KAPREALIAN ENGINEERING
INCORPORATED

KEI-P90-1103.QR5
October 19, 1992

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 #0752
800 Harrison Street
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-P90-1103.P1) dated February 1, 1991, and as modified in KEI's quarterly report (KEI-P90-1103.QR4) dated July 27, 1992. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from July through September of 1992.

BACKGROUND

The subject site contains a Unocal service station facility. Two underground gasoline storage tanks, one waste oil tank, and the product piping were removed from the site in November and December of 1990, during tank replacement activities. The fuel tank pit, waste oil tank pit, and one pump island were subsequently overexcavated in order to remove contaminated soil. Six monitoring wells and two exploratory borings have been installed at 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 monthly report (KEI-P90-1103.QR3) dated April 30, 1992.

RECENT FIELD ACTIVITIES

The three wells (MW1, MW2, and MW3) were monitored three times and were sampled once during the quarter. During monitoring, the wells were checked for depth to water and the presence of free product. Prior to sampling, the wells were also checked for the presence of a sheen. No free product or sheen was noted in any of the wells

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

during the quarter. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from the wells on September 15, 1992. Prior to sampling, the wells were each purged of between 7 and 9 gallons of water by the use of a surface pump. The samples were collected by the use of a clean Teflon bailer. The samples were decanted into clean VOA vials and/or one-liter amber bottles, as appropriate, which were then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to the state-certified laboratory.

HYDROLOGY

The measured depth to ground water at the site on September 15, 1992, ranged between 20.12 and 21.26 feet below grade. The water levels in all of the wells have shown net decreases ranging from 0.21 to 0.26 feet since June 30, 1992. Based on the water level data gathered during the quarter, the ground water flow direction appeared to be to the south, as shown on the attached Figures 1, 2, and 3. The flow direction reported this quarter is similar to the flow direction reported in the previous four quarters. The average hydraulic gradient across the site on September 15, 1992, was approximately 0.008.

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 (BTX&E) by EPA method 8020. In addition, the ground water sample collected from monitoring well MW1 was analyzed for TPH as diesel by EPA method 3510/modified 8015, and for EPA method 8010 constituents.

The ground water sample analytical results 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 4. Copies of the laboratory analytical results and 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-P90-1103.P1) dated February 1, 1991, and as modified in KEI's quarterly report (KEI-P90-1103.QR4) dated July 27, 1992.

As shown on Figure 4, the extent of ground water contamination has not been defined at and in the vicinity of the site. Therefore, KEI previously recommended the installation of three additional monitoring wells in order to further define the extent of the contamination. The locations of the proposed wells are shown on the attached Figure 5. The wells were recently installed on September 30 and October 1, 1992. Documentation of the well installation procedures, sample collection techniques, analytical results, and recommendations for further work will be presented in a separate technical report.

DISTRIBUTION

A copy of this report should be sent to Ms. Jennifer Eberle of 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 me 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
Ground Water Flow Direction - Figures 1, 2 & 3
Concentrations of Petroleum Hydrocarbons - Figure 4
Locations of Proposed Monitoring Wells - Figure 5
Laboratory Analyses
Chain of Custody documentation

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TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Gallons Pumped
(Monitored and Sampled on September 15, 1992)					
MW1	13.68	21.26	0	No	9
MW2	14.08	20.89	0	No	7
MW3	13.27	20.12	0	No	8
(Monitored on August 28, 1992)					
MW1	13.71	21.23	0	--	0
MW2	14.10	20.87	0	--	0
MW3	13.31	20.08	0	--	50
(Monitored on July 24, 1992)					
MW1	13.84	21.10	0	--	0
MW2	14.20	20.77	0	--	0
MW3	13.46	19.93	0	--	55

Well #	Surface Elevation* (feet)
MW1	34.94
MW2	34.97
MW3	33.39

-- Sheen determination was not performed.

* The elevations of the tops of the well covers have been surveyed relative to Mean Sea Level (MSL), per the City of Oakland disk stamped "25/A" at elevation 28.81 feet MSL.

