KAPREALIAN ENGINEERING
INCORPORATED

ST 10
3537

April 2, 1993

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

Dear Mr. Peacock:

Per the request of Mr. Tim Howard of Unocal Corporation, enclosed please find our report dated February 10, 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.QR13
February 10, 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) 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 November of 1992 through January 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 four 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 wells (MW1 through MW6) were monitored once, and wells MW2, MW3, MW5, and MW6 were sampled once during the quarter. Wells MW1

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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 January 8, 1993. Prior to sampling, these wells were each purged of between 6 and 12 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 January 8, 1993, ranged between 13.00 and 17.65 feet below grade. The water levels in all of the wells have shown net increases ranging from 1.15 to 1.36 feet since November 30, 1992. Based on the water level data gathered on January 8, 1993, the ground water flow direction appeared to be predominantly to the south-southwest in the area to the north of the site, and predominantly to the east at the site, as shown on the attached Potentiometric Surface Map, Figure 1. The flow directions reported this quarter are relatively unchanged from the flow directions reported on November 30, 1992. Prior to the installation of off-site wells MW5 and MW6, the ground water flow direction at the site was reported to be to the east for the previous ten quarters. The hydraulic gradient across the site on January 8, 1993, was approximately 0.005, and the hydraulic gradient to the north of the site was approximately 0.04. The difference between the ground water level in well MW6 (off-site to the north of the site) and all other wells was more than 4 feet (resulting in a steeper gradient), whereas the difference in the ground water levels in the five other wells was less than 0.37 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.

The ground water sample analytical results are summarized in Table 2. 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 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) August 12, 1992.

As shown on the attached laboratory analysis sheets, Sequoia Analytical Laboratory reported that the ground water sample collected from well MW2 "does not appear to contain gasoline" and that the unidentified peak is "in the methyl tert butyl ether (MTBE) range." In addition, Sequoia reported that the hydrocarbon detected in the ground water sample collected from well MW3 was partially due to "an unidentified peak in the MTBE range." Based on these results, KEI recommends that future ground water samples collected from wells MW2 and MW3 also 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

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February 10, 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 January 8, 1993)					
MW1*	54.78	17.65	0	--	0
MW2	54.43	17.20	0	No	7
MW3	54.49	17.57	0	No	6
MW4*	54.80	17.18	0	--	0
MW5	54.65	16.86	0	No	10
MW6	58.79	13.00	0	No	12

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.

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	PCE
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	1.4
	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	ND	1.8
	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	ND	2.0
	MW2	--	2,200	160	4.3	62	23	--
	MW3	--	880	170	1.1	110	34	--
	MW4	--	ND	ND	ND	ND	ND	--
1/15/91	MW1*	ND	ND	ND	ND	ND	ND	2.1
	MW2	--	680	170	0.7	81	19	--
	MW3	--	3,200	460	1.5	270	120	--
	MW4	--	ND	ND	ND	ND	ND	--

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	PCE
10/16/90	MW1*	ND	ND	ND	ND	ND	ND	2.0
	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	ND	1.7
	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	ND	2.2
	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	ND	1.5	2.3	4.3	ND	2.1
	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	ND	0.61	ND	ND	2.7
	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.

+ All EPA method 8010 compounds were non-detectable, except for PCE, as indicated above.

