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

APPROVED
OCT 23 1990
RONALD E. BOCK

KEI-P89-0805.QR1
October 12, 1990

Unocal Corporation
2000 Crow Canyon Place, Suite #400
P.O. Box 5155
San Ramon, CA 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 first quarter of monitoring and sampling of the monitoring wells since the installation of new wells on February 9, 1990 at the referenced site by Kaprealian Engineering, Inc. (KEI), per proposal KEI-P89-0805.P3 dated November 30, 1989. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from June through August, 1990.

BACKGROUND

The subject site is presently used as a gasoline station. A Location Map, Site Vicinity Map, and Site Plans are attached to this report.

KEI's work at the site began on August 16, 1989 when KEI was asked to collect soil samples following the removal of two underground fuel storage tanks and one 280 gallon waste oil tank at the site. The fuel tanks consisted of one 10,000 gallon unleaded tank and one 10,000 gallon super unleaded tank. The tanks were made of steel and no apparent holes or cracks were observed in any of the tanks. Water was encountered in the fuel tank pit at a depth of about 10 feet, 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. Soil sample point locations are shown on the attached Site Plan, Figure 2.

On August 17, 1989, approximately 1,500 gallons of ground water was 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. Also, on August 18, 1989, four soil samples were collected from the product pipe trenches at depths ranging from 5.0 to 6.5 feet. 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 was 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 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.

Soil sample analyses 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. The soil sample 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. The 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. However, the ground water sample analyses from the tank pit showed 4,700 ppb of TPH as gasoline, 180 ppb of benzene (after purging 1,500 gallons), 1,200 ppb of TPH as gasoline, and 12 ppb of benzene (after purging 5,000 gallons). Analytical results of the soil samples are summarized in Table 4, and water samples in Table 5. Documentation of soil sample collection and sample 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 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 Plan, Figure 1, were installed at the site. The three wells were drilled and completed to total depths ranging from 20 to 22.5 feet. Ground water was encountered at depths ranging from 11 to 13 feet beneath the surface during drilling. Soil samples were taken at 5 foot intervals beginning at 5 feet below grade until ground water was encountered. The wells were sampled on November 1, 1989. Analytical results for the soil samples are summarized in Table 3, and water 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. The details of the monitoring well installation activities are presented in KEI's report (KEI-P89-0805.R4) dated November 30, 1989.

On January 26, 1990, two two-inch diameter monitoring wells (designated as MW4 and MW5 on the attached Site Plan, 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 each of 20 feet. Ground water was encountered at depths of approximately 12.5 feet beneath the surface during drilling. The new wells were developed on February 9, 1990, and sampled on February 15, 1990. No free product was noted in any of the wells.

Water and soil samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California. Samples were analyzed for TPH as gasoline by EPA method 5030 in conjunction with modified 8015 and BTX&E by EPA method 8020. Analytical results of the soil samples, collected from borings MW4 and MW5, indicate levels of TPH as gasoline ranging from 2.5 to 370 ppm. Benzene was detected at concentrations ranging from non-detectable to 1.8 ppm. The water sample analyses showed non-detectable levels of all constituents in well MW2. In wells MW1 and MW4, TPH as gasoline was detected at 170 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 and 24,000 ppb, respectively, and benzene was detected at 1,700 and 1,500 ppb, respectively. Results of the soil analyses are summarized in Table 3, and the water analyses in Table 2.

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

FIELD ACTIVITIES

The five wells (MW1 through MW5) were monitored three times and sampled once during the quarter. During monitoring, the wells were checked for depth to water and presence of free product and sheen. No free product or sheen was noted in any of the wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on August 16, 1990. Prior to sampling, the wells were purged of between 15 and 55 gallons using a surface pump. Samples were then collected using a clean Teflon bailer. Samples were decanted into clean VOA vials and/or one liter amber bottles as appropriate which were sealed with Teflon-lined screw caps and stored in a cooler on ice until delivery to the state certified laboratory.

HYDROGEOLOGY AND GEOLOGY

Based on the water level data gathered during the quarter, ground water flow direction appeared to be to the south-southwest on August 16, 1990, relatively unchanged from February 15, 1990. Water levels have steadily decreased during the quarter, showing a net decrease in all wells of 0.47 to 0.71 feet since February 15, 1990. The measured depth to ground water at the site on August 16, 1990, ranged between 8.70 and 10.59 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. 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.

