KAPREALIAN ENGINEERING
INCORPORATED

KEI-P89-0805.QR6
July 8, 1992

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

Attention: Mr. Keith Bullock

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

Dear Mr. Bullock:

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 February through May of 1992.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a service 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 gasoline 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 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). The analytical results of the soil samples are summarized in Table 7, and the analytical results of the water samples are summarized in Table 8. Documentation of soil sample collection techniques and the analytical 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. The analytical results of the soil samples are summarized in Table 5, and the analytical 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 each 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 of the 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. The results of the soil analyses are summarized in Table 5, and the 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 monitoring 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 of the 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. The results of the soil analyses are summarized in Table 6, and the results of the water analyses are summarized in Table 2. Documentation of the well installation protocol, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P89-0805.R6) dated December 17, 1990. Based on the analytical results, KEI recommended the continuation of the monthly monitoring and quarterly sampling program.

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

Based on the analytical results collected and evaluated through August 28, 1991, KEI recommended 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. In addition, KEI also recommended 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).

On October 22, 1991, water recovery tests were performed on wells MW3, MW5, MW8, and MW9. The wells were uniformly pumped of various amounts of ground water, and the water levels were measured at periodic time intervals to determine the ground water recovery rate for each well. The water recovery tests were performed to obtain information about relative recovery rates at various locations at the site, and to better determine locations of recovery wells. Well recovery data are summarized in Table 4.

On January 7, 1992, two additional two-inch diameter monitoring wells (designated as MW10 and MW11 on the attached Site Vicinity Map, Figure 1) were installed at the site. The third proposed well (MW12) was not installed at this time since the City of Oakland encroachment permit had not yet been received by KEI. The two wells were each drilled to depths of 21 to 22 feet below grade and were completed to total depths ranging from 19 to 22 feet below grade. Ground water was encountered during drilling at depths below grade ranging from 20 feet at MW10 to about 10.5 feet at MW11. Wells MW10 and MW11 were developed on January 10, 1992, and all of the wells except MW5 were sampled on February 6, 1992. Well

MW5 was not sampled due to the presence of 0.01 feet of free product.

Water samples from all wells (except MW5), and selected soil samples from borings of MW10 and MW11, were analyzed at Sequoia Analytical Laboratory in Concord, California.

Analytical results of the soil samples collected from borings MW10 and MW11 indicated non-detectable levels of TPH as gasoline and BTX&E in all analyzed samples, except for 0.021 ppm of xylenes detected in sample MW10(5). Analytical results of the water samples collected from MW1, MW6, MW7, MW10, and MW11 indicated non-detectable levels of TPH as gasoline and BTX&E. TPH as gasoline was also non-detectable in well MW2. In wells MW3, MW4, MW8, and MW9, TPH as gasoline was detected at concentrations of 24,000 ppb, 5,700 ppb, 2,600 ppb, and 660 ppb, respectively. In wells MW2, MW3, MW4, MW8, and MW9, benzene was detected at levels of 0.36 ppb, 600 ppb, 2,200 ppb, 4.1 ppb, and 41 ppb, respectively. Well MW5 was not sampled due to the presence of free product. The results of the soil analyses are summarized in Table 3, and the results of the water analyses are summarized in Table 2.

Documentation of the well installation procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P89-0805.R7) dated March 9, 1992. Based on the analytical results, KEI recommended the continuation of the monthly monitoring and quarterly sampling program for all of the wells. In addition, KEI recommended the installation of a recovery well, followed by a subsequent pump test.

RECENT FIELD ACTIVITIES

All eleven wells (MW1 through MW11) were monitored four times and were 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 three additional times during the quarter, and well MW4 was monitored and purged two additional times. During monitoring, the wells were checked for depth to water and presence of free product. During sampling, the wells were also checked for the presence of sheen. Free product was noted only in well MW5 on two occasions during the quarter. Sheen was not observed in any of the other wells. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on May 23, 1992, 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 6.5 and 9 gallons by the use of a surface pump. Samples were then

collected by 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 water level data gathered on May 23, 1992, the ground water flow direction in the vicinity of the site was to the southwest, which is relatively unchanged from the previous quarter. The average hydraulic gradient was approximately 0.019, based on water level data collected from the monitoring wells prior to purging. The water levels in wells MW1 through MW11 have fluctuated since February 6, 1992, and show a net increase in all wells of between 0.29 and 0.61 feet.

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.

