KAPREALIAN ENGINEERING
INCORPORATED

June 3, 1993

STID 3627

Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, CA 94621

Attention: Mr. Tom Peacock

RE: Unocal Service Station #3538
411 W. MacArthur Blvd.
Oakland, California

Gentlemen:

Per the request of Mr. Tim Howard of Unocal Corporation, enclosed please find our report dated April 29, 1993, for the above referenced site.

If you should have any questions, please feel free to call our office at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

Judy A. Dewey

jad\82

Enclosure

cc: Tim Howard, Unocal Corporation

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510.602.5100 Fax: 510.687.0602

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P89-0703.QR14
April 29, 1993

Unocal Corporation
2000 Crow Canyon Place, Suite 400
P.O. Box 5155
San Ramon, California 94583

Attention: Mr. Tim Howard

RE: Quarterly Report
Unocal Service Station #3538
411 W. MacArthur Boulevard
Oakland, California

Dear Mr. Howard:

This report presents the results of the most recent quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per KEI's proposal (KEI-P89-0703.P3) dated February 28, 1991, and as modified in KEI's quarterly reports (KEI-P89-0703.QR7) dated August 20, 1991, and (KEI-P89-0703.QR11) dated August 12, 1992. All of the wells are currently monitored quarterly, and wells MW2, MW3, MW5, and MW6 are sampled on a quarterly basis. Wells MW1 and MW4 are sampled on an annual basis. This report covers the work performed by KEI from February through April of 1993.

BACKGROUND

The subject site contains a Unocal service station facility. Two underground fuel storage tanks, one waste oil tank, and the product piping were removed from the site in July of 1989 during tank replacement activities. The fuel tank pit was subsequently overexcavated 4 feet laterally and to the ground water depth (10.5 feet below grade) in order to remove contaminated soil. Six monitoring wells have been installed at and in the vicinity of the site.

A site description, detailed background information including a summary of all of the soil and ground water subsurface investigation/remediation work conducted to date, site hydrogeologic conditions, and tables that summarize all of the soil and ground water sample analytical results are presented in KEI's report (KEI-P89-0703.R6) dated January 18, 1993.

RECENT FIELD ACTIVITIES

The six monitoring wells (MW1 through MW6) were monitored once, and wells MW2, MW3, MW5, and MW6 were sampled once during the quarter.

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510.602.5100 Fax: 510.687.0602

Wells MW1 and MW4 are sampled on an annual basis, and therefore were not sampled this quarter. Prior to sampling, the wells were checked for depth to water and the presence of free product or sheen. No free product or sheen was noted in any of the wells during the quarter. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from wells MW2, MW3, MW5, and MW6 on April 13, 1993. Prior to sampling, these wells were each purged of between 5 and 13 gallons of water by the use of a surface pump. Water samples were collected by the use of a clean Teflon bailer. The samples were decanted into clean VOA vials that were then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to a state-certified laboratory.

HYDROLOGY

The measured depth to ground water at the site on April 13, 1993, ranged between 11.94 and 17.96 feet below grade. The water levels in all of the wells have shown net decreases ranging from 0.05 to 0.66 foot since January 8, 1993, except for well MW6, which showed a net increase of 1.06 feet. Based on the water level data gathered on April 13, 1993, the ground water flow direction appeared to be predominantly to the east over the majority of the Unocal site, and to the south-southwest over the northeast portion of the site vicinity, as shown on the attached Potentiometric Surface Map, Figure 1. The ground water flow direction has been predominantly to the east over the majority of the Unocal site since October of 1990 (ten consecutive quarters). In addition, since the installation of off-site wells MW5 and MW6 in November of 1992, a south-southwest ground water flow direction has been observed at the northeast portion of site vicinity (the last two consecutive quarters). The hydraulic gradient at the site on April 13, 1993, was approximately 0.012, and the hydraulic gradient to the northeast of the site was approximately 0.047. The difference between the ground water level in well MW6 (off-site and to the north of the site) and all of the other wells was more than 5 feet, whereas the difference in the ground water levels in the five other wells was less than 0.75 feet.