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October 19, 1992

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
9/15/92	MW1	ND	76	1.0	ND	ND	ND
	MW2	--	1,300	91	5.7	110	80
	MW3	--	10,000	1,900	330	580	400
6/30/92	MW1	120	ND	ND	ND	ND	ND
	MW2	--	76	9.3	0.76	6.9	4.8
	MW3	--	8,900	1,900	210	550	430
4/02/92	MW1	94	ND	ND	ND	ND	ND
	MW2	--	88	12	0.32	7.2	6.3
	MW3	--	8,000	1,400	200	310	300
12/30/91	MW1	ND	ND	ND	ND	ND	ND
	MW2	--	91	16	0.89	1.9	11
	MW3	--	7,200	2,100	690	550	410
9/30/91	MW1	ND	ND	ND	ND	ND	ND
	MW2	--	130	18	0.53	9.6	14
	MW3	--	6,800	1,400	130	240	290
6/05/91	MW1	ND	47	ND	ND	ND	ND
	MW2	--	49	ND	ND	ND	ND
	MW3	--	5,800	1,200	40	97	140

ND = Non-detectable.

-- Indicates analysis was not performed.

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

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TABLE 3

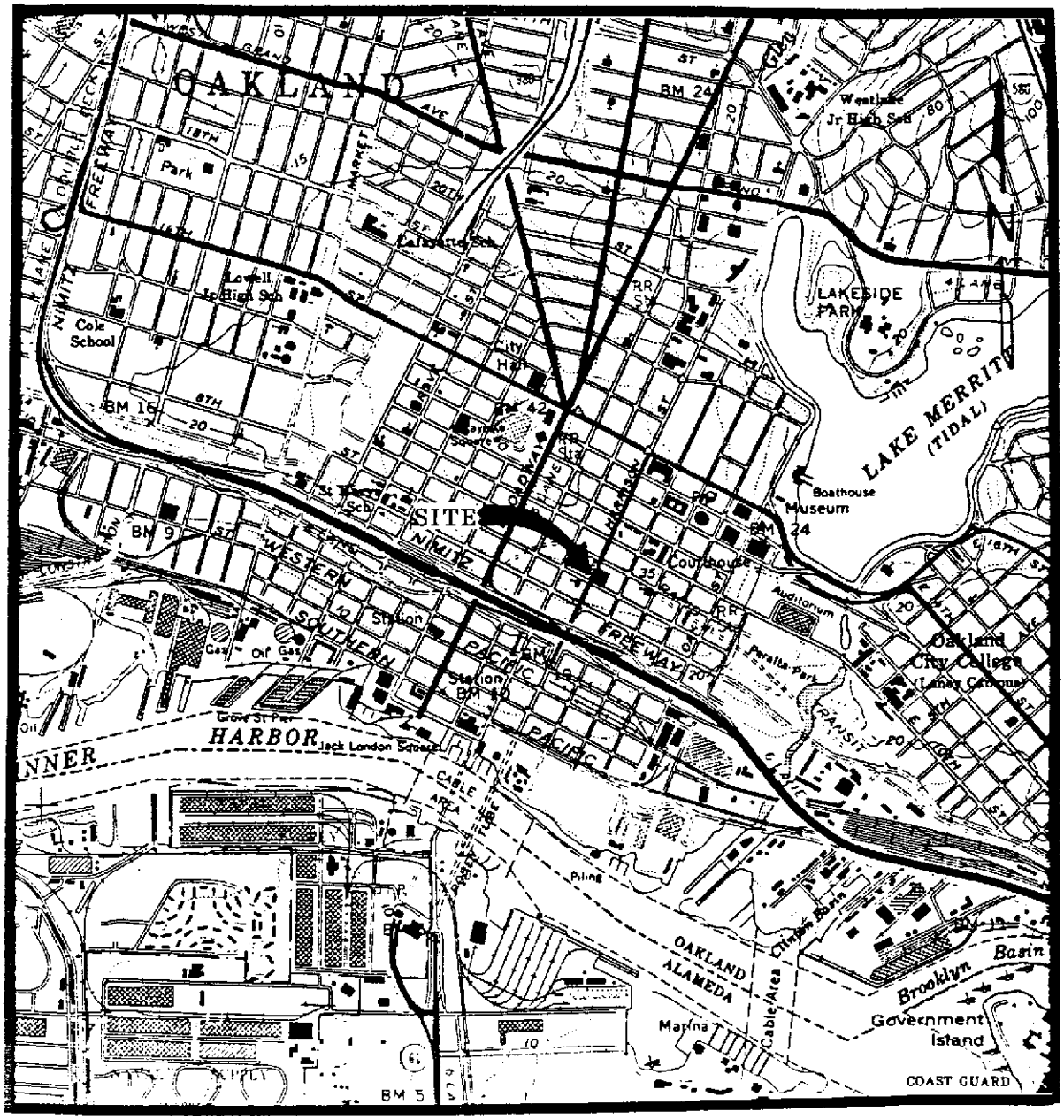
SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	Chloroform	Tetrachloroethene	Trichloroethene
9/15/92	MW1*	12	2.2	1.3
6/30/92	MW1*	9.5	2.2	1.3
4/02/92	MW1*	7.1	2.6	1.4
12/30/91	MW1*	6.4	2.1	0.9
9/30/91	MW1	--	--	--
6/04/91	MW1*	7.8	2.9	1.3

* All EPA method 8010 constituents were non-detectable, except for the above compounds.

