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

December 13, 1991

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

STID 1119

94611

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 December 13, 1991, for the above referenced site.

If you have any questions, please 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.QR5
December 13, 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.P6 dated April 15, 1991. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from September through November, 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 gasoline tank and one 10,000 gallon super unleaded gasoline 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, each 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 to 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 results of the

water samples are summarized in Table 6. Documentation of the tank and piping removal procedures, 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 results of the water samples are summarized 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 drilled and completed to total depths 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 results of the water analyses are summarized 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. Documentation of the well installation procedures, sample collection techniques, analytical results, 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 results of the water analyses are summarized 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.

In KEI's quarterly report (KEI-P89-0805.QR2) dated April 12, 1991, KEI recommended the installation of three additional off-site monitoring wells in order to further define the extent of ground water contamination.

RECENT FIELD ACTIVITIES

All 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 and MW5 were monitored and purged six additional times during the quarter, well MW4 was monitored and purged three additional times and well MW8 was monitored and purged five additional times. During monitoring, the wells were checked for depth to water and presence of free product. Additionally, during sampling the wells were checked for the presence of sheen. A trace of free product was noted only in well MW5 on several occasions throughout the quarter. Sheen was observed in well MW3 only on November 5, 1991, but was not observed in any of the other wells. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on November 19, 1991, except for well MW5, which was not sampled due to the presence of free product. Prior to sampling, the wells were each purged of between 7 and 8.5 gallons by the use of a surface pump. Well MW5 was purged of one gallon on November 19, 1991. After completion of purging water, 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.

A water recovery test was performed on wells MW3, MW5, MW8 and MW9 after monitoring on October 22, 1991. The wells were pumped dry

and the water levels were measured at periodic time intervals in order to determine the water recovery rate for each well. Well recovery data are summarized in Table 7. Generally, these wells required between approximately 1/2 and 1-1/2 hours for a full recovery.

HYDROLOGY AND GEOLOGY

Based on the water level data gathered on November 19, 1991, the ground water flow direction appeared to be towards the southwest, at an average gradient of approximately 0.020, relatively unchanged from the last several quarters. An apparent depression in the water table at MW4 was present on November 19, 1991, and has occurred intermittently during the previous quarters. Water levels fluctuated during the quarter, showing a net increase in all wells of between 0.05 and 1.49 feet, since August 28, 1991. The measured depth to ground water at the site on November 19, 1991 ranged between 8.32 and 11.61 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 to 6 feet. The fill materials are inturn underlain by silty clay materials extending to depths below grade ranging from about 7 to 11.5 feet, and which are about 5 to 6.5 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 15.5 feet, and ranging in thickness from approximately 3.5 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, except for 32 ppb of TPH as gasoline in MW7. In monitoring wells MW3, MW4, MW8, and MW9, TPH as gasoline was detected at concentrations of 22,000 ppb, 55 ppb, 1,600 ppb, and 360 ppb, respectively, and benzene was detected at concentrations of 250 ppb, 9.2 ppb, 8.1 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 samples collected on November 19, 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.P6) dated April 15, 1991. Also, KEI recommends that wells MW3, 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 and Unocal are still in the process of obtaining an encroachment permit from the City of Oakland for the third monitoring well (MW11).

Installation of wells MW10 and MW12 is currently scheduled for January 7, 1992. Once the necessary encroachment permit is received for well MW11, KEI will schedule the installation as soon as possible.

As previously mentioned in this report, KEI conducted water recovery tests this quarter on wells MW3, MW5, MW8, and MW9. Once the extent of ground water contamination has been adequately defined, KEI will use the well recovery test data to determine a suitable location for installation of a recovery well. A pump test will then be performed using the recovery well and the pump test information will then be used to determine the location and number of additional recovery wells that may be necessary to achieve hydraulic control of the contamination plume. A ground water remediation system will then be designed and installed (after obtaining all required permits).

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.