ANALYTICAL RESULTS

The ground water samples were analyzed at Sequoia Analytical Laboratory and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by EPA method 5030/modified 8015, and benzene, toluene, xylenes, and ethylbenzene by EPA method 8020. In addition, the ground water samples collected from

wells MW2 and MW3 were analyzed for methyl tert butyl ether (MTBE) by EPA method 8020 (modified).

The analytical results for all of the ground water samples collected to date are summarized in Tables 2 and 3. The concentrations of TPH as gasoline and benzene detected in the ground water samples collected this quarter are shown on the attached Figure 2. Copies of the laboratory analytical results and the Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results for the ground water samples collected and evaluated to date, and no evidence of free product or sheen in any of the wells, KEI recommends the continuation of the current ground water monitoring and sampling program, per KEI's proposal (KEI-P89-0703.P3) dated February 28, 1991, and as modified in KEI's quarterly reports (KEI-P89-0703.QR7) dated August 20, 1991, and (KEI-P89-0703.QR11) dated August 12, 1992. KEI also recommends that the ground water samples collected from wells MW2 and MW3 continue to be analyzed for MTBE.

DISTRIBUTION

A copy of this report should be sent to the Alameda County Health Care Services Agency, and to the Regional Water Quality Control Board, San Francisco Bay Region.

LIMITATIONS

Environmental changes, either naturally-occurring or artificially-induced, may cause changes in ground water levels and flow paths, thereby changing the extent and concentration of any contaminants.

Our studies assume that the field and laboratory data are reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

The results of this study are based on the data obtained from the field and laboratory analyses obtained from a state-certified laboratory. We have analyzed these data using what we believe to be currently applicable engineering techniques and principles in the Northern California region. We make no warranty, either expressed or implied, regarding the above, including laboratory analyses, except that our services have been performed in accordance with generally accepted professional principles and practices existing for such work.

If you have any questions regarding this report, please do not hesitate to call at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

Thomas J. Berkins
Senior Environmental Engineer

Joel G. Greger, C.E.G.
Senior Engineering Geologist

License No. 1633
Exp. Date 6/30/94

Timothy R. Ross
Project Manager

/bp

Attachments: Tables 1, 2 & 3
Location Map
Potentiometric Surface Map - Figure 1
Concentrations of Petroleum Hydrocarbons - Figure 2
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0703.QR14
April 29, 1993

TABLE 1

SUMMARY OF MONITORING DATA

Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)
(Monitored and Sampled on April 13, 1993)					
MW1*	54.73	17.70	0	--	0
MW2	53.77	17.86	0	No	7
MW3	54.10	17.96	0	No	5
MW4*	54.31	17.67	0	--	0
MW5	54.02	17.49	0	No	9
MW6	59.85	11.94	0	No	13

Well No.	Well Cover Elevation** (feet)
MW1	72.43
MW2	71.63
MW3	72.06
MW4	71.98
MW5	71.51
MW6	71.79

* Monitored only.

** The elevations of the tops of the well covers have been surveyed relative to Mean Sea Level, per City of Oakland Benchmark #9NW10 (elevation = 75.50).

-- Sheen determination was not performed.

