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KEI-P89-0801.QR7
February 17, 1992

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

Attention: Mr. Ron Bock

RE: Quarterly Report
Unocal Service Station #6034
4700 First Street
Livermore, 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-P89-0801.P3 dated January 31, 1991, and as modified in KEI's quarterly report KEI-P89-0801.QR5 dated August 7, 1991. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from November of 1991 through January of 1992.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The subject site is situated on gently sloping, northwest trending topography, and is located adjacent to and northeast of the drainage channel for Arroyo Seco. In addition, the site is located approximately 9,000 feet northwest of the Lawrence Radiation Laboratory and the University of California. BP and Chevron service stations are located to the south and southeast of the Unocal site. A Location Map, a Site Vicinity Map, and Site Plans are attached to this report.

KEI's initial work at the site began on August 2, 1989, when KEI was retained by Unocal to collect soil samples from beneath two 12,000 gallon gasoline storage tanks and one waste oil tank during their replacement. The tanks were made of steel, and no apparent holes or cracks were observed in the tanks. Six soil samples (designated as A1, A2, A3, B1, B2, and B3) were collected from beneath the fuel tanks at depths of 15 to 16 feet below grade, and one soil sample, labeled WO1, was collected from beneath the waste oil tank at a depth of 8.5 feet below grade. KEI returned to the site on August 7, 1989, in order to collect soil samples from the product pipe trenches. Seven soil samples, labeled P1 through P7,

were collected from the pipe trenches at depths ranging from 2.5 to 3.5 feet below grade. Ground water was encountered in the fuel tank pit at a depth of 17.5 feet below grade during subsequent excavation of contaminated soil from the location where sample A3 was collected. The soil sample locations are shown on the attached Site Plan, Figure 2. One ground water sample, labeled W1, was collected from the excavated pit.

All samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California, for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, xylenes, and ethylbenzene (BTX&E). In addition, the sample collected from beneath the waste oil tank was analyzed for TPH as diesel, total oil and grease (TOG), and EPA methods 8010 and 8270 compounds. Analytical results of the soil samples collected from the fuel tank pit and pipe trenches indicated levels of TPH as gasoline ranging from non-detectable to 9.6 ppm for all samples, except for sample A3, which showed 390 ppm. However, the area below sample A3 was excavated to the depth of the water table. The soil sample collected from beneath the waste oil tank showed non-detectable levels of all constituents analyzed, except for TPH as diesel at 1.4 ppm. Analytical results of the water sample collected from the fuel tank pit showed 47,000 ppb of TPH as gasoline, and 260 ppb of benzene. Results of the soil analyses are summarized in Table 5, and results of the water sample are summarized in Table 6. Documentation of the tank and piping removal procedures, sample collection techniques, and analytical results are provided in KEI's report (KEI-J89-0801.R2) dated August 15, 1989. Based on the sample results, KEI recommended the installation of four monitoring wells.

On October 25 and 26, 1989, four two-inch diameter monitoring wells (designated as MW1, MW2, MW3, and MW4 on the attached Site Plan, Figure 1, and Site Vicinity Map, Figure 3) were installed at the site. The monitoring wells were drilled and completed to total depths ranging from 26 to 28.5 feet below grade. Ground water was encountered at depths ranging from 14.5 to 17.5 feet beneath the surface during drilling. The wells were developed on November 3 and 9, 1989, and were initially sampled on November 18, 1989. Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline and BTX&E. In addition, soil and water samples collected from monitoring well MW1 were analyzed for TPH as diesel, EPA method 8010 compounds, and TOG.

Analytical results of the soil samples collected from the borings for the monitoring wells indicated levels of TPH as gasoline ranging from non-detectable to 3.0 ppm for all samples, except for samples MW2(5), MW2(17), and MW4(15), which showed levels of TPH as gasoline at concentrations of 23 ppm, 790 ppm, and 56 ppm,

respectively. TPH as diesel, EPA method 8010 results, and TOG were non-detectable in all soil samples collected from MW1.

Analytical results of the ground water samples collected from monitoring wells MW1 and MW3 indicated non-detectable levels of TPH as gasoline. TPH as gasoline was detected in monitoring wells MW2 and MW4 at concentrations of 53,000 ppb and 990 ppb, respectively. Benzene was detected in monitoring wells MW2, MW3, and MW4 at concentrations of 540 ppb, 0.35 ppb, and 9.8 ppb, respectively. In monitoring well MW1, TPH as diesel was detected at 400 ppb, TOG at 3.1 ppm, and EPA method 8010 constituents were non-detectable, except for trichloroethene, which was detected at a concentration of 0.55 ppb. Analytical results of the soil samples are summarized in Table 4, and results of the water samples are summarized in Table 2. Based on the analytical results, KEI recommended a monthly monitoring and quarterly sampling program. Documentation of the well installation procedures, sample collection techniques, and analytical results are presented in KEI's report (KEI-J89-0801.R4) dated December 18, 1989. The monthly monitoring and quarterly sampling program began on January 4, 1990. The well covers of all wells have been surveyed to Mean Sea Level (MSL).

Based on the levels of TPH as gasoline and benzene detected in well MW2 on December 24, 1990, KEI recommended the installation of three additional monitoring wells in KEI's fourth quarterly report (KEI-P89-0801.QR4) dated January 31, 1991.

On April 2, 1991, three additional two-inch diameter monitoring wells (designated as MW5, MW6, and MW7 on the attached Site Plan, Figure 1, and Site Vicinity Map, Figure 3) were installed at the site. The wells were drilled and completed to total depths ranging from 24 to 24.5 feet below grade. Ground water was encountered at depths ranging from 15.5 to 16 feet beneath the surface during drilling. The surface of each well cover was surveyed by Kier & Wright of Pleasanton, California, to MSL and to a vertical accuracy of 0.01 feet.