The results of our subsurface studies indicate that the site and immediate vicinity are directly underlain by artificial fill materials that range from 2 feet to 6 feet in thickness. The fill materials are in turn underlain predominantly by clay materials that extend to depths below grade of approximately 5 feet at MW11 to about 11.5 feet at MW9. The clay zone is further underlain by a coarse-grained zone, which extends to approximately 10 feet below grade at MW6 and MW11 to approximately 15.5 feet below grade at MW5 and MW9. Generally, ground water was encountered within the coarse-grained zone or during drilling, except at MW6, MW10, and MW11, where ground water was encountered between 1 to 8 feet below the base of this zone. The coarse-grained zone is generally underlain by clay and/or silt materials that extend to the maximum depths explored (20 to 22.5 feet below grade). At MW1, MW10, and MW11, a second coarse-grained zone composed of clayey gravel or clayey to silty sand extends to depths of about 19 to 20 feet below grade.

ANALYTICAL RESULTS

Ground water samples were analyzed a Sequoia Analytical Laboratory in Concord, California, and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline by 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, MW4, MW6, MW7, MW10, and MW11 indicated non-detectable levels of TPH as gasoline and BTX&E. In monitoring wells MW3, MW8, and MW9, TPH as gasoline was detected at concentrations of 25,000 ppb, 2,100 ppb, and 460 ppb, respectively, and benzene was detected at concentrations of 300 ppb, 8.6 ppb, and 18 ppb, respectively. Monitoring well MW5 was not sampled due to a trace of free product. The results of the water analyses are summarized in Table 2. Concentrations of TPH as gasoline and benzene detected in ground water samples collected on May 23, 1992, 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 of the samples collected to date, KEI recommends the continuation of the current monthly monitoring and quarterly sampling program of the existing monitoring wells. Results of the monitoring program will be documented and evaluated after each monitoring and sampling event. Recommendations for altering or terminating the program will be made as warranted.

As previously recommended, on June 25, 1992, monitoring well MW12 and a six-inch diameter recovery well RW1 were installed. An aquifer test will be performed on the recovery well in the near future. The aquifer test results are anticipated to be used in the design of a ground water remediation system for the site. A separate technical report will be submitted that documents the installation of MW12 and RW1, the aquifer test results, and that includes additional recommendations for future remedial work at the site.

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

Soil deposits and rock formations may vary in thickness, lithology, saturation, strength and other properties across any site. In addition, environmental changes, either naturally-occurring or artificially-induced, may cause changes in 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 (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

Thomas J. Berkins
Senior Environmental Engineer

Joel G. Greger, C.E.G.
Senior Engineering Geologist

License No. 1633
Exp. Date 6/30/93

Robert H. Kezerian, P.E.
Project Engineer

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Attachments: Tables 1 through 8
Location Map
Site Vicinity Maps - Figures 1, 1a & 1b
Site Plan - Figure 2
Laboratory Analyses
Chain of Custody documentation

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TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (Gallons)	Product Purged (ounces)
(Monitored and Sampled on May 23, 1992)						
MW1	72.70	8.37	0	No	8	0
MW2	71.94	9.68	0	No	7.5	0
MW3	71.79	10.22	0	No	9	0
MW4	70.53	10.95	0	No	6.5	0
MW5	71.53	10.06	Trace	N/A	0	0
MW6	72.44	8.03	0	No	8	0
MW7	72.91	8.92	0	No	6.5	0
MW8	70.68	11.03	0	No	8	0
MW9	70.16	10.97	0	No	8	0
MW10	69.01	12.89	0	No	6.5	0
MW11	67.51	10.92	0	No	3	0
(Monitored on May 7, 1992)						
MW3	71.88	10.13	0	--	55	0
MW5	71.71	9.88	0	--	55	0
MW8	70.90	10.81	0	--	21	0
(Monitored on April 23, 1992)						
MW1	72.90	8.17	0	--	0	0
MW2	72.20	9.42	0	--	0	0
MW3	72.12	9.89	0	No	23	0
MW4	70.07	11.41	0	No	7	0
MW5	71.96	9.64	0.01	N/A	55	<1
MW6	72.67	7.80	0	--	0	0
MW7	73.16	8.67	0	--	0	0
MW8	71.09	10.62	0	No	20	0
MW9	70.63	10.50	0	--	0	0
MW10	69.34	12.56	0	--	0	0
MW11	67.91	10.52	0	--	0	0
(Monitored on April 9, 1992)						
MW3	72.22	9.79	0	No	20	0
MW4	69.71	11.77	0	No	18	0
MW5	72.01	9.58	0	No	8	0
MW8	71.22	10.49	0	No	55	0