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

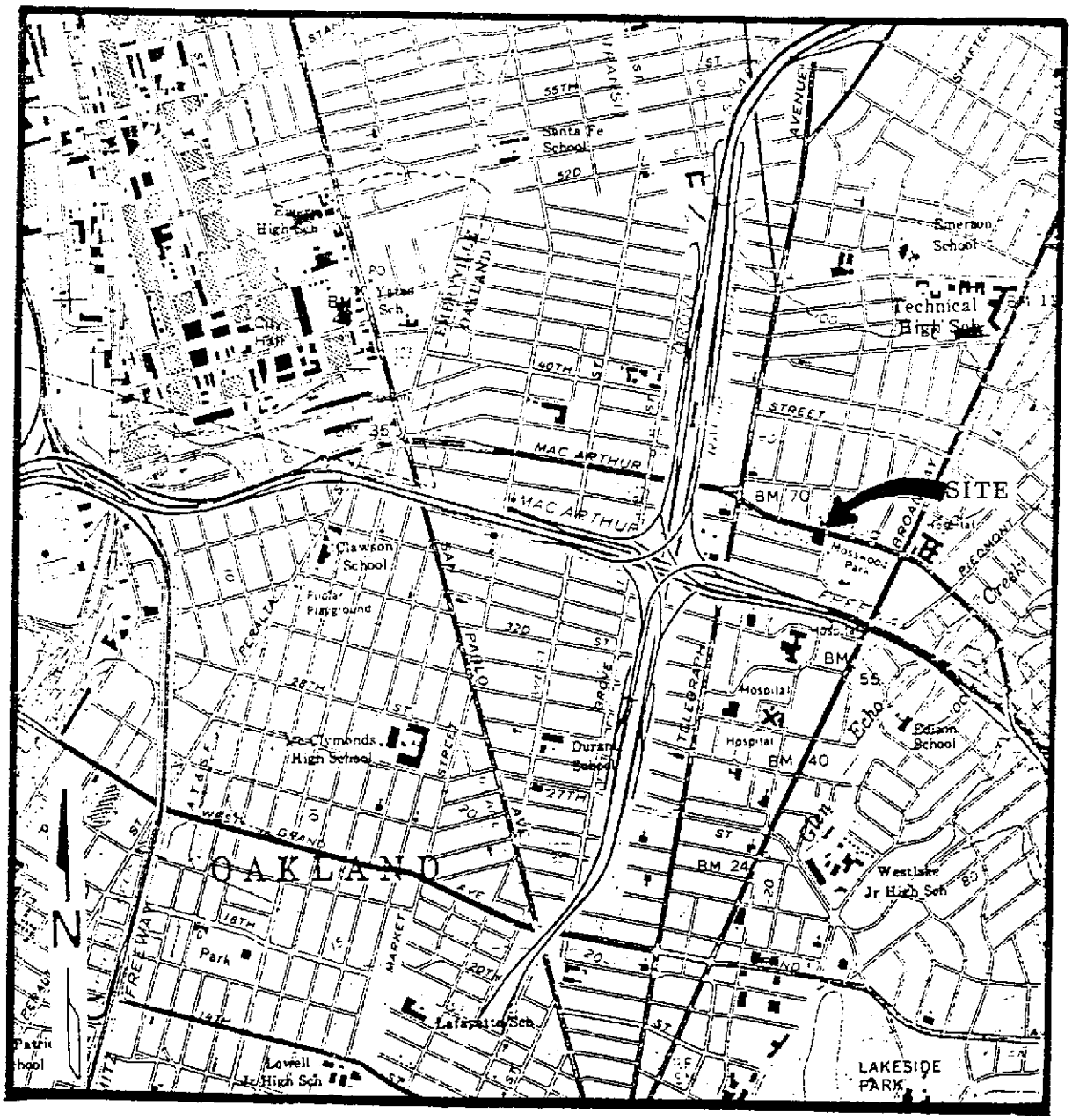
* Total oil and grease was non-detectable. All EPA method 8010 compounds were non-detectable, except for PCE, as indicated above.

** TOG was 1.5 ppm. All EPA method 8010 compounds were non-detectable, except for PCE, as indicated above.

*** TOG was <50 ppm. All EPA method 8010 compounds were non-detectable, except for PCE, as indicated above.

ND = Non-detectable.