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 and MW2, indicate non-detectable levels of TPH as gasoline and benzene. Analytical results of the ground water samples, collected from MW3, MW4 and MW5, indicate levels of TPH as gasoline at concentrations of 6,800 ppb, 3,600 ppb and 16,000 ppb, respectively. Benzene was detected in MW3, MW4 and MW5 at concentrations of 600 ppb, 400 ppb and 1,400 ppb, respectively. Results of the analyses are summarized in Table 2. Copies of the analytical results and Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results collected and evaluated to date and no evidence of free product or sheen in any of the wells, KEI recommends the continuation of the current monitoring and sampling program of the existing wells per KEI's proposal (KEI-P89-0805.P3) dated November 30, 1989. In addition, KEI has previously proposed the installation of four additional monitoring wells, two on-site and two off-site. Off-site permission and agency permits have recently been obtained. These wells are presently scheduled for installation in late October, 1990.

DISTRIBUTION

A copy of this report should be sent to Mr. Gil Wistar, of the Alameda County Health Agency, and to the Regional Water Quality Control Board, San Francisco Bay Region.

LIMITATIONS

Environmental changes, either naturally-occurring or artificially-induced, may cause changes in ground water levels and flow paths, thereby changing the extent and concentration of any contaminants.

Our studies assume that the field and laboratory data are reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

The results of this study are based on the data obtained from the field and laboratory analyses obtained from a state certified laboratory. We have analyzed this data using what we believe to be currently applicable engineering techniques and principles in the Northern California region. We make no warranty, either expressed or implied, regarding the above, including laboratory analyses, except that our services have been performed in accordance with generally accepted professional principles and practices existing for such work.

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

Sincerely,

Kaprealian Engineering, Inc.

Doug Lee
Geologist

Don R. Braun
Certified Engineering Geologist

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

Mardo Kaprealian
President

bam

Attachments: Tables 1 through 5
Location Map
Site Vicinity Map
Site Plans - Figures 1 & 2
Boring Logs
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0805.QR1
October 12, 1990

TABLE 1

SUMMARY OF MONITORING DATA

Date	Well No.	Depth to Water (feet)	Product Thickness	Sheen	Water Purged (gallons)
8/16/90	MW1	8.70	0	None	15
	MW2	9.94	0	None	15
	MW3	10.59	0	None	30
	MW4	10.13	0	None	10
	MW5	10.42	0	None	55
7/09/90	MW1	8.42	-	-	-
	MW2	9.63	-	-	-
	MW3	10.21	0	None	55
	MW4	9.84	-	-	-
	MW5	10.07	0	None	55
6/06/90	MW1	8.32	0	None	0
	MW2	9.48	0	None	0
	MW3	10.09	0	None	0
	MW4	9.68	0	None	0
	MW5	9.86	0	None	0

- Indicates no data available.

KEI-P89-0805.QR1
October 12, 1990

TABLE 2

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	0.3	0.3	0.3	0.3

ND = Non-detectable.

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

KEI-P89-0805.QR1
October 12, 1990

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
		(Collected on October 17, 1989)				
MW1(5)	5	8.5	ND	ND	0.14	ND
MW1(10)	10	ND	ND	ND	ND	ND
MW2(5)	5	ND	ND	ND	ND	ND
MW2(10)	10	ND	ND	ND	ND	ND
MW2(12.5)	12.5	ND	ND	ND	ND	ND
MW3(5)	5	3.1	0.068	ND	ND	ND
MW3(10)	10	69	0.89	2.6	7.9	2.0
MW3(11)	11	1,100	16	85	150	35
		(Collected on January 26, 1990)				
MW4(5)	5	22	0.059	ND	ND	ND
MW4(7)	7	2.5	ND	ND	ND	ND
MW4(10)	10	250	1.2	0.66	20	1.4
MW4(11)	11	280	1.0	4.0	36	7.6
MW5(5)	5	25	0.21	ND	ND	ND
MW5(7.5)	7.5	46	0.25	0.28	0.20	0.46
MW5(10)	10	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.QR1
October 12, 1990

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

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

Sample #	Depth (feet)	TPH as Gasoline	TPH as Diesel	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	20	--	0.30	2.5	5.6	1.1
P4	5	3.8	--	0.11	0.19	0.23	0.1
WO1*	8	1.6	ND	ND	1.3	ND	ND
Detection Limits		1.0	1.0	0.05	0.1	0.1	0.1

