KEI-P91-1004.QR4 June 22, 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 #5043

449 Hegenberger Road 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-P91-1004.P2) dated July 7, 1992. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from March through May of 1993.

BACKGROUND

The subject site contains a Unocal service station facility. Six monitoring wells 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 report (KEI-P91-1004.R4) dated October 12, 1992.

RECENT FIELD ACTIVITIES

The six wells (MW1 through MW6) were monitored three times and were sampled once during the quarter, except for well MW1, which was not sampled due to the presence of free product. 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 during the quarter, except for 0.02 to 0.33 foot of free product that was observed in well MW1 throughout the quarter. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from all of the wells (except well MW1) on May 4, 1993. Prior to sampling, the wells were each purged

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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 Teflonlined 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 May 4, 1993, ranged between 2.13 and 4.37 feet below grade. The water levels in all of the wells have shown net increases ranging from 0.13 to 1.75 feet since February 4, 1993, except for well MW6, which showed a net increase of 0.20 foot. Based on the water level data gathered during the quarter, the ground water flow direction varied from west-northwesterly over the majority of the site to northeasterly at the western portion of the site, as shown on the attached Potentiometric Surface Maps, Figures 1, 2, and 3. The ground water flow directions reported this quarter are generally similar to the predominantly westerly flow direction reported since August of 1992. The hydraulic gradient at the site on May 4, 1993, was approximately 0.03.

ANALYTICAL RESULTS

The ground water samples collected this quarter 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, TPH as diesel by EPA method 3510/modified 8015, and benzene, toluene, xylenes, and ethylbenzene by EPA method 8020. In addition, the ground water sample collected from monitoring well MW5 was analyzed for total oil and grease (TOG) by Standard Methods 5520B&F.

The analytical results of all of the ground water samples collected from the monitoring wells to date are summarized in Table 2. The concentrations of TPH as gasoline, benzene, and TPH as diesel detected in the ground water samples collected this quarter are shown on the attached Figures 4, 5, and 6, respectively. 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 of the ground water samples collected and evaluated to date, KEI recommends the continuation of the current ground water monitoring and sampling program, per KEI's

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proposal (KEI-P91-1004.P2) dated July 7, 1992. The wells are currently monitored monthly and sampled quarterly. The results of the monitoring and sampling program will be documented and evaluated after each monitoring and sampling event. Recommendations for altering or terminating the program will be made as warranted.

As shown on the attached Figures 4, 5, and 6, the extent of the ground water contamination has not been defined at the Unocal site. Therefore, KEI recommends the installation of four additional monitoring wells in order to further define the extent of the ground water contamination. The tentative locations for the proposed wells are shown on the attached Figure 7. These locations may be slightly modified due to access limitations. Our work plan/proposal for the installation of these wells is attached for your review and consideration.

Lastly, a continuous surface-skimming free product recovery device has been installed in well MW1. Any free product that accumulates in the skimming device is removed during the monthly monitoring events.

DISTRIBUTION

A copy of this report should be sent to 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.

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

Sincerely,

Kaprealian Engineering, Inc.

Thomas J. Berkens

Thomas J. Berkins

Senior Environmental Engineer

Joel G. Greger, C.E.G.

God 11 My

Senior Engineering Geologist

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

Timothy R. Ross Project Manager

/bp

Attachments: Tables 1 & 2

Location Map

Figures 1 through 7 Laboratory Analyses

Chain of Custody documentation

Work Plan/Proposal

TABLE 1
SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet) (Monitore	Depth to Water (feet) d and Sample	Product Thickness (feet) ed on May 4,	<u>Sheen</u>	Water Purged (gallons)
MW1♦	5.73*	2.13	0.10	N/A	0
MW2	6.48	2.48	0	No	9
EWM.	3.52	4.32	Ö	No	7
MW4	4.91	4.09	Ö	No	7
MW5	4.90	4.37	Ö	No	7
MW6	5.40	3.72	0	No	. 7
MW1	(Mo	nitored on 2	April 1, 199	3) N/A	0
MW1	7.14	1.82	0.33	N/A	0
MW2 MW3	7.14 3.74	4.10	0		Ö
MW4	5.36	3.64	0		Ö
MW5	5.45	3.82	0		0
MW6	5.56	3.56	0		0
MMO	5.56	3.50	O		· ·
	(Mo	nitored on 1	March 4, 199	3)	
MW1	5.97*	1.83	0.02	N/A	0.25 w/3 oz. of product
MW2	7.03	1.93	0		0
EWM	4.32	3.52	0		0
MW4	5.86	3.14	0		0
MW5	5.93	3.34	0		0
MW6	5.62	3.50	0		0