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

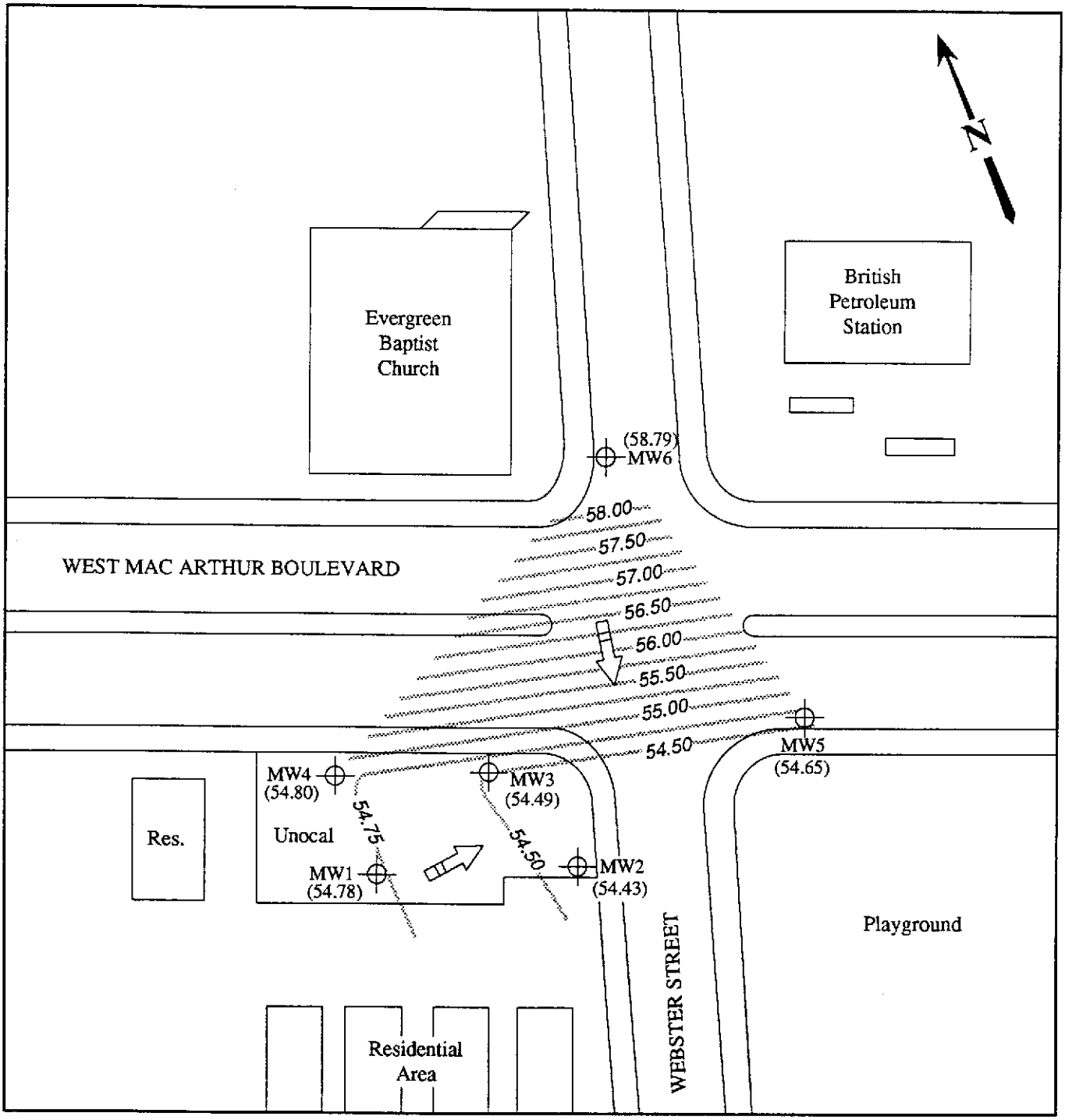


Base modified from 7.5 minute U.S.G.S. Oakland West Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

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

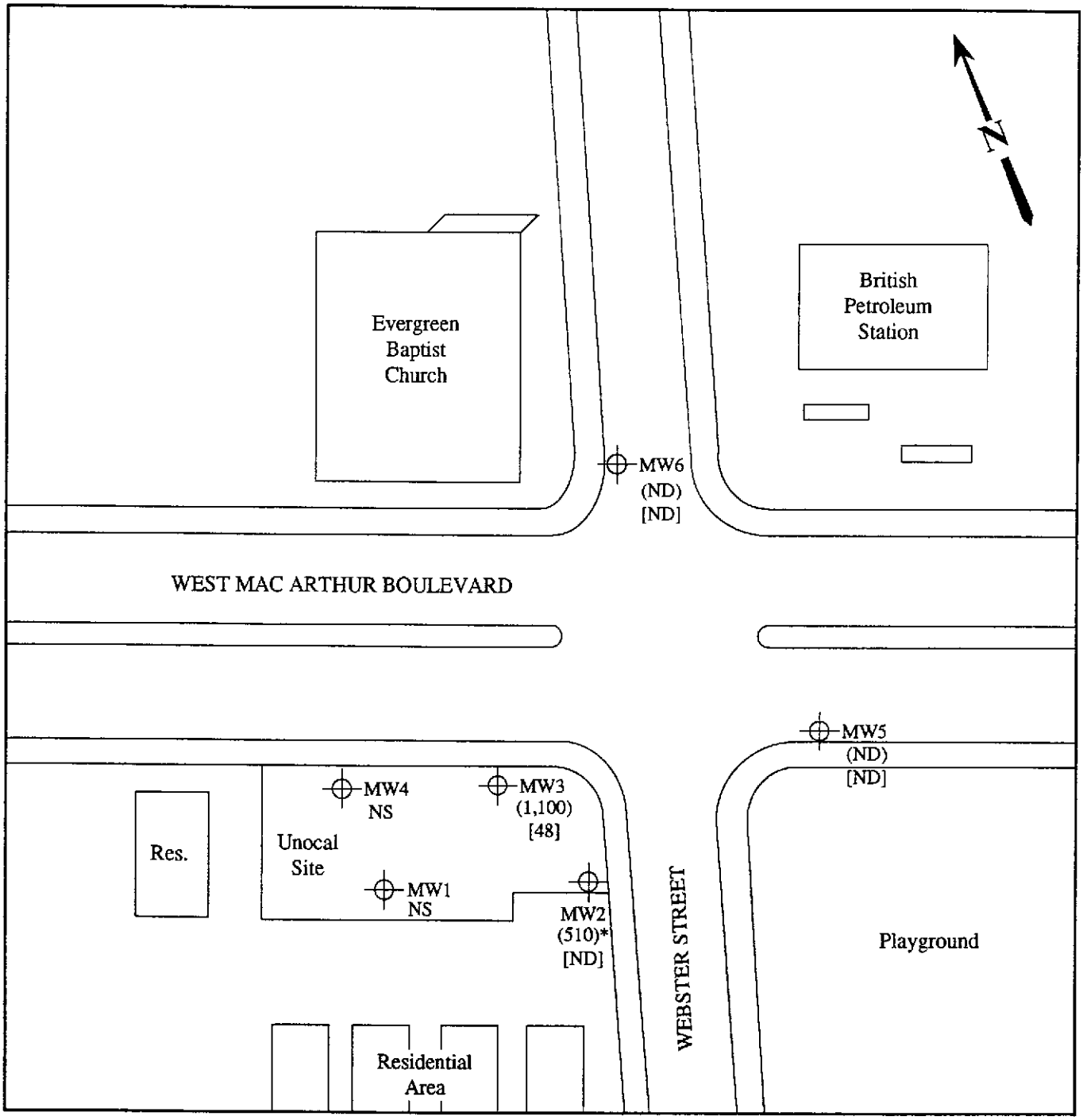
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE JANUARY 8, 1993 MONITORING EVENT