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TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (Gallons)	Product Purged (ounces)
		(Monitored March 26, 1992)				
MW1	73.55	7.52	0	--	0	0
MW2	72.05	9.57	0	--	0	0
MW3	73.20	8.81	0	--	24	0
MW4	70.23	11.25	0	--	8	0
MW5	73.11	8.48	0	--	55	0
MW6	73.37	7.10	0	--	0	0
MW7	73.66	8.17	0	--	0	0
MW8	72.43	9.28	0	--	26	0
MW9	72.31	8.82	0	--	0	0
MW10	69.91	11.99	0	--	0	0
MW11	68.27	10.16	0	--	0	0
		(Monitored March 13, 1992)				
MW3	71.83	9.24	0	No	24	0
MW4	71.40	10.22	0	No	8	0
MW5	73.08	8.93	0	No	55	0
MW8	71.93	9.78	0	No	24	0
		(Monitored February 20, 1992)				
MW1	74.01	7.06	0	--	0	0
MW2	73.72	7.90	0	--	0	0
MW3	73.75	8.26	0	--	55	0
MW4	70.40	11.08	0	--	0	0
MW5	73.67	7.92	0	--	55	0
MW6	73.94	6.53	0	--	0	0
MW7	74.09	7.74	0	--	0	0
MW8	73.30	8.41	0	--	55	0
MW9	73.31	7.82	0	--	0	0
MW10	69.31	12.59	0	--	0	0
MW11	66.93	11.50	0	--	0	0

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TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

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
MW10	81.90
MW11	78.43

-- Sheen determination was not performed.

* The elevations of the tops of the well covers have been 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
5/23/92	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	ND	ND	ND
	MW3	25,000	300	130	4,900	880
	MW4	ND	ND	ND	ND	ND
	MW5	NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT				
	MW6	ND	ND	ND	ND	ND
	MW7	ND	ND	ND	ND	ND
	MW8	2,100	8.6	1.6	28	1.7
	MW9	460	18	0.66	3.2	1.4
	MW10	ND	ND	ND	ND	ND
	MW11	ND	ND	ND	ND	ND
2/06/92	MW1	ND	ND	ND	ND	ND
	MW2	ND	0.36	0.66	0.62	ND
	MW3	24,000	600	1,800	5,800	1,200
	MW4	5,700	2,200	140	980	57
	MW5	NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT				
	MW6	ND	ND	ND	ND	ND
	MW7	ND	ND	ND	ND	ND
	MW8	2,600	4.1	7.0	93	31
	MW9	660	41	1.0	15	33
	MW10	ND	ND	ND	ND	ND
	MW11	ND	ND	ND	ND	ND
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 THE 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

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

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

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
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	0.30	0.30	0.30	0.30

ND = Non-detectable.

-- Indicates analysis was not performed.

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

KEI-P89-0805.QR6
July 8, 1992

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
1/07/92	MW10(5)	5.0	ND	ND	ND	0.021	ND
	MW10(7)	7.0	ND	ND	ND	ND	ND
	MW10(11.5)	11.5	ND	ND	ND	ND	ND
	MW10(14.5)	14.5	ND	ND	ND	ND	ND
	MW10(19.5)	19.5	ND	ND	ND	ND	ND
	MW11(5)	5.0	ND	ND	ND	ND	ND
	MW11(10)	10.0	ND	ND	ND	ND	ND
	MW11(12.5)	12.5	ND	ND	ND	ND	ND
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.QR6
July 8, 1992

TABLE 4

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

KEI-P89-0805.QR6
July 8, 1992

TABLE 5

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.QR6
July 8, 1992

TABLE 6

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.

KEI-P89-0805.QR6
July 8, 1992

TABLE 7

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 was not performed.

ND = Non-detectable.

