KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
(707) 746-6915 • (707) 746-6916 • FAX: (707) 746-5581

August 20, 1991

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

Attention: Mr. Gil Wistar

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

Dear Mr. Wistar:

Per the request of Mr. Rick Sisk of Unocal Corporation, enclosed please find our report dated August 20, 1991, for the above referenced site.

Should you have any questions, please feel free to call our office at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.

Judy A. Dewey

jad\82

Enclosure

cc: Rick Sisk, Unocal Corporation

91 AUG 21 AM 11:21

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
(707) 746-6915 • (707) 746-6916 • FAX: (707) 746-5581

KEI-P89-0703.QR7
August 20, 1991

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

Attention: Mr. Rick Sisk

RE: Quarterly Report
Unocal Service Station #3538
411 W. MacArthur Boulevard 94609
Oakland, California

Dear Mr. Sisk:

This report presents the results of the seventh 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. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from May through July, 1991.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The site is located on gently sloping, south-southwest trending topography, and is situated approximately 1,900 feet northwest of Glen Echo Creek. Also, the site is located adjacent to and west of Mosswood Park and southwest of a BP Service Station. A Location Map, Site Vicinity Map and Site Plans are attached to this report.

KEI's initial work at the site began in July 1989, when KEI was asked to collect soil samples following the removal of two underground fuel storage tanks and one waste oil tank at the site. The tanks consisted of one 10,000 gallon super unleaded, one 12,000 gallon regular unleaded, and one 550 gallon waste oil tank. No apparent holes or cracks were observed in the fuel tanks; however, the waste oil tank had four small holes. Water was encountered in the fuel tank pit at a depth of 10.5 feet, thus prohibiting sampling directly from beneath the fuel tanks. Six sidewall samples, labeled SW1, SW1(4), SW2, SW3, SW4 and SW4(2), were collected from the fuel tank pit at a depth of 10 feet below grade. The soil sample collected from beneath the waste oil tank, labeled WO1, was collected at a depth of 8.5 feet below grade. KEI also collected four samples, labeled P1 through P4, from the piping trenches at depths of 5 to 10 feet below grade. After sampling,

the water was pumped from the fuel tank pit. Since there was no recharge, a water sample was not collected. All samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California, for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, xylenes and ethylbenzene (BTX&E). In addition, the waste oil tank sample was analyzed for TPH as diesel, total oil and grease (TOG), and EPA methods 8010 and 8270 compounds.

The analytical results of the fuel tank pit soil samples showed levels of TPH as gasoline ranging from non-detectable to 11 ppm, except for sample SW1, which showed 3,100 ppm of TPH as gasoline. However, following excavation of approximately 4 feet of the sidewall where sample SW1 was collected, an additional sample, labeled SW1(4), was collected, analyzed, and indicated non-detectable levels of TPH as gasoline and BTX&E. The sample collected from the waste oil pit showed non-detectable levels of TPH as gasoline, TPH as diesel, and BTX&E, with TOG levels of 36 ppm. Results of the soil analyses are summarized in Table 3, and the sample locations are as shown on the attached Site Plan, Figure 2. Documentation of soil sample collection techniques and sample analytical results from the tank excavation are summarized in KEI's report (KEI-J89-0703.R1) dated July 31, 1989. To comply with the requirements of the regulatory agencies and based on the results of the laboratory analyses, KEI recommended the installation of four monitoring wells.

On September 6 and 7, 1989, four two-inch diameter monitoring wells, designated as MW1, MW2, MW3 and MW4 on the attached Site Plan, Figure 1, were installed at the site. The four wells were drilled and completed to total depths ranging from 29 to 30 feet. Ground water was encountered at depths ranging from 19 to 19.5 feet beneath the surface during drilling. The wells were developed on September 12, 1989, and were initially sampled on September 15, 1989.

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California. Samples were analyzed for TPH as gasoline and BTX&E. In addition, the sample collected from monitoring well MW1 was analyzed for TPH as diesel, TOG, and purgeable halocarbons using EPA method 8010. Analytical results of soil samples collected from the borings for the monitoring wells showed levels of TPH as gasoline ranging from non-detectable to 20 ppm in all samples. TPH as diesel and EPA method 8010 compounds were non-detectable in all samples collected from MW1. All TOG levels in MW1 were less than 50 ppm. Benzene levels were non-detectable in all samples except MW2 at 19 feet and MW3 at 10 feet, which were 1.5 ppm and 0.29 ppm, respectively. The analytical results of water samples collected from the monitoring wells

indicated non-detectable levels of benzene in all wells. MW1 also revealed non-detectable levels of TPH as diesel and less than 50 ppm of TOG, however, 2.7 ppb of tetrachloroethene (PCE) was detected. TPH as gasoline levels were 290 ppb in MW2, 32 ppb in MW3, and non-detectable in wells MW1 and MW4. Laboratory results of the soil samples are summarized in Table 3, and water samples in Table 2. The details of the monitoring well installation are presented in KEI's report (KEI-P89-0703.R5) dated October 23, 1989. Based on these analytical results, KEI recommended the implementation of a monthly monitoring and quarterly sampling program. The monthly monitoring and quarterly sampling was initiated in November, 1989, and the first quarter results are presented in KEI's report (KEI-P89-0703.QR1) dated February 20, 1990.