KEI-P89-0703.QR14
April 29, 1993

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	MTBE
4/13/93	MW2	410♦♦	42	7.7	28	6.4	200
	MW3	12,000♦♦	290	38	2,300	760	1,400
	MW5	ND	ND	ND	ND	ND	--
	MW6	ND	ND	ND	ND	ND	--
1/08/93	MW2	510♦	ND	ND	ND	ND	--
	MW3	1,100♦♦	48	0.99	93	0.90	--
	MW5	ND	ND	ND	ND	ND	--
	MW6	ND	ND	ND	ND	ND	--
11/30/92	MW5	ND	ND	ND	ND	ND	--
	MW6	ND	ND	ND	ND	ND	--
10/12/92	MW2	370	3.4	0.56	11	ND	--
	MW3	3,200	160	10	540	230	--
7/14/92	MW1	ND	ND	ND	ND	ND	--
	MW2	130	3.7	ND	ND	ND	--
	MW3	21,000	890	200	4,300	1,200	--
	MW4	ND	1.3	2.5	1.0	ND	--
4/14/92	MW2	150	6.2	ND	1.4	ND	--
	MW3	14,000	660	48	2,000	560	--
1/15/92	MW2	220	37	0.52	7.0	1.1	--
	MW3	3,000	590	14	750	310	--
10/15/91	MW2	140	44	0.56	12	1.5	--
	MW3	3,100	390	34	390	150	--
7/15/91	MW1	ND	ND	ND	ND	ND	--
	MW2	2,200	770	12	370	72	--
	MW3	9,200	1,300	230	1,900	490	--
	MW4	ND	ND	ND	ND	ND	--
4/12/91	MW1	ND	ND	ND	ND	ND	--
	MW2	2,200	160	4.3	62	23	--
	MW3	880	170	1.1	110	34	--
	MW4	ND	ND	ND	ND	ND	--

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April 29, 1993

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	MTBE
1/15/91	MW1	ND	ND	ND	ND	ND	--
	MW2	680	170	0.7	81	19	--
	MW3	3,200	460	1.5	270	120	--
	MW4	ND	ND	ND	ND	--	
10/16/90	MW1	ND	ND	ND	ND	ND	--
	MW2	1,400	430	2.0	240	48	--
	MW3	740	210	1.4	82	2.5	--
	MW4	ND	ND	ND	ND	ND	--
7/17/90	MW1	ND	ND	ND	ND	ND	--
	MW2	490	76	0.59	46	11	--
	MW3	4,000	270	48	250	130	--
	MW4	ND	ND	ND	ND	ND	--
4/19/90	MW1	ND	ND	ND	ND	ND	--
	MW2	3,900	550	5.1	390	91	--
	MW3	3,100	600	27	220	54	--
	MW4	ND	ND	0.48	ND	ND	--
1/23/90	MW1	ND	1.5	2.3	4.3	ND	--
	MW2	400	73	36	40	10	--
	MW3	450	110	1.2	11	4.4	--
	MW4	ND	ND	0.40	ND	ND	--
9/15/89	MW1	ND	ND	0.61	ND	ND	--
	MW2	290	ND	12	ND	ND	--
	MW3	32	ND	ND	ND	ND	--
	MW4	ND	ND	ND	ND	ND	--

-- Indicates analysis was not performed.

♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be gasoline.

♦♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be a gasoline and a non-gasoline mixture.

ND = Non-detectable.

Results in parts per billion (ppb), unless otherwise indicated.

