KAPREALIAN ENGINEERING
INCORPORATED

Rec
7/27/93

KEI-P88-0205.QR20
June 30, 1993

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

Attention: Mr. Edward C. Ralston

RE: Quarterly Report
Unocal Service Station #5366
7375 Amador Valley Boulevard
Dublin, California

Dear Mr. Ralston:

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 report (KEI-P88-0205.QR3) dated February 15, 1989, and as modified in KEI's quarterly reports (KEI-P88-0205.QR16) dated June 30, 1992, and (KEI-P88-0205.QR18) dated December 18, 1992. The wells are currently monitored quarterly. Well MW1 is sampled on a quarterly basis, and wells MW2, MW3, and MW4 are sampled on an annual basis. This report covers the work performed by KEI during May of 1993.

BACKGROUND

The subject site contains a Unocal service station facility. Three underground fuel storage tanks were removed from the site in February of 1988 during tank replacement activities. Contaminated soil in the tank pit was overexcavated to a depth of 13 feet below grade (2 feet below the depth of ground water at the time). Four 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-P88-0205.QR16) dated June 30, 1992.

RECENT FIELD ACTIVITIES

The four Unocal monitoring wells (MW1 through MW4) were monitored once during the quarter. Monitoring well MW1 was sampled once during the quarter. Monitoring wells MW2, MW3, and MW4 are currently sampled annually, and thus were not sampled this quarter. During monitoring, the wells were checked for depth to water and

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the presence of free product. Prior to sampling, monitoring well MW1 was also checked for the presence of a sheen. No free product or sheen was noted in any of the Unocal wells during the quarter.

On May 10, 1993, a joint monitoring event was conducted with the nearby BP and former Shell service station sites. For this quarter, the BP data was unavailable. Monitoring data from the former Shell station is summarized in Table 2. The monitoring data collected for the Unocal site this quarter is summarized in Table 1.

A water sample was collected by KEI from Unocal's well MW1 on May 10, 1993. Prior to sampling, the well was purged of 10 gallons of water by the use of a surface pump. The sample was collected by the use of a clean Teflon bailer. The sample was 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 a state-certified laboratory.

HYDROLOGY

The measured depth to ground water at the Unocal site on May 10, 1993, ranged between 9.57 and 9.91 feet below grade. The water levels in all of the Unocal monitoring wells have shown net decreases of 0.94 to 0.96 feet since February 10, 1993. Based on the water level data gathered during the joint monitoring event conducted with the adjacent former Shell service station on May 10, 1993, the ground water flow over the majority of the site vicinity was to the east (varying from the east-northeast to the southeast), as shown on the attached Potentiometric Surface Map, Figure 1. The ground water flow direction this quarter is generally similar to the flow directions reported in most previous quarters. The hydraulic gradient over the majority of the site vicinity on May 10, 1993, ranged from approximately 0.02 to 0.09.

ANALYTICAL RESULTS

The ground water sample collected from Unocal monitoring well MW1 this quarter was analyzed at Sequoia Analytical Laboratory and was accompanied by properly executed Chain of Custody documentation. The sample was 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, ethylbenzene, and xylenes by EPA method 8020.

The analytical results of all of the ground water samples collected from the Unocal monitoring wells to date are summarized in Tables 3 and 4. 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 from the Unocal site to date, and no evidence of free product or sheen in any of the Unocal wells, KEI recommends the continuation of the current ground water monitoring and sampling program, per KEI's report (KEI-P88-0205.QR3) dated February 15, 1989, and as modified in KEI's quarterly reports (KEI-P88-0205.QR16) dated June 30, 1992, and (KEI-P88-0205.QR18) dated December 18, 1992. All four existing monitoring wells are currently monitored quarterly; well MW1 is sampled quarterly; and wells MW2, MW3, and MW4 are sampled annually. In addition, KEI will attempt to continue the joint monitoring program with the adjacent BP and former Shell service stations (and also try to include the nearby Arco service station site in the joint program). Recommendations for modifying or terminating the monitoring and sampling program will be made as warranted.

As recommended last quarter, on April 20, 1993, a representative of KEI reviewed the file for the Arco service station located at 7249 Village Parkway (across Village Parkway and east of Unocal, as shown on the attached Figure 1). The file review was conducted at the offices of the Alameda County Health Care Services (ACHCS) Agency. Based on a Quarterly Groundwater Monitoring report dated April 2, 1993, the direction of ground water flow at the Arco site varied from the south-southeast to the east-northeast during the last quarter of 1992. On the November 10, 1992, sampling event, the maximum concentration of TPH as gasoline in ground water was detected in MW1 at a concentration of 2,800 ppb. Based on a report by RESNA titled "Additional Onsite Subsurface Investigation and Vapor Extraction Test" dated January 29, 1993, there are currently six monitoring wells and four vapor extraction wells on-site. Vapor extraction tests were performed at the Arco site on November 10, 1992. Based on the results of the test, RESNA concluded that vapor extraction appeared to be a viable soil remediation alternative for the Arco site.