* TOG and 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.QR1
October 12, 1990

TABLE 5

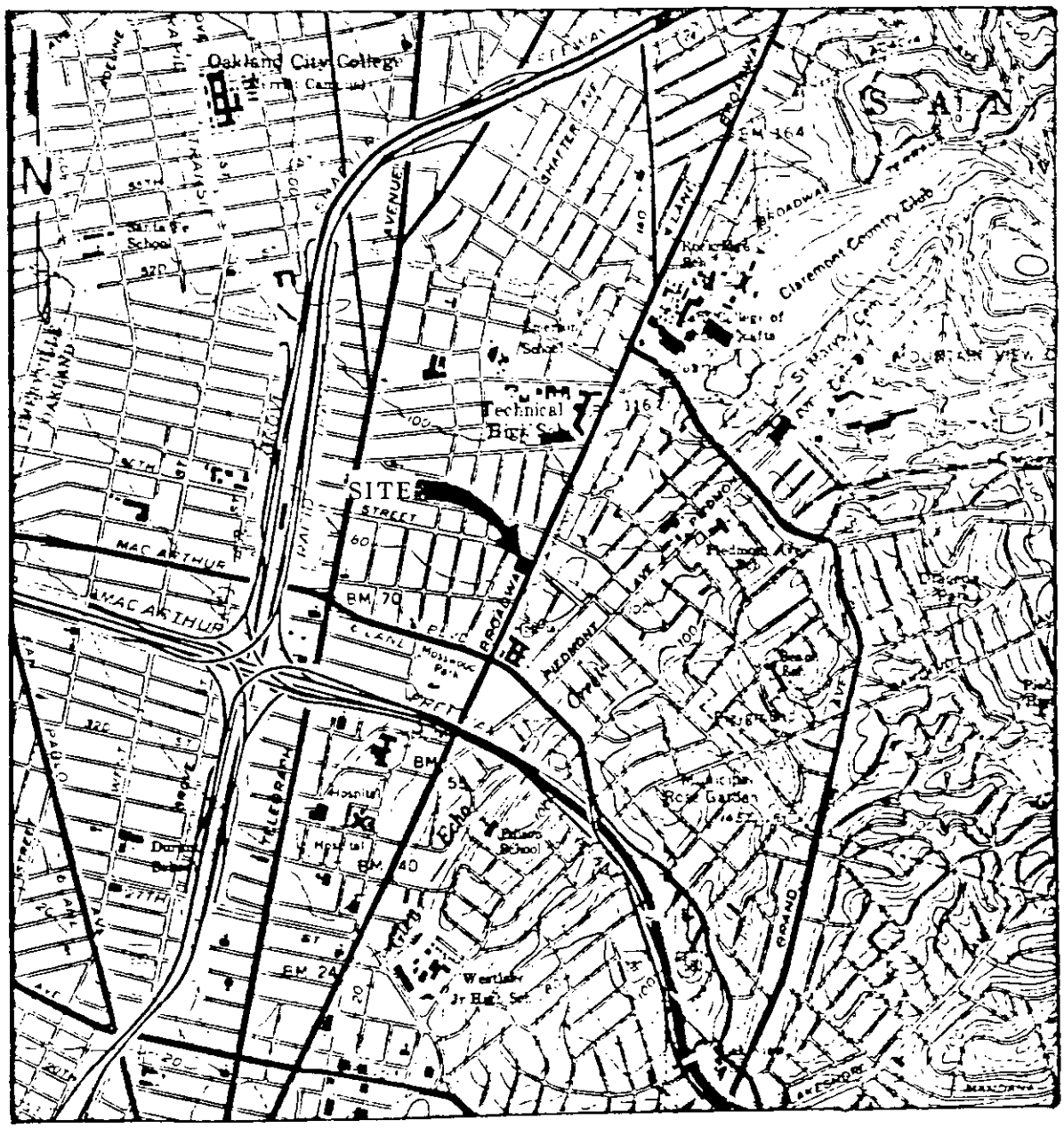
SUMMARY OF LABORATORY ANALYSES
WATER

Sample #	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
W1	10.5	4,700	180	420	860	150
W2*	10.5	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.

