



**KAPREALIAN ENGINEERING, INC.**  
**Consulting Engineers**

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

February 12, 1991

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

Attention: Mr. Lowell Miller

RE: Unocal Service Station #6034  
4700 First Street  
Livermore, California

Dear Mr. Miller:

Per the request of Mr. Ron Bock of Unocal Corporation, enclosed please find our report and work plan/proposal, both dated January 31, 1991, for the above referenced site.

Should you have any questions, please feel free to call our office at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.

Judy A. Dewey

jad\82

Enclosure

cc: Ron Bock, Unocal Corporation

91 FEB 14 PM 12:54



**KAPREALIAN ENGINEERING, INC.**  
*Consulting Engineers*

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

KEI-P89-0801.QR4  
January 31, 1991

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 #6034  
4700 First Street  
Livermore, California

Dear Mr. Bock:

This report presents the results of the fourth quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per proposal KEI-P89-0801.P2 dated December 18, 1989. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from October through December, 1990.

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. A Location Map, Site Vicinity Map, and Site Plans are attached to this report. BP and Chevron Service Stations are located to the south and southeast of the Unocal site.

KEI's work at the site began on August 2, 1989, when KEI was asked to collect soil samples from beneath two 12,000 gallon fuel 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, and one soil sample, labeled W01, was collected from beneath the waste oil tank at a depth of 8.5 feet. 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 trench at depths ranging from 2.5 to 3.5 feet. Ground water was encountered in the fuel tank pit at a depth of 17.5 feet during subsequent excavation of contaminated soil from the location where sample A3 was collected. Locations of soil samples 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 3, and the water sample in Table 5. Documentation of soil and water sample collection 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 Vicinity Map, Figure 1) were installed at the site. The monitoring wells were drilled and completed to total depths ranging from 26 to 28.5 feet. 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 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, 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 and EPA method 8010 results were non-detectable, and TOG was <50 ppm in all samples.

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 water samples in Table 2. Based on the analytical results, KEI recommended a monthly monitoring and quarterly sampling program. Documentation of the well installation and laboratory analyses 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 were surveyed to Mean Sea Level (MSL) on July 23, 1990. This report covers the most recent quarterly sampling period.

#### FIELD ACTIVITIES

The four wells (MW1 through MW4) 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. Well MW4 was purged of 37 to 55 gallons during each monthly monitoring event. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on December 24, 1990. Prior to sampling, the wells were purged of between 15 and 55 gallons each using a Teflon bailer. 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 a state certified laboratory.

#### HYDROLOGY AND GEOLOGY

For the December 24, 1990 monitoring event, KEI coordinated a joint monitoring at the BP and Chevron stations located to the south and southeast of the Unocal station, across First Street. The ground water flow direction on that date appeared to be generally toward the northwest at an average gradient of 0.006 from the BP and Chevron sites toward the Unocal station (see the attached Site Vicinity Map, Figure 1).

At the Unocal site, water levels have fluctuated during the quarter, showing a net decrease of 0.14 feet in well MW4, no change

in well MW1, and increases of 0.04 feet and 0.06 feet in wells MW2 and MW3, respectively, since September 7, 1990. The measured depth to ground water at the site on December 24, 1990 ranged between 15.34 and 16.75 feet.

Review of the Spring 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, 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). These alluvium materials generally consist of a gravelly unit at the surface varying 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 varies significantly in thickness from about 6.5 to 8 feet thick in the vicinity of MW1 and MW2, and about 12.5 feet thick in the vicinity of MW3. This second gravelly unit is in turn 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 and extends to the maximum depths explored (26 to 28.5 feet).

#### 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. In addition, the ground water sample collected from monitoring well MW1 was analyzed for TPH as diesel using EPA method 3510 in conjunction with modified 8015, TOG using SM 503A&E, and halogenated volatile organics using EPA method 8010.