Lastly, in order to comply with the requirements of the ACHCS, KEI recommends the installation of one additional monitoring well in the downgradient direction of MW1. Due to the space limitations in the vicinity of MW1, a site reconnaissance will be conducted to determine a feasible location for the proposed additional monitoring well. Once the reconnaissance is completed and a suitable well

location identified, KEI will prepare and submit a work plan for the proposed well. It is anticipated that this well will be useful in further delineating the extent of contamination at this site. In addition, KEI will also perform periodic RWQCB file reviews for the nearby Arco site in order to track the progress and effectiveness of any remedial measures.

DISTRIBUTION

A copy of this report should be sent to ACHCS, and to the RWQCB, San Francisco 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 through 4
Location Map
Potentiometric Surface Map - Figure 1
Laboratory Analyses
Chain of Custody documentation

KEI-P88-0205.QR20
June 30, 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 May 10, 1993)					
MW1	327.15	9.57	0	No	10
MW2*	327.61	9.75	0	--	0
MW3*	327.62	9.91	0	--	0
MW4*	327.10	9.90	0	--	0

Well #	Well Cover Elevation** (feet)
MW1	336.72
MW2	337.36
MW3	337.53
MW4	337.00

-- Sheen determination was not performed.

* Monitored only.

** The elevations of the tops of the well covers have been surveyed relative to Mean Sea Level (MSL), per a County of Alameda Benchmark (elevation = 337.40 MSL).

KEI-P88-0205.QR20
June 30, 1993

TABLE 2

SUMMARY OF MONITORING DATA

(Former Shell Service Station Wells
Monitored by EMCON)

Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Top of Casing Elevation (feet)
(Monitored and Sampled on May 10, 1993)			
MW1	327.05	7.78	334.83
MW2	327.31	9.65	336.96
MW3	328.05	8.88	336.93
MW4	327.60	9.54	337.14
MW5	327.20*	7.76	334.96
MW6	327.32	8.10	335.42
MW7	326.55	6.68	333.23
MW8	327.80	8.00	335.80
MW9	327.01	7.56	334.57
MW11	327.02	7.18	334.20
MW12	WELL WAS INACCESSIBLE		
MW13	327.58	8.06	335.64

* Ground water elevation was not used for contours. The well is screened across a deeper aquifer.

KEI-P88-0205.QR20
June 30, 1993

TABLE 3

SUMMARY OF LABORATORY ANALYSES
WATER ppb

Date	Sample Well #	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
5/10/93	MW1	1,600	39	0.40	25	3.3
2/10/93	MW1	3,000	230	ND	340	200
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
11/10/92	MW1	1,100	49	ND	71	21
8/12/92	MW1	1,700	51	ND	93	21
5/22/92	MW1	2,500	120	ND	230	37
	MW2	ND	ND	ND	ND	ND
2/25/92	MW1	3,900	500	ND	450	400
11/13/91	MW1	860	40	ND	11	2.5
8/12/91	MW1	1,100	68	2.6	210	9.3
5/15/91	MW1	2,100	220	ND	360	27
2/14/91	MW1	1,900	150	2.9	340	43
11/14/90	MW1	2,000	110	0.52	410	16
8/15/90	MW1	2,200	160	ND	570	45
5/18/90	MW1	2,000	140	1.8	460	19
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
2/06/90	MW1	2,700	170	ND	350	29
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
10/20/89	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	0.38	ND
	MW4	ND	ND	ND	ND	ND

TABLE 3 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
7/27/89	MW1	1,900	130	6.3	ND	68
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	0.34	ND	ND	ND
5/22/89	MW3	ND	ND	ND	ND	ND
4/28/89	MW1	1,000	97	0.8	170	24
	MW2	ND	ND	ND	ND	ND
	MW3	880	9.6	9.7	19	12.7
	MW4	ND	0.3	ND	ND	ND
1/26/89	MW1	1,900	240	1.8	81	30
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	0.67	ND	ND	ND
10/28/88	MW1	5,200	150	ND	250	12
	MW2	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
7/25/88	MW1	6,100	170	2.1	94	94
	MW2	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
4/29/88	MW1	10,000	960	17	870	1,500
	MW2	170	2.7	0.6	ND	13
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND

ND = Non-detectable.