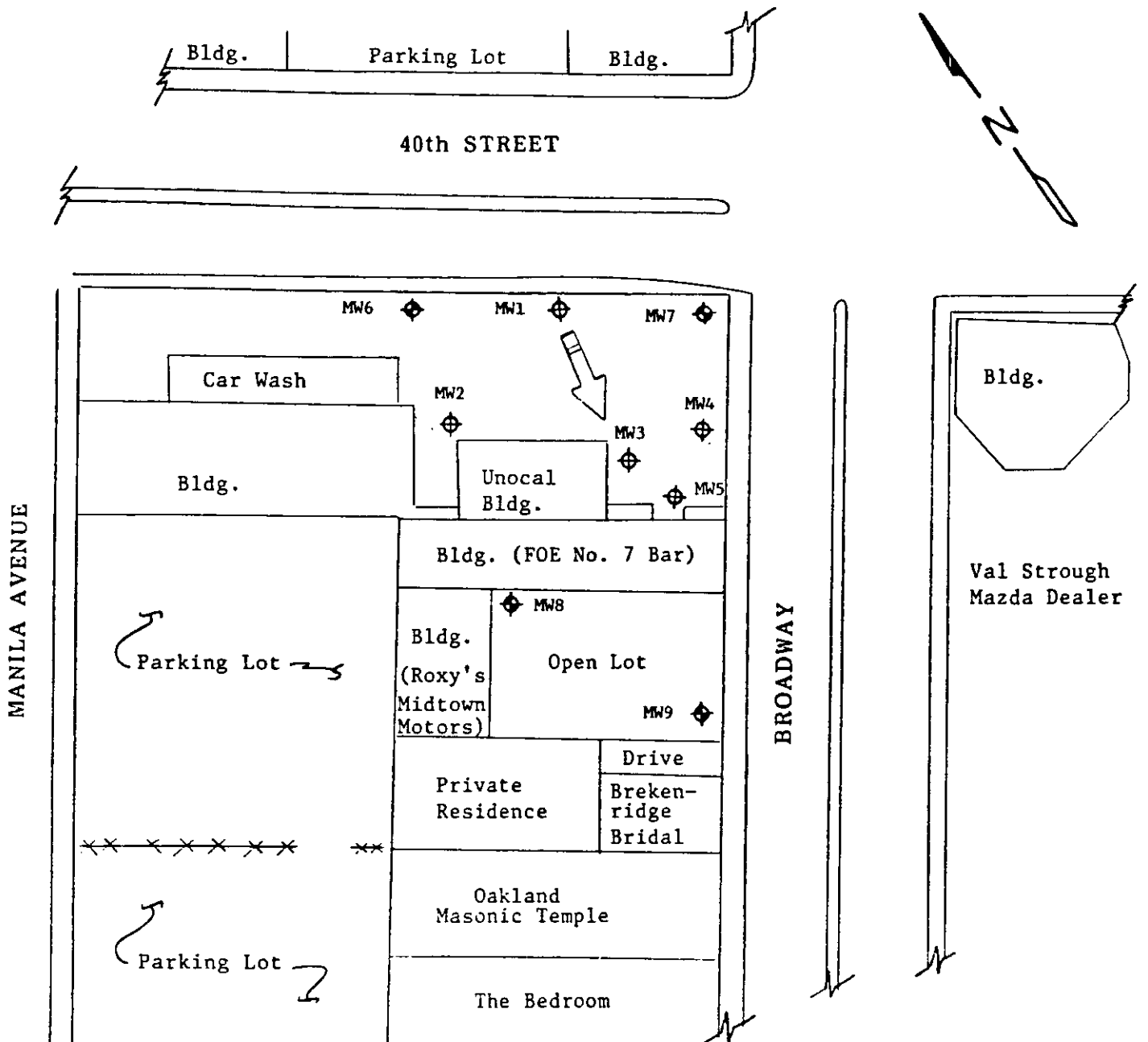
KAPREALIAN ENGINEERING, INC.
Consulting Engineers
PO BOX 996 • BENICIA, CA 94510
(707) 746-6915 • (707) 746-6916 • FAX (707) 746-5581



