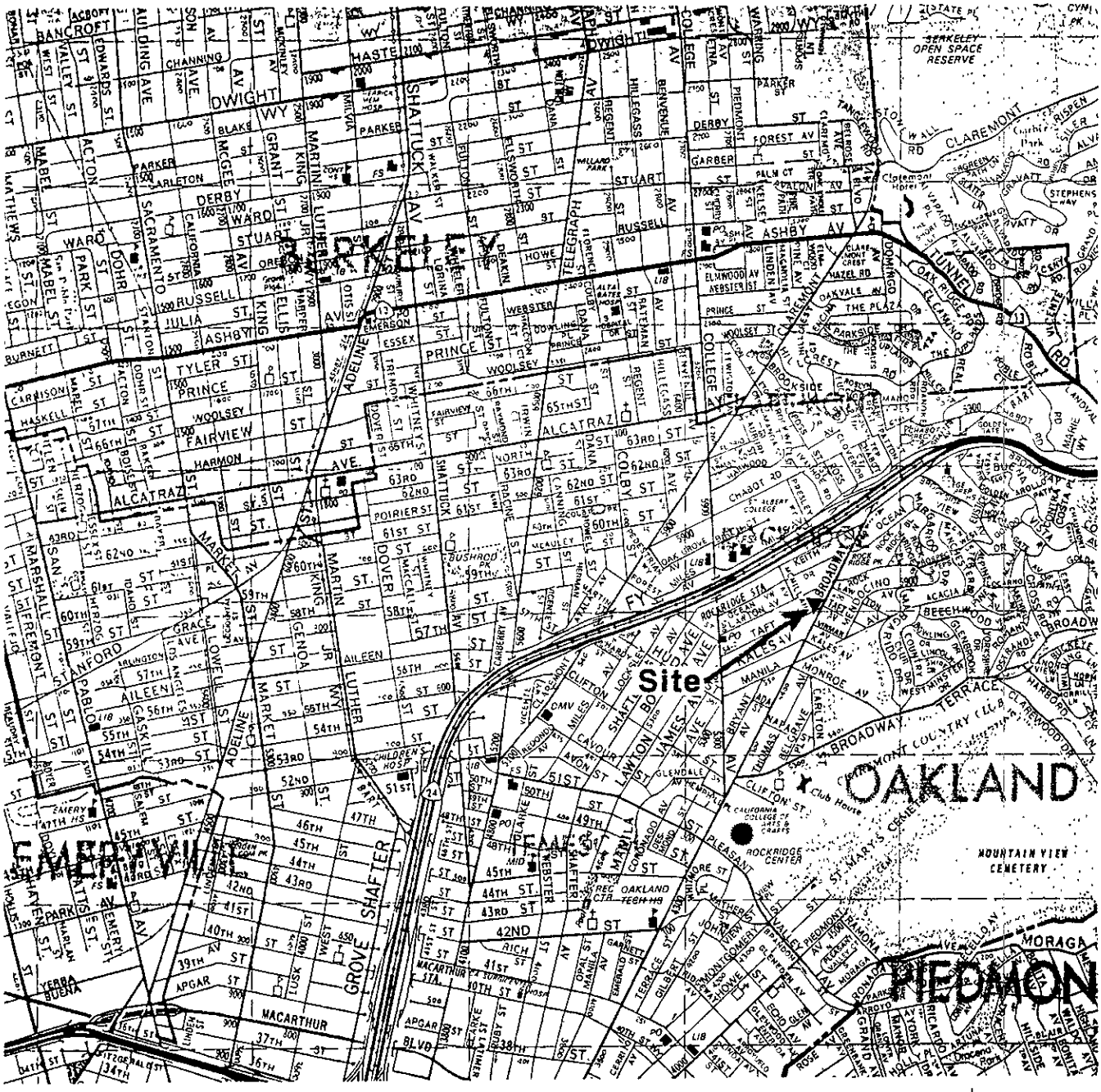
Detection limits in parentheses
ND = Not present above detection limits
ppb = Parts per billion
TPH = Total petroleum hydrocarbons
* From EMCON report dated 08/01/85
-- = Not tested

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
	06/03/91		3.51	96.49
	08/30/91		4.24	95.76
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
	06/03/91		4.02	94.90
	08/30/91		4.70	94.22
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
	06/03/91		3.25	98.42
	08/30/91		4.73	96.94