-- Indicates analysis was not performed.

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

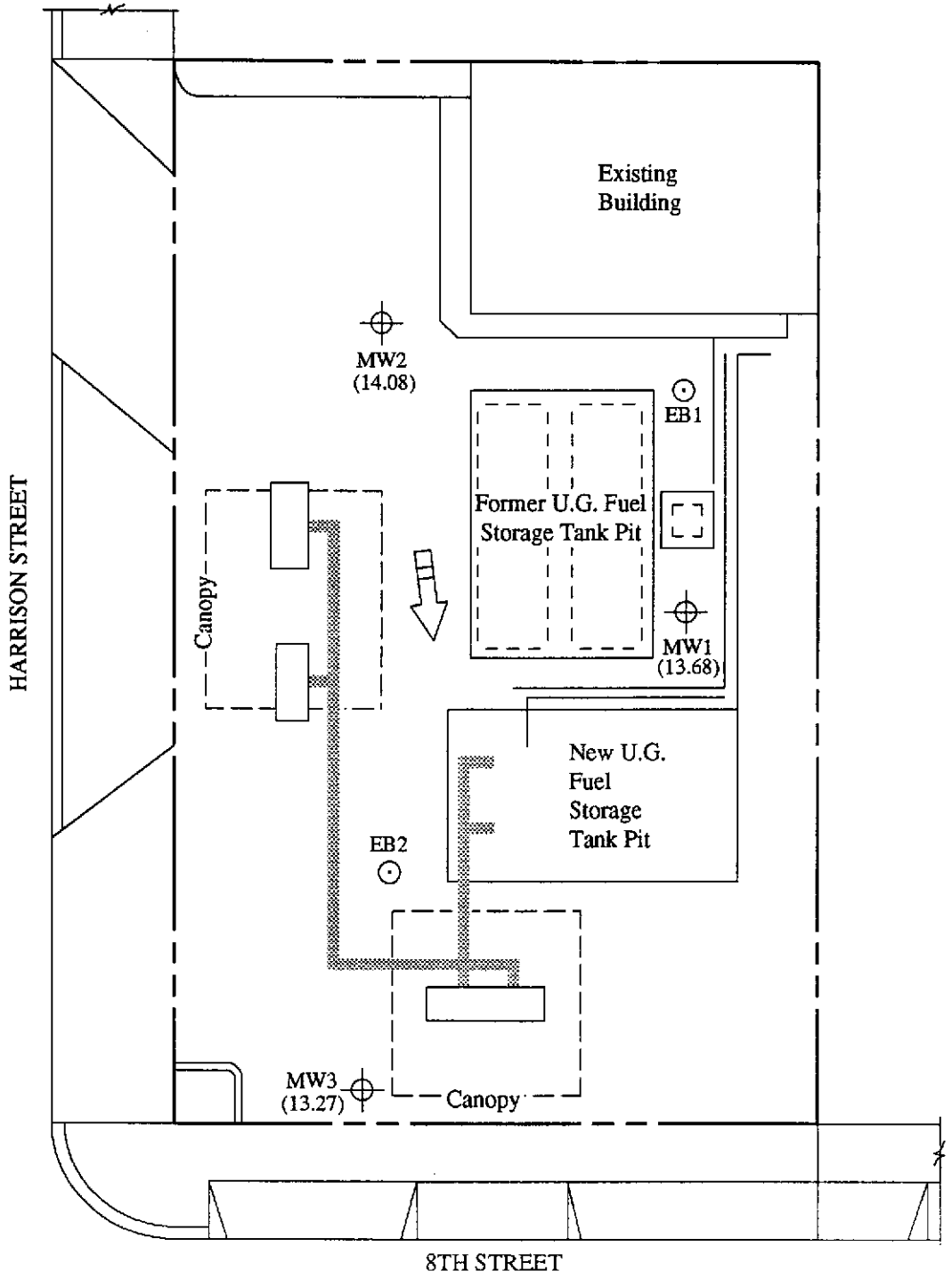


Base modified from 7.5 minute U.S.G.S. Oakland West Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #0752 800 HARRISON STREET OAKLAND, CA	LOCATION MAP