Wells MW5, MW6, and MW7 were developed on April 5, 1991, and all wells were sampled on April 10, 1991. Water samples from all wells, and selected soil samples from the borings of MW5 through MW7, were analyzed at Sequoia Analytical Laboratory in Concord, California, for TPH as gasoline and BTX&E. In addition, the water sample collected from MW1 was analyzed for TPH as diesel, TOG, and EPA method 8010 constituents.

Analytical results of the soil samples collected from the borings for monitoring wells MW5, MW6, and MW7 indicated non-detectable levels of TPH as gasoline and benzene in all analyzed samples. Analytical results of the water samples collected from monitoring

wells MW1, MW3, MW6, and MW7 indicated non-detectable levels of TPH as gasoline and BTX&E. In wells MW2, MW4, and MW5, levels of TPH as gasoline were detected at 22,000 ppb, 950 ppb, and 630 ppb, respectively, with benzene levels at 170 ppb, 0.84 ppb, and 35 ppb, respectively. In monitoring well MW1, TPH as diesel, TOG and all EPA method 8010 constituents were non-detectable. Results of the soil analyses are summarized in Table 3, and results of the water analyses are summarized in Table 2. Documentation of the well installation procedure, sample collection techniques, and laboratory analyses are presented in KEI's report (KEI-P89-0801.R5) dated May 10, 1991. Based on the analytical results, KEI recommended the continuation of the monthly monitoring and quarterly sampling program.

On January 24, 1991, KEI reviewed the most recent quarterly report (available for review by KEI) prepared for Chevron USA by Western Geologic Resources, Inc., dated June 12, 1990. At the time, there were 18 active monitoring wells (designated as C-1 through C-19 on the attached Site Vicinity Map, Figure 3) in the vicinity of the Chevron station. Chevron monitoring well C-4 was previously destroyed.

A review of the historical water quality data for Chevron's monitoring wells (C-2, C-3, C-6, C-7, C-8, and C-9) that are located directly upgradient of Unocal's monitoring well MW4 showed that "total fuel hydrocarbons" (TFH) were detected in ground water samples collected from these wells in 1988 at levels ranging from 2,100 ppb to 86,000 ppb. Based on analytical results from samples collected on January 1, 1990, the levels of contamination detected in each of the above mentioned Chevron wells had decreased significantly due to remediation activities at the site. However, "total petroleum hydrocarbons" (TPH) were still detected in each of the wells at levels ranging from 910 ppb to 5,600 ppb. KEI concluded that the elevated levels of TPH as gasoline detected in Unocal's upgradient monitoring well MW4, and the general northwesterly ground water flow direction, suggested that upgradient contamination from the Chevron station has migrated onto the Unocal site and may be contributing to contamination detected in Unocal's monitoring well MW2.

RECENT FIELD ACTIVITIES

The seven wells (MW1 through MW7) were monitored three times and six of the wells (MW2 through MW7) were sampled once during the quarter. Well MW1 is no longer sampled based on previous non-detectable levels detected in the well. During monitoring, the wells were checked for depth to water and the presence of free product. In addition, during sampling, the wells were also checked for the presence of sheen. No free product or sheen was noted in

any of the wells during the quarter. Well MW2 was also purged of 55 gallons on two occasions during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from wells MW2 through MW7 on January 14, 1992. Prior to sampling, the wells were each purged of 8 gallons by the use of a Teflon bailer. Samples were then collected by the use of a clean Teflon bailer. Samples were decanted into clean VOA vials that were then sealed with Teflon-lined screw caps, and stored in a cooler, on ice, until delivery to a State certified laboratory.

HYDROLOGY AND GEOLOGY

Based on the water level data gathered on January 14, 1992, the ground water flow direction appeared to be predominantly toward the west-northwest at the Unocal site, varying from approximately due west to the northwest, which is relatively similar to the flow direction reported in previous quarters. The average hydraulic gradient at the site on January 14, 1992, was approximately 0.006. Water levels have fluctuated during the quarter, showing a net increase of 1.13 to 1.25 feet in all wells since October 14, 1991. The measured depth to ground water at the site on January 14, 1992, ranged between 14.65 and 16.20 feet below grade.

KEI coordinated joint monitoring on December 24, 1990, with the BP and Chevron stations located to the south and southeast, respectively, of the Unocal station (across First Street). The ground water flow direction on that date appeared to be generally toward the northwest from the BP and Chevron stations (i.e. toward the Unocal station).

A review of the Fall 1990 Ground Water Level Report, produced by the Alameda County Flood Control and Water Conservation District, indicates that the subject site is located near the northeastern corner of the Mocho Subbasin (Mocho 1), and near the boundary with the Spring Subbasin, where the regional ground water flow direction is toward the northwest.

Based on review of regional geologic maps (U.S. Geological Survey Open-File Report 80-533B "Preliminary Geologic Map of the Livermore Quadrangle, Alameda and Contra Costa Counties, California" by Thomas W. Dibblee, Jr., 1980), the subject site is inferred to be underlain by Quaternary-age alluvium. In addition, adjacent hillside areas northwest and southwest of the site are mapped as being underlain by the Livermore Gravel formation. The Livermore Gravel is typically composed of light redding-gray cobble-pebble gravel, pebbly sand, silt, and clay.

The results of our previous subsurface study indicate that the subject site is underlain by Quaternary alluvium materials to the maximum depth explored (28.5 feet below grade). These alluvium materials generally consist of a gravelly unit at the surface that varies from about 5 to 7 feet thick. This upper gravel unit is underlain by a clay unit to depths below grade of about 11 to 12.5 feet. A second gravelly unit underlies the clay unit, but this unit varies significantly in thickness (from about 6.5 to 8 feet thick in the vicinity of MW1 and MW2, to about 12.5 feet thick in the vicinity of MW3). This second gravelly unit is inturn underlain by a second clay unit, which locally contains sandy and gravelly lenses and extends from depths below grade of about 23.5 to 25 feet to the maximum depths explored (26 to 28.5 feet below grade).