Should 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

Mardo Kaprealian
President

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Attachments: Tables 1 through 7
Location Map
Site Vicinity Maps - Figures 1, 1a & 1b
Site Plan - Figure 2
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0805.QR5
December 13, 1991

TABLE 1

SUMMARY OF MONITORING DATA

Well	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)
(Monitored and Sampled on November 19, 1991)					
MW1	72.41	8.66	0	No	8
MW2	71.62	10.00	0	No	7
MW3	71.37	10.64	0	No	8.5
MW4	69.91	11.57	0	No	6
MW5	71.20	10.39	Trace	N/A	1
MW6	72.15	8.32	0	No	8
MW7	72.56	9.27	0	No	7
MW8	70.10	11.61	0	No	8
MW9	69.75	11.38	0	No	7.5
(Monitored on November 5, 1991)					
MW3	71.63	10.38	0	Yes	20
MW4	71.42	10.06	0	No	20
MW5	71.41	10.18	Trace	N/A	20
MW8	70.25	11.46	0	No	20
(Monitored on October 22, 1991)					
MW1	72.24	8.83	0	--	0
MW2	71.44	10.18	0	--	0
MW3	71.20	10.81	0	--	15
MW4	70.63	10.85	0	--	8
MW5	71.06	10.53	0	--	47
MW6	71.93	8.54	0	--	0
MW7	72.40	9.43	0	--	0
MW8	69.89	11.82	0	--	14
MW9	69.76	11.37	0	--	30
(Monitored on October 8, 1991)					
MW3	71.27	10.74	0	--	30
MW4	69.62	11.86	0	--	7
MW5	71.12	10.47	Trace	--	30
MW8	70.01	11.70	0	--	30

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TABLE 1 (Continued)

SUMMARY OF MONITORING DATA

Well	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)
(Monitored on October 1, 1991)					
MW3	71.25	10.76	0	--	24
MW4	70.27	11.21	0	--	7
MW5	71.08	10.51	Trace	--	30
(Monitored on September 24, 1991)					
MW1	72.30	8.77	0	--	0
MW2	70.93	10.69	0	--	0
MW3	70.37	11.64	0	--	20
MW4	69.79	11.69	0	--	0
MW5	71.08	10.51	0	--	35
MW6	72.05	8.42	0	--	0
MW7	72.52	9.31	0	--	0
MW8	70.05	11.66	0	--	25
MW9	69.88	11.25	0	--	0
(Monitored on September 17, 1991)					
MW3	71.49	10.52	0	--	25
MW5	71.32	10.27	Trace	--	35
MW8	70.14	11.57	0	--	23
(Monitored on September 10, 1991)					
MW3	71.44	10.57	0	--	22
MW5	71.27	10.32	Trace	--	30
MW8	70.07	11.64	0	--	18

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TABLE 1 (Continued)

SUMMARY OF MONITORING DATA

Well	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)
(Monitored on September 3, 1991)					
MW3	70.44	11.57	0	--	30
MW5	71.10	10.49	0	--	30
MW8	71.48	10.23	0	--	30

Well #	Surface Elevation* (feet)
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

-- Sheen determination not performed.

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

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
11/19/91	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	ND	ND	ND
	MW3	22,000	250	440	3,000	660
	MW4	55	9.2	4.5	6.7	1.4
	MW5	NOT SAMPLED DUE TO PRESENCE OF FREE PRODUCT				
	MW6	ND	ND	ND	ND	ND
	MW7	32	ND	ND	ND	ND
	MW8	1,600	8.1	1.8	52	19
	MW9	360	17	0.45	11	15
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

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
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
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.

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TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
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.

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TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
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.QR5
December 13, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

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

Sample #	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
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.QR5
December 13, 1991

TABLE 6

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
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.

