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KAPREALIAN ENGINEERING, INC.

Consulting Engineers

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October 7, 1991

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

Attention: Mr. Gil Wistar

RE: Unocal Service Station #0746
3943 Broadway
Oakland, California

Dear Mr. Wistar:

Per the request of Mr. Ron Bock of Unocal Corporation, enclosed please find our report dated October 7, 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: Ron Bock, Unocal Corporation



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KEI-P89-0805.QR4

October 7, 1991

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

Attention: Mr. Ron Bock

RE: Quarterly Report
Unocal Service Station #0746
3943 Broadway
Oakland, California

Dear Mr. Bock:

This report presents the results of the most recent quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per KEI's proposal KEI-P89-0805.P5 dated December 17, 1990. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from June through August, 1991.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The site is situated on gently sloping, south-southwest trending topography, and is located at the southwest corner of the intersection of Broadway and 40th Street in Oakland, California. A Location Map, Site Vicinity Maps, and a Site Plan are attached to this report.

KEI's initial work at the site began on August 16, 1989, when KEI was asked to collect soil samples following the removal of two underground fuel storage tanks and one 280 gallon waste oil tank at the site. The fuel tanks consisted of one 10,000 gallon unleaded tank and one 10,000 gallon super unleaded tank. The tanks were made of steel and no apparent holes or cracks were observed in any of the tanks. Water was encountered in the fuel tank pit at a depth of about 10 feet below grade, thus prohibiting the collection of any soil samples from immediately beneath the tanks. Six soil samples, designated as SW1 through SW6, were collected from the sidewalls of the gasoline tank pit approximately six inches above the water table. One soil sample was collected from the bottom of the waste oil tank excavation at a depth of 8 feet below grade. Soil sample point locations are shown on the attached Site Plan, Figure 2.

On August 17, 1989, approximately 1,500 gallons of ground water were pumped from the fuel tank pit. One water sample, labeled W1, was then collected from the fuel tank pit.

To accommodate the installation of new, larger tanks, additional soil was excavated approximately 14 feet laterally along the north wall of the tank pit, in the vicinity of sample points SW1 and SW2. On August 18, 1989, KEI returned to the site to collect additional soil samples. One soil sample, labeled SW2(R), was collected from the north sidewall of the fuel tank pit after additional excavation at a depth of 9.5 feet below grade. Also on August 18, 1989, four soil samples, labeled P1 through P4, were collected from the product pipe trenches at depths ranging from 5 to 6.5 feet below grade. After soil sampling, the pipe trenches were excavated to the sample depths. Collection points for the soil samples are shown on the attached Site Plan, Figure 2.

KEI again returned to the site on August 24, 1989, to collect an additional ground water sample. After approximately 5,000 gallons of contaminated ground water were pumped from the fuel tank pit, one ground water sample, labeled W2, was collected.

All soil and water 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). The soil sample collected from beneath the waste oil tank was analyzed for TPH as gasoline, BTX&E, TPH as diesel, total oil and grease (TOG), and EPA method 8010 constituents.

Analytical results of soil samples collected from the fuel tank pit indicated non-detectable levels of TPH as gasoline and BTX&E for all samples, except samples SW1 and SW2, which showed levels of TPH as gasoline at 13 ppm and 290 ppm, respectively. However, the entire area of sample points SW1 and SW2 was excavated as described above, and the new sample, SW2(R), showed non-detectable levels of TPH as gasoline and BTX&E. Analytical results of the soil sample collected from the waste oil tank pit showed non-detectable levels of all constituents analyzed, except for TPH as gasoline at 1.6 ppm, and toluene at 1.3 ppm. Analytical results of soil samples collected from pipe trenches showed levels of TPH as gasoline ranging from 3.8 ppm to 36 ppm, and benzene ranging from non-detectable to 0.52 ppm. The analytical results of ground water samples collected from the tank pit (W1) showed 4,700 ppb of TPH as gasoline and 180 ppb of benzene (after purging 1,500 gallons), while W2 showed 1,200 ppb of TPH as gasoline and 12 ppb of benzene (after purging an additional 5,000 gallons). Analytical results of the soil samples are summarized in Table 5, and water samples in

Table 6. Documentation of soil sample collection techniques and sample results are presented in KEI's report (KEI-J89-0805.R1) dated August 30, 1989. To comply with the requirements of the regulatory agencies and based on the analytical results, KEI proposed the installation of three monitoring wells.

On October 17, 1989, three two-inch diameter monitoring wells, designated as MW1, MW2, and MW3 on the attached Site Vicinity Map, Figure 1, were installed at the site. The three wells were drilled and completed to total depths ranging from 20 to 22.5 feet below grade. Ground water was encountered at depths ranging from 11 to 13 feet beneath the surface during drilling. The wells were developed on October 26 and 30, 1989, and were initially sampled on November 1, 1989.

Water and selected soil samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline and BTX&E. Analytical results of all soil samples collected from the borings for monitoring wells MW1 and MW2 showed non-detectable levels of TPH as gasoline and BTX&E, except for sample MW1(5), collected at a depth of 5 feet below grade, which showed TPH as gasoline at 8.5 ppm, and xylenes at 0.14 ppm. Soil samples collected from the boring for well MW3 showed TPH as gasoline at levels ranging from 3.1 ppm to 1,100 ppm, and benzene levels ranging from 0.068 ppm to 16 ppm. The analytical results of water samples collected from wells MW2 and MW3 showed TPH as gasoline concentrations at 200 ppb and 13,000 ppb, respectively. Benzene was detected in well MW3 only at a concentration of 57 ppb. Analytical results for the soil samples are summarized in Table 4, and water samples in Table 2. Based on analytical results of the soil and ground water samples, KEI recommended the installation of three additional monitoring wells to further define the extent of contamination. Documentation of the well installation protocol, sampling techniques, analytical results, and recommendations for further work are presented in KEI's report (KEI-P89-0805.R4) dated November 30, 1989.

On January 26, 1990, two additional two-inch diameter monitoring wells (designated as MW4 and MW5 on the attached Site Vicinity Map, Figure 1) were installed at the site. A third proposed monitoring well could not be installed because of underground utilities and an on-site storage shed. The two wells were each drilled and completed to total depths each of 20 feet below grade. Ground water was encountered at depths of approximately 12.5 feet beneath the surface during drilling. The new wells (MW4 and MW5) were developed on February 9, 1990, and all wells were sampled on February 15, 1990.

Water samples from all of the existing wells, and soil samples from the borings for wells MW4 and MW5, were analyzed at Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline and BTX&E. Analytical results of the soil samples collected from the borings for monitoring wells MW4 and MW5 indicated levels of TPH as gasoline ranging from 2.5 ppm to 370 ppm. Benzene was detected at concentrations ranging from non-detectable to 1.8 ppm. Analytical results of the water samples collected from monitoring well MW2 showed non-detectable levels of all constituents analyzed. In wells MW1 and MW4, TPH as gasoline was detected at 170 ppb and 150 ppb, respectively, and benzene was detected at 7.9 ppb and 8.0 ppb, respectively. In wells MW3 and MW5, TPH as gasoline was detected at 20,000 ppb and 24,000 ppb, respectively, and benzene was detected at 1,700 ppb and 1,500 ppb, respectively. Results of the soil analyses are summarized in Table 4, and the water analyses in Table 2.