The results of our most recent subsurface study indicate that the site is underlain by fill materials that extend to depths below grade of about 4 to 5.75 feet at MW6 and MW7 and may extend to a depth of about 6.5 feet below grade at MW5. The fill materials are inturn underlain by clay and/or silt materials to depths below grade of about 12.25 feet at MW6, and to about 15 to 15.5 feet at MW5 and MW7. These fine-grained soils are inturn underlain by silty to clayey sand and gravel materials at MW5 and MW6 to depths below grade of about 16 to 18 feet. At MW5 and MW6, these coarse-grained soils are inturn underlain by clay and silt materials, which extend to depths below grade of about 17.5 feet at MW6, and to about 22.75 feet at MW5. Underlying the clay and silt soils at depths below grade of about 22.75 feet at MW5, 17.5 feet at MW6, and 15 feet at MW7, is a zone of well graded gravel, which is about 4 to 7 feet thick at MW6 and MW7, and by clayey sand at MW5, which is about 0.5 feet thick. These coarse-grained soils are inturn underlain by clay materials at depths of about 21.5 to 23.25 feet below grade, which extend to the maximum depths explored (24 to 24.5 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 ground water samples collected from monitoring wells MW3, MW6, and MW7 indicated non-detectable levels of TPH as gasoline and BTX&E. In wells MW2, MW4, and MW5, levels of TPH as gasoline were detected at concentrations of 5,600 ppb, 1,500 ppb and 99 ppb, respectively, with benzene levels detected at concentrations of 36 ppb, 4.2 ppb, and 1.0 ppb, respectively. Concentra-

tions of TPH as gasoline and benzene detected in the ground water samples collected on January 14, 1992, are shown on the attached Site Plan, Figure 1a. Results of the analyses are summarized in Table 2. Copies of the laboratory analyses and Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results collected and evaluated to date, and no evidence of free product or sheen in any of the wells, KEI recommends the continuation of the current monitoring and sampling program of the existing wells, per KEI's proposal (KEI-P89-0801.P3) dated January 31, 1991. As recommended in KEI's report (KEI-P89-0801.QR5) dated August 7, 1991, well MW1 will no longer be sampled. However, well MW1 should continue to be monitored monthly in order to collect ground water elevation data.

Monitoring wells MW3, MW6, and MW7 continue to show non-detectable levels of TPH as gasoline and BTX&E; however, upgradient monitoring well MW4, located at the southeast corner of the Unocal site, has consistently shown TPH as gasoline levels greater than or equal to 800 ppb in all nine quarterly samples collected to date. As previously stated, these findings would appear to support a conclusion that a local off-site source of contamination has possibly migrated onto the Unocal site.

Therefore, KEI continues to recommend that a meeting be arranged between representatives of Chevron and Unocal Corporation to discuss further the investigations and remediation at the respective sites. Furthermore, additional joint monitoring and sampling of the wells at the Unocal, Chevron, and the BP sites should be conducted on a regular basis. KEI recently contacted the consultant for the Chevron site in an attempt to reestablish joint monitoring and sampling activities for the next quarters. The Chevron wells are currently on a semi-annual sampling program. Joint monitoring and sampling is scheduled for April 6, 1992. A meeting with Chevron will be scheduled following the joint monitoring and sampling event.

Based on discussions during November of 1991 with the City of Livermore Public Works Department, Jack Fong of the Alameda County Flood Control and Water Conservation District (Zone 7), and Tom Ruark of Bissel-Karngreiner Construction, a new development named Plaza 580 is being constructed in the vicinity of the subject Unocal site by Mervyns and Target Stores (which will include other retail space to be leased). As a condition of the permitting of construction, Zone 7 required an improvement to an earth channel that is part of the storm drain system in the area. The improvement consisted of realignment, widening, and deepening the Arroyo

Seco transitional channel by using concrete to replace the old earth channel. During construction, ground water was encountered and pumped from the area in order to better facilitate construction. The new channel is now complete and extends 12 feet deep (to a six-inch thick pad that is underlain by drain rock). The newly constructed channel and the significant pumping of ground water during construction of the channel may have affected ground water elevation and flow direction in the vicinity of the site.

The exact details of this channel construction, especially concerning intersection of ground water (potentially contaminated), will be obtained and evaluated during the next quarter. A discussion of the potential effect of this construction on the Unocal and Chevron sites will be presented in the next quarterly report.

DISTRIBUTION

Copies of this report should be sent to the Alameda County Health Care Services Agency, and to the RWQCB, 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 (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

Timothy R. Ross
Project Manager

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Attachments: Tables 1 through 6
Location Map
Site Plans - Figures 1, 1a & 2
Site Vicinity Map - Figure 3
Laboratory Results
Chain of Custody documentation

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TABLE 1

SUMMARY OF GROUND WATER MONITORING
AND PURGING DATA

Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Water Bailed (gallons)
(Monitored and Sampled on January 14, 1992)					
MW1	504.68	16.20	0	--	0
MW2	504.62	15.55	0	No	8
MW3	504.88	15.03	0	No	8
MW4	505.47	14.65	0	No	8
MW5	504.98	15.60	0	No	8
MW6	504.56	14.78	0	No	8
MW7	504.56	14.81	0	No	8
(Monitored on December 12, 1991)					
MW1	504.46	16.42	0	--	0
MW2	504.48	15.69	0	--	55
MW3	504.69	15.22	0	--	0
MW4	505.20	14.92	0	--	0
MW5	504.90	15.68	0	--	0
MW6	504.37	14.97	0	--	0
MW7	504.36	15.01	0	--	0
(Monitored on November 14, 1991)					
MW1	504.81	16.07	0	--	0
MW2	504.62	15.55	0	--	55
MW3	505.13	14.78	0	--	0
MW4	503.35	14.78	0	--	0
MW5	504.60	15.98	0	--	0
MW6	504.40	14.94	0	--	0
MW7	504.45	14.92	0	--	0

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TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING
AND PURGING DATA

Well #	Surface Elevation* (feet)
MW1	520.88
MW2	520.17
MW3	519.91
MW4	520.12
MW5	520.58
MW6	519.34
MW7	519.37

-- Sheen determination was not performed.