KEI-P89-0805.QR5
December 13, 1991

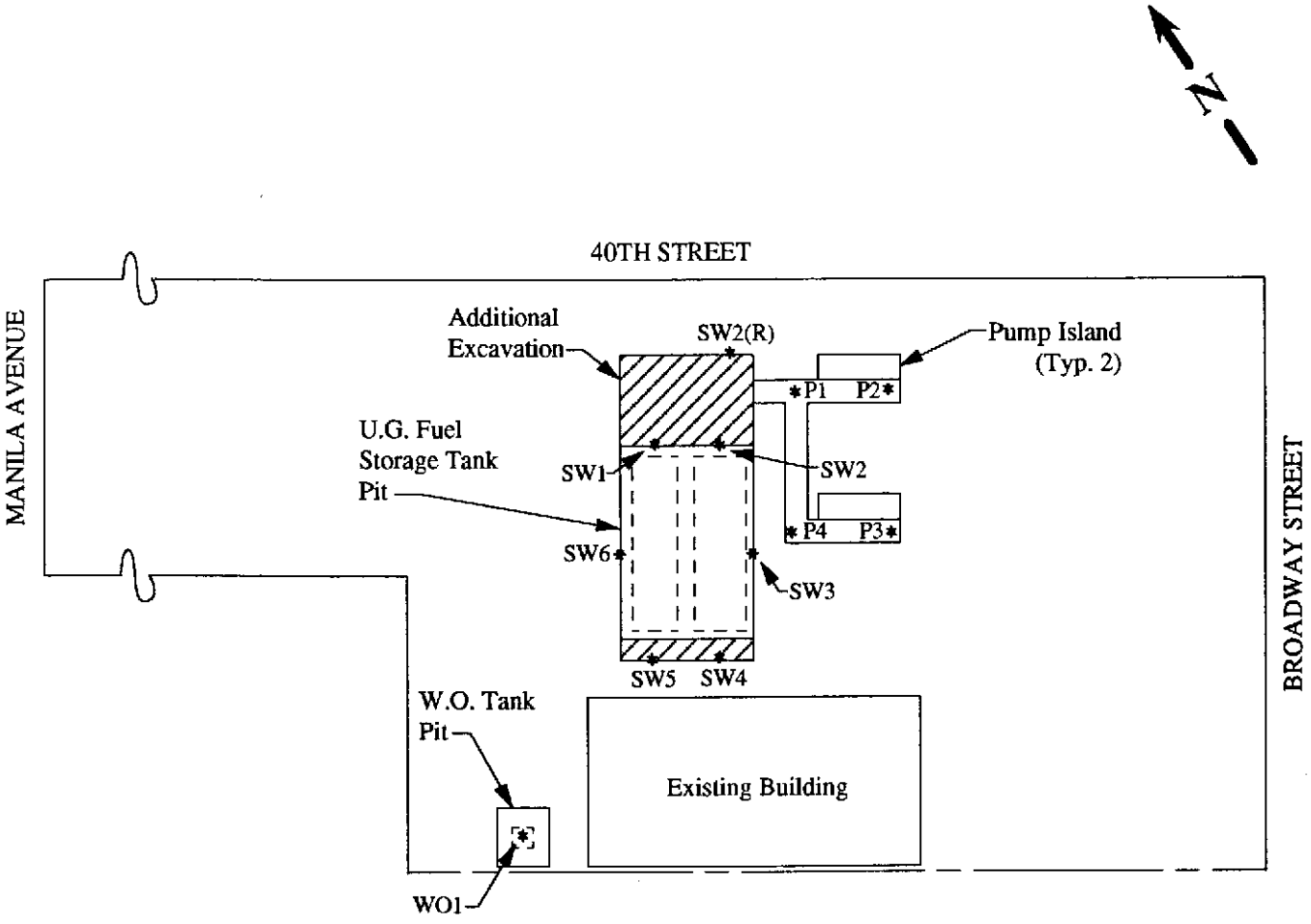
TABLE 7

SUMMARY OF WELL RECOVERY DATA

(Measured on October 22, 1991)

Well #	Average Flow Rate (gpm)	Casing Volume (gallons)	Amount Purged (gallons)	Purged Casing Volume	Recovery (%)	Recovery Time (hours)
MW3	0.79	1.97	15	7.62	50	0.07
					70	0.11
					90	0.23
					95	0.33
					99	0.73
MW5	1.68	1.62	47	29.1	60	0.03
					70	0.08
					80	0.13
					90	0.53
					95	1.33
					96	1.58
MW8	1.08	1.66	14	8.43	50	0.06
					70	0.11
					90	0.19
					97	0.43
MW9	1.11	1.88	30	15.93	50	0.02
					70	0.05
					90	0.08
					95	0.16
					99	0.50