Based on the analytical results, KEI recommended the installation of four additional monitoring wells (two on-site, and two off-site) to further define the extent of detected contamination. In addition, KEI recommended continuation of the monthly monitoring and quarterly sampling program. The details of the monitoring well installation activities and recommendations for further work are presented in KEI's report (KEI-P89-0805.R5) dated March 16, 1990.

On October 23, 1990, four additional two-inch diameter monitoring wells (designated as MW6, MW7, MW8, and MW9 on the attached Site Vicinity Map, Figure 1) were installed at the site. The four wells were drilled and completed to total depths ranging from 20 to 22 feet below grade. Ground water was encountered at depths ranging from 11.7 to 12.7 feet beneath the surface during drilling. All wells were surveyed by a licensed surveyor (Kier & Wright of Pleasanton, California) to Mean Sea Level (MSL) and to a vertical accuracy of 0.01 feet. The new wells (MW6, MW7, MW8, and MW9) were developed on October 26, 1990, and all wells were sampled on November 7, 1990. Water samples from all of the existing wells, and selected soil samples from the borings for wells MW6 through MW9, were analyzed at Sequoia Analytical Laboratory in Concord, California, for TPH as gasoline and BTX&E.

The analytical results of the soil samples collected from the borings for monitoring wells MW6 through MW9 showed non-detectable levels of TPH as gasoline and benzene in all analyzed samples, except in MW7(5), MW9(10) and MW9(12), which showed TPH as gasoline levels of 11 ppm, 84 ppm and 120 ppm, respectively, with benzene levels detected only in samples MW9(10) and MW9(12) at 0.32 ppm and 0.19 ppm, respectively. The analytical results of the ground water samples showed non-detectable levels of TPH as gasoline and BTX&E

in wells MW1, MW2, MW6, and MW7, except for TPH as gasoline detected at a level of 45 ppb in well MW1. In wells MW3, MW4, MW5, MW8, and MW9, TPH as gasoline was detected at levels of 42,000 ppb, 180 ppb, 20,000 ppb, 4,700 ppb, and 480 ppb, respectively, with benzene detected at levels of 1,400 ppb, 1.5 ppb, 640 ppb, 28 ppb, and 7.8 ppb, respectively. Results of the soil analyses are summarized in Table 3, and water analyses in Table 2. Documentation of well installation protocol, sample collection techniques, and sample results are presented in KEI's report (KEI-P89-0805.R6) dated December 17, 1990. Based on the analytical results, KEI recommended continuation of the monthly monitoring and quarterly sampling program.

RECENT FIELD ACTIVITIES

The nine wells (MW1 through MW9) were monitored three times and sampled once during the quarter, except for well MW5, which was not sampled due to the presence of a trace of free product. In addition, wells MW3, MW5, and MW8 were monitored and purged nine additional times during the quarter, and well MW4 was monitored and purged three additional times. During monitoring, the wells were checked for depth to water and presence of free product and sheen. A trace of free product was noted only in well MW5 on August 20 and 28, 1991. Sheen was observed on several occasions in wells MW3, MW5, and MW8, but was not observed in any of the other wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on August 28, 1991, except for well MW5, which was not sampled due to the presence of free product. Prior to sampling, the wells were purged of 8 gallons each 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 then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to the state certified laboratory.

HYDROLOGY AND GEOLOGY

Based on the water level data gathered during the quarter, ground water flow direction appeared to be towards the southwest, at an average gradient of approximately 0.018 on August 28, 1991, slightly changed from the south-southwest flow direction determined for May 28, 1991. Although not present on August 28, 1991, a depression in the water table at MW4 was present on June 25 and July 30, 1991, as had occurred intermittently during the previous quarter. Water levels fluctuated during the quarter, showing a net increase of between 0.17 to 1.52 feet in wells MW4 and MW5, and a net decrease in all other wells of between 0.04 and 0.30, since May

25, 1991. The measured depth to ground water at the site on August 28, 1991 ranged between 8.27 and 11.55 feet below grade.

Based on review of regional geologic maps (U.S. Geological Survey Miscellaneous Geologic Investigations Map I-239 "Areal and Engineering Geology of the Oakland West Quadrangle, California" by D.H. Radbruch, 1957), the site is underlain by Quaternary-age alluvium fan deposits (Temescal Formation), which typically consists of lenses of clayey gravel, sandy silty clay and sand-clay-silt mixtures. Specifically, the subsurface earth materials at the site, based on our previous subsurface exploration activities, consist predominantly of clayey silt and silty clay to gravelly clay with local lenses of well graded sand or gravel, and clayey sand or gravel. The lenses of coarse grained soils are generally less than about 2 feet thick. Artificial fill materials were encountered at the surface of this site varying from about 2 to 2.5 feet thick in the vicinity of wells MW4 and MW5.

The results of our most recent subsurface study indicates the site and immediate vicinity are underlain by artificial fill materials extending to depths below grade ranging from about 2-1/4 to 5-3/4 feet. The fill materials are inturn underlain by silty clay materials extending to depths below grade ranging from about 7-1/4 to 11-1/2 feet, and which are about 4-3/4 to 6-1/2 feet in thickness. This silty clay zone is inturn underlain by a coarse-grained sequence consisting predominantly of clayey gravel (except in MW7 where clayey sand and a well graded gravel lens were also encountered). This coarse-grained zone extends to depths below grade ranging from 10 to 15-1/2 feet, and ranging in thickness from approximately 3-1/2 to 4 feet. Ground water was encountered during drilling within this coarse-grained sequence in all borings except MW6. The coarse-grained sequence is inturn underlain by a fine-grained zone consisting of gravelly or sandy clay, silty clay, or clayey silt extending to the maximum depth explored (22 feet below grade).

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 BTX&E using EPA method 8020.

Analytical results of the ground water samples collected from monitoring wells MW1, MW2, MW6, and MW7 indicated non-detectable levels of TPH as gasoline and BTX&E. In monitoring wells MW3, MW4, MW8, and MW9, TPH as gasoline was detected at concentrations of

16,000 ppb, 2,000 ppb, 1,800 ppb, and 450 ppb, respectively, and benzene was detected at concentrations of 650 ppb, 1,500 ppb, 3.2 ppb, and 17 ppb, respectively. Monitoring well MW5 was not sampled due to a trace of free product. Results of the water analyses are summarized in Table 2. Concentrations of TPH as gasoline and benzene detected in ground water on August 28, 1991, are shown on the attached Site Vicinity Maps, Figures 1a and 1b, respectively. 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, KEI recommends the continuation of the current monitoring and sampling program of the existing wells, per KEI's proposal (KEI-P89-0805.P5) dated December 17, 1990. Also, KEI recommends that wells MW3, MW4, MW5, and MW8 continue to be purged on a bi-weekly basis, in an attempt to reduce levels of contamination in the vicinity of these wells, until the lateral extent of contamination has been delineated and a ground water remediation system is designed and implemented.