* Elevation of the tops of the well covers were surveyed to MSL, per City of Livermore Benchmark No. C-18-5.

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
1/14/92	MW2	--	5,600	36	120	2,600	450
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	1,500	4.2	7.1	9.2	18
	MW5	--	99	1.0	1.2	0.32	ND
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
10/14/91	MW2	--	11,000	79	130	4,700	660
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	880	3.8	2.2	5.8	8.6
	MW5	--	660	55	4.4	66	50
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
7/10/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2	--	14,000	70	160	5,400	570
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	830	8.4	19	7.2	7.7
	MW5	--	220	5.1	8.7	9.7	9.1
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
4/10/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2	--	22,000	170	190	6,200	490
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	950	0.84	4.3	5.0	9.6
	MW5	--	630	35	14	30	47
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
12/24/90	MW1*	ND	ND	ND	ND	0.40	ND
	MW2	--	32,000	440	340	13,000	460
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	1,400	ND	8.7	10	15
9/07/90	MW1*	ND	ND	ND	1.2	ND	ND
	MW2	--	ND	ND	1.5	ND	ND
	MW3	--	1,100	11	ND	16	6.6
	MW4	--	15,000	100	140	4,600	210

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
6/05/90	MW1*	ND	ND	ND	ND	ND	ND
	MW2	--	31,000	250	460	9,200	950
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	1,400	1.2	4.7	12	24
3/08/90	MW1**	ND	ND	ND	ND	ND	ND
	MW2	--	26,000	230	410	2,100	1,300
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	1,200	18	8.4	28	37
11/18/89	MW1***	400	ND	ND	ND	ND	ND
	MW2	--	53,000	540	500	22,000	130
	MW3	--	ND	0.35	ND	ND	ND
	MW4	--	990	9.8	10	4.7	7.1
Detection Limits		50	30	0.3	0.3	0.3	0.3

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

** TOG showed 4.7 ppm. All EPA method 8010 compounds were non-detectable.

*** TOG showed 3.1 ppm, and all EPA method 8010 compounds were non-detectable, except trichloroethene at 0.55 ppb.

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
4/02/91	MW5(5)	5.0	ND	ND	0.0056	ND	ND
	MW5(10)	10.0	ND	ND	ND	ND	ND
	MW5(15.5)	15.5	ND	ND	ND	0.0060	ND
	MW6(5)	5.0	ND	ND	0.010	0.0086	ND
	MW6(10)	10.0	ND	ND	ND	0.017	ND
	MW6(15.5)	15.5	ND	ND	ND	0.058	ND
	MW7(5.5)	5.5	ND	ND	ND	ND	ND
	MW7(10)	10.0	ND	ND	0.0086	0.030	ND
	MW7(15)	15.0	ND	ND	0.0098	0.010	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.

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TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/25/89	MW1(5)*	5.0	ND	ND	ND	ND	ND
&	MW1(7)*	7.0	ND	ND	ND	ND	ND
10/26/89	MW1(10)*	10.0	ND	ND	ND	ND	ND
	MW1(12.5)*	12.5	ND	ND	ND	ND	ND
	MW1(15)*	15.0	ND	ND	ND	ND	ND
	MW1(17)*	17.0	ND	ND	ND	ND	ND
	MW2(5)	5.0	23	ND	ND	ND	ND
	MW2(10)	10.0	ND	ND	ND	ND	ND
	MW2(12.5)	12.5	ND	ND	ND	ND	ND
	MW2(15)	15.0	3.0	ND	ND	ND	ND
	MW2(17)	17.0	790	0.14	0.23	10	2.7
	MW3(5)	5.0	1.1	ND	ND	ND	ND
	MW3(10)	10.0	ND	ND	ND	ND	ND
	MW3(11.5)	11.5	ND	ND	ND	ND	ND
	MW3(14)	14.0	ND	ND	ND	ND	ND
	MW4(5)	5.0	1.9	ND	ND	ND	ND
	MW4(9.5	9.5	ND	ND	ND	ND	ND
	MW4(12)	12.0	ND	ND	ND	ND	ND
	MW4(15)	15.0	56	0.10	0.11	1.5	1.5
Detection Limits			1.0	0.05	0.1	0.1	0.1

* TPH as diesel, TOG, and all EPA method 8010 constituents were non-detectable.

ND = Non-detectable.

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

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TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
8/02/89	A1	15.0	--	2.1	ND	ND	0.21	ND
&	A2	15.0	--	1.6	ND	ND	ND	ND
8/07/89	A3	16.0	--	390	1.7	45	86	16
	B1	15.0	--	ND	ND	ND	0.10	ND
	B2	15.0	--	ND	ND	ND	ND	ND
	B3	15.0	--	2.3	ND	ND	0.30	0.12
	P1	3.5	--	9.6	ND	ND	0.94	0.16
	P2	3.5	--	ND	ND	ND	ND	ND
	P3	3.5	--	ND	ND	ND	ND	ND
	P4	3.5	--	ND	ND	ND	ND	ND
	P5	2.5	--	ND	ND	ND	ND	ND
	P6	2.5	--	ND	ND	ND	ND	ND
	P7	2.5	--	1.5	ND	ND	ND	ND
	WO1*	8.5	1.4	ND	ND	ND	ND	ND
Detection Limits			1.0	1.0	0.05	0.1	0.1	0.1

* TOG, and all EPA method 8010 and 8270 constituents were non-detectable.

-- Indicates analysis not performed.

ND = Non-detectable.