LEGEND

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

0 20 40

Approx. scale feet

GROUND WATER FLOW DIRECTION MAP FOR THE SEPTEMBER 15, 1992 MONITORING EVENT

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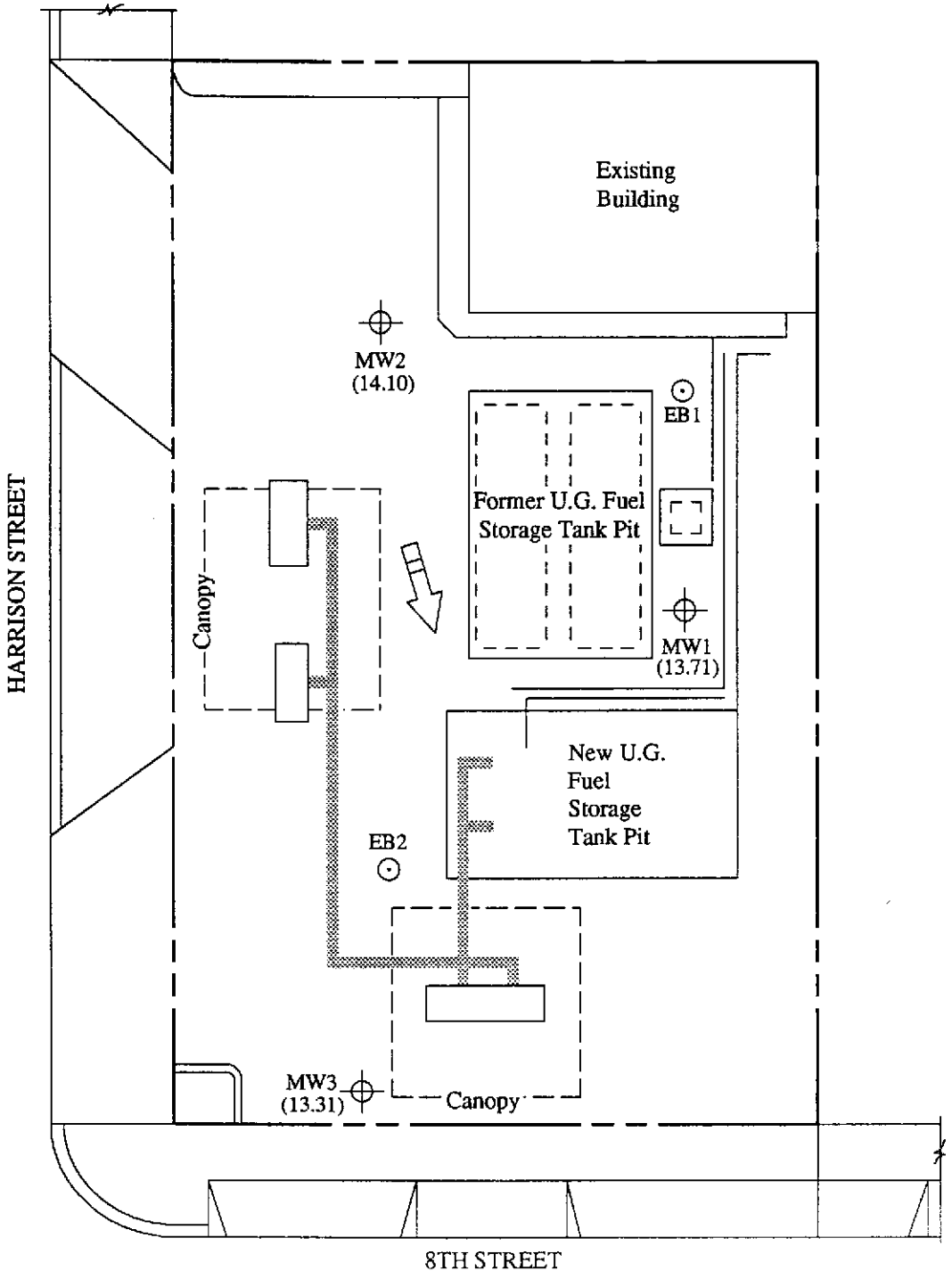
INCORPORATED

UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE
1



LEGEND

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

0 20 40

Approx. scale feet

GROUND WATER FLOW DIRECTION MAP FOR THE AUGUST 28, 1992 MONITORING EVENT

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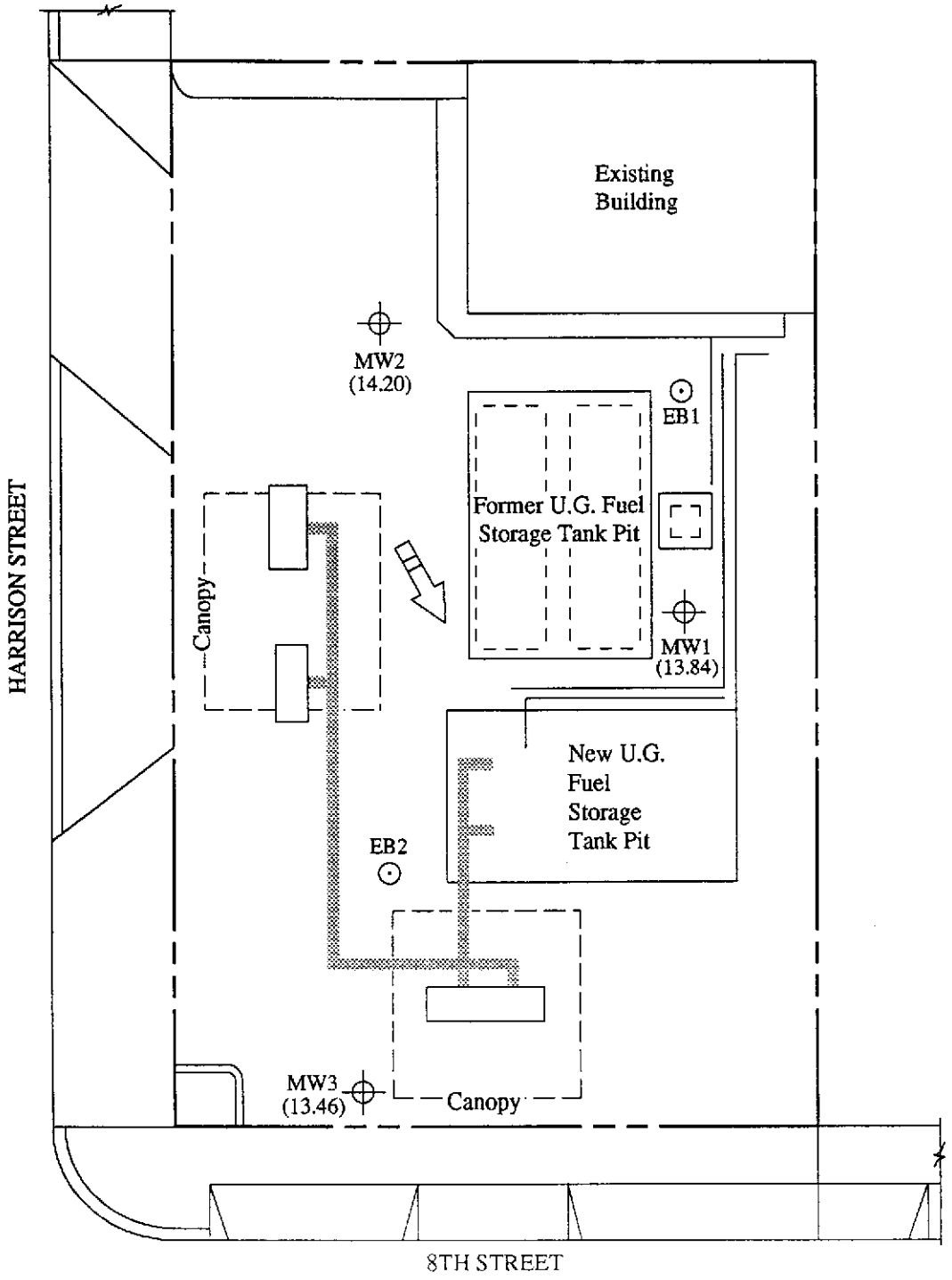
UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE
2