Based on the contaminant levels detected in monitoring wells MW2 and MW3 in subsequent quarters, KEI recommended the installation of two additional monitoring wells (see the attached Site Vicinity Map) in KEI's fifth quarterly report (KEI-P89-0703.QR5) dated February 28, 1991. KEI considered proposing installation of monitoring wells in the median strip in the center of MacArthur Boulevard; however, access is precluded due to the presence of utilities and trees.

RECENT FIELD ACTIVITIES

The four wells (MW1 through MW4) were monitored three times and sampled once during the quarter. During monitoring, the wells were checked for depth to water and presence of free product and sheen. In addition, wells MW2 and MW3 were purged of between 45 to 55 gallons during each monthly monitoring event. No free product or sheen was noted in any of the wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on July 15, 1991. Prior to sampling, the wells were purged of between 15 to 55 gallons using a surface pump. Samples were then collected using a clean Teflon bailer. Samples were decanted into clean VOA vials and/or one liter amber bottles, as appropriate, which were sealed with Teflon-lined screw caps, and stored in a cooler on ice until delivery to the state certified laboratory.

HYDROLOGY AND REGIONAL GEOLOGY

Based on the water level data gathered during the quarter, ground water flow direction appeared to be generally toward the east on July 15, 1991, relatively unchanged from the previous quarter. The average hydraulic gradient at the site on July 15, 1991 was approximately 0.008. Water levels have steadily decreased during

the quarter, showing a net decrease of 0.56 to 0.90 feet in all wells since April 15, 1991. The measured depth to ground water at the site on July 15, 1991 ranged between 18.34 and 18.58 feet.

Based on review of regional geologic maps (U.S. Geological Survey Professional Paper 943 "Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties, and their Importance to Comprehensive Planning" by E.J. Helley and K.R. Lajoie, 1979), the subject site is underlain by Late Pleistocene Alluvium (Qpa). These materials, considered to be alluvial fan deposits, are described as consisting of weakly consolidated, slightly weathered, irregular interbedded clay, silt, sand, and gravel. The maximum thickness of these deposits are unknown, but is considered to be at least 150 feet thick.

The results of our previous subsurface study (log of borings for MW1 through MW4) indicate the site is underlain by alluvial materials to at least the maximum depth explored (30.5 feet). The alluvium materials underlying the site typically consist of clay with variable amounts of sand and/or gravel to depths below grade of 16.5 to 21 feet with occasional lenses of sand and gravel (see log of MW2). The upper clay zone is inturn underlain by a coarse-grained zone consisting of gravel and/or sand lenses, which range in thickness from a minimum of 8 feet up to a maximum of about 11.5 feet. This coarse-grained zone appears to be underlain by a second clay zone, which was generally encountered at depths below grade of about 27.5 to 29 feet (except in the vicinity of well MW3, which encountered clayey gravel to the maximum depth explored of 29 feet). Immediately underlying the surface of the site is a relatively thin layer of artificial fill materials varying in thickness from 1 to 2 feet.

ANALYTICAL RESULTS

Ground water samples were analyzed at Sequoia Analytical Laboratory in Concord, California, and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, and benzene, toluene, xylenes and ethylbenzene (BTX&E) using EPA method 8020. In addition, the ground water sample collected from MW1 was analyzed for TPH as diesel using EPA method 3510 in conjunction with modified 8015, TOG using Standard Method 5520B&F, and halogenated volatile organics using EPA method 8010.

Analytical results of the ground water samples, collected from monitoring wells MW1 and MW4, indicate non-detectable levels of TPH as gasoline and BTX&E. Analytical results of the ground water samples, collected from monitoring wells MW2 and MW3, indicate