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

KEI-P89-0805.QR6
July 8, 1992

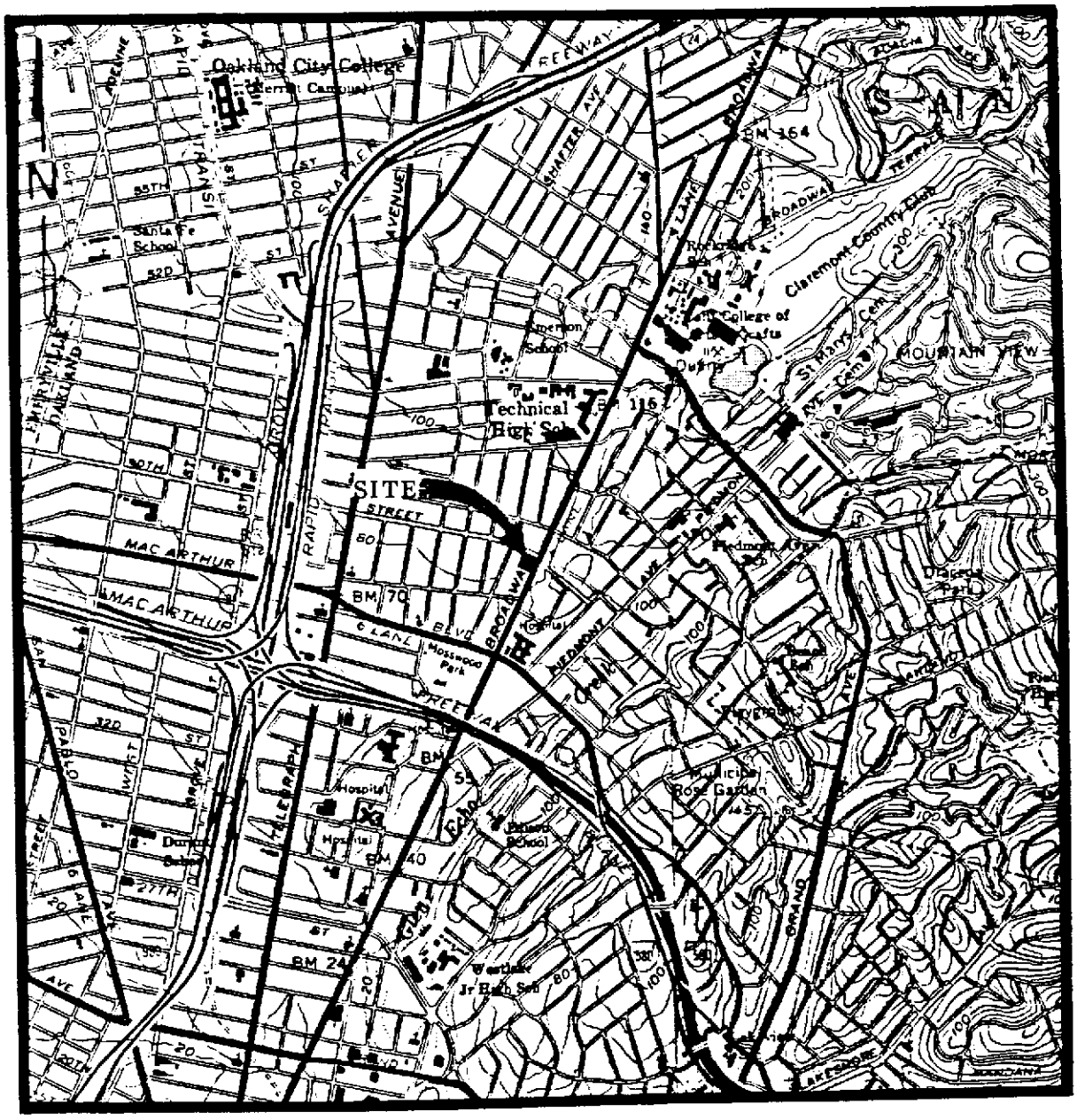
TABLE 8

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	0.30	0.30	0.30	0.30

* 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.



Base modified from 7.5 minute U.S.G.S. Oakland East and West Quadrangles (both photorevised 1980)

0 2000 4000

Approx. scale feet

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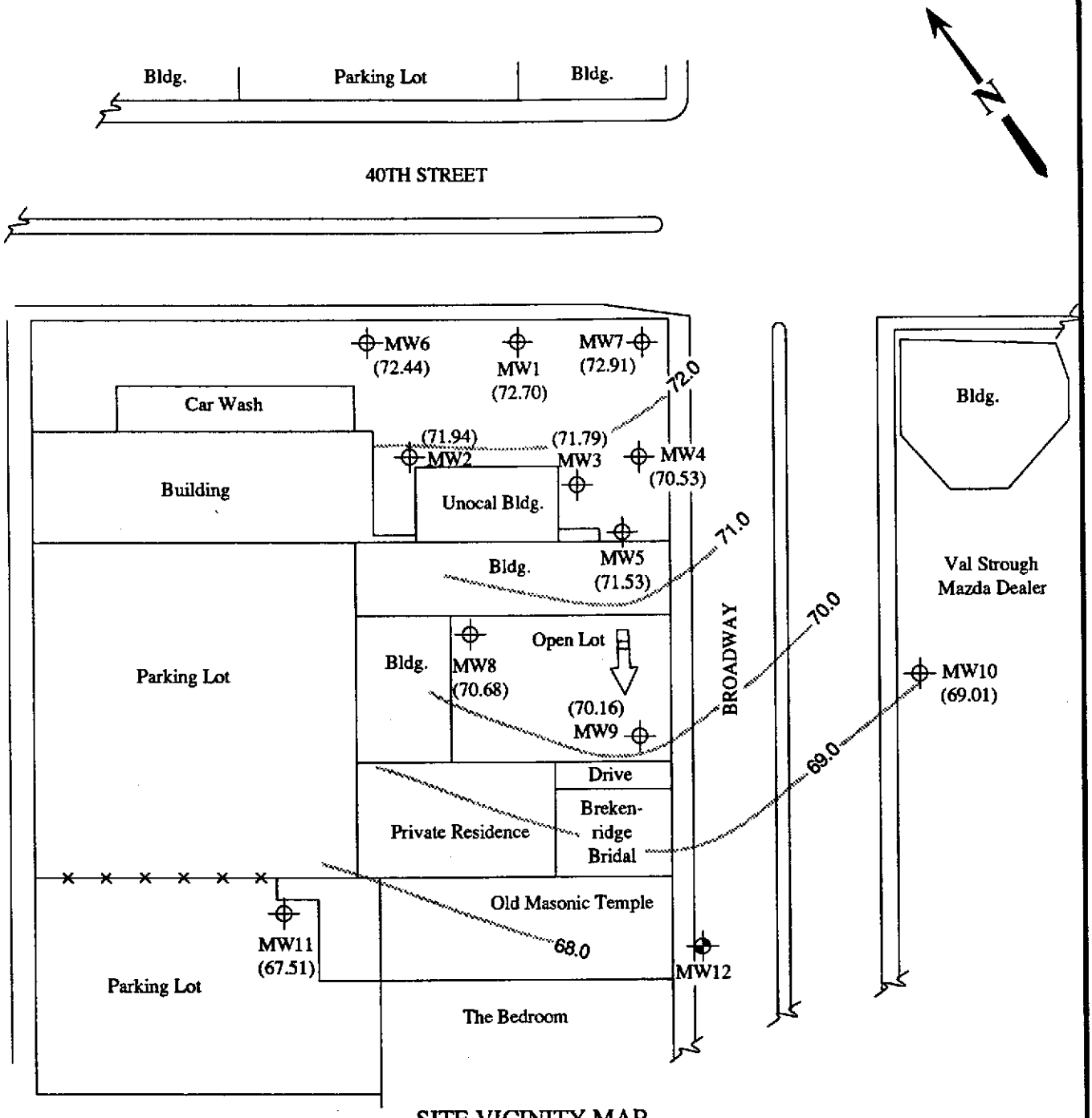
OAKLAND, CA