LOCATION MAP

Unocal S/S #0746
3943 Broadway
Oakland, CA

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



SITE VICINITY MAP

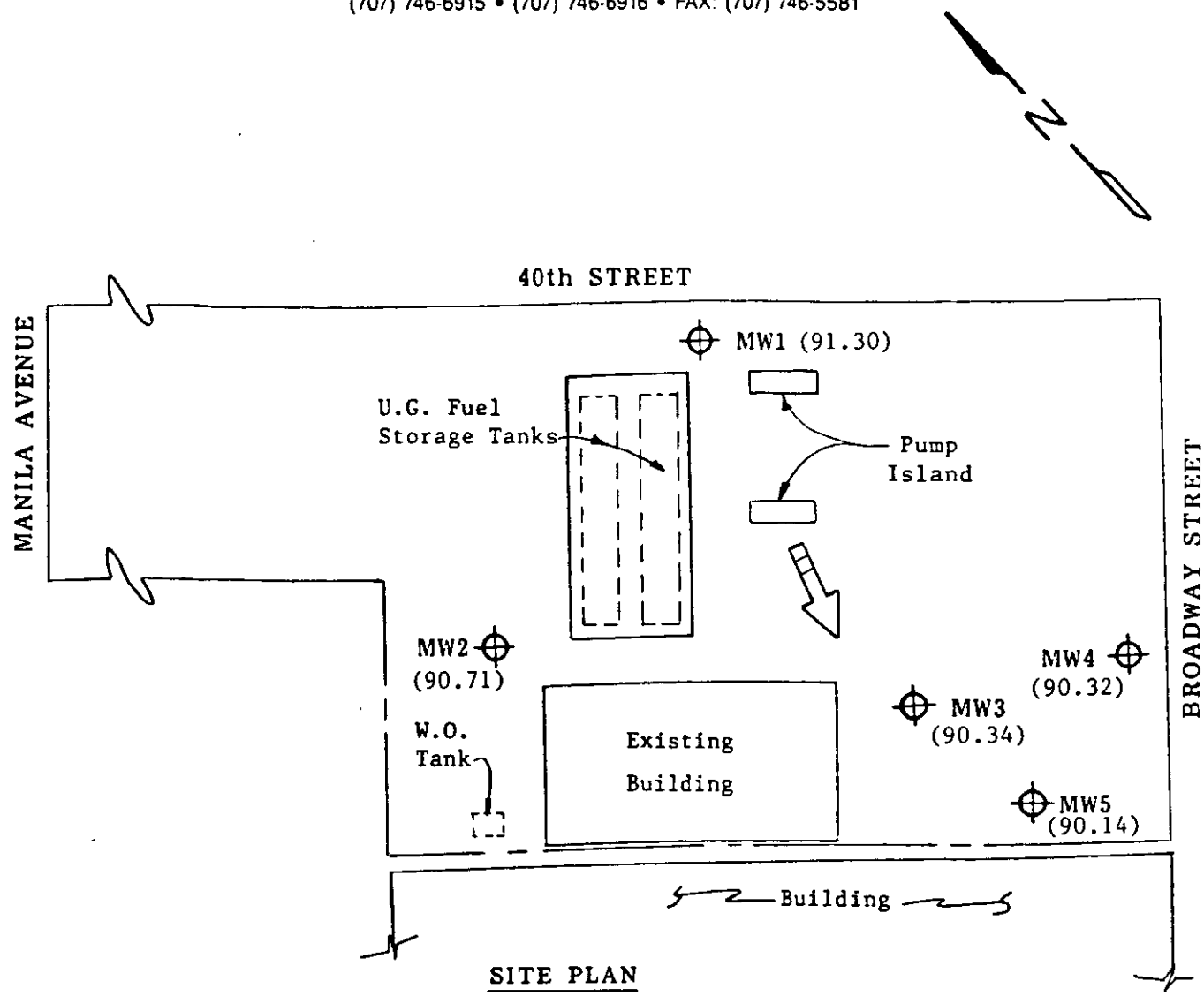
0 60 120
Approx. Scale feet

LEGEND

- Monitoring Well (existing)
- Monitoring Well (proposed)
- Direction of Ground Water Flow

Unocal S/S #0746
3943 Broadway
Oakland, California

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 1

LEGEND

⊕ Monitoring Well (Existing)