levels of TPH as gasoline at concentrations of 2,200 ppb and 9,200 ppb, respectively. Benzene was detected in monitoring wells MW2 and MW3 at concentrations of 770 ppb and 1,300 ppb, respectively. In MW1, TPH as diesel, TOG and all EPA method 8010 constituents were non-detectable, except for 1.8 ppb of tetrachloroethene (PCE). Concentrations of TPH as gasoline and benzene detected in ground water are plotted on the attached Site Plan, Figure 1a. Results of the analyses are summarized in Table 2. Copies of the analytical results and Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results 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 monitoring and sampling program of the existing wells per KEI's proposal (KEI-P89-0703.P3) dated February 28, 1991. However, ground water samples collected from well MW1 during the past six quarters have shown non-detectable levels of TPH as diesel and TOG; therefore, KEI recommends discontinuing the TPH as diesel and TOG analyses for well MW1. In addition, ground water samples collected from wells MW1 and MW4 during the past six and eight quarters, respectively, have shown non-detectable levels of TPH as gasoline and benzene; therefore, KEI also recommends reducing the frequency of the TPH as gasoline and BTX&E analyses for wells MW1 and MW4 from quarterly to annually. These annual samples will be conducted in order to verify that the contamination detected in wells MW2 and MW3 has not migrated to wells MW1 and MW4. MW1 and MW4 will continue to be monitored monthly in order to collect ground water elevation data.

KEI has obtained the necessary permits and is currently in the process of obtaining off-site access permission for two additional monitoring wells as proposed in KEI's work plan/proposal (KEI-P89-0703.P3) dated February 28, 1991. The approximate locations of the off-site wells are shown on the attached Site Vicinity Map. KEI is prepared to install the additional monitoring wells as soon as access permission is received.

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 this 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 (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.

Thomas J. Berkins
Senior Environmental Engineer

Don R. Braun
Certified Engineering Geologist

License No. 1310
Exp. Date 6/30/92

Timothy R. Ross
Project Manager

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Attachments: Tables 1, 2 & 3
Location Map
Site Vicinity Map
Site Plans - Figures 1, 1a & 2
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0703.QR7
August 20, 1991

TABLE 1

SUMMARY OF MONITORING DATA

Well	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)	Product Purged
(Monitored and Sampled on July 15, 1991)						
MW1	82.29	18.53	0	No	15	0
MW2	81.59	18.41	0	No	55	0
MW3	81.83	18.58	0	No	55	0
MW4	82.01	18.34	0	No	15	0
(Monitored on June 14, 1991)						
MW1	82.43	18.39	0	No	0	0
MW2	81.70	18.30	0	No	55	0
MW3	81.98	18.43	0	No	45	0
MW4	82.14	18.21	0	No	0	0
(Monitored on May 14, 1991)						
MW1	82.72	18.10	0	No	0	0
MW2	81.90	18.10	0	No	55	0
MW3	82.17	18.24	0	No	55	0
MW4	82.36	17.99	0	No	0	0

Well	Well Cover Elevation (feet)*
MW1	100.82
MW2	100.00
MW3	100.41
MW4	100.35

* Elevations of top of well covers surveyed to assumed datum of 100.00 feet at top of MW2 well cover.

KEI-P89-0703.QR7
August 20, 1991

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	PCE
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	--
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	--

KEI-P89-0703.QR7
August 20, 1991

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene	PCE
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	--
Detection Limits		50	30	0.3	0.3	0.3	0.3	0.5

* TOG was non-detectable. All EPA method 8010 compounds were non-detectable, except for PCE (see above).

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

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

ND = Non-detectable.

-- Indicates analysis not performed.

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

KEI-P89-0703.QR7
August 20, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
(Collected on July 12 & 17, 1989)							
SW1	10	--	3,100	12	300	730	110
SW1(4)	10	--	ND	ND	ND	ND	ND
SW2	10	--	1.1	0.10	ND	0.18	ND
SW3	10	--	5.7	0.26	ND	0.45	0.23
SW4	10	--	2.5	ND	ND	0.24	ND
SW4(2)	10	--	11	0.61	0.51	1.3	0.44
P1	6.5	--	ND	ND	ND	ND	ND
P2	6.5	--	ND	ND	ND	ND	ND
P3	5.5	--	ND	ND	ND	ND	ND
P4	10	--	170	0.71	12	47	6.8
WO1*	8.5	ND	ND	ND	ND	ND	ND
(Collected on September 6 & 7, 1989)							
MW1**	5	ND	3.4	ND	ND	ND	ND
MW1**	10	ND	5.0	ND	ND	ND	ND
MW1**	15	ND	2.2	ND	ND	ND	ND
MW1**	19	ND	ND	ND	ND	ND	ND
MW2	5	--	1.4	ND	ND	ND	ND
MW2	10	--	ND	ND	ND	ND	ND
MW2	15	--	1.8	ND	ND	ND	ND
MW2	19	--	13	1.5	2.1	1.8	0.34
MW3	5	--	1.3	ND	ND	ND	ND
MW3	10	--	1.8	0.29	ND	ND	ND
MW3	15	--	3.3	ND	ND	ND	ND
MW3	18.5	--	ND	ND	ND	ND	ND
MW4	5	--	3.1	ND	ND	ND	ND
MW4	10	--	17	ND	ND	0.10	ND
MW4	15	--	20	ND	ND	0.27	ND
MW4	18.5	--	2.1	ND	ND	ND	ND
Detection Limits		1.0	1.0	0.05	0.1	0.1	0.11

KEI-P89-0703.QR7
August 20, 1991

TABLE 3 (Continued)

SUMMARY OF LABORATORY ANALYSES
SOIL

* TOG was 36 ppm, and EPA method 8010 and 8270 constituents were non-detectable.