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

KEI-P89-0801.QR7
February 17, 1992

TABLE 6

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
8/07/89	W1	47,000	260	840	9,400	830
Detection Limits		30	0.3	0.3	0.3	0.3

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

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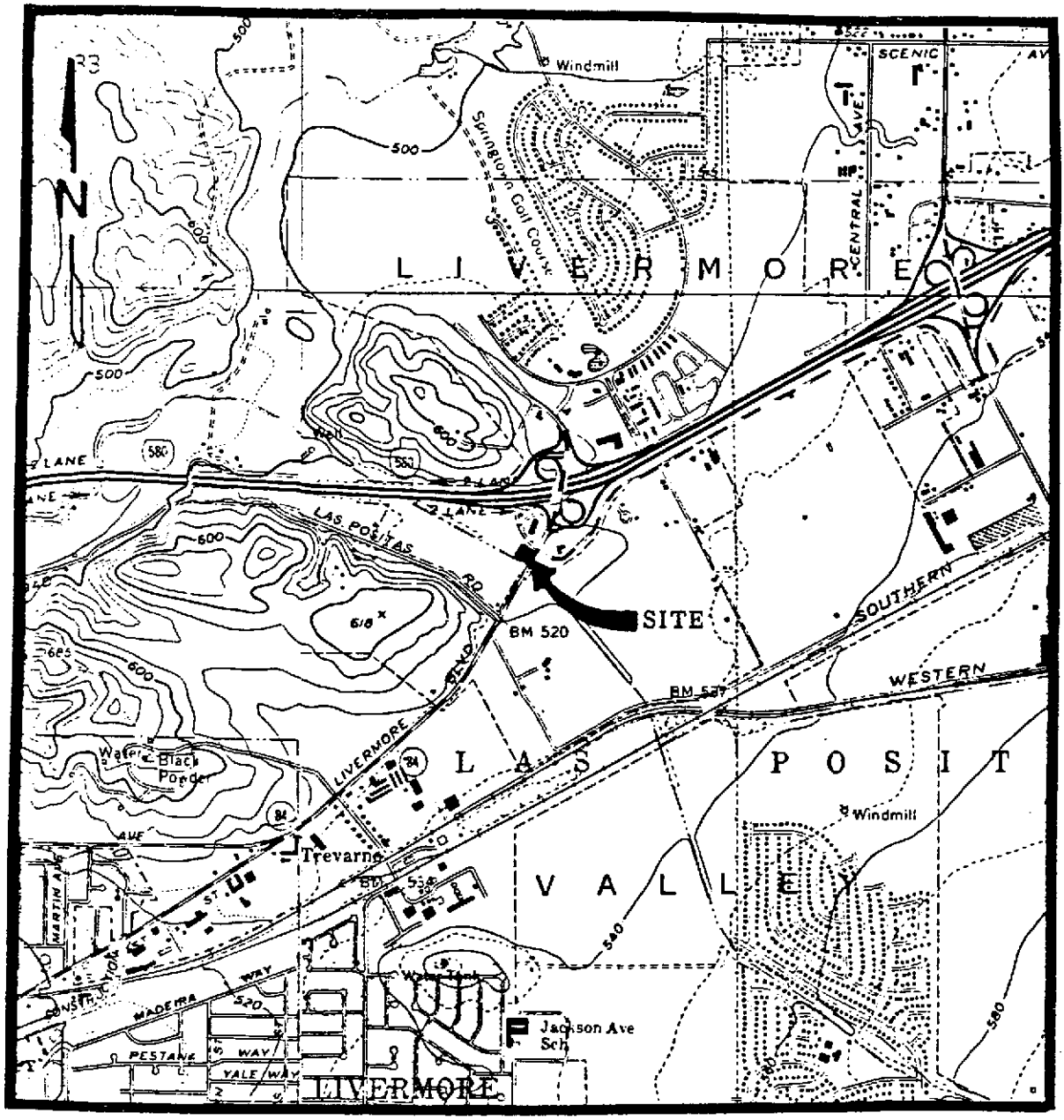

LOCATION MAP

Base from U.S.G.S. 7.5 minute Livermore Quadrangle
(photorevised 1980) and Altamont Quadrangle (photorevised 1981)

Unocal S/S #6034
4700 First Street
Livermore, CA

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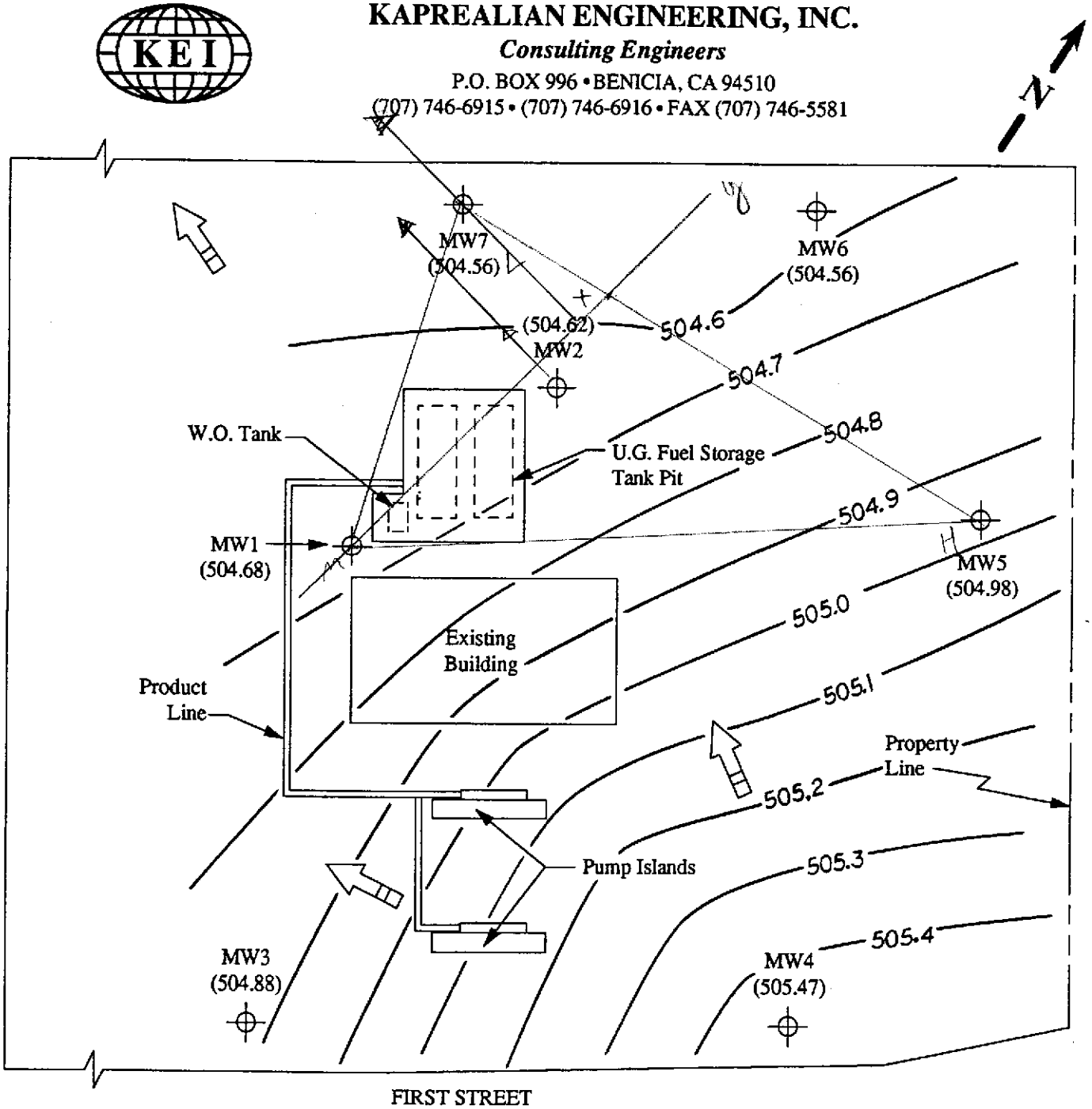