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



SITE PLAN

Figure 2

LEGEND

* Sample Point Location

0 30 60

Approx. scale feet

Unocal Service Station #0746
3943 Broadway Street
Oakland, CA

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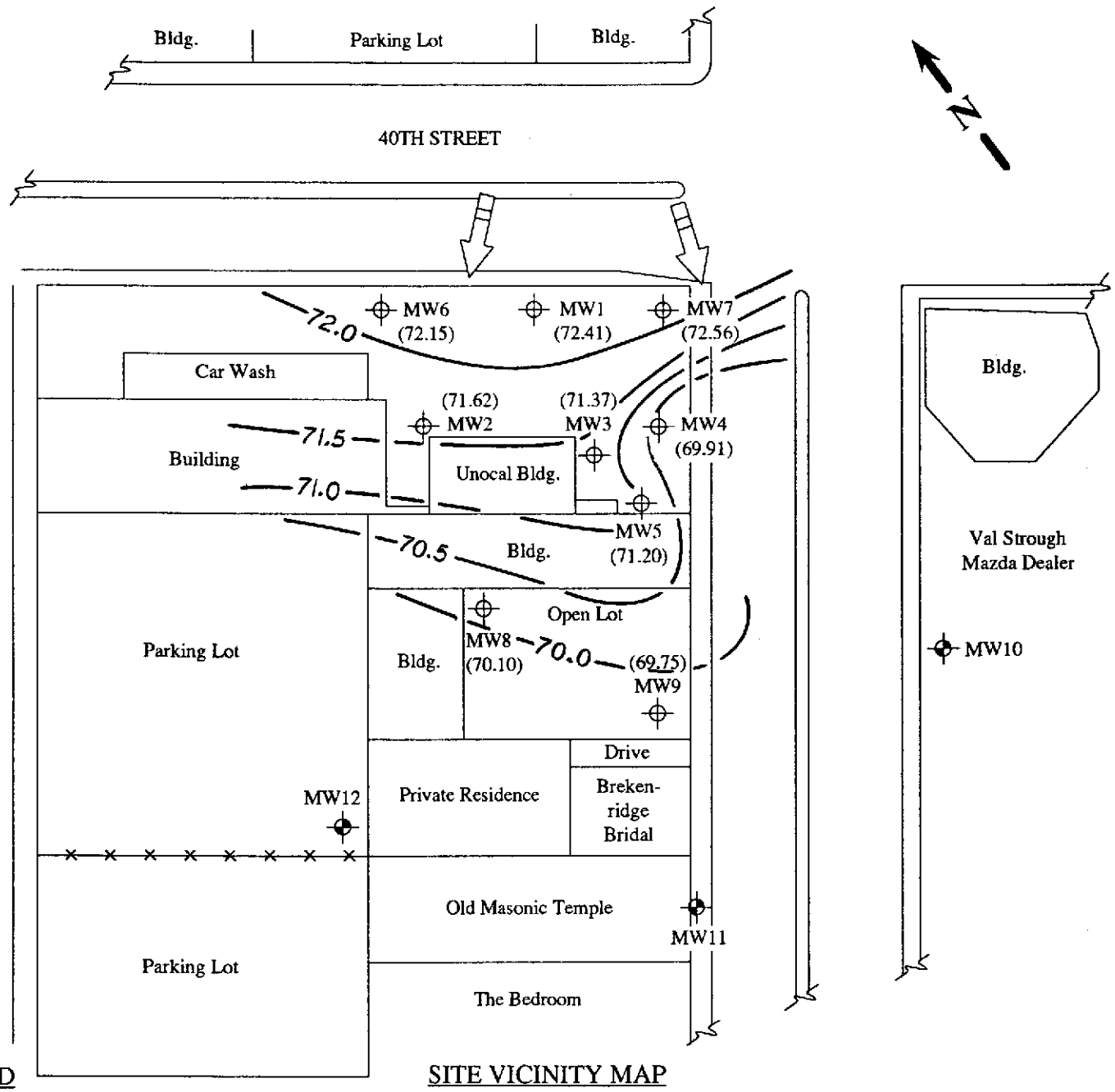