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TABLE 3

SUMMARY OF LABORATORY ANALYSES
WATER

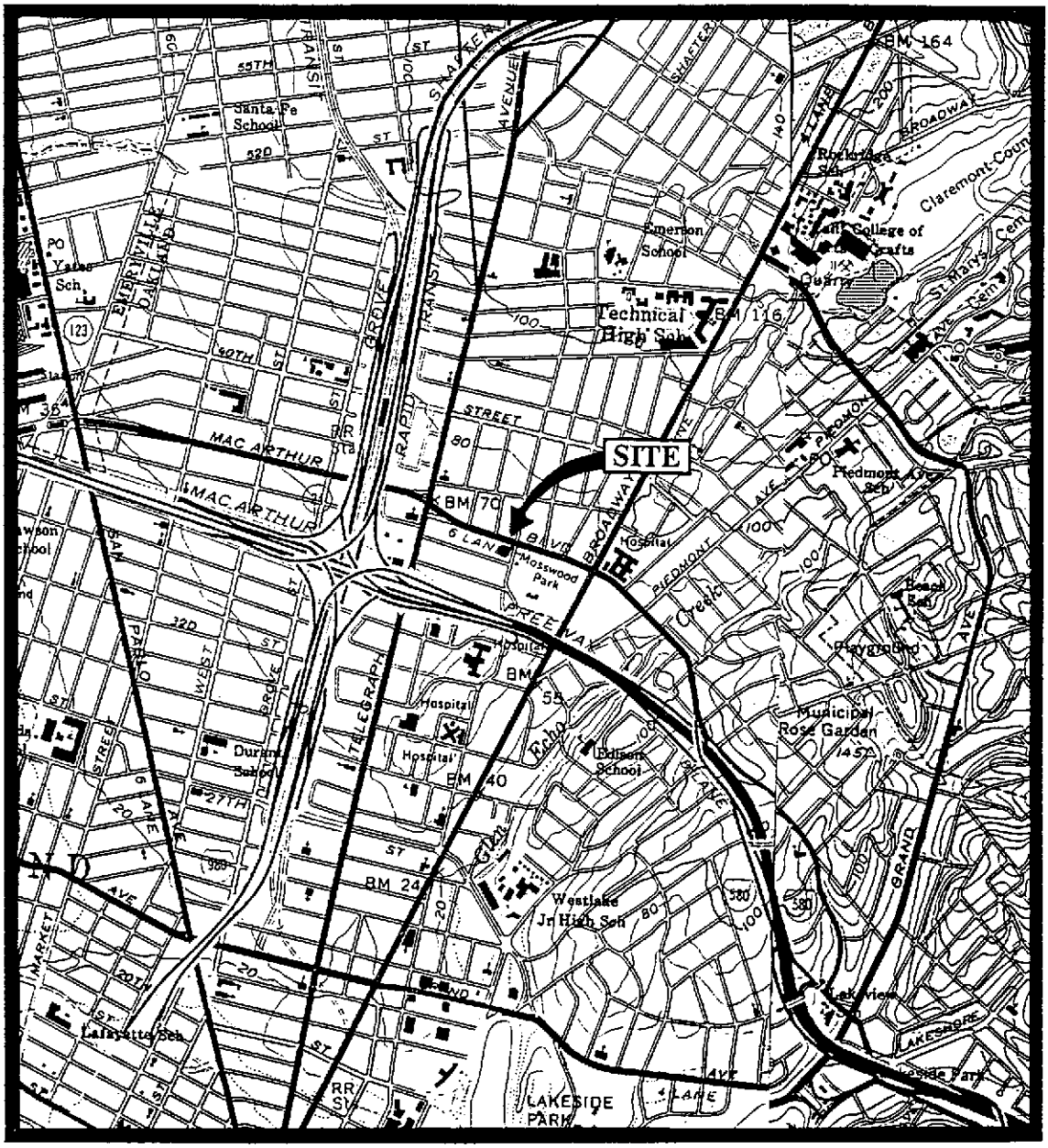
Date	Sample Well #	TPH as Diesel	TOG (ppm)	Tetrachloro-ethene*
7/14/92	MW1	--	--	1.4
7/15/91	MW1	ND	ND	1.8
4/12/91	MW1	ND	ND	2.0
1/15/91	MW1	ND	ND	2.1
10/16/90	MW1	ND	ND	2.0
7/17/90	MW1	ND	ND	1.7
4/19/90	MW1	ND	ND	2.2
1/23/90	MW1	ND	1.5	2.1
9/15/89	MW1	ND	<50	2.7

-- Indicates analysis was not performed.

* All EPA method 8010 constituents were non-detectable, except for tetrachloroethene as indicated.

ND = Non-detectable.

Results in parts per billion (ppb), unless otherwise indicated.



Base modified from 7.5 minute U.S.G.S. Oakland East & West Quadrangles
(both photorevised 1980)