** TOG was <50 ppm for these samples. EPA method 8010 compounds were non-detectable for these samples.

ND = Non-detectable.

-- Indicates analysis not performed.

Results in parts per million (ppm), unless otherwise indicated.

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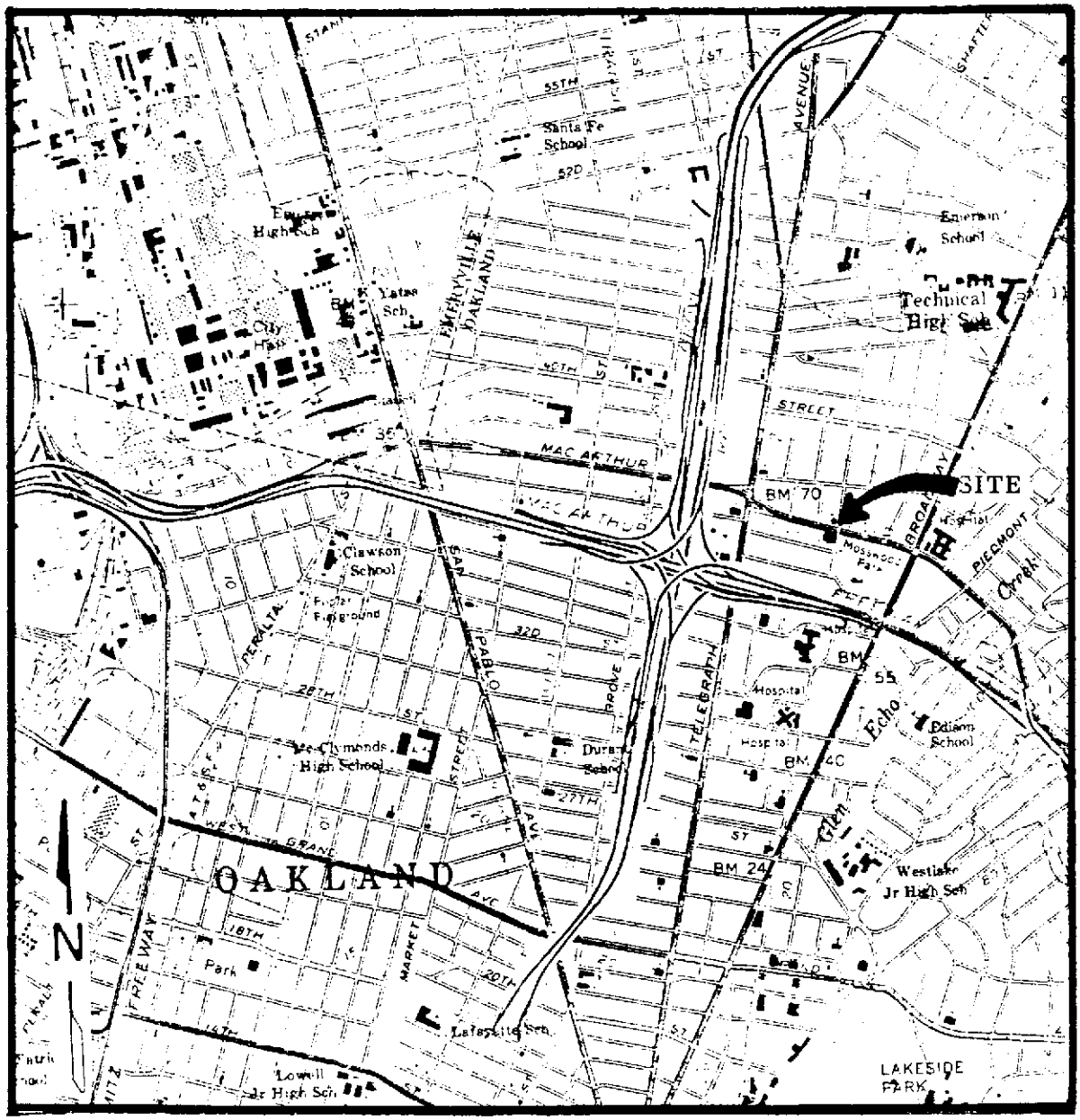