KEI has obtained the necessary permits and off-site access permission to install two of the three additional off-site monitoring wells that have been previously proposed. KEI is waiting for required documents (which are being prepared by Unocal) to complete an application for an encroachment permit from the City of Oakland for the third monitoring well (MW11). KEI is prepared to install these wells once all permits and access permission have been received. If access to drill MW11 is delayed, KEI recommends that the other wells be installed as soon as possible. In addition, water recovery tests for wells MW3, MW5, MW8, and MW9 should be conducted during the next quarter in order to evaluate the aquifer characteristics at and in the vicinity of the site (so that the eventual design of a ground water remediation system is not delayed unnecessarily).

DISTRIBUTION

A copy of this report should be sent to Mr. Gil Wistar of the Alameda County Health Care Services Agency, and to Mr. Lester Feldman of 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.

KEI-P89-0805.QR4
October 7, 1991
Page 9

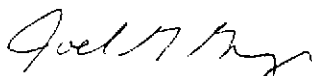
If you have any questions regarding this report, please do not hesitate to call me at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.



Thomas J. Berkins
Senior Environmental Engineer



Joel G. Greger
Certified Engineering Geologist

License No. 1633
Exp. Date 6/30/92



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 through 6
Location Map
Site Vicinity Maps - Figures 1, 1a & 1b
Site Plan - Figure 2
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0805.QR4
October 7, 1991

TABLE 1

SUMMARY OF MONITORING DATA

<u>Well</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness (feet)</u>	<u>Sheen</u>	<u>Water Purged (gallons)</u>
(Monitored and Sampled on August 28, 1991)					
MW1	72.50	8.57	0	No	8
MW2	71.68	9.94	0	No	8
MW3	71.54	10.47	0	No	8
MW4	71.40	10.08	0	No	8
MW5	71.38	10.21	Trace	N/A	1
MW6	72.20	8.27	0	No	8
MW7	72.76	9.07	0	No	8
MW8	70.16	11.55	0	No	8
MW9	70.01	11.12	0	No	8
(Monitored on August 20, 1991)					
MW3	71.56	10.45	0	--	26
MW5	71.38	10.21	Trace	N/A	55
MW8	70.19	11.52	0	--	22
(Monitored on August 13, 1991)					
MW3	71.60	10.41	0	--	30
MW5	71.45	10.14	0	--	30
MW8	70.21	11.50	0	--	30
(Monitored on August 6, 1991)					
MW3	70.41	11.60	0	--	30
MW5	71.12	10.47	0	--	30
MW8	71.48	10.23	0	--	30

KEI-P89-0805.QR4
October 7, 1991

TABLE 1 (Continued)

SUMMARY OF MONITORING DATA

<u>Well</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness (feet)</u>	<u>Sheen</u>	<u>Water Purged (gallons)</u>
(Monitored on July 30, 1991)					
MW1	72.53	8.54	0	--	0
MW2	71.76	9.86	0	--	0
MW3	71.55	10.46	0	--	30
MW4	70.09	11.39	0	--	0
MW5	71.37	10.22	0	--	30
MW6	72.32	8.15	0	--	0
MW7	72.73	9.10	0	--	0
MW8	70.13	11.58	0	--	30
MW9	69.66	11.47	0	--	0
(Monitored on July 23, 1991)					
MW3	71.73	10.28	0	Yes	30
MW5	71.12	10.47	0	Yes	30
MW8	70.11	11.60	0	No	30
(Monitored on July 16, 1991)					
MW3	71.55	10.46	0	Yes	30
MW5	71.22	10.37	0	Yes	30
MW8	70.11	11.60	0	Yes	30
(Monitored on July 9, 1991)					
MW3	71.64	10.37	0	Yes	55
MW5	71.47	10.12	0	Yes	55
MW8	70.18	11.53	0	Yes	37

KEI-P89-0805.QR4
October 7, 1991

TABLE 1 (Continued)

SUMMARY OF MONITORING DATA

<u>Well</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness (feet)</u>	<u>Sheen</u>	<u>Water Purged (gallons)</u>
(Monitored on June 25, 1991)					
MW1	72.42	8.65	0	No	0
MW2	71.55	10.07	0	No	0
MW3	71.55	10.46	0	No	42
MW4	70.92	10.56	0	No	10
MW5	71.37	10.22	0	Yes	55
MW6	72.29	8.18	0	No	0
MW7	72.73	9.10	0	No	0
MW8	70.13	11.58	0	No	0
MW9	69.74	11.39	0	No	0
(Monitored on June 18, 1991)					
MW3	71.60	10.41	0	Yes	55
MW4	70.38	11.10	0	No	18
MW5	71.48	10.11	0	Yes	55
MW8	70.08	11.63	0	No	34
(Monitored on June 11, 1991)					
MW3	71.78	10.23	0	Yes	55
MW4	69.80	11.68	0	No	8.5
MW5	71.61	9.98	0	Yes	55
MW8	70.39	11.32	0	No	55
(Monitored on June 4, 1991)					
MW3	71.91	10.10	0	Yes	55
MW4	69.80	11.68	0	No	16
MW5	71.73	9.86	0	Yes	55
MW8	70.45	11.26	0	No	34

KEI-P89-0805.QR4
October 7, 1991

TABLE 1 (Continued)
SUMMARY OF MONITORING DATA

<u>Well #</u>	<u>Surface Elevation*</u> <u>(feet)</u>
MW1	81.07
MW2	81.62
MW3	82.01
MW4	81.48
MW5	81.59
MW6	80.47
MW7	81.83
MW8	81.71
MW9	81.13

* Elevation of top of well covers surveyed relative to MSL.

-- Indicates not measured.