LOCATION MAP



SITE VICINITY MAP

LEGEND

- Monitoring well (existing)
- Monitoring well (previously proposed)
- ( ) Ground water elevation in feet above Mean Sea Level on 5/23/92
- Direction of ground water flow
- Contours of ground water elevation

0 60 120

Approx. scale feet

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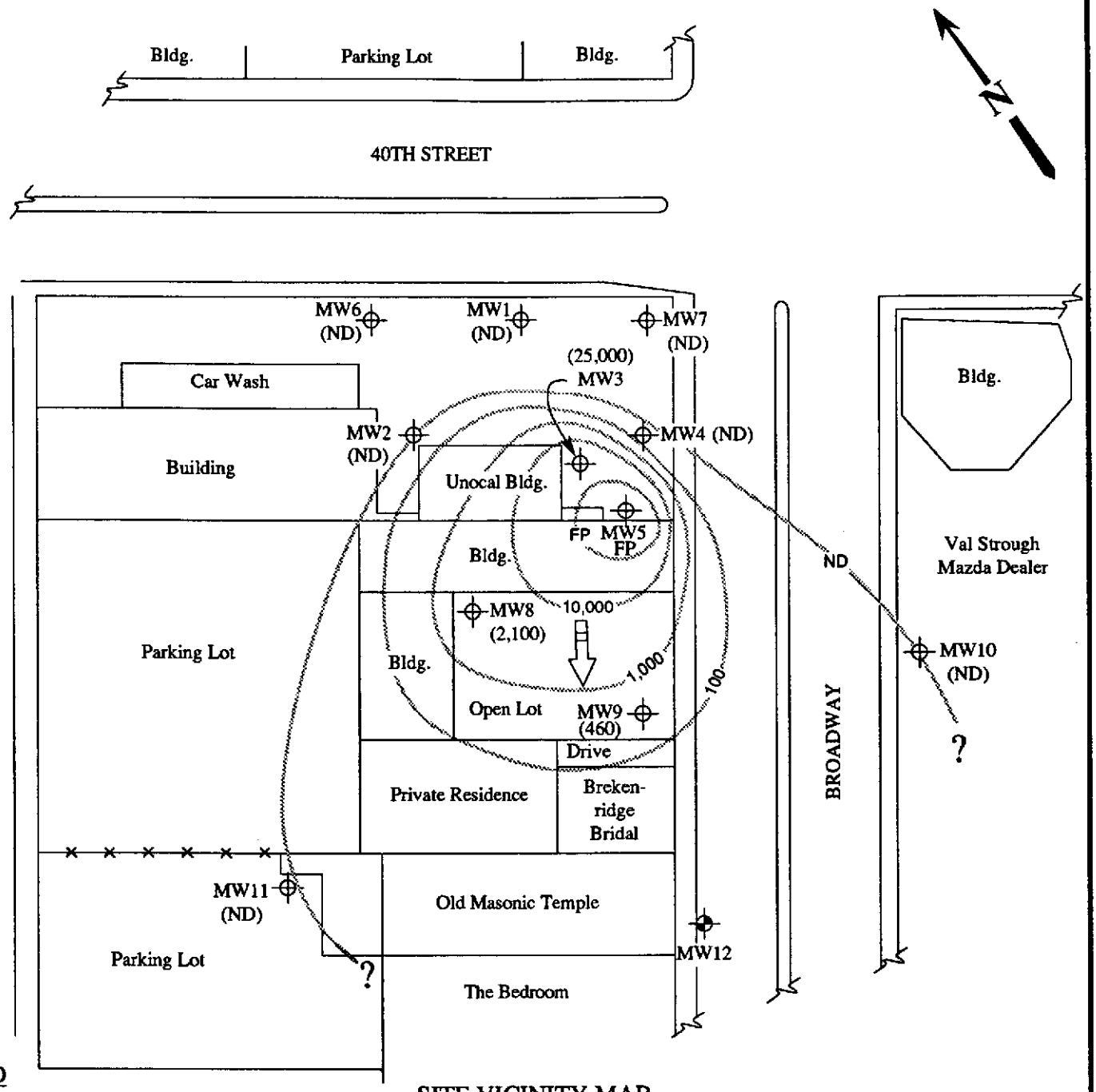
UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CA