LOCATION MAP

Unocal S/S #3538
411 W. MacArthur Blvd.
Oakland, CA

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
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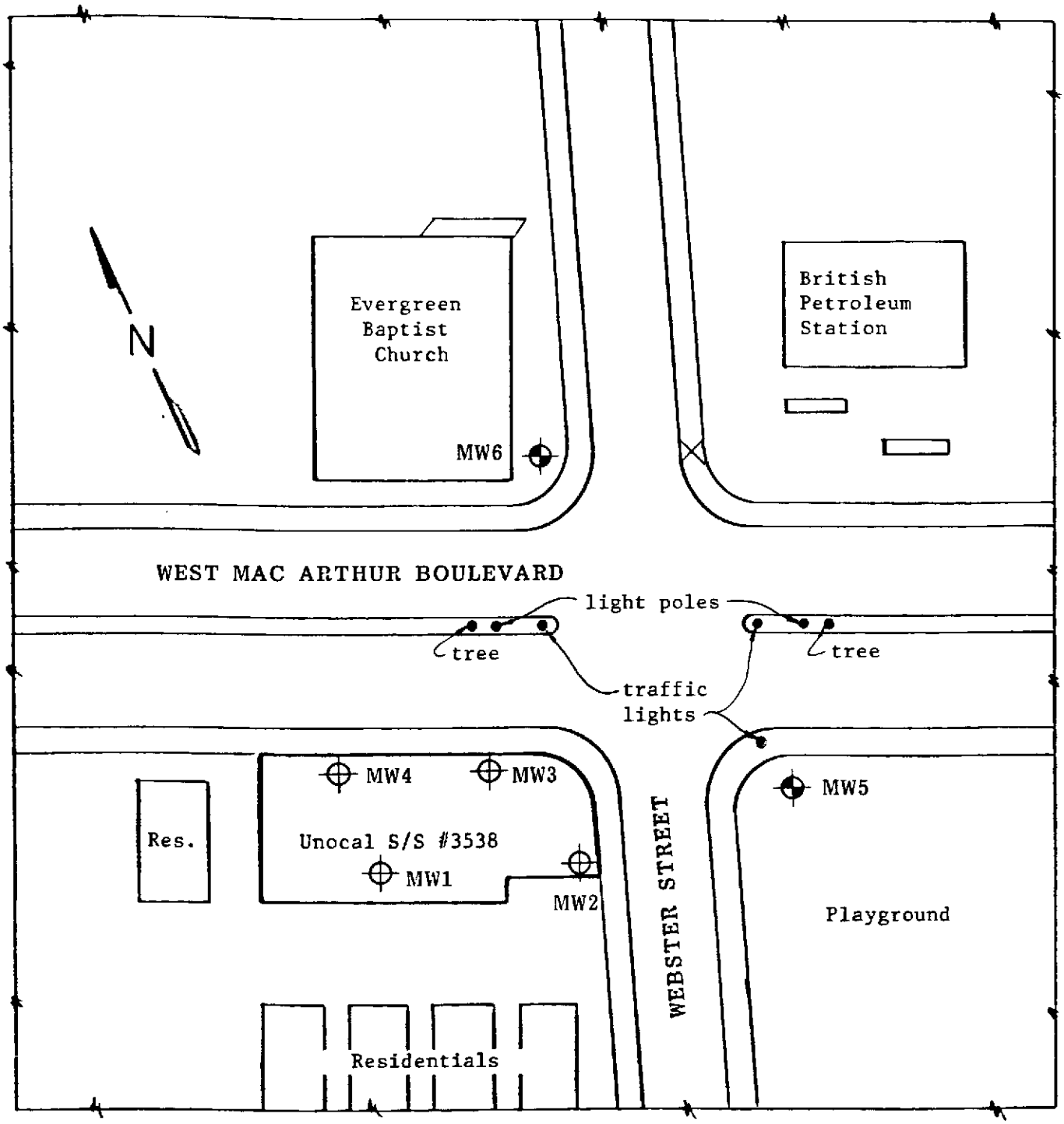

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- Utility pole & overhead lines