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- ( ) Ground water elevation in feet above Mean Sea Level on 11/19/91
- Direction of ground water flow
- Contours of ground water elevation

SITE VICINITY MAP

Figure 1

0 60 120
Approx. scale feet

Unocal Service Station #0746
3943 Broadway
Oakland, CA

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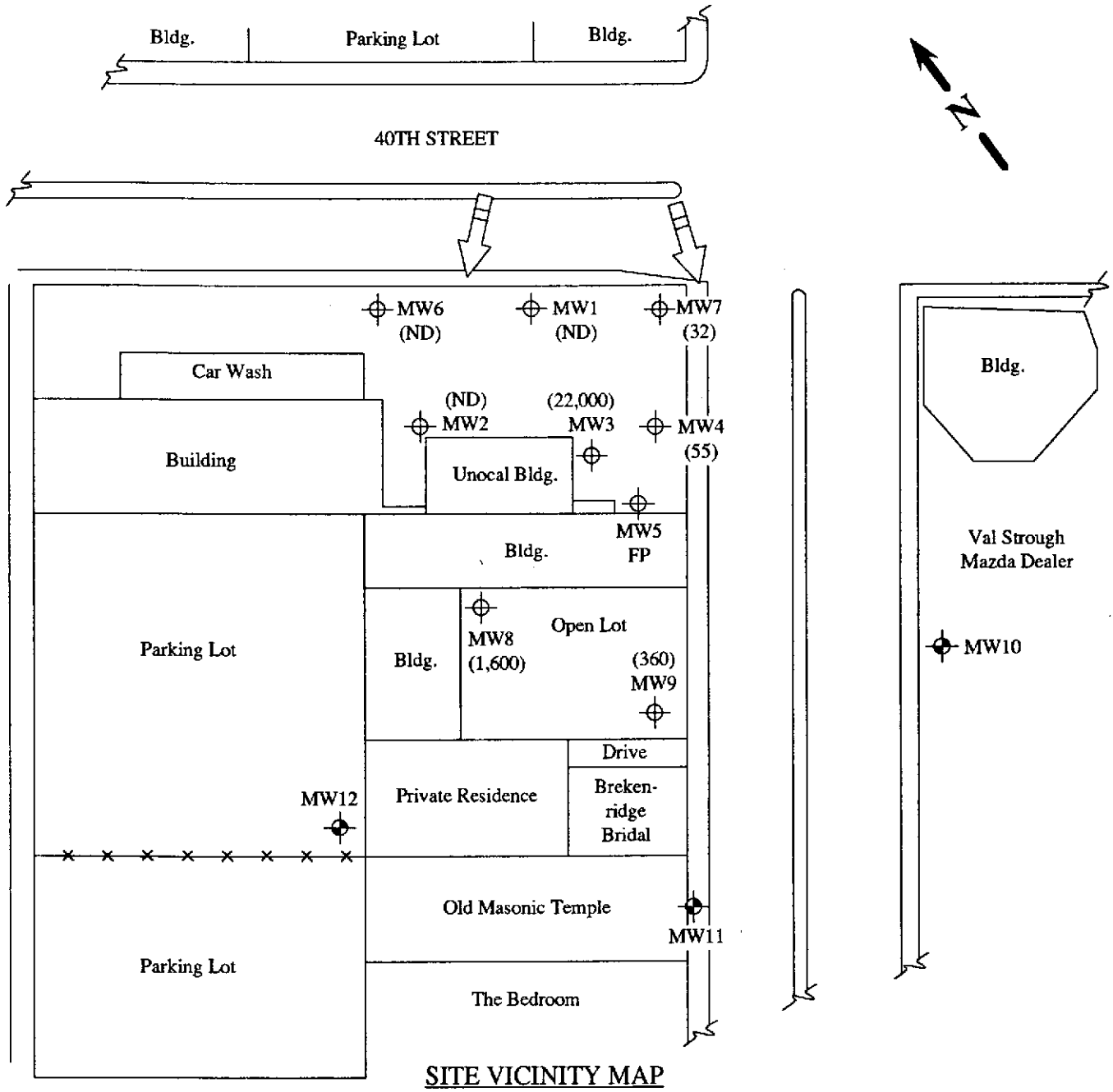