KEI-P89-0805.QR4
 October 7, 1991

TABLE 2
 SUMMARY OF LABORATORY ANALYSES
 WATER

<u>Date</u>	<u>Well #</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>	
8/28/91	MW1	ND	ND	ND	ND	ND	
	MW2	ND	ND	ND	ND	ND	
	MW3	16,000	650	2,200	5,400	1,100	
	MW4	2,000	1,500	20	300	120	
	MW5	NOT SAMPLED DUE TO PRESENCE OF FREE PRODUCT					
	MW6	ND	ND	ND	ND	ND	
	MW7	ND	ND	ND	ND	ND	
	MW8	1,800	3.2	1.9	74	19	
	MW9	450	17	0.9	14	13	
5/28/91	MW1	ND	ND	ND	ND	ND	
	MW2	ND	ND	ND	ND	ND	
	MW3	24,000	570	1,100	4,200	810	
	MW4	38	ND	ND	1.9	ND	
	MW5	24,000	2,300	3,400	6,000	1,300	
	MW6	ND	ND	ND	0.42	ND	
	MW7	39	ND	ND	0.73	ND	
	MW8	4,800	4.2	1.3	170	5.1	
	MW9	590	6.0	0.43	1.4	6.8	
2/25/91	MW1	ND	ND	ND	ND	ND	
	MW2	ND	0.68	0.42	0.86	ND	
	MW3	37,000	730	2,900	7,300	1,300	
	MW4	22,000	600	1,300	2,800	780	
	MW5	25,000	950	1,300	3,500	900	
	MW6	ND	0.37	0.40	1.5	0.35	
	MW7	70	ND	ND	0.52	ND	
	MW8	5,300	17	6.1	300	53	
	MW9	390	13	1.1	14	2.8	
11/07/90	MW1	45	ND	ND	ND	ND	
	MW2	ND	ND	ND	ND	ND	
	MW3	42,000	1,400	5,000	7,500	1,800	
	MW4	180	1.5	0.37	26	6.3	
	MW5	20,000	640	1,100	3,000	670	
	MW6	ND	ND	ND	ND	ND	
	MW7	ND	ND	ND	ND	ND	
	MW8	4,700	28	38	7,200	86	
	MW9	480	7.8	1.2	47	13	

KEI-P89-0805.QR4
October 7, 1991

TABLE 2 (Continued)
SUMMARY OF LABORATORY ANALYSES
WATER

<u>Date</u>	<u>Well #</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
8/16/90	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	6.7	ND	ND
	MW3	6,800	600	660	160	760
	MW4	3,600	480	17	260	230
	MW5	16,000	1,400	1,900	660	2,800
2/15/90	MW1	170	7.9	ND	2.8	2.2
	MW2	ND	ND	ND	ND	ND
	MW3	20,000	1,700	2,100	3,100	750
	MW4	150	8.0	8.0	45	10
	MW5	24,000	1,500	1,700	3,600	260
11/01/89	MW1	ND	ND	ND	0.30	ND
	MW2	200	ND	ND	1.2	3.0
	MW3	13,000	57	48	120	1.7
Detection Limits		30	0.3	0.3	0.3	0.3

ND = Non-detectable.

-- Indicates analysis not performed.

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

KEI-P89-0805.QR4
 October 7, 1991

TABLE 3
 SUMMARY OF LABORATORY ANALYSES
 SOIL

<u>Date</u>	<u>Sample Number</u>	<u>Depth (feet)</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	
10/23/90	MW6(5)	5.0	ND	ND	ND	ND	ND	
	MW6(9)	9.0	ND	ND	ND	0.010	ND	
	MW6(11.5)	11.5	ND	ND	ND	ND	ND	
	MW7(5)	5.0	11	ND	ND	0.032	0.0064	
	MW7(8.5)	8.5	ND	ND	ND	0.019	ND	
	MW7(11.5)	11.5	ND	ND	ND	0.036	ND	
	MW8(5)	5.0	ND	ND	ND	ND	ND	
	MW8(10)	10.0	ND	ND	ND	0.0080	ND	
	MW9(5.5)	5.5	ND	ND	ND	ND	ND	
	MW9(10)	10.0	84	0.32	0.27	0.51	0.63	
	MW9(12)	12.0	120	0.19	0.11	0.69	0.14	
	Detection Limits			1.0	0.0050	0.0050	0.0050	0.0050

ND = Non-detectable.

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

KEI-P89-0805.QR4
 October 7, 1991

TABLE 4
 SUMMARY OF LABORATORY ANALYSES
 SOIL

<u>Date</u>	<u>Sample Number</u>	<u>Depth (feet)</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	
10/17/89	MW1 (5)	5.0	8.5	ND	ND	0.14	ND	
	MW1 (10)	10.0	ND	ND	ND	ND	ND	
	MW2 (5)	5.0	ND	ND	ND	ND	ND	
	MW2 (10)	10.0	ND	ND	ND	ND	ND	
	MW2 (12.5)	12.5	ND	ND	ND	ND	ND	
	MW3 (5)	5.0	3.1	0.068	ND	ND	ND	
	MW3 (10)	10.0	69	0.89	2.6	7.9	2.0	
	MW3 (11)	11.0	1,100	16	85	150	35	
	1/26/90	MW4 (5)	5.0	22	0.059	ND	ND	ND
MW4 (7)		7.0	2.5	ND	ND	ND	ND	
MW4 (10)		10.0	250	1.2	0.66	20	1.4	
MW4 (11)		11.0	280	1.0	4.0	36	7.6	
MW5 (5)		5.0	25	0.21	ND	ND	ND	
MW5 (7.5)		7.5	46	0.25	0.28	0.20	0.46	
MW5 (10)		10.0	140	1.5	1.7	10	4.0	
MW5 (11.5)		11.5	370	1.8	14	51	11	
Detection Limits			1.0	0.05	0.1	0.1	0.1	

ND = Non-detectable.

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

KEI-P89-0805.QR4
October 7, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on August 16, 17, 18 & 24, 1989)

<u>Sample #</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
SW1	9.5	--	13	ND	0.13	0.39	0.15
SW2	9.5	--	290	0.82	8.7	44	7.6
SW2 (R)	9.5	--	ND	ND	ND	ND	ND
SW3	9.5	--	ND	ND	ND	ND	ND
SW4	9.5	--	ND	ND	ND	ND	ND
SW5	9.5	--	ND	ND	ND	ND	ND
SW6	9.5	--	ND	ND	ND	ND	ND
P1	6.5	--	6.1	ND	ND	ND	ND
P2	6.5	--	36	0.52	4.4	8.0	1.4
P3	5.0	--	20	0.30	2.5	5.6	1.1
P4	5.0	--	3.8	0.11	0.19	0.23	0.1
WO1*	8.0	ND	1.6	ND	1.3	ND	ND
Detection Limits		1.0	1.0	0.05	0.1	0.1	0.1

* TOG and all EPA method 8010 constituents were non-detectable.

-- Indicates analysis not performed.

ND = Non-detectable.