0 2000 4000

Approx. scale feet

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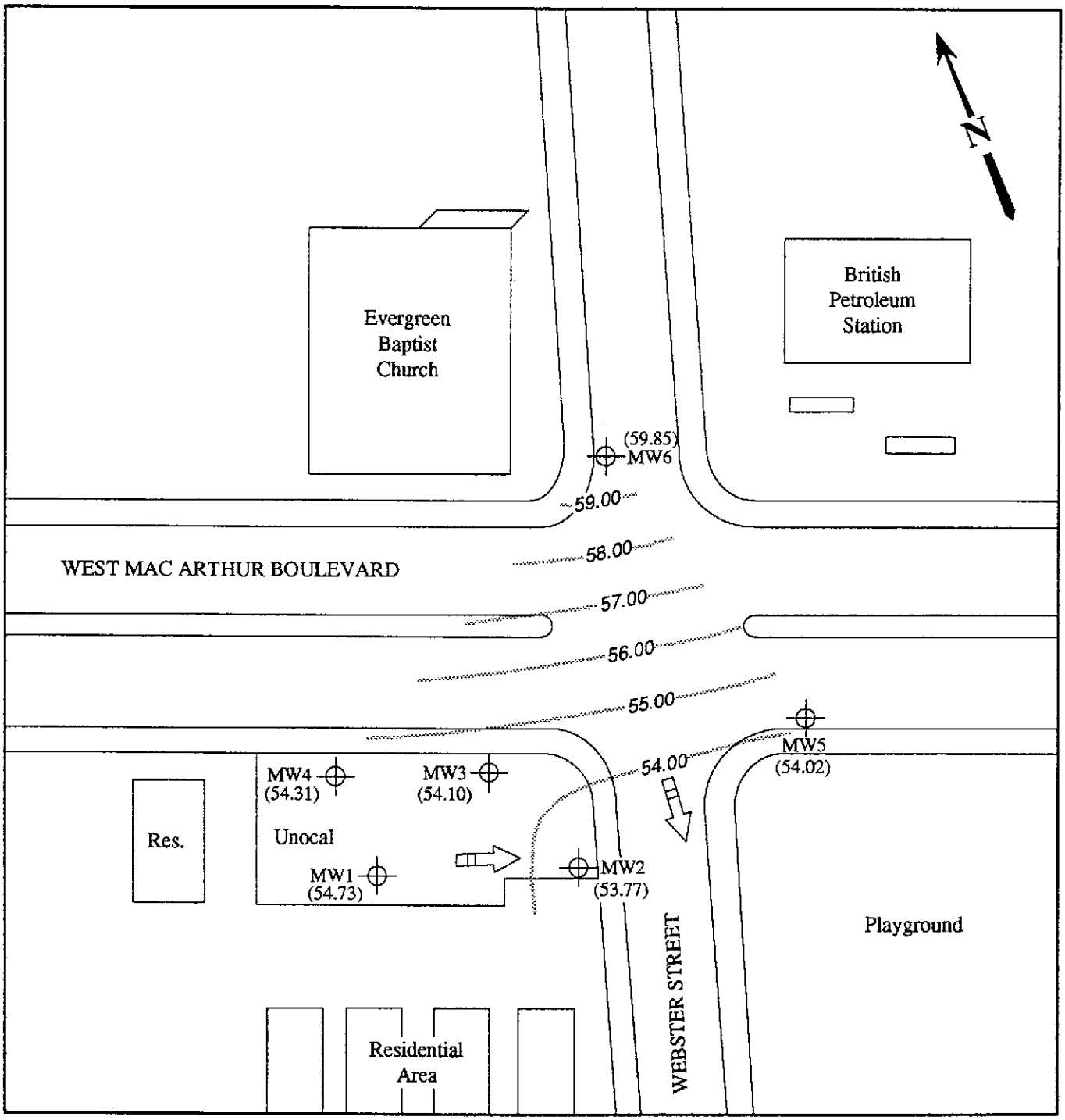
UNOCAL SERVICE STATION # 3538
411 W. MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

LOCATION MAP



LEGEND

- Monitoring well
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

0 60 120

Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE APRIL 13, 1993 MONITORING EVENT