SITE VICINITY MAP

0 60 120
Approx. scale feet

Unocal S/S #3538
411 W. MacArthur Boulevard
Oakland, CA

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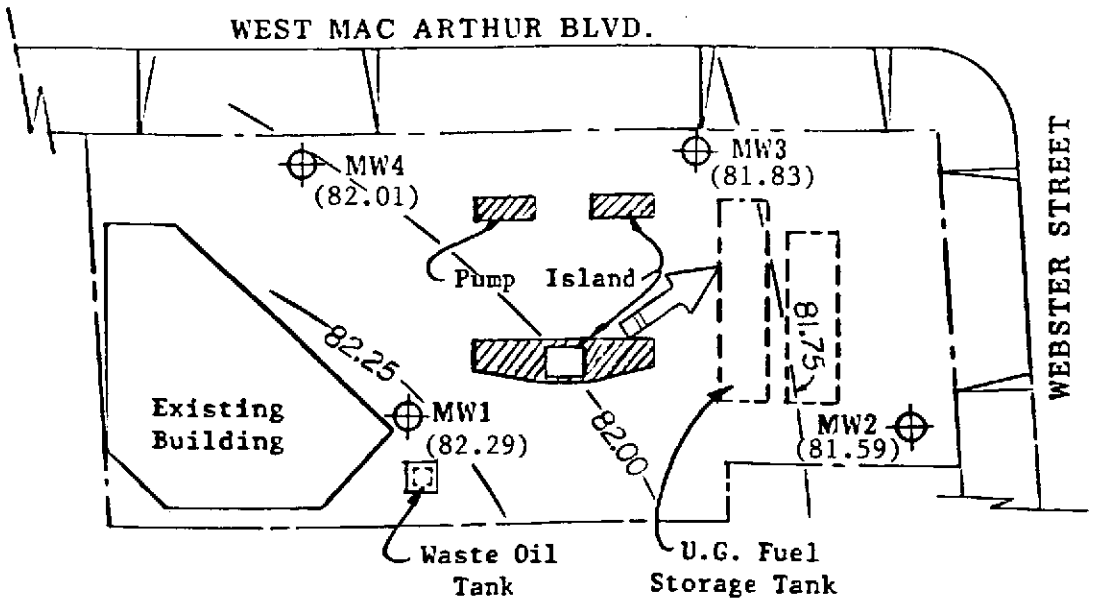

SITE PLAN
Figure 1

LEGEND

⊕ Monitoring Well

( ) Water Table elevation in feet on 7/15/91. Top of MW2 wellcover assumed 100.00 feet as datum

⇨ Ground water flow direction

——— Contours of water table elevation

0 30 60
Approx. Scale feet

Unocal S/S #3538
411 W. MacArthur Blvd.
Oakland, CA

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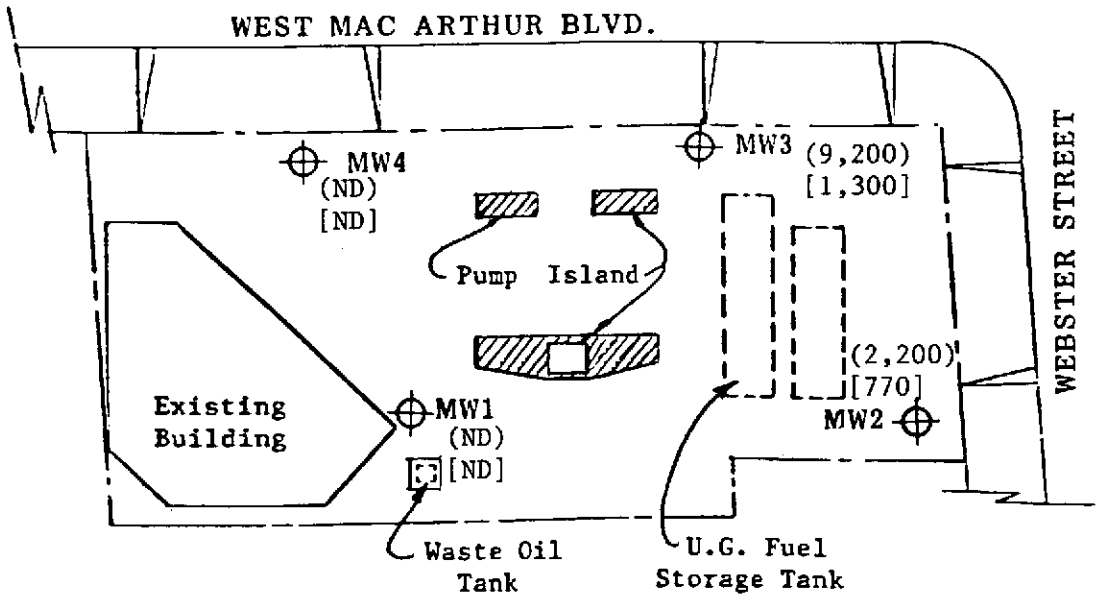

SITE PLAN
Figure 1a

LEGEND

⊕ Monitoring Well

( ) Concentration of TPH as gasoline in ppb

[ ] Concentration of benzene in ppb

ND = Non-detectable

0 30 60
Approx. Scale feet

Unocal S/S #3538
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Oakland, CA