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

KEI-P89-0805.QR4
October 7, 1991

TABLE 6
SUMMARY OF LABORATORY ANALYSES
WATER

<u>Date</u>	<u>Sample #</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethylbenzene</u>
8/17/89	W1	4,700	180	420	860	150
8/24/89	W2*	1,200	12	10	88	5.9
Detection Limits		30	0.3	0.3	0.3	0.3

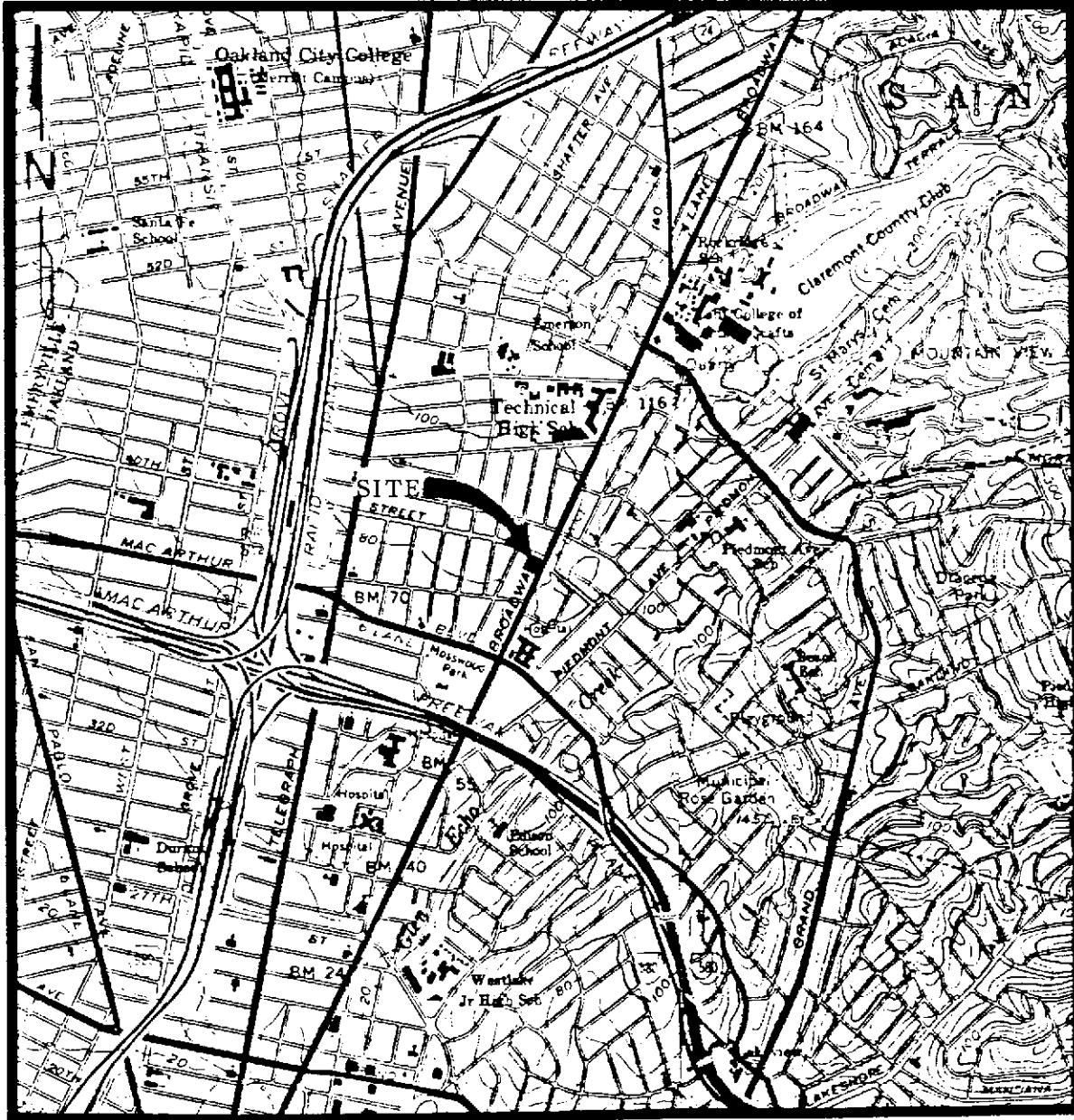
* Sample (W2) was collected after pumping 5,000 gallons of ground water from the fuel tank pit.

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



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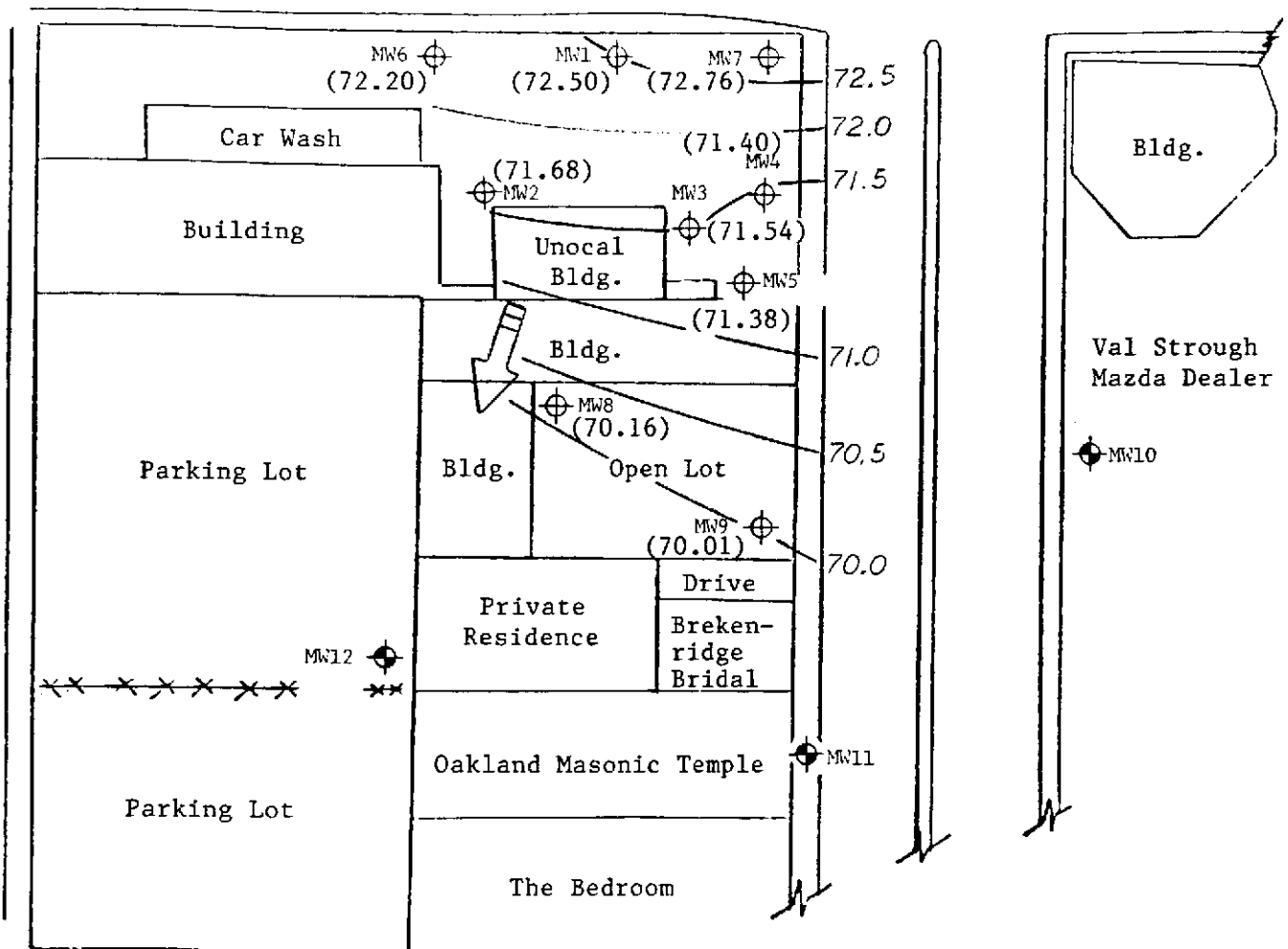
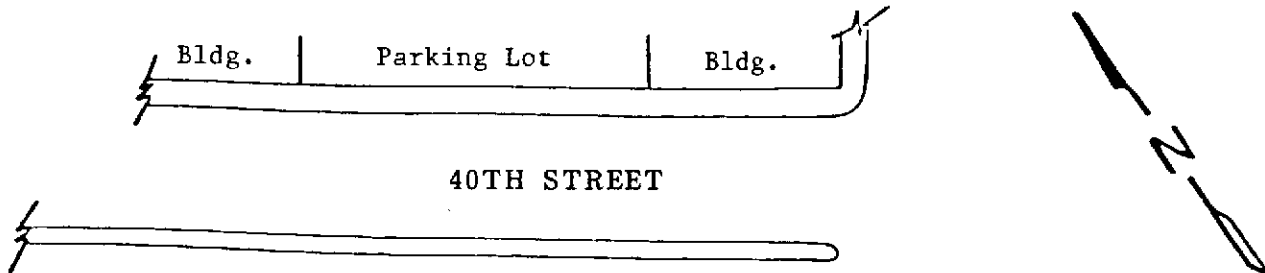
LOCATION MAP