Well #	Surface Elevation**(feet)
MW1	7.78
MW2	8.96
MW3	7.84
MW4	9.00
MW5	9.27
MW6	9.12

TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

- Monitored only.
- * The ground water elevation was corrected for the presence of free product by the use of a specific gravity of 0.77.
- ** The elevations of the tops of the well covers were surveyed relative to Mean Sea Level (MSL), per the City of Oakland Benchmark #3880 (elevation = 20.37 MSL).

N/A = Not applicable.

-- Sheen determination was not performed.

TABLE 2
SUMMARY OF LABORATORY ANALYSES
WATER

<u>Date</u>	Sample <u>Number</u>	TPH as <u>Diesel</u>	TPH as <u>Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	Ethyl- <u>benzene</u>
5/04/93	MW1	NOT SAME	PLED DUE T	O THE PRES	SENCE OF	FREE PROD	UCT
-,,	MW2	7,100+				17,000	470
	MW3	250♦♦	1,800*	['] 95	ND	ND	ND
	MW4	ND	110*	0.95	ND	ND	ND
	MW5+	4,600♦	7,400	41	ND	35	1,000
	MW6	1,800♦	4,900	360	18	430	450
2/04/93		NOT SAMI	PLED DUE T				
	MW2	6,100♦	•	1,600	3,000	6,900	ND
	MW3		3,300	320	ND	6.1	
	MW4	ND	ND	ND	ND	ND	ND
	MW5+		5,700	38	ИD	170	620
	MW6	890♦♦	3,600	340	ND	550	290
11/30/92	MW1	NOT SAMI	PLED DUE T	O THE PRES	SENCE OF	FREE PROD	UCT
,	MW2	5,700♦			3,400	6,900	1,200
	MW3	94	790**	•	ND	ND	ND
	MW4	61	420**	ND	ND	ND	ИD
	MW5+	470♦♦	930	70	0.7	79 14	290
	MW6	1,400♦	9,200	550	ND	1,600	740
8/31/92	MW1		64,000				
	MW2	1,600♦	9,000			2,000	140
	MW3	92♦♦			ИD	ИD	ND
	MW4	90♦♦			ND		
	MW5	690♦	78	0.89	ND	13	ND
	MW6	750♦♦	ND	ND	ND	ND	ND
5/20/92			PLED DUE T				
	MW2	4,300♦		•	7,600	11,000	630
	EWM	WELL WA:	S INACCESS	IBLE FOR	SAMPLING		
2/18/92		13,000			26,000		
	MW2		•	1,000	•	*	260
	MW3	ND	230	4.8	22	33	1.8

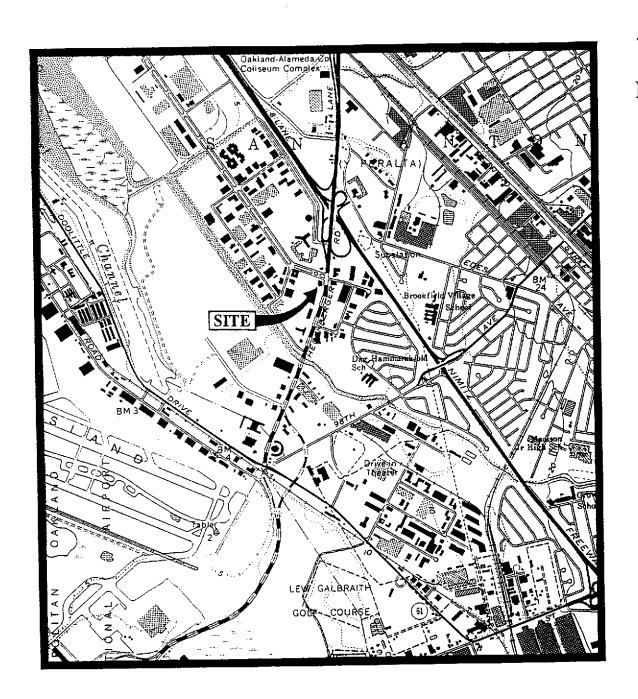
TABLE 2

SUMMARY OF LABORATORY ANALYSES WATER

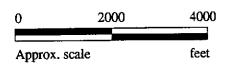
- Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be diesel.
- ♦♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be diesel and non-diesel mixture.
- * Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be a gasoline and non-gasoline mixture.
- ** Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be gasoline.
- + TOG was non-detectable.