LEGEND

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

0 20 40

Approx. scale feet

GROUND WATER FLOW DIRECTION MAP FOR THE JULY 24, 1992 MONITORING EVENT

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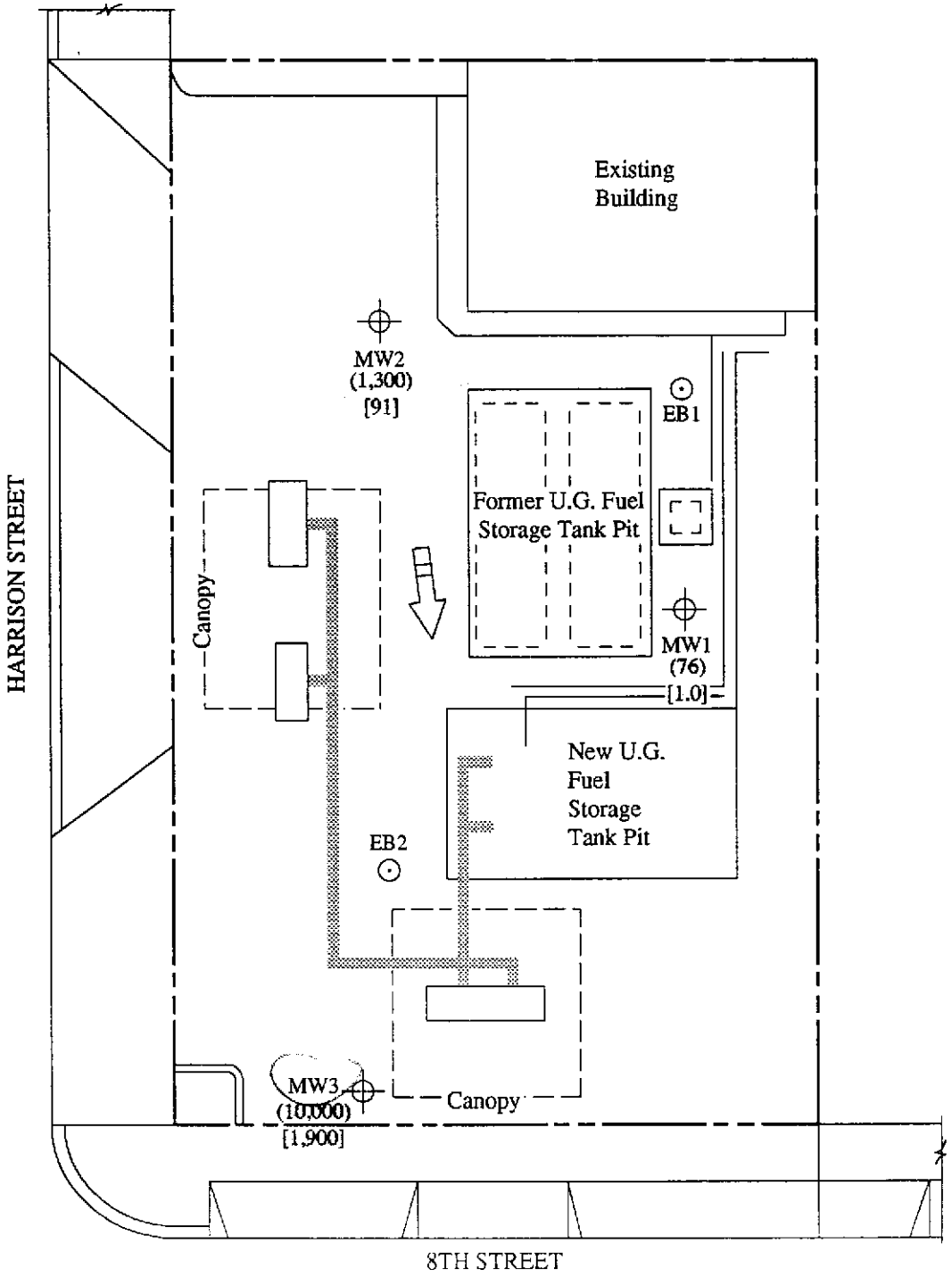
OAKLAND, CA

FIGURE
3



LEGEND

- Monitoring well
- Exploratory boring
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- Direction of ground water flow