Unocal S/S #0746
3943 Broadway
Oakland, CA



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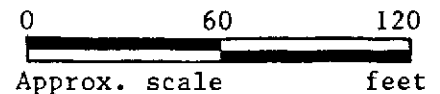


SITE VICINITY MAP

Figure 1

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- () Ground water elevation in feet above Mean Sea Level on 8/28/91
- Direction of ground water flow
- Contours of ground water elevation

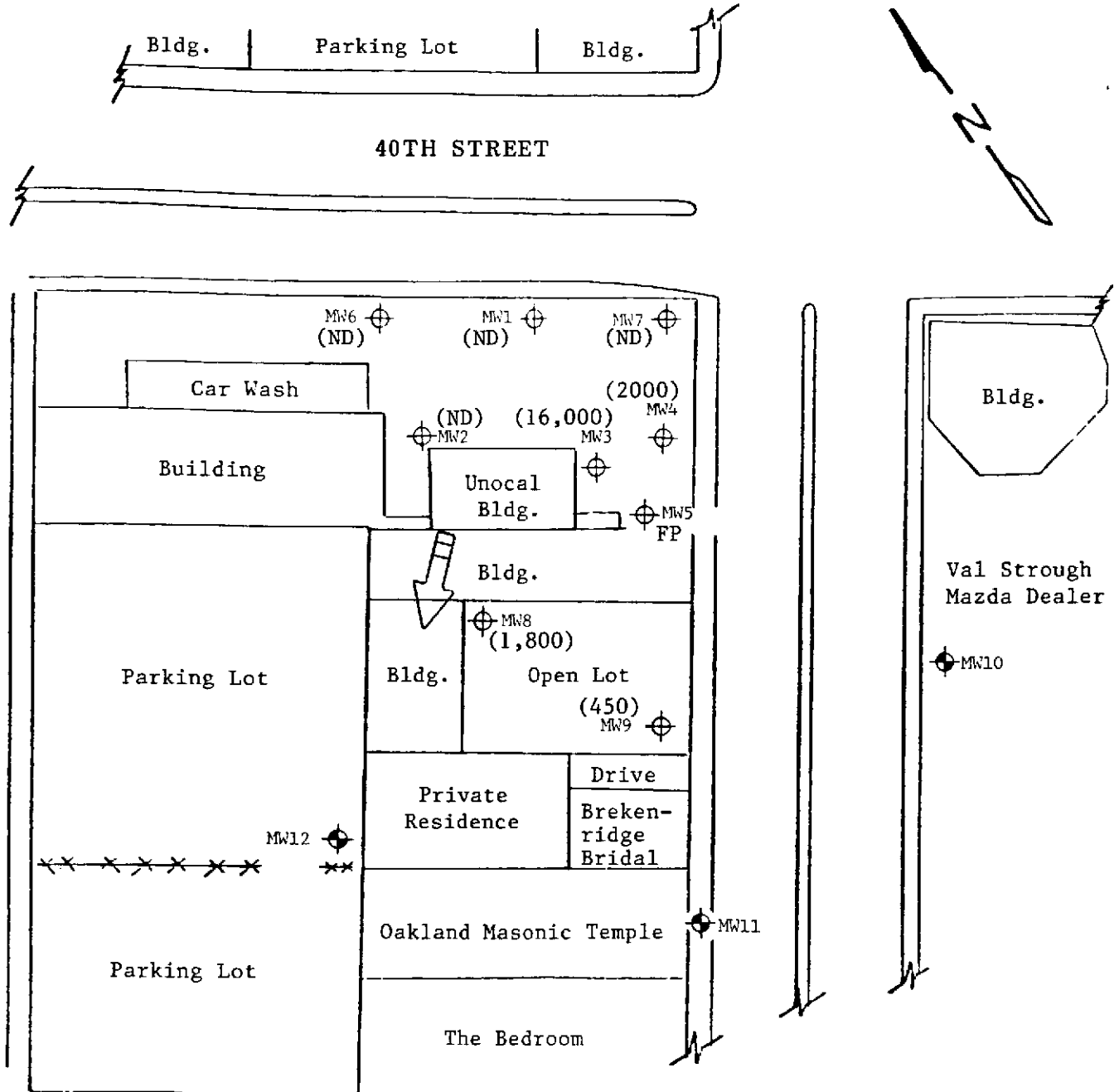


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 Oakland, CA



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SITE VICINITY MAP

Figure 1a

LEGEND

- Monitoring well (existing)
 - Monitoring well (proposed)
 - () Concentration of TPH as gasoline in ppb
 - Direction of ground water flow
- (Soil Samples Collected on 8/28/91)