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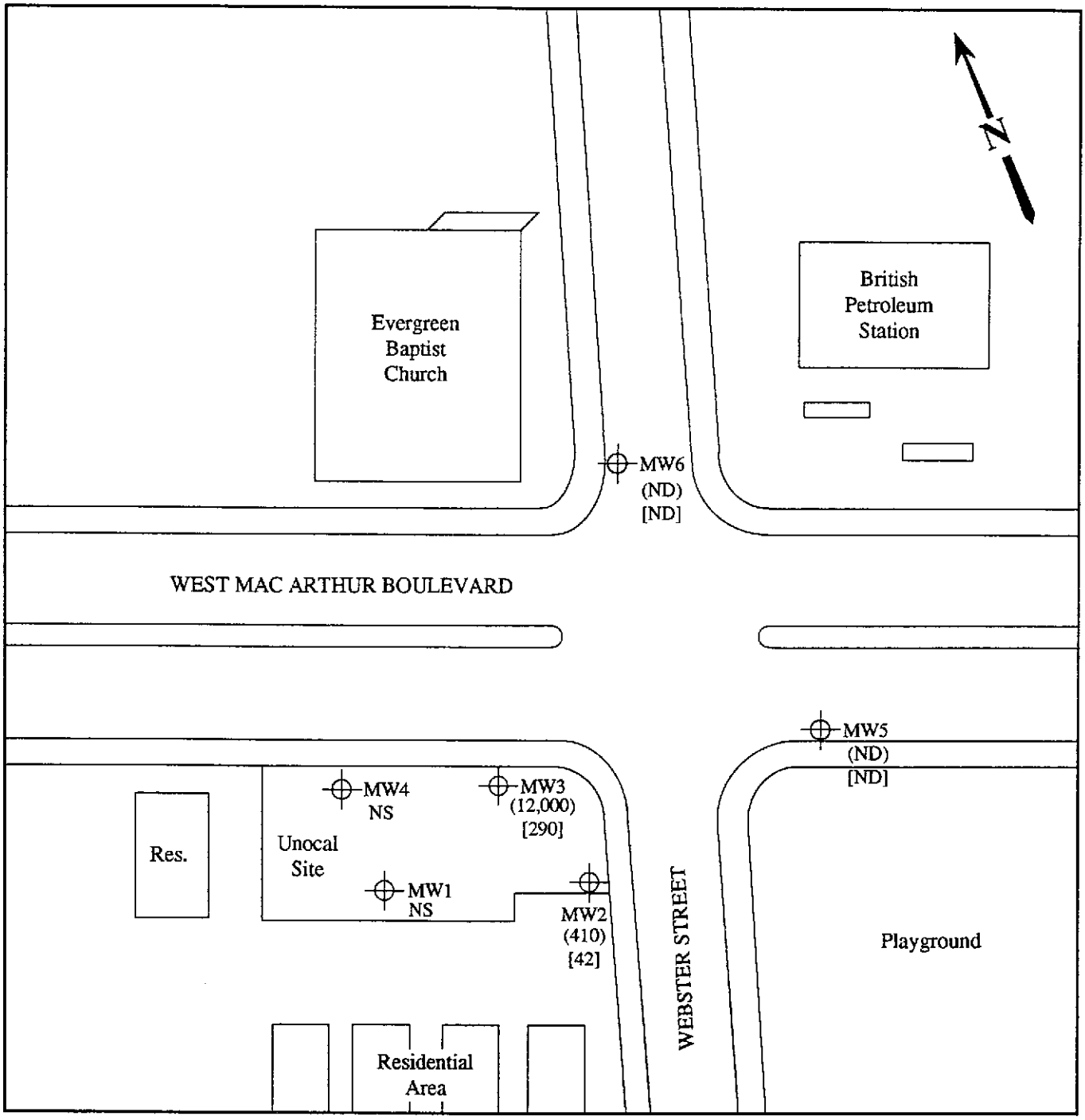
UNOCAL SERVICE STATION # 3538
411 W. MACARTHUR BOULEVARD
OAKLAND, CA

FIGURE
1



LEGEND

- ⊕ Monitoring well
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- NS = Not sampled ND = Non-detectable

0 60 120

Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON APRIL 13, 1993

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION # 3538
411 W. MACARTHUR BOULEVARD
OAKLAND, CA