KAPREALIAN ENGINEERING INCORPORATED

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

* The lab reported that the hydrocarbons detected do not appear to be gasoline.

0 60 120

Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON JANUARY 8, 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 MacArthur, Oakland	Sampled:	Jan 8, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Jan 8, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Jan 19, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	301-0165		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 301-0165 MW-2*	Sample I.D. 301-0166 MW-3*	Sample I.D. 301-0167 MW-5	Sample I.D. 301-0168 MW-6	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	510	1,100	N.D.	N.D.	
Benzene	0.5	N.D.	48	N.D.	N.D.	
Toluene	0.5	N.D.	0.99	N.D.	N.D.	
Ethyl Benzene	0.5	N.D.	0.90	N.D.	N.D.	
Total Xylenes	0.5	N.D.	93	N.D.	N.D.	
Chromatogram Pattern:		Discrete Peak	Gasoline and Discrete Peak	--	--	

Quality Control Data

Report Limit Multiplication Factor:	5.0	1.0	1.0	1.0	1.0
Date Analyzed:	1/14/93	1/11/93	1/11/93	1/11/93	1/11/93
Instrument Identification:	HP-5	HP-4	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	106	97	104	103	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: * In the above samples, "Discrete Peak" refers to an unidentified peak in the MTBE range. Sample MW-2 does not appear to contain gasoline.

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.
2401 Stanwell Drive, Suite 400
Concord, CA 94520
Attention: Mardo Kaprealian, P.E.

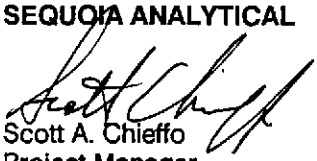
Client Project ID: Unocal, 411 MacArthur, Oakland
QC Sample Group: 301065-168
Reported: Jan 19, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	J.F.	J.F.	J.F.	J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jan 14, 1993	Jan 14, 1993	Jan 14, 1993	Jan 14, 1993
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	21	21	20	71
Matrix Spike % Recovery:	105	105	100	118
Conc. Matrix Spike Dup.:	22	21	21	73
Matrix Spike Duplicate % Recovery:	110	105	105	122
Relative % Difference:	4.6	0.0	4.8	2.8

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.
Laboratory Blank contained the following analytes: None detected.

SEQUOIA ANALYTICAL



Scott A. Chieffo
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

KAPREALIAN ENGINEERING
INCORPORATED

CHAIN OF CUSTODY

SAMPLER: JOE

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
411 Mac Arthur

ANALYSES REQUESTED: TPHG, BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION
MW-2	1-8-93	10:30		✓	✓		2	MW
MW-3	"			✓	✓		2	"
MW-5	"			✓	✓		2	"
MW-6	"	12.00		✓	✓		2	"

REMARKS:
3010165AB
166AB
167AB
168AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Joe Kaprealian	1-8-93 1440	[signature] 1/8/93
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)

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? NO
4. Were samples in appropriate containers and properly packaged? Y

[signature] — Signature; F.S. — Title; 1/8/93 — Date

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510.602.5100 Fax: 510.602.0602