ND = Non-detectable.

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

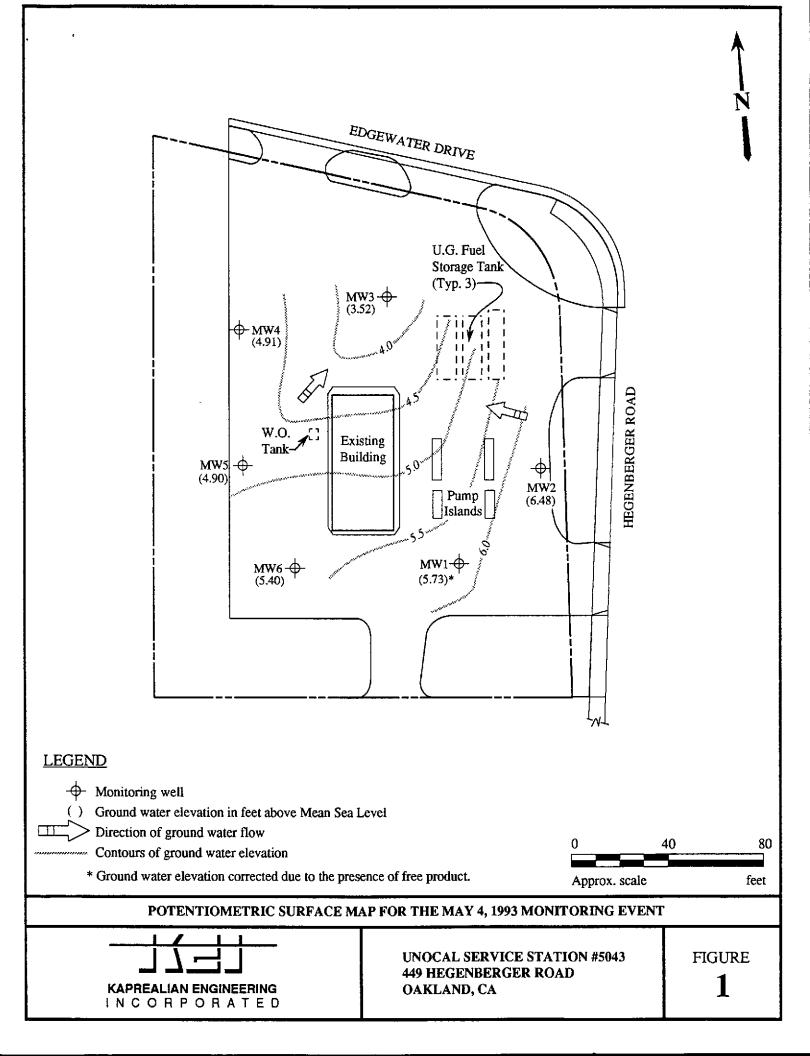


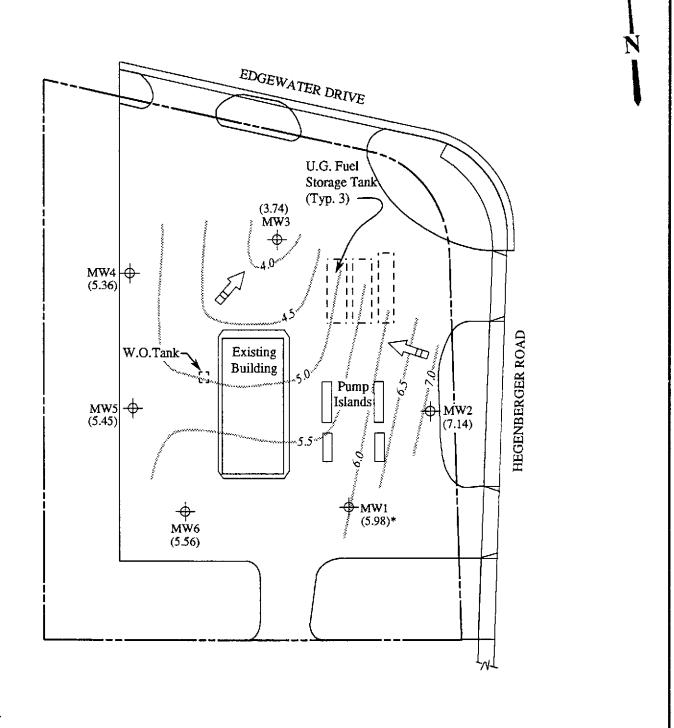
Base modified from 7.5 minute U.S.G.S. San Leandor Quadrangle (photorevised 1980)





UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CALIFORNIA LOCATION MAP





Monitoring well

Ground water elevation in feet above Mean Sea Level

Direction of ground water flow Contours of ground water elevation

* Ground water elevation corrected due to the presence of free product.