-- Indicates analysis was not performed.

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

KEI-P88-0205.QR20
June 30, 1993

TABLE 4

SUMMARY OF LABORATORY ANALYSES
WATER

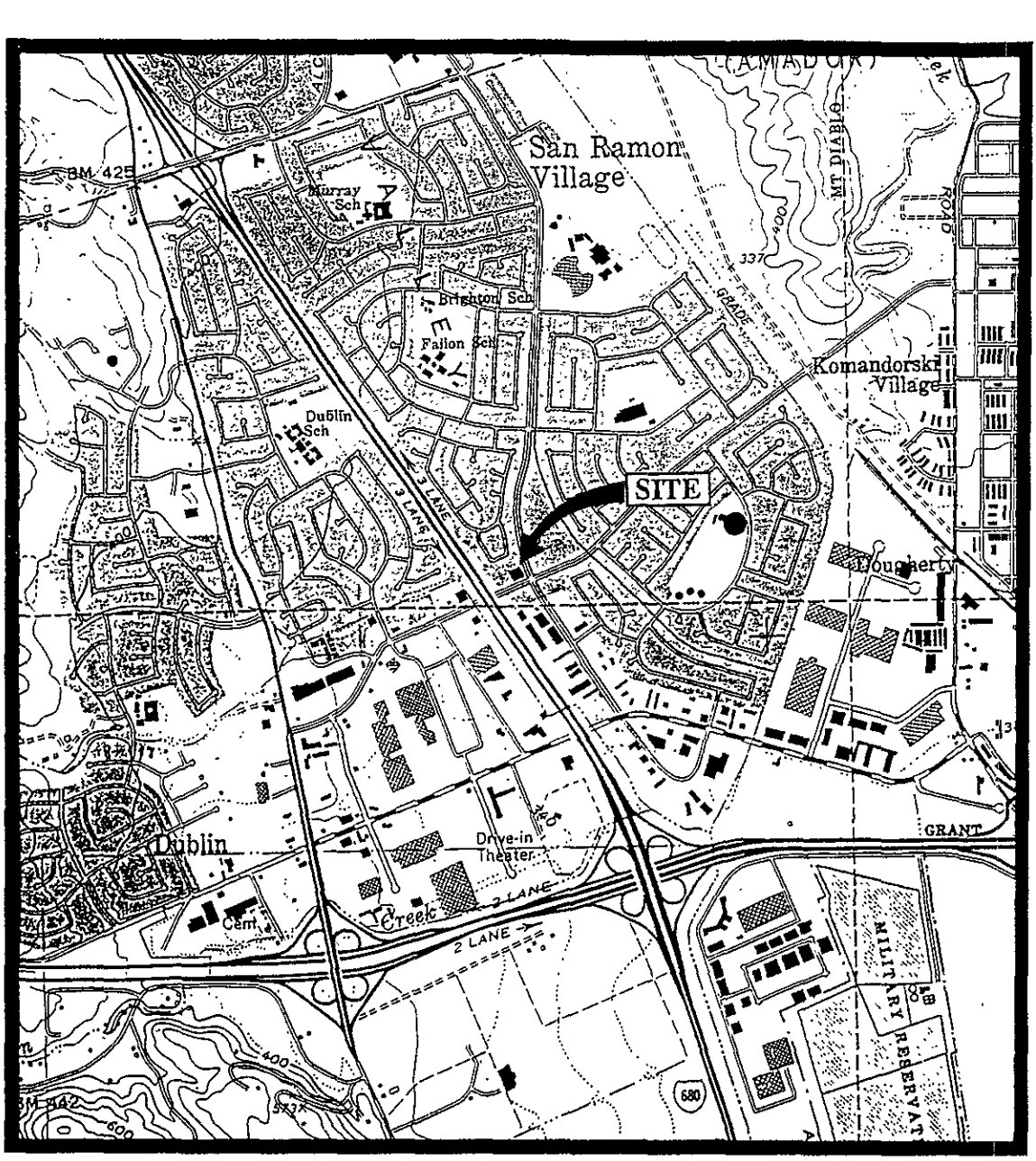
Date	Sample Well #	TPH as Diesel	TOG (ppm)	EPA 8010 Constituents
5/10/93	MW1	730*	--	--
2/10/93	MW3	200	ND	--
5/18/90	MW3	ND	ND	ND
2/06/90	MW3	ND	ND	ND
10/20/89	MW3	ND	2.5	ND
7/27/89	MW3	ND	1.6	ND
5/22/89	MW3	--	--	--
4/28/89	MW3	72	ND	ND
1/26/89	MW3	ND	--	ND
10/28/88	MW3	ND	--	ND
7/25/88	MW3	ND	--	ND
4/29/88	MW3	ND	--	ND

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

ND = Non-detectable.