Analytical results of ground water samples, collected from monitoring wells MW1 and MW3, indicate non-detectable levels of TPH as gasoline and BTX&E, except for 0.40 ppb of xylenes detected in monitoring well MW1. Analytical results of the ground water samples, collected from monitoring wells MW2 and MW4, indicate levels of TPH as gasoline at concentrations of 32,000 ppb and 1,400 ppb, respectively. Benzene was detected only in monitoring well MW2 at a concentration of 440 ppb. In monitoring well MW1, TPH as diesel, TOG and EPA method 8010 constituents were non-detectable. Concentrations of TPH as gasoline and benzene detected in ground water during this quarterly sampling are shown on the attached Site Plan, Figure 1a. 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

As discussed earlier in this report, KEI coordinated a joint monitoring on December 24, 1990 at the BP and Chevron stations located to the south and southeast 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 toward the Unocal station, as shown on the attached Site Vicinity Map, Figure 1. The monitoring data (ground water surface elevation) for the Chevron monitoring wells is summarized in the attached Table 1a.

Based on the analytical results of ground water samples collected from monitoring wells MW1 and MW3 during the past year (March, 1990 to December, 1990), levels of TPH as gasoline, benzene, and TPH as diesel have been non-detectable in three of four quarterly samples, including the most recent samples collected this quarter. Therefore, based on the water quality data obtained to date, it appears that contamination from upgradient sources has not migrated onto the southwest corner of the Unocal site in the vicinity of monitoring well MW3. However, upgradient monitoring well MW4, located at the southeast corner of the Unocal site, has consistently shown TPH as gasoline levels greater than 1,000 ppb in all four quarterly samples.

In addition to the above mentioned joint monitoring, KEI has also reviewed the most recent quarterly report (available for review by KEI) prepared for Chevron USA by Western Geologic Resources, Inc., dated June 12, 1990. Presently, there are 18 active monitoring wells (designated as C-1 through C-19 on the attached Site Vicinity Map, Figure 1) in the vicinity of the Chevron station. Chevron monitoring well C-4 has been 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), which are located directly upgradient of Unocal's monitoring well MW4, shows 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; however, "total petroleum hydrocarbons" (TPH) were still detected in each of the wells at levels ranging from 910 ppb to 5,600 ppb. The decreasing levels of petroleum hydrocarbons detected in Chevron's monitoring wells, coupled with the elevated levels of TPH as gasoline detected in Unocal's upgradient monitoring well MW4 and the general northwesterly ground water flow direction, suggests that upgradient contamination has migrated onto the Unocal site and may be contributing to contamination detected in Unocal's monitoring well MW2.

Therefore, it is recommended that a meeting be set up between representatives of Chevron and Unocal Corporation to discuss further investigations and remediation at the respective sites.

Based on the analytical results collected and evaluated to date and no evidence of free product 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.P2) dated December 18, 1989. In addition, based on the levels of TPH as gasoline (32,000 ppb) and benzene (440 ppb) detected in monitoring well MW2 during this quarterly sampling, KEI also recommends the installation of three additional monitoring wells as shown on the attached Site Plan, Figure 3, to further define the extent of ground water contamination. A work plan/proposal is attached for your review and consideration.

#### DISTRIBUTION

A copy of this report should be sent to Mr. Lowell Miller of the Alameda County Health Agency, Mr. R. Griffith of the City of Livermore Fire Department, 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.

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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.

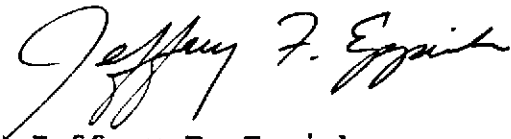


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January 31, 1991  
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If you have any questions regarding this report, please do not hesitate to call me at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.