FIGURE
1



LEGEND

- Monitoring well (existing)
- Monitoring well (previously proposed)
- ( ) Concentration of TPH as gasoline in ppb
- Direction of ground water flow
- Approximate iso-concentration contours of TPH as gasoline contamination in ground water

ND = Non-detectable

FP = Free product

SITE VICINITY MAP

(Samples Collected on 5/23/92)

0 60 120

Approx. scale feet

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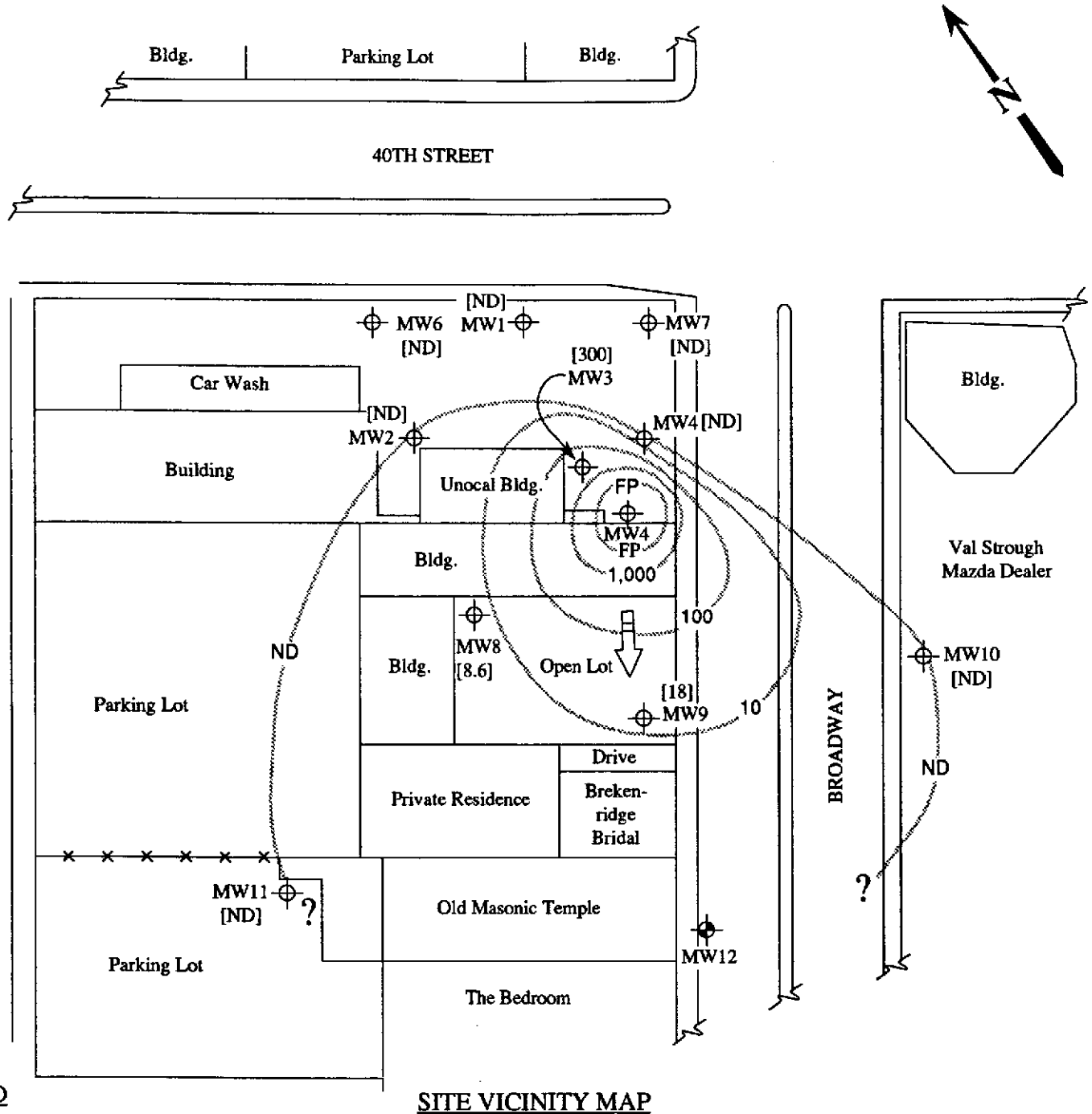
3943 BROADWAY
OAKLAND, CA