0 20 40

Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON SEPTEMBER 15, 1992

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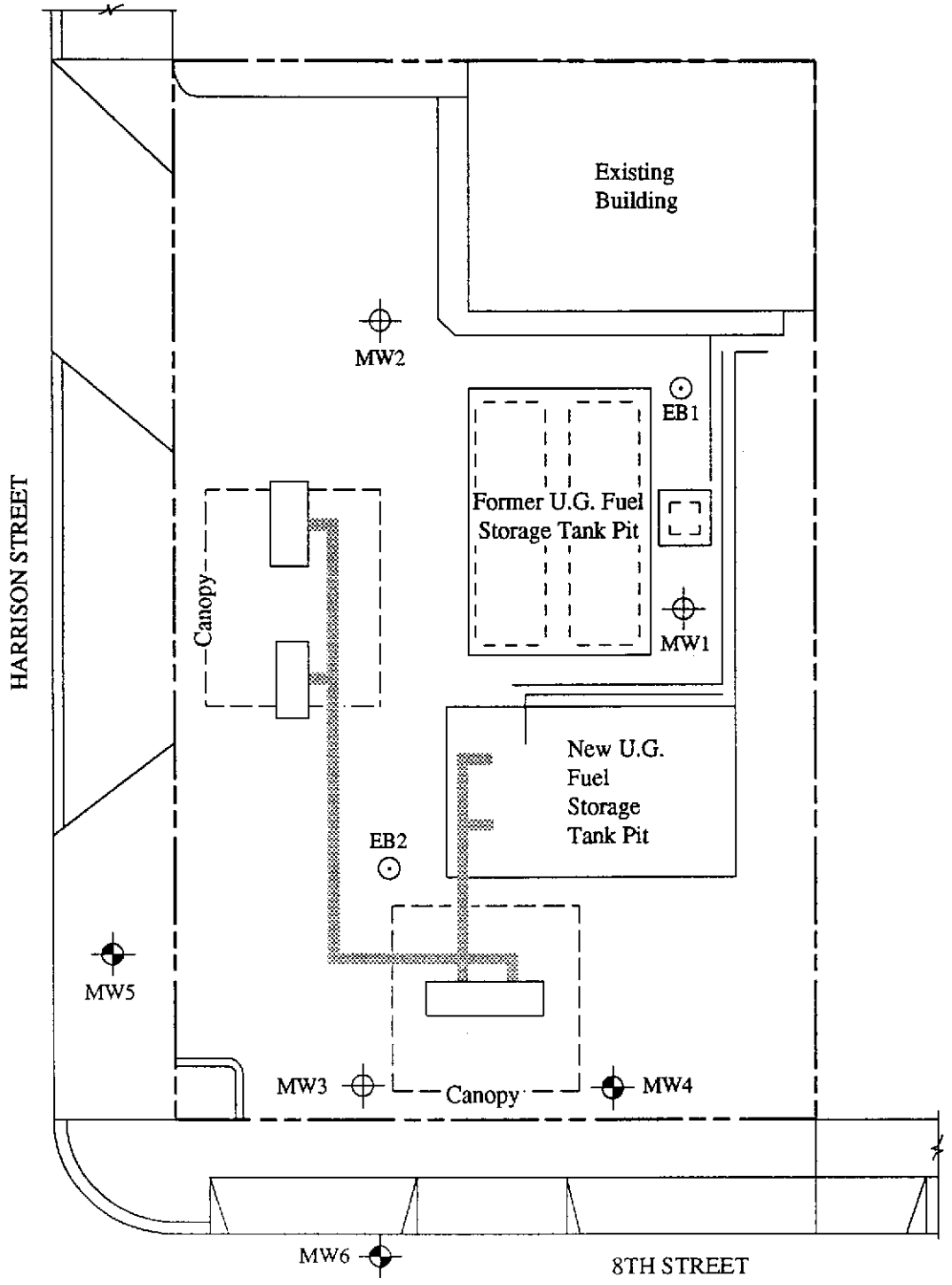
OAKLAND, CA

FIGURE
4



LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- Exploratory boring

0 20 40

Approx. scale feet

LOCATION OF PROPOSED MONITORING WELLS

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800 HARRISON STREET
OAKLAND, CA

FIGURE
5

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 800 Harrison St., Oakland	Sampled:	Sep 15, 1992
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Sep 15, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Sep 29, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	209-0701		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 209-0701 MW 1*	Sample I.D. 209-0702 MW 2	Sample I.D. 209-0703 MW 3	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	76	1,300	10,000	
Benzene	0.5	1.0	91	1,900	
Toluene	0.5	N.D.	5.7	330	
Ethyl Benzene	0.5	N.D.	80	400	
Total Xylenes	0.5	N.D.	110	580	
Chromatogram Pattern:		Gasoline and Discrete Peaks	Gasoline	Gasoline	

Quality Control Data

Report Limit Multiplication Factor:	1.0	10	20	1.0
Date Analyzed:	9/21/92	9/21/92	9/21/92	9/21/92
Instrument Identification:	HP-4	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	96	107	89	106

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

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Scott A. Chieffo
Project Manager

Please Note: * Purgeable Hydrocarbons are due, in part, to EPA 8010 compounds.