SITE VICINITY MAP

Figure 1a
(Samples collected on 11/19/91)

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)
- ( ) Concentration of TPH as gasoline in ppb
- Direction of ground water flow
- FP = Free Product

0 60 120
Approx. scale feet

Unocal Service Station #0746
3943 Broadway
Oakland, CA

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Consulting Engineers
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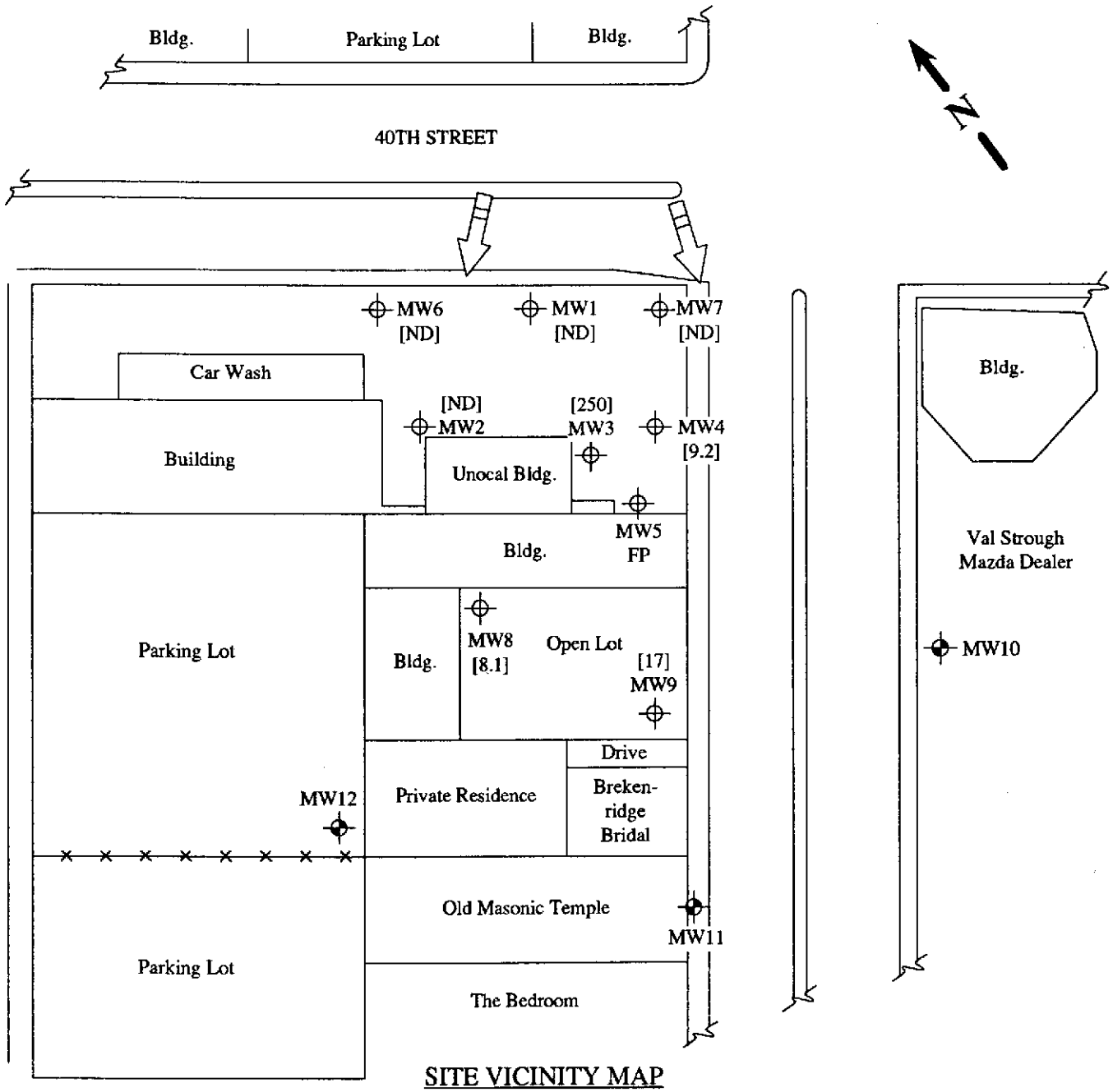