-- Indicates analysis was not performed.

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

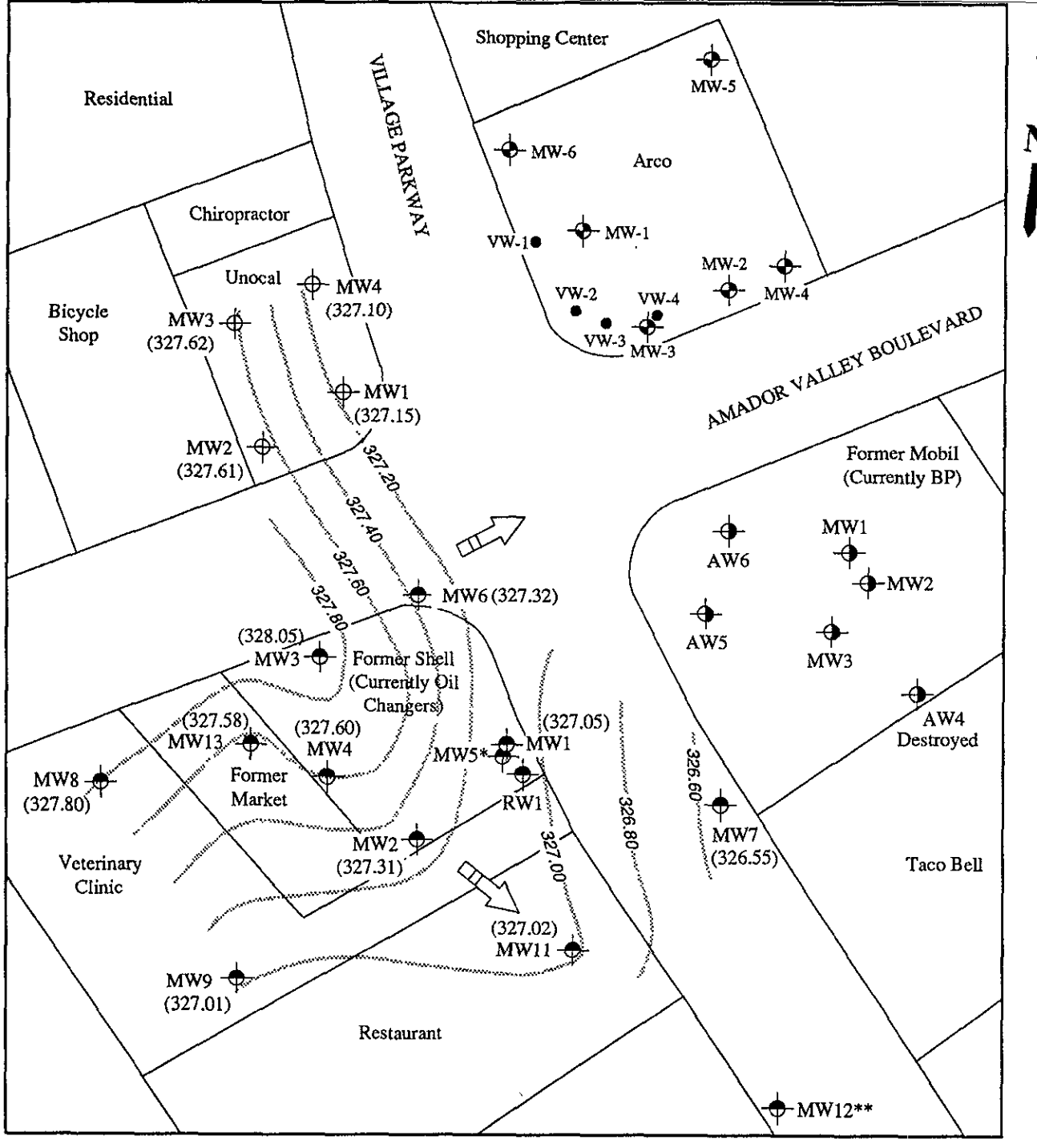


Base modified from 7.5 minute U.S.G.S. Dublin Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	**UNOCAL SERVICE STATION #5366** **7375 AMADOR VALLEY BLVD.** **DUBLIN, CA**	**LOCATION MAP**