0 60 120
 Approx. scale feet

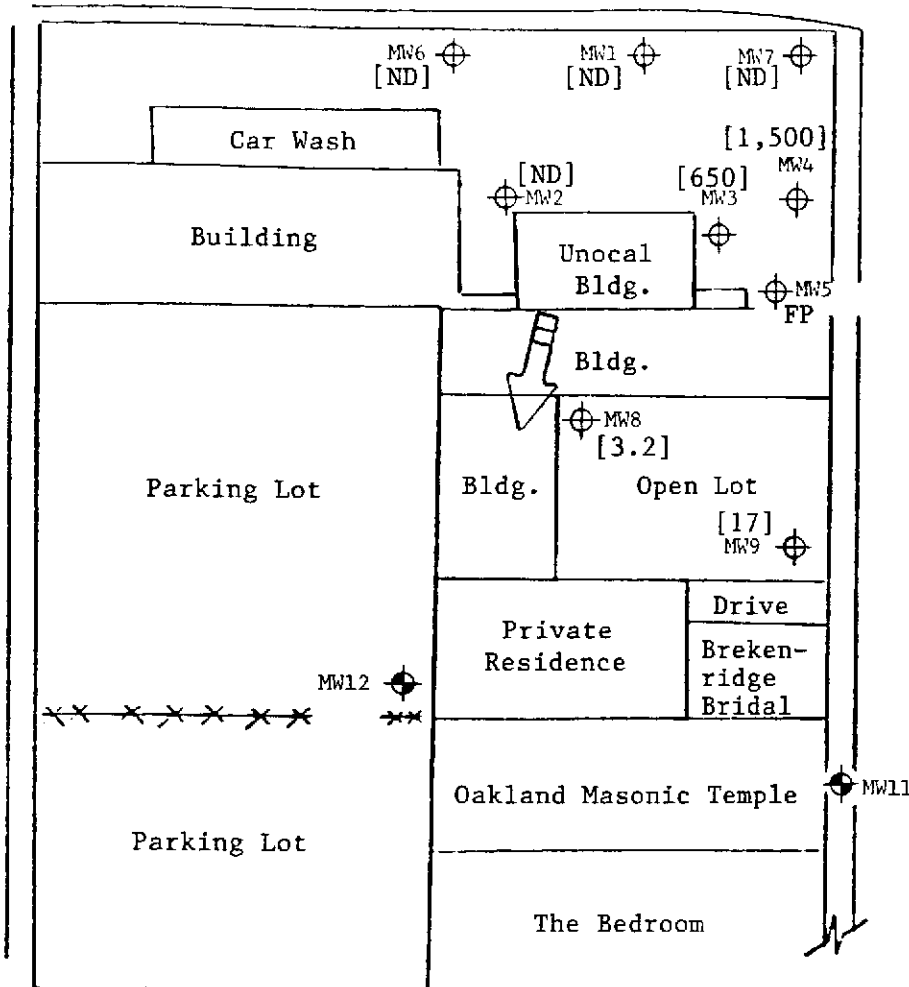
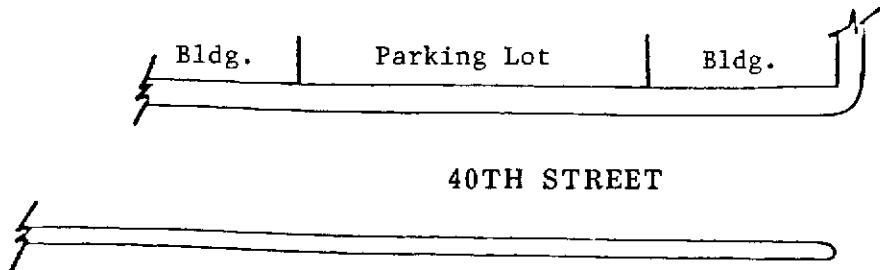
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 3943 Broadway
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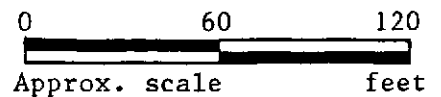


SITE VICINITY MAP
Figure 1b

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- [] Concentration of benzene in ppb
- Direction of ground water flow

(Soil Samples Collected on 8/28/91)

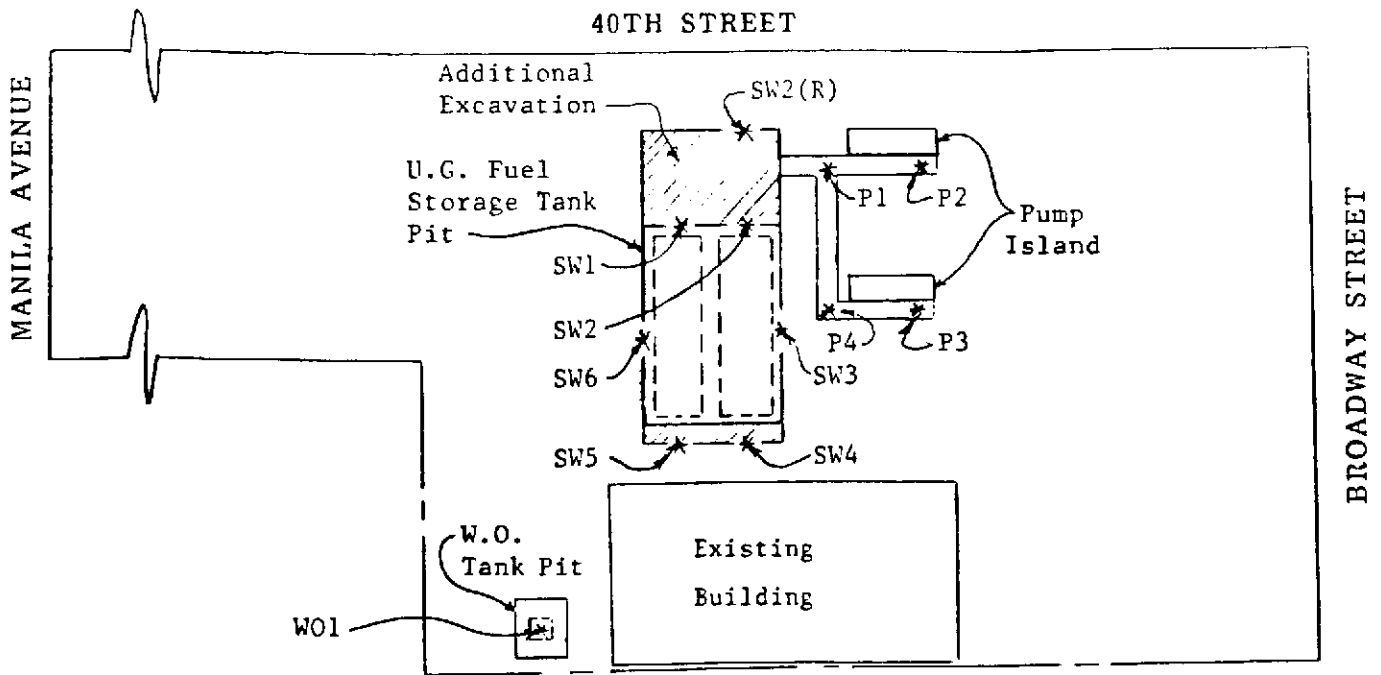


Unocal S/S #0746
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Oakland, CA