SITE VICINITY MAP

Figure 1b
(Samples collected on 11/19/91)

LEGEND

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

0 60 120
Approx. scale feet

Unocal Service Station #0746
3943 Broadway
Oakland, CA

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal/ 3943 Broadway, Oakland	Sampled:	Nov 19, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Nov 20, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Nov 22, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	111-0994 AB	Reported:	Nov 27, 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)
111-0994	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
111-0995	MW-2	N.D.	N.D.	N.D.	N.D.	N.D.
111-0996	MW-3	22,000	250	440	660	3,000
111-0997	MW-4	55	9.2	4.5	1.4	6.7
111-0998	MW-6	N.D.	N.D.	N.D.	N.D.	N.D.
111-0999	MW-7	32	N.D.	N.D.	N.D.	N.D.
111-1000	MW-8	1,600	8.1	1.8	19	52
111-1001	MW-9	360	17	0.45	15	11
Method Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc. Client Project ID: Unocal/ 3943 Broadway, Oakland
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 1110994-1001 Reported: Nov 27, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	R. Halsne	R. Halsne	R. Halsne	R. Halsne	R. Halsne	R. Halsne	R. Halsne
Reporting Units:	ppb	ppb	ppb	ppb	ppb	ppb	ppb
Date Analyzed:	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991
Sample #:	111-0994	111-0995	111-0996	111-0997	111-0998	111-0999	111-1000
Surrogate % Recovery:	100	100	100	100	100	110	84

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

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc. Client Project ID: Unocal/ 3943 Broadway, Oakland
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 1110994-1001 Reported: Nov 27, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

	EPA	EPA
Method:	8015/8020	8015/8020
Analyst:	R. Halsne	R. Halsne
Reporting Units:	ppb	ppb
Date Analyzed:	Nov 22, 1991	Nov 22, 1991
Sample #:	111-1001	Blank
Surrogate % Recovery:	100	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

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc. Client Project ID: Unocal/ 3943 Broadway, Oakland
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 1110994-001 Reported: Nov 27, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	R.H./J.F.	R.H./J.F.	R.H./J.F.	R.H./J.F.
Reporting Units:	ppb	ppb	ppb	ppb
Date Analyzed:	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991	Nov 22, 1991
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	21	20	21	63
Matrix Spike % Recovery:	105	100	105	105
Conc. Matrix Spike Dup.:	22	22	22	66
Matrix Spike Duplicate % Recovery:	110	110	110	110
Relative % Difference:	4.6	9.5	9.5	4.6

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

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

charged per Joe 11/19/91 6:45pm

SAMPLER: JOE

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland 3443 Broadway

ANALYSES REQUESTED: TPHG, BTXE

TURN AROUND TIME: ~~Regular~~ 5day

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION		REMARKS
MW-1	11/19/91			✓	✓		2	MW	111099 4	NOA-S preserved
MW-2	"			✓	✓		2	"	111099 5	
MW-3	"	P.M. 3:?		✓	✓		2	"	111099 6	
MW-4	"	"		✓	✓		2	"	111099 7	
MW-6	"	1		✓	✓		2	"	111099 8	
MW-7	"	P.M. 11:25		✓	✓		2	"	111099 9	
MW-8	"	"		✓	✓		2	"	111100 0	
MW-9	"			✓	✓		2	"	111100 1	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	11/19/91	[signature] 4:45 11/19/91
[signature]	11-20 10:35	[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? 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

RW — Signature; 100-10 — Title; 11/19/91 — Date