SITE PLAN

Figure 1

LEGEND

- Monitoring Well
- ( ) Water Table Elevation in feet above Mean Sea Level on 1/14/92
- Contour of equal elevation of ground water table
- Direction of Ground Water Flow

0 30 60

Approx. scale feet

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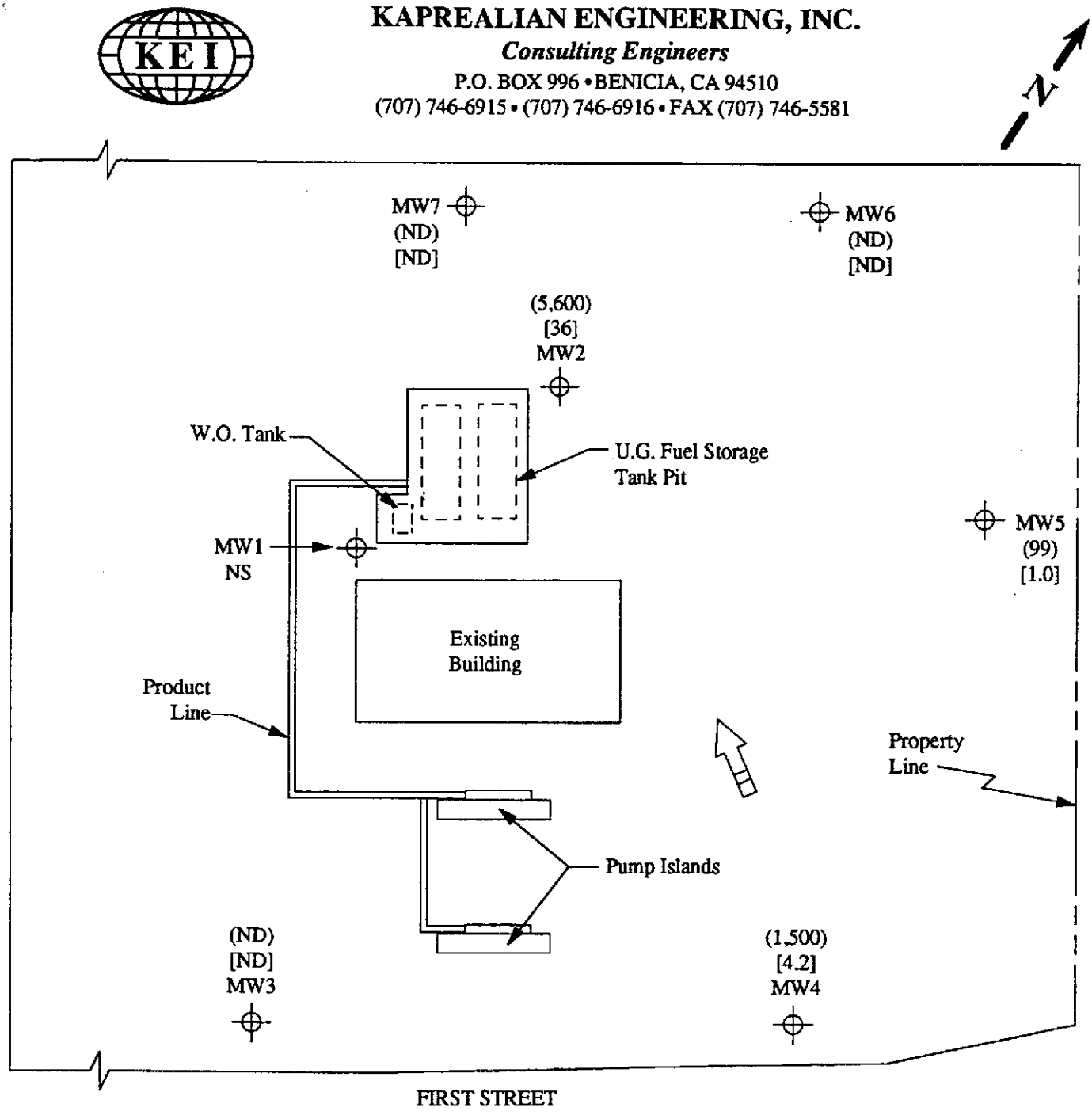

SITE PLAN

Figure 1a
(Samples Collected on 1/14/92)

LEGEND

- Monitoring Well
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- Direction of ground water flow