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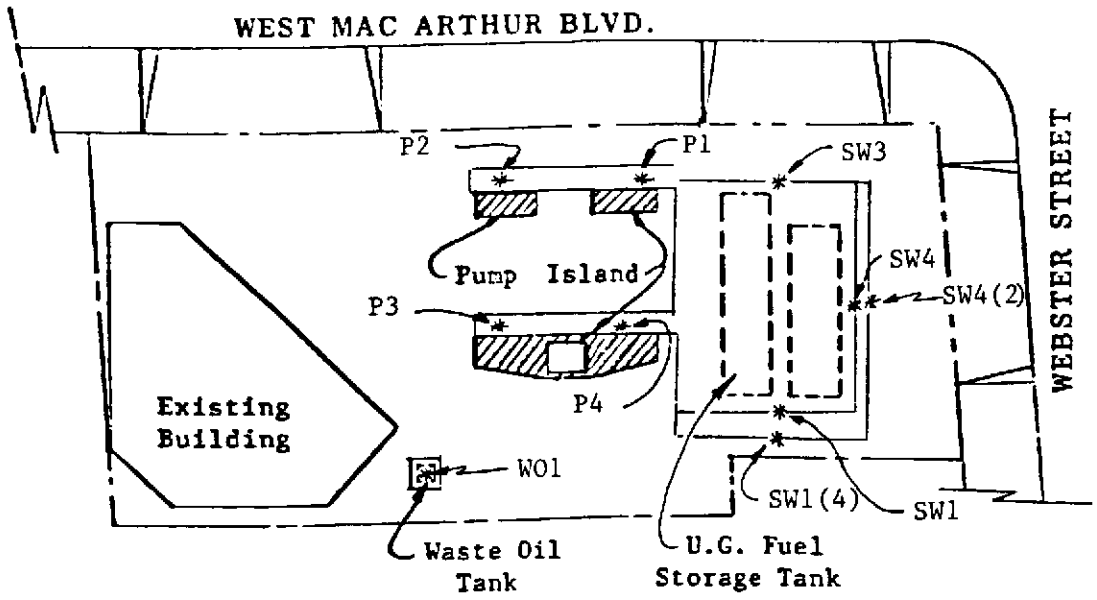

SITE PLAN
Figure 2

LEGEND

* Soil Sample Point Location

0 30 60
Approx. Scale feet

Unocal S/S #3538
411 W. MacArthur Blvd.
Oakland, CA

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(415) 686-9600 • FAX (415) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 411 W. Mac Arthur Blvd., Oakland	Sampled:	Jul 15, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Jul 16, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	7/18,25-26/91
Attention: Mardo Kaprealian, P.E.	First Sample #:	107-0327 AB	Reported:	Aug 1, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
107-0327 AB	MW1	N.D.	N.D.	N.D.	N.D.	N.D.
107-0328 AB	MW2	2,200	770	12	72	370
107-0329 AB	MW3	9,200	1,300	230	490	1,900
107-0330 AB	MW4	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(415) 686-9600 • FAX (415) 686-9689

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 1070327-30
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jul 18, 1991	Jul 18, 1991	Jul 18, 1991	Jul 18, 1991
QC Sample #:	BLK071891	BLK071891	BLK071891	BLK071891
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	21	20	22	65
Matrix Spike % Recovery:	110	100	110	110
Conc. Matrix Spike Dup.:	21	20	21	65
Matrix Spike Duplicate % Recovery:	110	100	110	110
Relative % Difference:	0	0	4.7	0

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

$$\text{\% Recovery:} = \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} = \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(415) 686-9600 • FAX (415) 686-9689

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 1070327-30
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jul 25, 1991	Jul 25, 1991	Jul 25, 1991	Jul 25, 1991
QC Sample #:	107-0485	107-0485	107-0485	107-0485
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	20	19	18	62
Matrix Spike % Recovery:	100	95	90	100
Conc. Matrix Spike Dup.:	20	20	20	64
Matrix Spike Duplicate % Recovery:	100	100	100	110
Relative % Difference:	0	5.1	11	3.2

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% 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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Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 1070327-30
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jul 26, 1991	Jul 26, 1991	Jul 26, 1991	Jul 26, 1991
QC Sample #:	107-0330	107-0330	107-0330	107-0330
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	20	18	19	60
Matrix Spike % Recovery:	100	90	95	100
Conc. Matrix Spike Dup.:	20	20	21	65
Matrix Spike Duplicate % Recovery:	100	100	110	110
Relative % Difference:	0	11	10	8.0

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 1070327-30
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jul 26, 1991	Jul 26, 1991	Jul 26, 1991	Jul 26, 1991	Jul 26, 1991
Sample #:	107-0327	107-0328	107-0329	107-0330	Blank
Surrogate % Recovery:	100	100	93	92	100

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% 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.	Client Project ID:	Unocal, 411 W. Mac Arthur Blvd., Oakland	Sampled:	Jul 15, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Jul 16, 1991
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted:	Jul 18, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	107-0327 C	Analyzed:	Jul 23, 1991
			Reported:	Aug 1, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
107-0327 C	MW1	N.D.