FIGURE **1a**



SITE VICINITY MAP

(Samples Collected on 5/23/92)

LEGEND

- Monitoring well (existing)
- Monitoring well (previously proposed)
- [ ] Concentration of benzene in ppb
- Direction of ground water flow
- Approximate iso-concentration contours of benzene contamination in ground water

ND = Non-detectable

FP = Free product

0 60 120

Approx. scale feet

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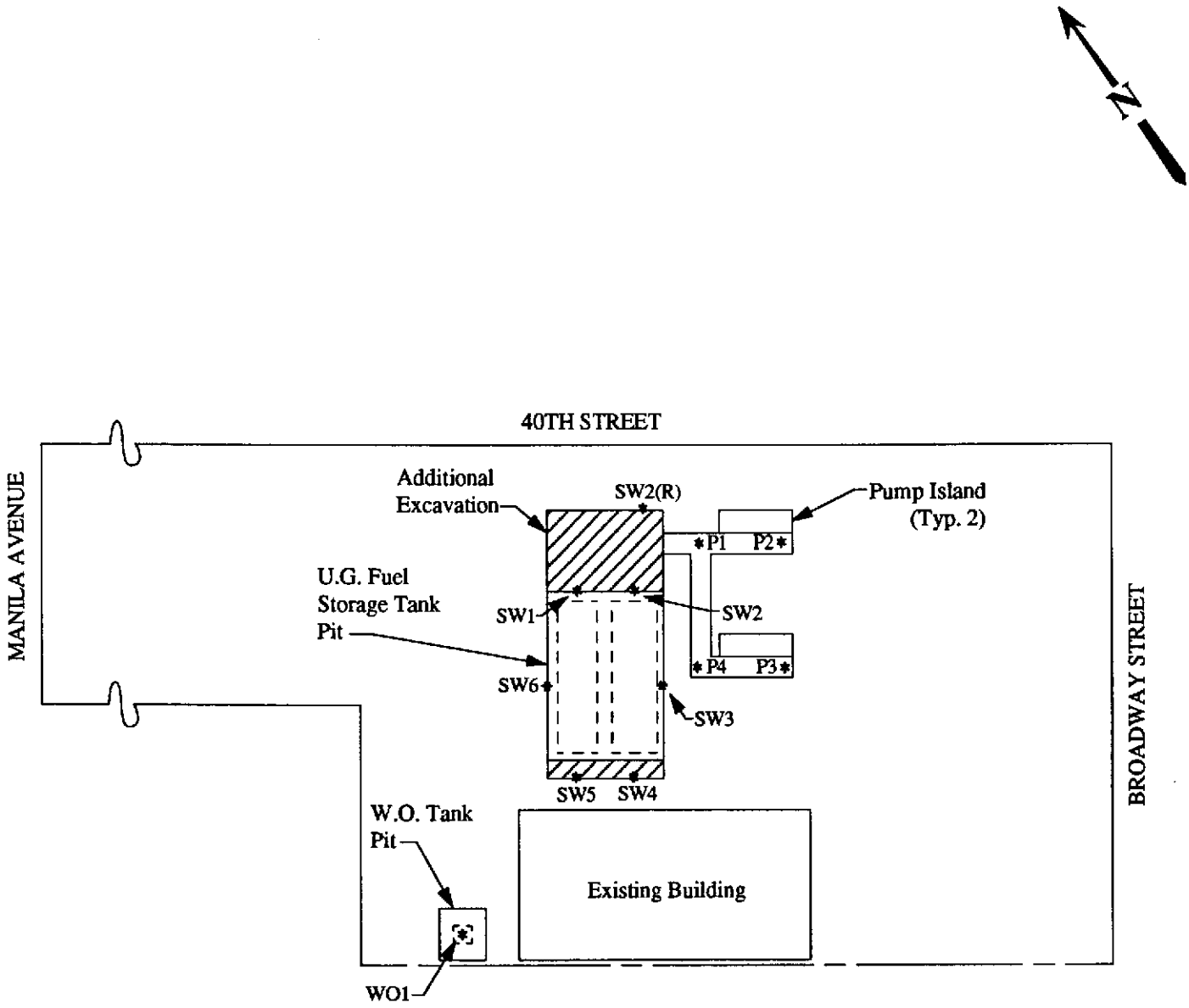
FIGURE
1b