LEGEND

- Monitoring well (Unocal)
- Monitoring well (BP)
- Monitoring well (Shell)
- Monitoring well (Arco)
- Vapor extraction well (Arco)
- ( ) Ground water elevation in feet above *Mean Sea Level*
- ..... Contours of ground water elevation
- Direction of ground water flow
- * Ground water elevation not used for contours (well screened across deeper aquifer).
- ** Well was inaccessable

POTENTIOMETRIC SURFACE MAP FOR THE MAY 10, 1993 JOINT MONITORING EVENT

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5366
7375 AMADOR VALLEY BLVD.
DUBLIN, CA

FIGURE
1

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 7375 Amador Valley, Dublin	Sampled: May 10, 1993
2401 Stanwell Dr., Ste. 400	Sample Matrix:	Water	Received: May 10, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported: May 20, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	305-0511	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 305-0511 MW-1	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	1,600	
Benzene	0.5	39	
Toluene	0.5	0.40	
Ethyl Benzene	0.5	25	
Total Xylenes	0.5	3.3	
Chromatogram Pattern:		Gasoline	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Analyzed:	5/14/93	5/14/93
Instrument Identification:	ML #2	ML #2
Surrogate Recovery, %: (QC Limits = 70-130%)	102	102

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

SEQUOIA ANALYTICAL

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

Kapreallan Engineering, Inc.	Client Project ID:	Unocal, 7375 Amador Valley, Dublin	Sampled:	May 10, 1993
2401 Stanwell Dr., Ste. 400	Sample Matrix:	Water	Received:	May 10, 1993
Concord, CA 94520	Analysis Method:	EPA 3510/3520/8015	Reported:	May 20, 1993
Attention: Mardo Kapreallan, P.E.	First Sample #:	305-0511		

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 305-0511 MW-1*	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	730	
Chromatogram Pattern:		Diesel & Non Diesel Mixture (<C14)	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Extracted:	5/15/93	5/15/93
Date Analyzed:	5/19/93	5/19/93
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.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

Please Note: * "Non Diesel mixture" is probably gasoline.

SEQUOIA ANALYTICAL
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Kapreallan Engineering, Inc.
2401 Stanwell Dr., Ste. 400
Concord, CA 94520
Attention: Mardo Kapreallan, P.E.

Client Project ID: Unocal, 7375 Amador Valley, Dublin
Matrix: Water
QC Sample Group 305-0511

Reported: May 20, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015
Analyst:	J.Dinsay	J.Dinsay	J.Dinsay	J.Dinsay	K.Wimer
Conc. Spiked:	10	10	10	30	300
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	GBLK051493	GBLK051493	GBLK051493	GBLK051493	BLK051593
Date Prepared:	5/14/93	5/14/93	5/14/93	5/14/93	5/15/93
Date Analyzed:	5/14/93	5/14/93	5/14/93	5/14/93	5/18/93
Instrument I.D.#:	ML #2	ML #2	ML #2	ML #2	HP-3B
LCS % Recovery:	110	110	110	103	120
Control Limits:	80-120	80-120	80-120	80-120	80-120
MS/MSD Batch #:	G3050507	G3050507	G3050507	G3050507	3050515
Date Prepared:	5/14/93	5/14/93	5/14/93	5/14/93	5/15/93
Date Analyzed:	5/14/93	5/14/93	5/14/93	5/14/93	5/15/93
Instrument I.D.#:	ML #2	ML #2	ML #2	ML #2	HP-3B
Matrix Spike % Recovery:	120	105	110	103	120
Matrix Spike Duplicate % Recovery:	120	106	110	103	120
Relative % Difference:	0.0	1.0	0.0	0.0	0.0

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.

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

Kapreallan Engineering, Inc. Client Project ID: Unocal, 7375 Amador Valley, Dublin
2401 Stanwell Dr., Ste. 400
Concord, CA 94520
Attention: Mardo Kapreallan, P.E. QC Sample Group: 305-0511 Reported: May 20, 1993

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015
Analyst:	K. Wimer	K. Wimer
Reporting Units:	µg/L	µg/L
Date Analyzed:	May 19, 1993	May 18, 1993
Sample #:	305-0511	Matrix Blank
Surrogate % Recovery:	91	115

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

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INCORPORATED

CHAIN OF CUSTODY

SAMPLER: Joe

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Dublin
7375 Amador Valley

ANALYSES REQUESTED: TPHG BTXE; TPHD

TURN AROUND TIME: 1 Week

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW-1	5-10-93	11:40 A.M.		✓	✓		3	MW	3050511AC

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Joe Geniza	5-10-93 1615	Erin Vonnund
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? N
4. Were samples in appropriate containers and properly packaged? Y

Signature | Title | Date: 5-10-93

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel. 510 602 5100 Fax 510 687 0602