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

ILLUSTRATIONS



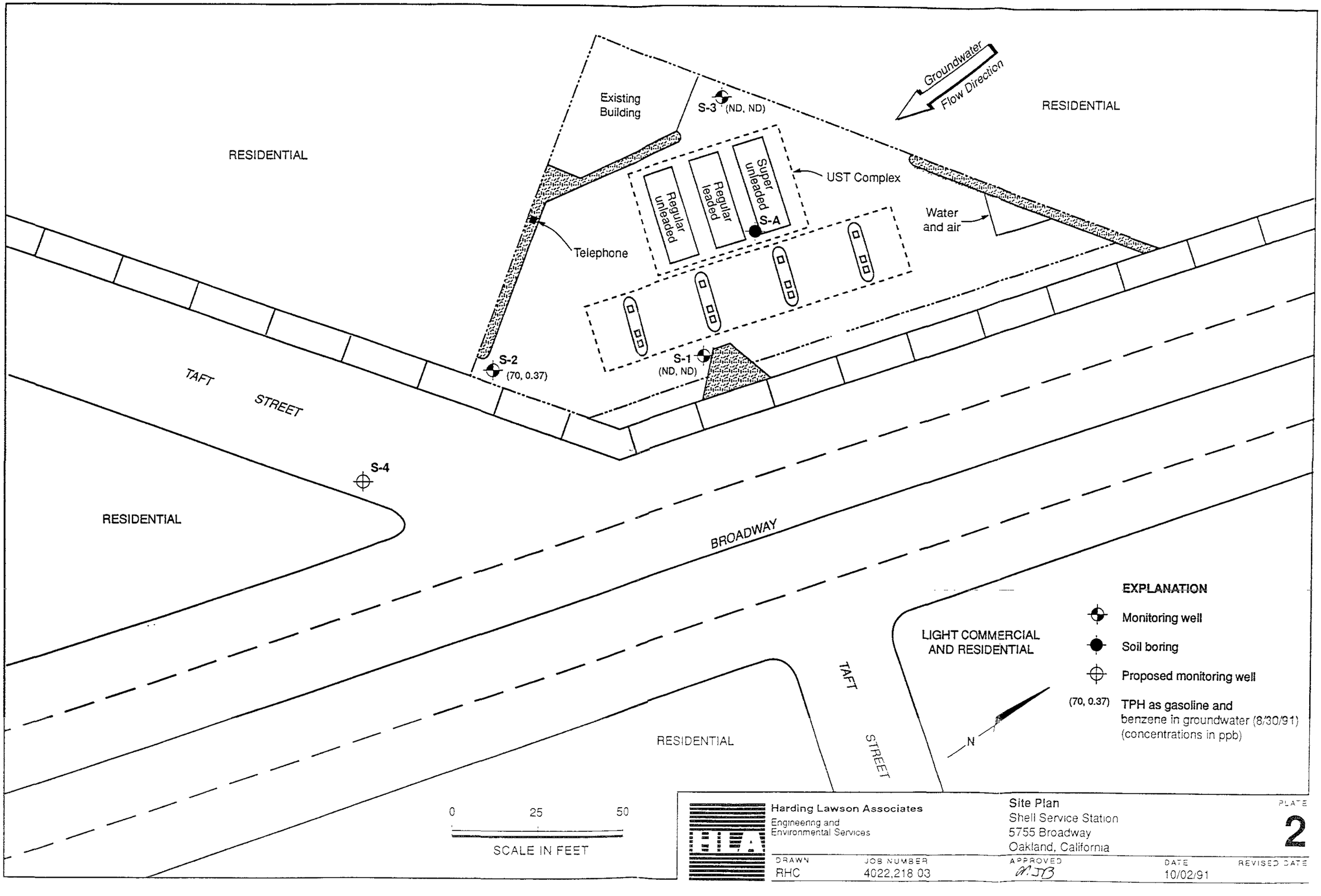
BASE MAP FROM THOMAS BROS. MAPS.

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		10/02/91	

APPENDIX

LABORATORY REPORT AND CHAIN-OF-CUSTODY

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: Mike Brink

HARDING ASSOC.
SEP 12 1991

Project: #4022, 218.03, Shell Broadway

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

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1085700	Water, S - 1	8/30/91	EPA 5030/8015/8020
1085701	Water, S - 2	8/30/91	EPA 5030/8015/8020
1085702	Water, S - 3	8/30/91	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 McBirney Springer
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:	Aug 30, 1991
1355 Willow Way, Suite 109	Matrix Descript:	Water	Received:	Sep 3, 1991
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Sep 5, 1991
Attention: Mike Brink	First Sample #:	108-5700 A - C	Reported:	Sep 7, 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)
108-5700	S - 1	N.D.	N.D.	N.D.	N.D.	N.D.
108-5701	S - 2	70	0.37	N.D.	N.D.	N.D.
108-5702	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 McBirney Springer
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: Mike Brink

Client Project ID: #4022, 218.03, Shell Broadway

QC Sample Group: 1085700 - 02

Reported: Sep 7, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	D.Dreblow	D.Dreblow	D.Dreblow	D.Dreblow
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Sep 5, 1991	Sep 5, 1991	Sep 5, 1991	Sep 5, 1991
QC Sample #:	GBLK090591	GBLK090591	GBLK090591	GBLK090591
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	10	10	10	30
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	9.6	9.7	9.8	29
Matrix Spike Duplicate % Recovery:	96	97	98	97
Relative % Difference:	4.1	3.1	2.0	3.4

SEQUOIA ANALYTICAL

Maile McBirney Springer
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
1333 Willow Way, Suite 109
Concord, California 94520
415/687-9660
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CHAIN OF CUSTODY FORM

COPY

Lab: Sequoia

Samplers: DPM

Job Number: 4022,218.03

Name/Location: Shell Broadway

Project Manager: M. Brink

Recorder: D Meyer (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCl VOA	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	TPHgas BTEX
23	X							3	S	1		91	08	30		Std Shell TAT							X
23	X							3	S	2													X
23	X							3	S	3													X

1085700
01
02

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
						5155 Broadway X.S. taft WIC#204-5510-0303

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) D Meyer	RECEIVED BY: (Signature) David Newton	DATE/TIME 8/30 1425
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature) Z. Moreno	DATE/TIME 9/30 8:00A
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
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Oakland, California 94621
Attention: Mr. Ed Howell

MJB/DGG/mlr 032608P/R49

QUALITY CONTROL REVIEWER

Terence J. McManus
Associate Environmental Scientist