SITE PLAN

LEGEND

* Sample Point Location

0 30 60

Approx. scale feet

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UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CA

FIGURE 2

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:	May 23, 1992
2401 Stanwell Drive, Suite 400	Matrix Descript:	Water	Received:	May 26, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Analyzed:	May 29, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	205-1272	Reported:	Jun 10, 1992

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)
205-1272	MW - 1	N.D.	N.D.	N.D.	N.D.	N.D.
205-1273	MW - 2	N.D.	N.D.	N.D.	N.D.	N.D.
205-1274	MW - 3	25,000	300	130	880	4,900
205-1275	MW - 4	N.D.	N.D.	N.D.	N.D.	N.D.
205-1276	MW - 6	N.D.	N.D.	N.D.	N.D.	N.D.
205-1277	MW - 7	N.D.	N.D.	N.D.	N.D.	N.D.
205-1278	MW - 8	2,100	8.6	1.6	1.7	28
205-1279	MW - 9	460	18	0.66	1.4	3.2
205-1280	MW - 10	N.D.	N.D.	N.D.	N.D.	N.D.
205-1281	MW - 11	N.D.	N.D.	N.D.	N.D.	N.D.
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

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.
2401 Stanwell Drive, Suite 400
Concord, CA 94520
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 3943 Broadway, Oakland
QC Sample Group: 2051272-281
Reported: Jun 10, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	A. T.	A. T.	A. T.	A. T.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992
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:	23	23	24	73
Matrix Spike % Recovery:	115	115	120	122
Conc. Matrix Spike Dup.:	23	23	24	72
Matrix Spike Duplicate % Recovery:	115	115	120	120
Relative % Difference:	0.0	0.0	0.0	1.4

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

SEQUOIA ANALYTICAL

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

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

Client Project ID: Unocal, 3943 Broadway, Oakland
QC Sample Group: 2051272-281
Reported: Jun 10, 1992

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:	A. T.	A. T.	A. T.	A. T.	A. T.	A. T.	A. T.
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992
Sample #:	205-1272	205-1273	205-1274	205-1275	205-1276	205-1277	205-1278
Surrogate % Recovery:	99	102	120	99	98	95	82

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

2051272.KEI <3>

SEQUOIA ANALYTICAL

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

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

Client Project ID: Unocal, 3943 Broadway, Oakland
QC Sample Group: 2051272-281
Reported: Jun 10, 1992

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	A. T.	A. T.	A. T.	A. T.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992
Sample #:	205-1279	205-1280	205-1281	Matrix Blank
Surrogate % Recovery:	87	95	95	108

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

Page 1 of 2

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER	SITE NAME & ADDRESS	ANALYSES REQUESTED	TURN AROUND TIME:
JOE	Unocal / Oakland 3943 Broadway	TPHG, BTXE	Regular
WITNESSING AGENCY			

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG, BTXE							REMARKS
mw-1	5/23/92			✓	✓		2	mw	✓							2051272AB
mw-2	"			✓	✓		2	"	✓							1273AB
mw-3	"	8:30 am		✓	✓		2	"	✓							1274AB
mw-4	"			✓	✓		2	"	✓							1275AB
mw-6	"			✓	✓		2	"	✓							1276AB
mw-7	"	9:40 am		✓	✓		2	"	✓							1277AB
mw-8	"			✓	✓		2	"	✓							1278AB
mw-9	"			✓	✓		2	"	✓							1279AB
mw-10	"			✓	✓		2	"	✓							1280AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Joe [signature]	5/26/92 1800	A. Nayo [signature]
Relinquished by: (Signature) Tim [signature]	Date/Time 5/27/92 10:35	Received by: (Signature) [signature]
Relinquished by: (Signature) [signature]	Date/Time 5-27-92 12:30	Received by: (Signature) [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] Title: [signature] Date: 5/26

Page 2

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Joe

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
3943 Broadway

ANALYSES REQUESTED: TPHG, BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW-11	5/23/92			✓	✓		2	MW	205128 1AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Joe Kaprealian	5/26/92 1860	A Vogel
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jim Cahill	5/27/92 10:35	Troy Coplan
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Tony Hoglund	5-27-92 12:30 PM	
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

A Vogel — Signature; Lab Supervisor — Title; 5/26 — Date