ND = Non-detectable
NS = Not sampled

0 30 60
Approx. scale feet

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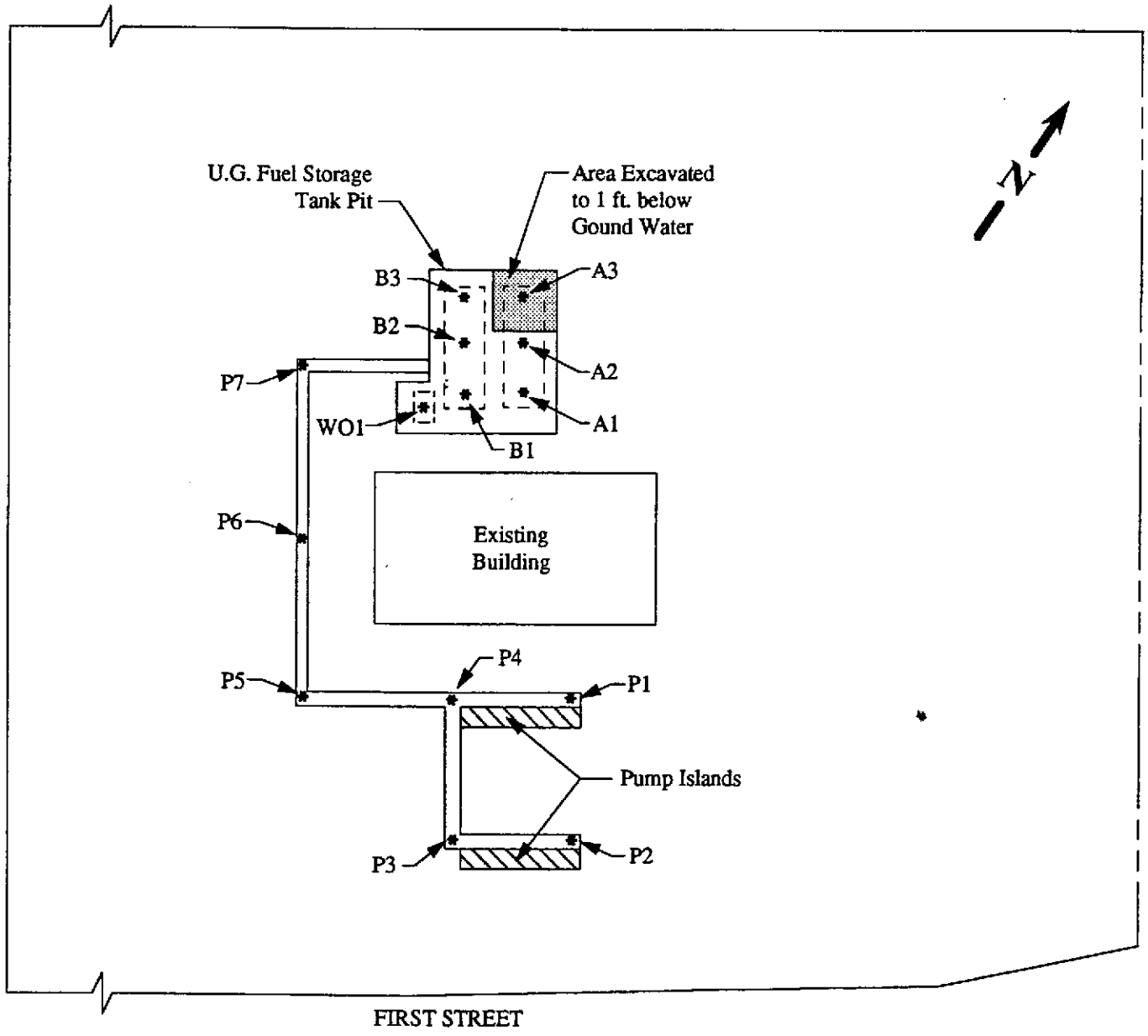