Jeffrey F. Eppink  
Project Geologist



Thomas J. Berkins  
Senior Environmental Engineer



Don R. Braun  
Certified Engineering Geologist

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

\\bam:jad

Attachments: Tables 1 through 5  
Location Map  
Site Vicinity Map - Figure 1  
Site Plans - Figures 1a & 2 & 3  
Laboratory Analyses  
Chain of Custody documentation  
Work Plan/Proposal

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 January 31, 1991

TABLE 1

SUMMARY OF MONITORING DATA

<u>Date</u>	<u>Well No.</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness</u>	<u>Sheen</u>	<u>Water Bailed (gallons)</u>
12/24/90	MW1	504.13	16.75	0	None	15
	MW2	503.91	16.26	0	None	15
	MW3	504.52	15.39	0	None	35
	MW4	504.78	15.34	0	None	55
11/8/90	MW1	504.06	16.82	0	None	0
	MW2	503.85	16.32	0	None	36
	MW3	504.41	15.50	0	None	0
	MW4	504.77	15.35	0	None	37
10/8/90	MW1	504.13	16.75	0	None	0
	MW2	503.92	16.25	0	None	0
	MW3	504.44	15.47	0	None	25
	MW4	504.87	15.25	0	None	55

<u>Well #</u>	<u>Surface Elevation* (feet)</u>
MW1	520.88
MW2	520.17
MW3	519.91
MW4	520.12

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

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TABLE 1a

SUMMARY OF MONITORING DATA  
(Chevron Monitoring Wells)

(Monitored on December 24, 1990)

<u>Well No.</u>	<u>Ground Water Elevations (feet)</u>
C-1	506.54
C-2	506.61
C-3	506.73
C-4 (DESTROYED)	
C-5	506.82
C-6	506.43
C-7	506.59
C-8	505.93
C-9	506.24
C-10	505.35
C-11	505.41
C-12	505.12
C-13	507.16
C-14	506.36
C-15	506.91
C-16	505.72
C-17	505.90
C-18	504.98
C-19	505.43

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TABLE 2  
SUMMARY OF LABORATORY ANALYSES  
WATER

<u>Date</u>	<u>Sample Well #</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>
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
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 EPA method 8010 constituents were non-detectable.

\*\* TOG showed 4.7 ppm. 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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January 31, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on August 2 & 7, 1989)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
A1	15	--	2.1	ND	ND	0.21	ND
A2	15	--	1.6	ND	ND	ND	ND
A3	16	--	390	1.7	45	86	16
B1	15	--	ND	ND	ND	0.10	ND
B2	15	--	ND	ND	ND	ND	ND
B3	15	--	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, 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.QR4  
January 31, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on October 25 & 26, 1989)

<u>Sample Number</u>	<u>Depth (feet)</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>
MW1(5)*	5	ND	ND	ND	ND	ND
MW1(7)*	7	ND	ND	ND	ND	ND
MW1(10)*	10	ND	ND	ND	ND	ND
MW1(12.5)*	12.5	ND	ND	ND	ND	ND
MW1(15)*	15	ND	ND	ND	ND	ND
MW1(17)*	17	ND	ND	ND	ND	ND
MW2(5)	5	23	ND	ND	ND	ND
MW2(10)	10	ND	ND	ND	ND	ND
MW2(12.5)	12.5	ND	ND	ND	ND	ND
MW2(15)	15	3.0	ND	ND	ND	ND
MW2(17)	17	790	0.14	0.23	10	2.7
MW3(5)	5	1.1	ND	ND	ND	ND
MW3(10)	10	ND	ND	ND	ND	ND
MW3(11.5)	11.5	ND	ND	ND	ND	ND
MW3(14)	14	ND	ND	ND	ND	ND
MW4(5)	5	1.9	ND	ND	ND	ND
MW4(9.5)	9.5	ND	ND	ND	ND	ND
MW4(12)	12	ND	ND	ND	ND	ND
MW4(15)	15	56	0.10	0.11	1.5	1.5
Detection Limits		1.0	0.05	0.1	0.1	0.1

\* TPH as diesel and EPA method 8010 constituents were non-detectable. TOG was <50 ppm.

ND = Non-detectable.