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SITE PLAN
Figure 2

LEGEND

* Sample Point Location

0 30 60
Approx. scale feet

Unocal S/S #0746
3943 Broadway Street
Oakland, CA



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9066 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID: Unocal/Oakland, 3943 Broadway	Sampled: Aug 28, 1991
P.O. Box 996	Matrix Descript: Water	Received: Aug 28, 1991
Benicia, CA 94510	Analysis Method: EPA 5030/8015/8020	Analyzed: 9/6,9/10/91
Attention: Mardo Kaprealian, P.E.	First Sample #: 108-1674 AB	Reported: Sep 13, 1991

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

Sample Number	Sample Description	Low/Medium B.P.	Ethyl			
		Hydrocarbons	Benzene	Toluene	Benzene	Xylenes
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
108-1674 AB	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
108-1675 AB	MW-2	N.D.	N.D.	N.D.	N.D.	N.D.
108-1676 AB	MW-3	16,000	650	2,200	1,100	5,400
108-1678 AB	MW-4	2,000	1,500	20	120	300
108-1679 AB	MW-6	N.D.	N.D.	N.D.	N.D.	N.D.
108-1680 AB	MW-7	N.D.	N.D.	N.D.	N.D.	N.D.
108-1681 AB	MW-8	1,800	3.2	1.9	19	74
108-1677 AB	MW-9	450	17	0.90	13	14

Detection Limits:	30	0.30	0.30	0.30	0.30
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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
Belinda C. Vega
Laboratory Director

1081674.KEI <1>



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9066 • FAX (510) 686-9689

Kaprealian Engineering, Inc.
P.O. Box 996
Benicia, CA 94510

Client Project ID: Unocal/Oakland, 3943 Broadway

Attention: Mardo Kaprealian, P.E. QC Sample Group: 1081674-81

Reported: Sep 13, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene		Ethyl- Benzene	
	Benzene	Toluene	Benzene	Xylenes

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	RH/JF	RH/JF	RH/JF	RH/JF
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Sep 6, 1991	Sep 6, 1991	Sep 6, 1991	Sep 6, 1991
QC Sample #:	BLK090691	BLK090691	BLK090691	BLK090691

Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	22	20	21	71
Matrix Spike % Recovery:	110	100	110	120
Conc. Matrix Spike Dup.:	22	20	21	71
Matrix Spike Duplicate % Recovery:	110	100	110	120
Relative % Difference:	0	0	0	0

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Belinda C. Vega
Laboratory Director

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



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Kaprealian Engineering, Inc.

Client Project ID: Unocal/Oakland, 3943 Broadway

P.O. Box 996

Benicia, CA 94510

Attention: Mardo Kaprealian, P.E. QC Sample Group: 1081674-81

Reported:

QUALITY CONTROL DATA REPORT

ANALYTE

Benzene

Toluene

Benzene

Xylenes

Method: EPA8015/8020

EPA8015/8020

EPA8015/8020

EPA8015/8020

Analyst: RH/JF

RH/JF

RH/JF

RH/JF

Reporting Units: $\mu\text{g/L}$

$\mu\text{g/L}$

$\mu\text{g/L}$

$\mu\text{g/L}$

Date Analyzed: Sep 10, 1991

Sep 10, 1991

Sep 10, 1991

Sep 10, 1991

QC Sample #: BLK091091

BLK091091

BLK091091

BLK091091

Sample Conc.: N.D. N.D. N.D. N.D.

Spike Conc. Added: 20 20 20 60

Conc. Matrix Spike: 26 25 27 81

Matrix Spike % Recovery: 130 130 140 140

Conc. Matrix Spike Dup.: 24 24 26 78

Matrix Spike Duplicate % Recovery: 120 120 130 130

Relative % Difference: 8.0 4.1 3.8 3.8

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Belinda C. Vega
Belinda C. Vega
Laboratory Director

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

1081674.KEI <3>



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Kaprealian Engineering, Inc.

Client Project ID: Unocal/Oakland, 3943 Broadway

P.O. Box 996

Benicia, CA 94510

Attention: Mardo Kaprealian, P.E. QC Sample Group: 1081674-81

Reported: Sep 13, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	RH/JF	RH/JF	RH/JF	RH/JF	RH/JF	RH/JF	RH/JF
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Sep 10, 1991	Sep 10, 1991	Sep 10, 1991	Sep 10, 1991	Sep 10, 1991	Sep 10, 1991	Sep 10, 1991
Sample #:	108-1674 AB	108-1675 AB	108-1676 AB	108-1677 AB	108-1678 AB	108-1679 AB	108-1680 AB

Surrogate % Recovery:	87	94	74	96	120	95	88
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SEQUOIA ANALYTICAL

Belinda C. Vega
Belinda C. Vega
Laboratory Director

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

1081674.KEI <4>



SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9066 • FAX (510) 686-9689

Kaprealian Engineering, Inc. P.O. Box 996 Benicia, CA 94510 Attention: Mardo Kaprealian, P.E.	Client Project ID: Unocal/Oakland, 3943 Broadway QC Sample Group: 1081674-81	Reported: Sep 13, 1991
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QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020
Analyst:	RH/JF	RH/JF
Reporting Units:	µg/L	µg/L
Date Analyzed:	Sep 10, 1991	Sep 6, 1991
Sample #:	108-1681 AB	Blank

Surrogate		
% Recovery:	81	94

SEQUOIA ANALYTICAL

Belinda C. Vega
Belinda C. Vega
Laboratory Director

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



KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER JOE		SITE NAME & ADDRESS Unocal/Oakland 3943 Broadway				ANALYSES REQUESTED		TURN AROUND TIME: Regular				
WITNESSING AGENCY						TPHG, BTX ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		NOA-S preserved 1081674 AB 1081675 1081676 1081678 1081679 1081680 1081681 1081677 AB				
SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB				COMP	CONT.	SAMPLING LOCATION	REMARKS
MW-1	8/28/91			✓	✓					2	MW	NOA-S preserved 1081674 AB 1081675 1081676 1081678 1081679 1081680 1081681 1081677 AB
MW-2	"			✓	✓					2	"	
MW-3	"			✓	-					2	"	
MW-4	"			✓	✓					2	"	
MW-6	"	9:30 AM - 2:30 P.M.		✓	✓					2	"	
MW-7	"			✓	-					2	"	
MW-8	"			✓	✓					2	"	
MW-9	"			✓	✓					2	"	

Relinquished by: (Signature) Joe Levin	Date/Time 8/28/91 1600	Received by: (Signature) Beth Hays	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 _____
Relinquished by: (Signature) ANLU	Date/Time 8/29/91 1515	Received by: (Signature) Van Stambrook	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	

Signature: **BS** Title: **log m** Date: **8/28/91**