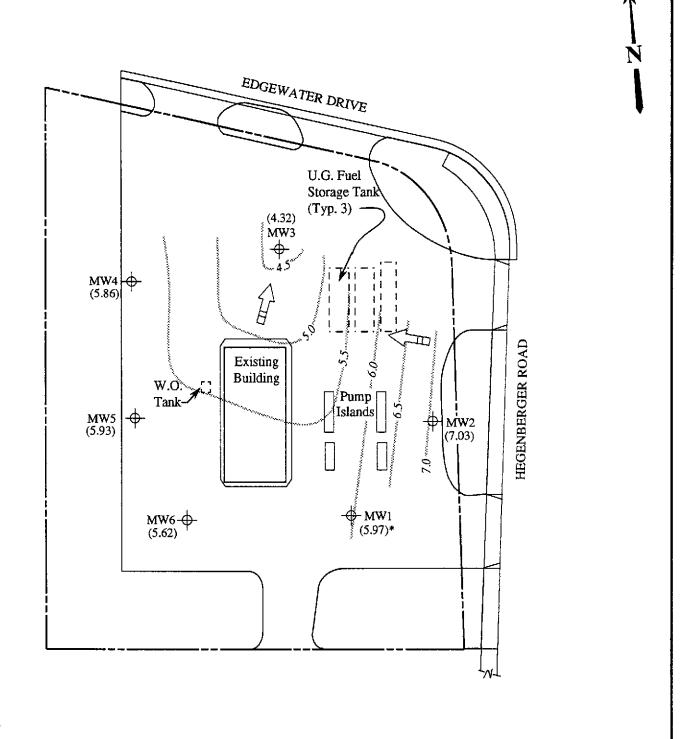
POTENTIOMETRIC SURFACE MAP FOR THE APRIL 1, 1993 MONITORING EVENT



UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA

FIGURE

2



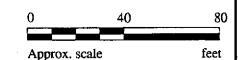
→ Monitoring well

) Ground water elevation in feet above Mean Sea Level

Direction of ground water flow

Contours of ground water elevation

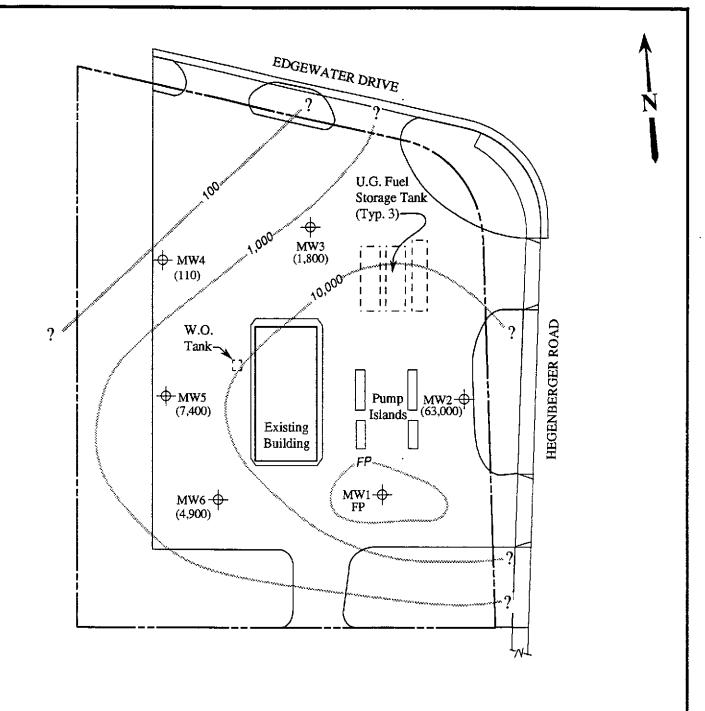
* Ground water elevation corrected due to the presence of free product.