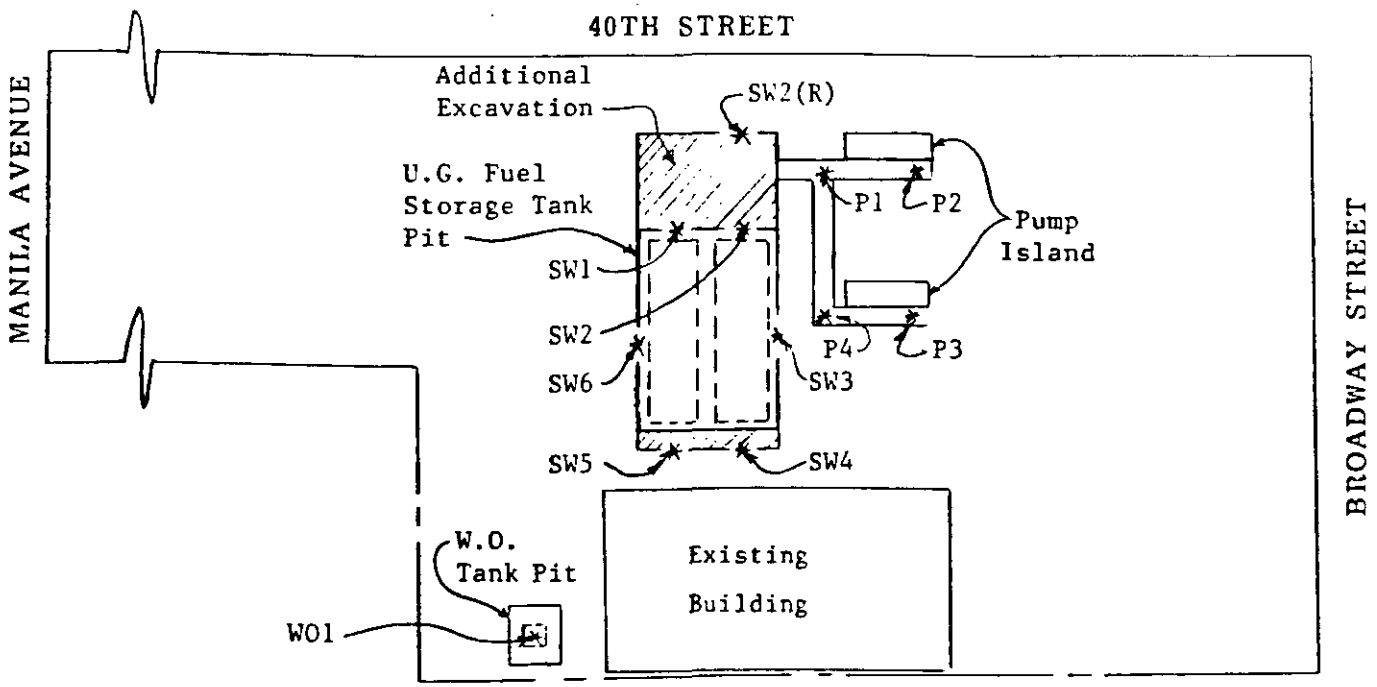
( ) Ground water surface elevation on 8/16/90. Top of MW1 well cover assumed 100.00 feet as datum.

⇨ Direction of ground water flow

0 30 60
Approx. Scale feet

Unocal Service Station #0746
3943 Broadway Street
Oakland, California

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

0 30 60
Approx. scale feet

LEGEND

* Sample Point Location

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

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal/3943 Broadway/Oakland	Sampled:	Aug 16, 1990
P.O. Box 996	Matrix Descript:	Water	Received:	Aug 17, 1990
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Aug 21, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #:	008-0370 A-B	Reported:	Aug 24, 1990

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)
008-0370 A-B	MW1	N.D.	N.D.	N.D.	N.D.	N.D.
008-0371 A-B	MW2	N.D.	N.D.	6.7	N.D.	N.D.
008-0372 A-B	MW3	6,800	600	660	160	760
008-0373 A-B	MW4	3,600	480	17	260	230
008-0374 A-B	MW5	16,000	1,400	1,900	660	2,800
Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

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

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Ray (KEI)

WITNESSING AGENCY:

SITE NAME & ADDRESS: UNOCAL OAKLAND, 3943 Broadway

ANALYSES REQUESTED: TPH G; BTEX

TURN AROUND TIME: 1 Week

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW1	8-16	14:30		X	X		2VOA		
MW2	"	"		X	X		4		
MW3	"	"		X	X		4		
MW4	"	"		X	X		4		
MW5	"	"		X	X		4		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Ray (KEI)	8-16-90	15:50

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? ✓

Signature | Title | Date: 8/16/90