Detection Limits:	50

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 107-0327
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel
Method:	EPA 8015
Analyst:	A.T.
Reporting Units:	mg/L
Date Analyzed:	Jul 23, 1991
QC Sample #:	BLK071891
Sample Conc.:	N.D.
Spike Conc. Added:	300
Conc. Matrix Spike:	260
Matrix Spike % Recovery:	87
Conc. Matrix Spike Dup.:	220
Matrix Spike Duplicate % Recovery:	73
Relative % Difference:	17

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 1070327-30
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015
Analyst:	A.T.	A.T.
Reporting Units:	mg/L	mg/L
Date Analyzed:	Jul 23, 1991	Jul 23, 1991
Sample #:	107-0327	Blank
Surrogate % Recovery:	110	110

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% 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.	Client Project ID:	Unocal, 411 W. Mac Arthur Blvd., Oakland	Sampled:	Jul 15, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Jul 16, 1991
Benicia, CA 94510	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	Jul 18, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	107-0327 D	Analyzed:	Jul 18, 1991
			Reported:	Aug 1, 1991

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
107-0327 D	MW1	N.D.

Detection Limits:	5.0

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

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Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 107-0327
Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Oil & Grease
Method:	SM 5520 B&F
Analyst:	mg/L
Reporting Units:	D. Newcomb
Date Analyzed:	Jul 18, 1991
QC Sample #:	Matrix Blank 071891M
Sample Conc.:	N.D.
Spike Conc. Added:	100
Conc. Matrix Spike:	99
Matrix Spike % Recovery:	99
Conc. Matrix Spike Dup.:	90
Matrix Spike Duplicate % Recovery:	90
Relative % Difference:	10

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 411 W. Mac Arthur Blvd., Oakland	Sampled:	Jul 15, 1991
P.O. Box 996	Sample Descript:	Water, MW1	Received:	Jul 16, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	Jul 19, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	107-0327 EF	Reported:	Aug 1, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	1.0	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	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-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	1.0	N.D.
trans-1,3-Dichloropropene	1.0	N.D.
Methylene chloride	2.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	**0.50**	**1.8**
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	1.0	N.D.
Vinyl chloride	1.0	N.D.

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

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 107-0327

Reported: Aug 1, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloroethene	Trichloroethene	Chloro-benzene	Benzene	Toluene	Chloro-benzene (PID)
Method:	EPA 8010	EPA 8010	EPA 8010	EPA 8010	EPA 8010	EPA 8010
Analyst:	S. Le	S. Le	S. Le	S. Le	S. Le	S. Le
Reporting Units:	ppb	ppb	ppb	ppb	ppb	ppb
Date Analyzed:	Jul 29, 1991	Jul 29, 1991	Jul 29, 1991	Jul 29, 1991	Jul 29, 1991	Jul 29, 1991
QC Sample #:	BLK072991	BLK072991	BLK072991	BLK072991	BLK072991	BLK072991
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	10	10	10
Conc. Matrix Spike:	7.5	10	11	8.7	7.8	8.4
Matrix Spike % Recovery:	75	100	110	87	78	84
Conc. Matrix Spike Dup.:	7.8	10	11	8.6	7.7	8.2
Matrix Spike Duplicate % Recovery:	78	100	110	86	77	82
Relative % Difference:	3.9	0	0	1.2	1.3	2.4

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% 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.
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 411 W. Mac Arthur Blvd., Oakland
QC Sample Group: 107-0327
Reported: Aug 1, 19

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8010	EPA 8010
Analyst:	S. Le	S. Le
Reporting Units:	ppb	ppb
Date Analyzed:	Jul 29, 1991	Jul 29, 1991
Sample #:	107-0327	Blank
Surrogate #1 % Recovery:	94	100
Surrogate #2 % Recovery:	93	120

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Vartkes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
411 W. MacArthur Blvd.

ANALYSES REQUESTED: TPHG & BTXE; TPH D; TOG (5520 B&F); 8010

TURN AROUND TIME: Regular.

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG & BTXE	TPH D	TOG (5520 B&F)	8010		REMARKS
MW 1	7/15/91	A.M. 10:00		✓	✓		6	Monitoring well	✓	✓	✓	✓	107032	All VOA's Preserved in HCl.
MW 2	"			✓	✓		2	" "	✓				328	AB "
MW 3	"			✓	✓		2	" "	✓				329	"
MW 4	"	P.M. 12:30		✓	✓		2	" "	✓				330	"

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Tashdjian	7/15/91 1:50	[signature] 7/15 1:50
KNUU	7/16 400	[signature]
[signature]	7/16 1800	[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? 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

[signature] — Signature; LOG-IN — Title; 7/15/91 — Date