POTENTIOMETRIC SURFACE MAP FOR THE MARCH 4, 1993 MONITORING EVENT



UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA

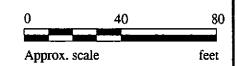


→ Monitoring well

() Concentrations of TPH as gasoline in ppb

"Iso-concentration contours in ppb

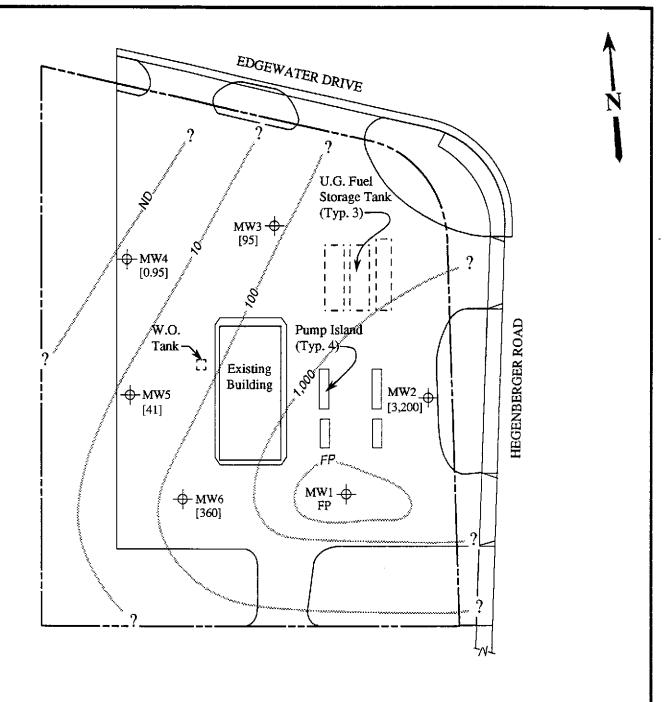
FP = Free product



TPH AS GASOLINE CONCENTRATIONS IN GROUND WATER ON MAY 4, 1993



UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA



→ Monitoring well

[] Concentrations of benzene in ppb

Iso-concentration contours in ppb

FP = Free product

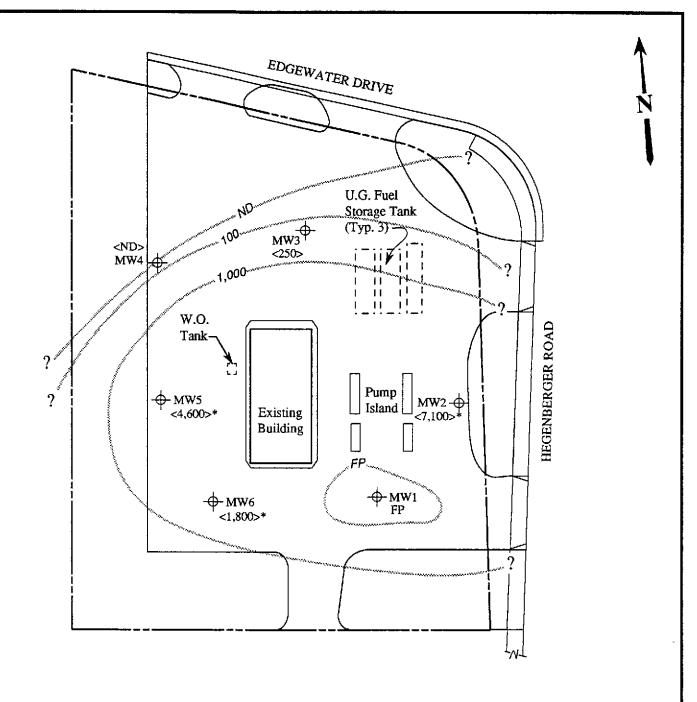
ND = Non-detectable



BENZENE CONCENTRATIONS IN GROUND WATER ON MAY 4, 1993



UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA



♦ Monitoring well

< > Concentrations of TPH as diesel in ppb

Iso-concentration contours in ppb

ND = Non-detectable

FP = Free product

* The lab reported that the hydrocarbons detected did not appear to be diesel.

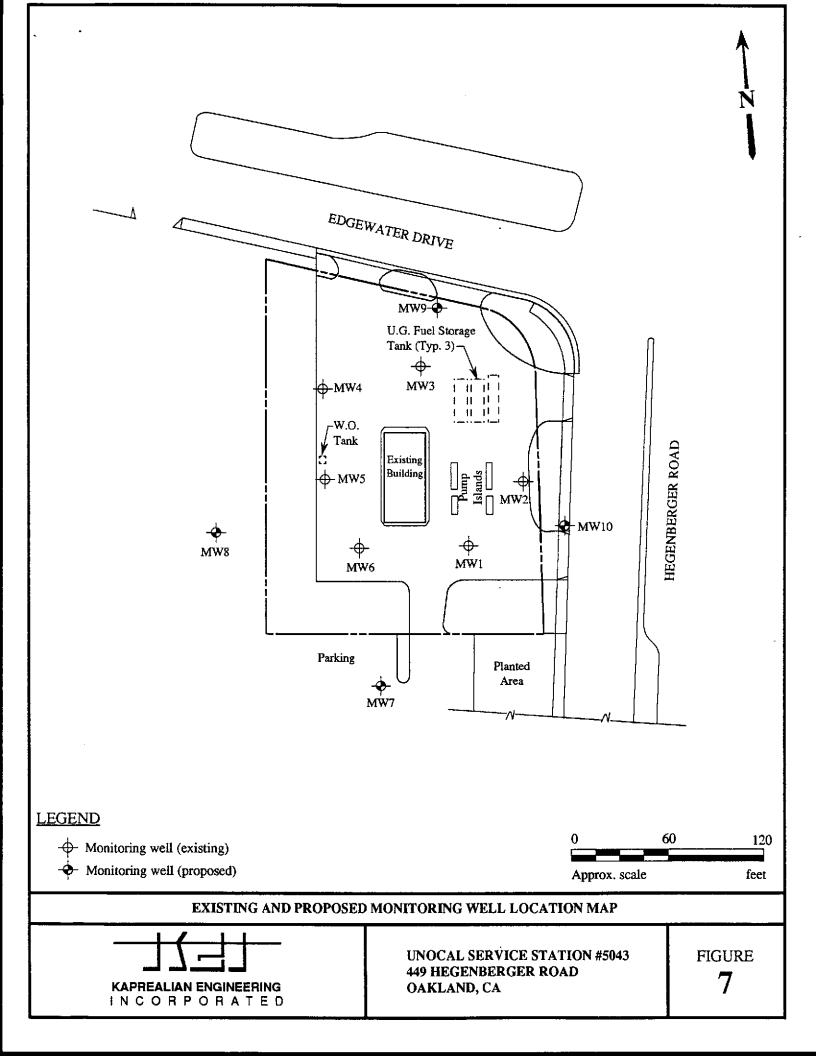


TPH AS DIESEL CONCENTRATIONS IN GROUND WATER ON MAY 4, 1993



UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA





Kaprealian Engineering, Inc. 2401 Stanwell Dr., Ste. 400

Concord, CA 94520 Attention: Mardo Kaprealian, P.E. Client Project ID: Sample Matrix:

Unocal, 449 Hegenbeger, Oakland

Sampled: Received:

May 4, 1993 May 4, 1993

Analysis Method: First Sample #:

EPA 5030/8015/8020

305-0206

Reported:

May 17, 1993

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit μg/L	Limit I.D. I.D. I.D.		Sample I.D. 305-0209 MW 5	Sample I.D. 305-0210 MW 6	Sample I.D. Matrix Blank	
Purgeable Hydrocarbons	50	63,000	1,800	110	7,400	4,900	
Benzene	0.5	3,200	95	0.95	41	360	
Toluene	0.5	17,000	N.D.	N.D.	N.D.	18	
Ethyl Benzene	0.5	470	N.D.	N.D.	1,000	450	
Total Xylenes	0.5	17,000	N.D.	N.D.	35	430	
Chromatogram Pattern:		Gasoline	Gasoline and Discrete Peak	Gascline and Discrete Peak	Gasoline	Gasoline	
Quality Control Da	ata					<u>-</u>	
Report Limit Multiplication Factor:		200	20	1.0	20	20	1.0
Date Analyzed:		5/10/93	5/10/93	5/7/93	5/10/93	5/10/93	5/10/93
Instrument Identific	ation:	HP-5	HP-5	HP-2	HP-5	HP-5	HP-5

110

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

111

SEQUOJA ANALYTICAL

Surrogate Recovery, %:

(QC Limits = 70-130%)

Project Manager

Please Note:	* "Discrete Peak" is an unidentified peak in the MTBE range.	

102

91

110

111

Kaprealian Engineering, Inc. 2401 Stanwell Dr., Ste. 400

Concord, CA 94520

Client Project ID: Sample Matrix:

Unocal, 449 Hegenbeger, Oakland

Water

EPA 3510/3520/8015

Sampled: May 4, 1993 Received: May 4, 1993

Reported:

May 17, 1993

Analysis Method: Attention: Mardo Kaprealian, P.E. First Sample #:

305-0206

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit μg/L	Sample I.D. 305-0206 MW 2	Sample I.D. 305-0207 MW 3*	Sample I.D. 305-0208 MW 4	Sample I.D. 305-0209 MW 5*	Sample I.D. 305-0210 MW 6*	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	7,100	250	N.D.	4,600	1,800	
Chromatogram Pa	ttern:	Non-Diesel Mixture (< C14)	Diesel and Non-Diesel Mixture (<c14)< td=""><td></td><td>Non-Diesel Mixture (< C14)</td><td>Non-Diesel Mixture (< C14)</td><td></td></c14)<>		Non-Diesel Mixture (< C14)	Non-Diesel Mixture (< C14)	

Quality Control Data

Report Limit Multiplication Factor:	10	1.0	1.0	10	10	1.0
Date Extracted:	5/11/93	5/11/93	5/11/93	5/11/93	5/11/93	5/11/93
Date Analyzed:	5/13/93	5/12/93	5/12/93	5/13/93	5/13/93	5/13/93
Instrument Identification:	НР-ЗА	НР-ЗА	HP-3A	HP-3A	НР-ЗА	HP-3B

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

SEQUOIA ANALYTICAL

itt A. Chieffo Project Manager

Please Note:	* "Non-Diesel Mixture" is probably gasoline.	



2401 Stanwell Dr., Ste. 400 Concord, CA 94520

Attention: Mardo Kaprealian, P.E.

Kaprealian Engineering, Inc. Client Project ID: Unocal, 449 Hegenbeger, Oakland

Sampled: Received:

May 4, 1993

Matrix Descript: Analysis Method: Water SM 5520 B&F (Gravimetric)

Extracted:

May 4, 1993 May 10, 1993

First Sample #: 305-0209 Analyzed: Reported:

May 11, 1993 May 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample	Sample	Oil & Grease
Number	Description	mg/L
305-0209	MW 5	N.D.

Detection Limits:

5.0

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

SEQUOIA ANALYTICAL

Scott A. Chieffox Project Manager Kaprealian Engineering, Inc.

Client Project ID:

Unocal, 449 Hegenbeger, Oakland

2401 Stanwell Dr., Ste. 400 Concord, CA 94520

Matrix: Water

Attention: Mardo Kaprealian, P.E.