FIGURE
2

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 411 W. MacArthur Blvd., Oakland	Sampled:	Apr 13, 1993
2401 Stanwell Dr., Ste. 400	Sample Matrix:	Water	Received:	Apr 13, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Apr 22, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	304-0596		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 304-0596 MW 2*	Sample I.D. 304-0597 MW 3*	Sample I.D. 304-0598 MW 5	Sample I.D. 304-0599 MW 6	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	410	12,000	N.D.	N.D.	
Benzene	0.5	42	290	N.D.	N.D.	
Toluene	0.5	7.7	38	N.D.	N.D.	
Ethyl Benzene	0.5	6.4	760	N.D.	N.D.	
Total Xylenes	0.5	28	2,300	N.D.	N.D.	
Chromatogram Pattern:		Gasoline & Discrete peak	Gasoline & Discrete peak	--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	100	1.0	1.0	1.0
Date Analyzed:	4/15/93	4/16/93	4/15/93	4/15/93	4/15/93
Instrument Identification:	HP-2	HP-4	HP-2	HP-2	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	117	108	98	101	107

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

Please Note:

* "Discrete Peak" refers to MTBE peak.

Revised report - 4/23/93.

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 411 W. MacArthur Blvd., Oakland	Sampled:	Apr 13, 1993
2401 Stanwell Dr., Ste. 400	Sample Descript:	Water	Received:	Apr 13, 1993
Concord, CA 94520	Analysis for:	MTBE (EPA 8020 - Modified)		
Attention: Mardo Kaprealian, P.E.	First Sample #:	304-0596	Analyzed:	4/15&4/16/93
			Reported:	Apr 22, 1993

LABORATORY ANALYSIS FOR: MTBE (EPA 8020 - Modified)

Sample Number	Sample Description	Detection Limit µg/L	Sample Result µg/L
304-0596	MW 2	0.60	200
304-0597	MW 3	60	1,400

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kapreallan Engineering, Inc.	Client Project ID:	Unocal, 411 W. MacArthur Blvd., Oakland
2401 Stanwell Dr., Ste. 400	Matrix:	Water
Concord, CA 94520		
Attention: Mardo Kapreallan, P.E.	QC Sample Group	3040596-599

Reported: Apr 22, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J.F.	J.F.	J.F.	J.F.
Conc. Spiked:	20	20	20	60
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	1LCS041593	1LCS041593	1LCS041593	1LCS041593
Date Prepared:	4/15/93	4/15/93	4/15/93	4/15/93
Date Analyzed:	4/15/93	4/15/93	4/15/93	4/15/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
LCS % Recovery:	116	109	108	110
Control Limits:	70-130%	70-130%	70-130%	70-130%
MS/MSD Batch #:	3040598	3040598	3040598	3040598
Date Prepared:	4/15/93	4/15/93	4/15/93	4/15/93
Date Analyzed:	4/15/93	4/15/93	4/15/93	4/15/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Matrix Spike % Recovery:	115	105	105	110
Matrix Spike Duplicate % Recovery:	115	110	110	112
Relative % Difference:	0.0	4.6	4.6	1.8

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

KEI

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER	SITE NAME & ADDRESS	ANALYSES REQUESTED	TURN AROUND TIME:
Vartkes	Unocal / Oakland 411 W. MacArthur Blvd.	TPHG & BTXE; MTBE	Regular
WITNESSING AGENCY			[redacted]

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG & BTXE	MTBE					REMARKS
MW 2	4/13/93	10:45 am.		X	X		4	Monitoring well	X	X					3040596AD
MW 3	"			X	X		4	" "	X	X					597AD
MW 5	"			X	X		2	" "	X						598AB
MW 6	"	12:50 pm.		X	X		2	" "	X						599AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. [illegible]	4/13/93 2:25	[illegible]
[illegible]	4.14.93 12:15	[illegible]
[illegible]	4.14.93 15:5[illegible]	[illegible]

The following MUST BE completed by the laboratory accepting samples for analysis:

1. Have all samples received for analysis been stored in ice? Y
2. Will samples remain refrigerated until analyzed? Y
3. Did any samples received for analysis have head space? N
4. Were samples in appropriate containers and properly packaged? Y

J.C.	Analyst	4.13.93
Signature	Title	Date