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 800 Harrison St., Oakland	Sampled:	Sep 15, 1992
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Sep 15, 1992
Concord, CA 94520	Analysis Method:	EPA 3510/3520/8015	Reported:	Sep 29, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	209-0701		

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 209-0701 MW 1	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	N.D.	
Chromatogram Pattern:		--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Extracted:	9/22/92	9/22/92
Date Analyzed:	9/28/92	9/23/92
Instrument Identification:	HP-3A	HP-3A

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

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Scott A. Chieffo
Project Manager

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 800 Harrison St., Oakland	Sampled:	Sep 15, 1992
2401 Stanwell Drive, Suite 400	Sample Descript:	Water	Received:	Sep 15, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8010	Analyzed:	Sep 22, 1992
Attention: Mardo Kaprealian, P.E.	Lab Number:	209-0701	Reported:	Sep 29, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	0.50	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	12
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	0.50	N.D.
trans-1,3-Dichloropropene	0.50	N.D.
Methylene chloride	5.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	2.2
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	1.3
Trichlorofluoromethane	0.50	N.D.
Vinyl chloride	1.0	N.D.

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

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Scott A. Chieffo
Project Manager

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

Client Project ID: Unocal, 800 Harrison St., Oakland
QC Sample Group: 2090701-703
Reported: Sep 29, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA8015
Analyst:	J.F.	J.F.	J.F.	J.F.	K. Wimer
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Sep 21, 1992	Sep 21, 1992	Sep 21, 1992	Sep 21, 1992	Sep 23, 1992
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60	300
Conc. Matrix Spike:	21	20	20	64	359
Matrix Spike % Recovery:	105	100	100	106	120
Conc. Matrix Spike Dup.:	20	19	19	62	348
Matrix Spike Duplicate % Recovery:	100	95	95	103	116
Relative % Difference:	4.8	5.1	5.1	3.2	3.1

Laboratory Blank contained the following analytes: None detected.

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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

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

Client Project ID: Unocal, 800 Harrison St., Oakland
QC Sample Group: 2090701-703
Reported: Sep 29, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloroethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	K. Nill	K. Nill	K. Nill
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Sep 22, 1992	Sep 22, 1992	Sep 22, 1992
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	40	N.D.
Spike Conc. Added:	100	100	100
Conc. Matrix Spike:	113	141	98
Matrix Spike % Recovery:	113	101	98
Conc. Matrix Spike Dup.:	111	140	100
Matrix Spike Duplicate % Recovery:	111	100	100
Relative % Difference:	1.8	1.0	2.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

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Scott A. Chieffo
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc. Client Project ID: Unocal, 800 Harrison St., Oakland
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 2090701-703 Reported: Sep 29, 1992

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015
Analyst:	K. Wimer	K. Wimer
Reporting Units:	µg/L	µg/L
Date Analyzed:	Sep 28, 1992	Sep 28, 1992
Sample #:	209-0701	Matrix Blank
Surrogate % Recovery:	82	107

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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

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(510) 686-9600 • FAX (510) 686-9689

Kapreallan Engineering, Inc.
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 800 Harrison St., Oakland
QC Sample Group: 2090701-703
Reported: Sep 29, 1992

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8010	EPA 8010
Analyst:	K. Nill	K. Nill
Reporting Units:	µg/L	µg/L
Date Analyzed:	Sep 22, 1992	Sep 22, 1992
Sample #:	209-0701	Matrix Blank
Surrogate #1 % Recovery:	105	110
Surrogate #2 % Recovery:	108	109

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Varttes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
800 Harrison str.

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG+BTXE	TPHD	8010	REMARKS
MW 1	9/15/92	3:10 p.m.		X	X		5	Monitoring Well	X	X	X	2090701AE
MW 2	"	3:45 p.m.		X	X		2	" "	X			702AB
MW 3	"	4:20 p.m.		X	X		2	" "	X			703AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
N. Tavlajian	9/15/92 5:20	[illegible] 9-15-92 1720
K.G. Lawrence	9-16-92 1:50	[illegible]
[illegible]	9-16-92	[illegible]
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? Yes
2. Will samples remain refrigerated until analyzed? Yes
3. Did any samples received for analysis have head space? No
4. Were samples in appropriate containers and properly packaged? Yes

[illegible] Signature — Lab Mgr Title — 9-15-92 Date