QC Sample Group 3050206-210

Reported: May 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE		······································	Ethyl-			Oil and	 -
	Benzene	Toluene	Benzene	Xylenes	Diesel	Grease	
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015	SM 5520	
Analyst:	J.F.	J.F.	J.F.	J.F.	K, Wimer	D. Newcomb	
Conc. Spiked:	20	20	20	20	300	100	
Units:	μg/L	μg/L	μg/L	μg/L	μg/L	mg/L	
LCS Batch#:	3LCS051093	3LCS051093	3LCS051093	3LCS051093	BLK051193	BLK051093	
Date Prepared:	5/10/93	5/10/93	5/10/93	5/10/93	5/11/93	5/10/93	
Date Analyzed:	5/10/93	5/10/93	5/10/93	5/10/93	5/13/93	5/10/93	
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5	HP-3B	N/A	
LCS %							
Recovery:	124	120	119	123	104	97	
Control Limits:	70-130%	70-130%	70-130%	70-130%	80-120%	80-120%	
MS/MSD							
Batch #:	3050238	3050238	3050238	3050238	051193	051093	
Date Prepared:	5/10/93	5/10/93	5/10/93	5/10/93	5/11/93	5/10/93	
Date Analyzed:	5/10/93	5/10/93	5/10/93	5/10/93	5/13/93	5/10/93	
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5	HP-3B	N/A	
Matrix Spike							
% Recovery:	115	115	115	116	104	97	
Matrix Spike							
Duplicate %							
Recovery:	120	120	120	122	106	92	
Relative %							
Difference:	4.2	4.2	4.2	3.4	1.9	5.0	

SEQUOIA ANALYTICAL

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.

Project Manager

Kaprealian Engineering, Inc.

Client Project ID: Unocal, 449 Hegenbeger, Oakland

2401 Stanwell Dr., Ste. 400

Concord, CA 94520

Attention: Mardo Kaprealian, P.E. QC Sample Group: 3050206-210

Reported: May 17, 1993

QUALITY CONTROL DATA REPORT

SURROGATE

Method: Analyst: EPA 8015 K. Wirner

EPA 8015 K. Wimer

EPA 8015 K. Wirner μg/L

EPA 8015 K. Wimer μg/L

EPA 8015 K. Wimer μg/L

EPA 8015 K. Wimer μg/L

Reporting Units: Date Analyzed: Sample #:

μg/L May 13, 1993 305-0206

μg/L May 12, 1993 305-0207

May 12, 1993 May 13, 1993 May 13, 1993 May 13, 1993 305-0208

305-0209

305-0210

Matrix Blank

Surrogate

% Recovery:

87

84

83

104

81

101

SEQUQIA ANALYTICAL

Scott A. Chieffo 4 Project Manager

% Recovery:

Conc. of M.S. - Conc. of Sample

x 100

Spike Conc. Added

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

(+ 4)

SAMPLER				·		 S I	TE HAI	HE & ADDRESS			ANALYS	ES REQL	JESTED		TURN AROUND TIME:
WITNESSING A	GENCY	<u> </u>						SENBERGER	9	(J)	4	(5 SZW			RECUCAR
SAMPLE ID NO.	DATE	TIME	\$01L	WATER			NO. OF CONT.	SAMPLING LOCATION	TPHG	Exx XX	THOI	766			REMARKS
MWZ	<i>5.4</i>			^	×		31	VOA AMB	×	х'	Y				3050206AC
MW3	žį			×	2'		ä	4	×	グ	×				1 207AC
MWU	u			~	٠,		а	4	1	ベ	Ж				208AC
MW5	У			~	X ⁴		2	VOA AMB	*	人	ᆺ	メ			209AD
MW6	4			٨	*		2	HMB	×	メ	×				U QIDAC
								,							
Relinquished	by: (\$i W (K	gnature)	5	ate/Ti	ine - 5 2] } _	Receive	ed by: (Signature)		for a	nalysi	5:	•	·	the laboratory accepting samples
Ret inquished	by! {sig	gnaturé)	D	ate/Ti	me	-	Receiv	ed by; (Signature)				•			ed until analyzed?
Relinquished	by: (\$i	gnature)	D	ate/Ti	пе	ſ	Receiv	ed by: (Signature)							nalysis have head space? Italiners and properly packaged? Y
Relinquished	by: (Si	gnature)	D	ate/Ti	me	5	Receiv	ed by: (Signature)	1	4. k	5	ature			itle "Date

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