SITE PLAN
Figure 2

LEGEND

* Sample Point Location

0 30 60
Approx. scale feet

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Livermore, CA

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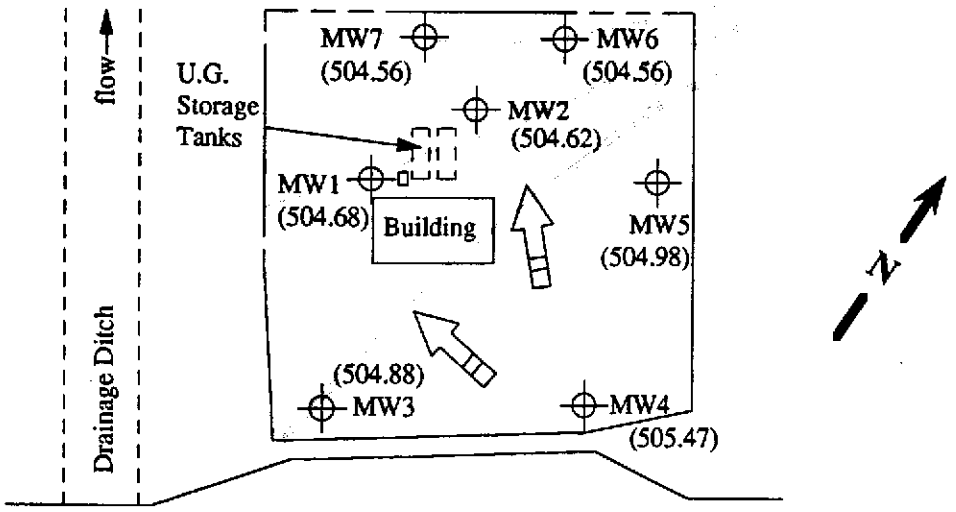
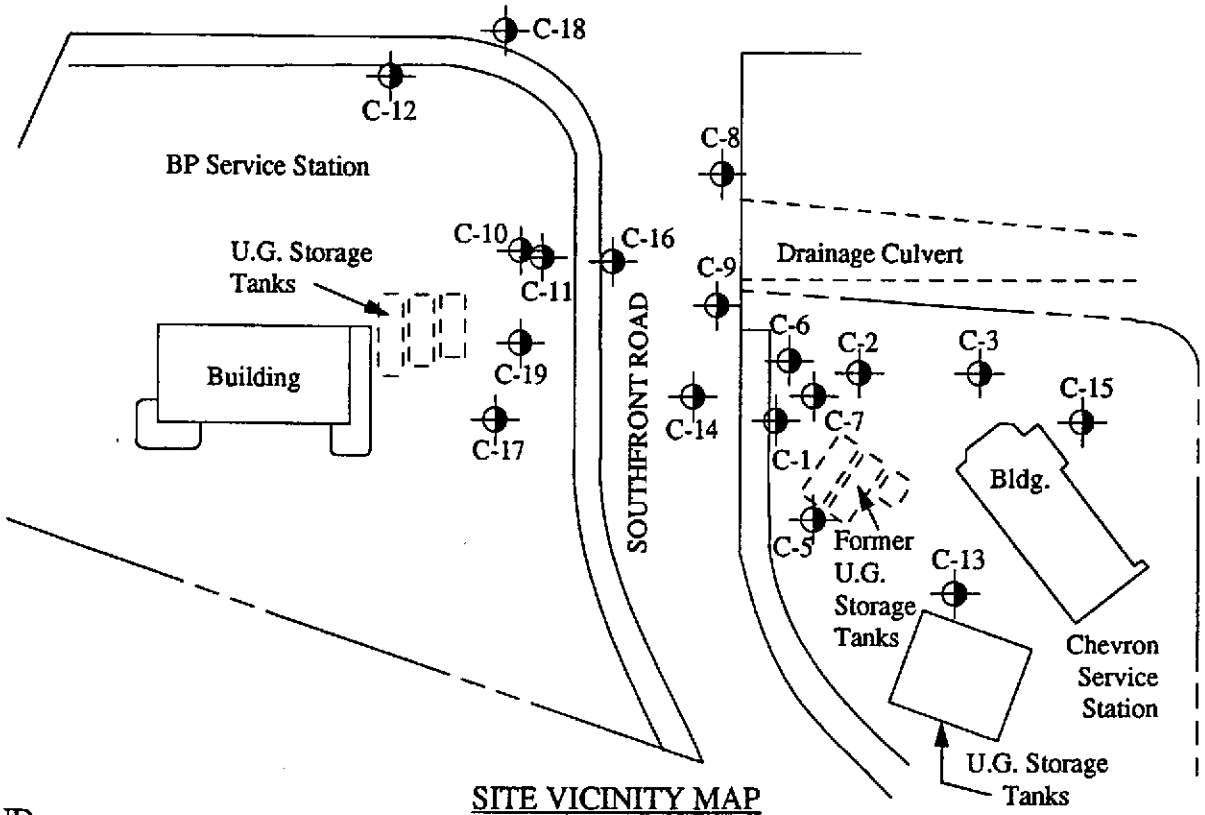


FIRST STREET



SITE VICINITY MAP

Figure 3

LEGEND

- Monitoring well (Unocal)
- Monitoring well (Chevron)
- ( ) Ground water elevation in feet above Mean Sea Level on 1/14/92
- Direction of ground water flow

0 80 160

Approx. scale feet

Unocal Service Station # 6034
4700 First Street
Livermore, 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, 4700 First St., Livermore	Sampled:	Jan 14, 1992
P.O. Box 996	Matrix Descript:	Water	Received:	Jan 14, 1992
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jan 20, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	201-0422	Reported:	Jan 28, 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)
201-0422	MW-2	5,600	36	120	450	2,600
201-0423	MW-3	N.D.	N.D.	N.D.	N.D.	N.D.
201-0424	MW-4	1,500	4.2	7.1	18	9.2
201-0425	MW-5	99	1.0	1.2	N.D.	0.32
201-0426	MW-6	N.D.	N.D.	N.D.	N.D.	N.D.
201-0427	MW-7	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

Belinda C. Vega
Laboratory Director

SEQUOIA ANALYTICAL

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(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc. Client Project ID: Unocal, 4700 First St., Livermore
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 2010422-427 Reported: Jan 28, 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:	J.F.	J.F.	J.F.	J.F.
Reporting Units:	ug/L	ug/L	ug/L	ug/L
Date Analyzed:	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992	Jan 20, 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:	18	17	14	60
Matrix Spike % Recovery:	90	85	70	100
Conc. Matrix Spike Dup.:	18	18	18	60
Matrix Spike Duplicate % Recovery:	90	90	90	100
Relative % Difference:	0.0	5.7	25	0.0

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
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Kaprealian Engineering, Inc. Client Project ID: Unocal, 4700 First St., Livermore
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E. QC Sample Group: 2010422-427 Reported: Jan 28, 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:	J.F.	J.F.	J.F.	J.F.	J.F.	J.F.	J.F.
Reporting Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Analyzed:	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992	Jan 20, 1992
Sample #:	201-0422	201-0423	201-0424	201-0425	201-0426	201-0427	Blank
Surrogate % Recovery:	98	100	100	110	100	100	99

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

SAMPLER: JOE

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Livermore
4700 First st.

ANALYSES REQUESTED: TPHG, BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG, BTXE	REMARKS
MW-2	1/14/92			✓	✓		2	MW	✓	VOA-s preserved 2010 4222 AB
MW-3	"	P.M. 1:40		✓	✓		2	"	✓	4213 AB
MW-4	"			✓	✓		2	"	✓	4214 AB
MW-5	"	P.M. 1		✓	✓		2	"	✓	4215 AB
MW-6	"	P.M. 10:55		✓	✓		2	"	✓	4216 AB
MW-7	"			✓	✓		2	"	✓	4217 AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Joe Kaprealian	1/14/92	K. Wall 3:40 PM 1/14/92
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
MMC	1/15	1:00 PM
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? ✓
2. Will samples remain refrigerated until analyzed? ✓
3. Did any samples received for analysis have head space? NO
4. Were samples in appropriate containers and properly packaged? ✓

KO — Signature; Logan — Title; 1/14/92 — Date