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

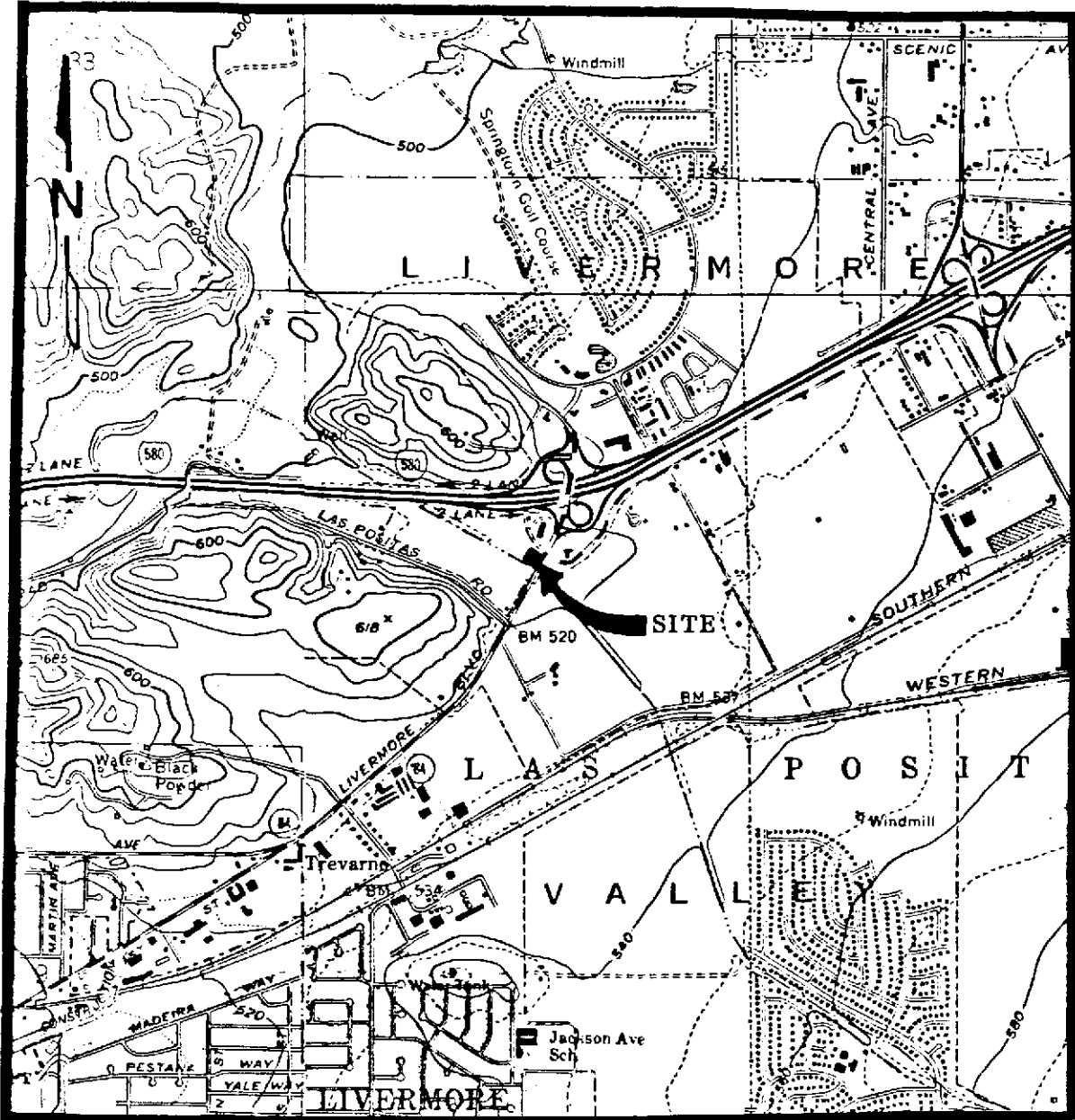


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## LOCATION MAP

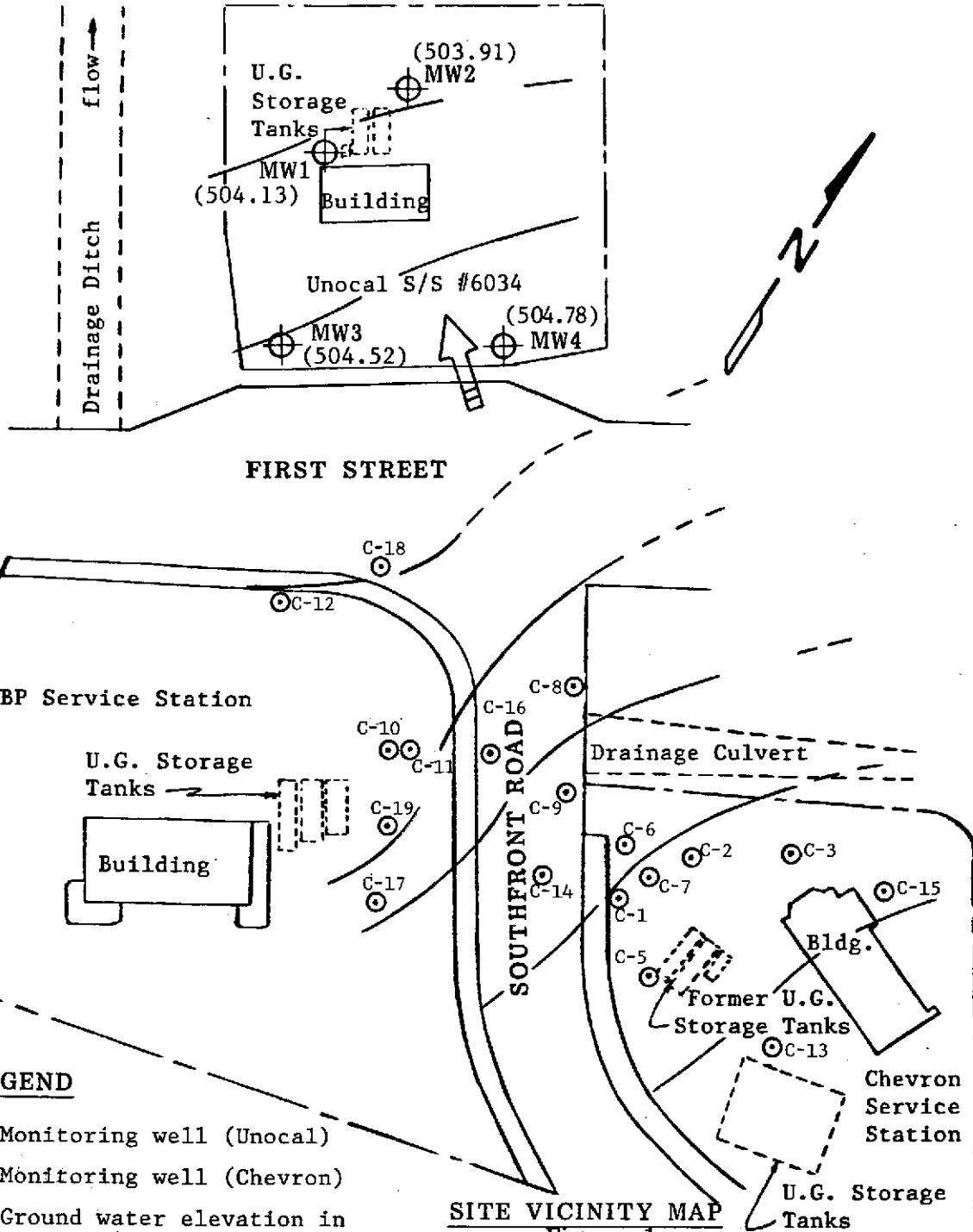
Base from U.S.G.S. 7.5 minute Livermore Quadrangle  
(photorevised 1980) and Altamont Quadrangle (photorevised 1981)

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



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**LEGEND**

- ⊕ Monitoring well (Unocal)
- ⊙ Monitoring well (Chevron)
- ( ) Ground water elevation in feet above Mean Sea Level on 12/24/90



- Direction of ground water flow
- Contours on ground water surface in feet

Note: ground water elevations for Chevron's wells are summarized in Table 1A

**SITE VICINITY MAP**  
 Figure 1

0 80 160  
 Approx. scale feet

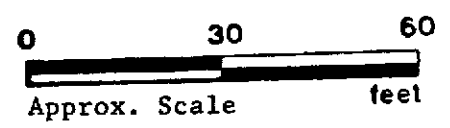
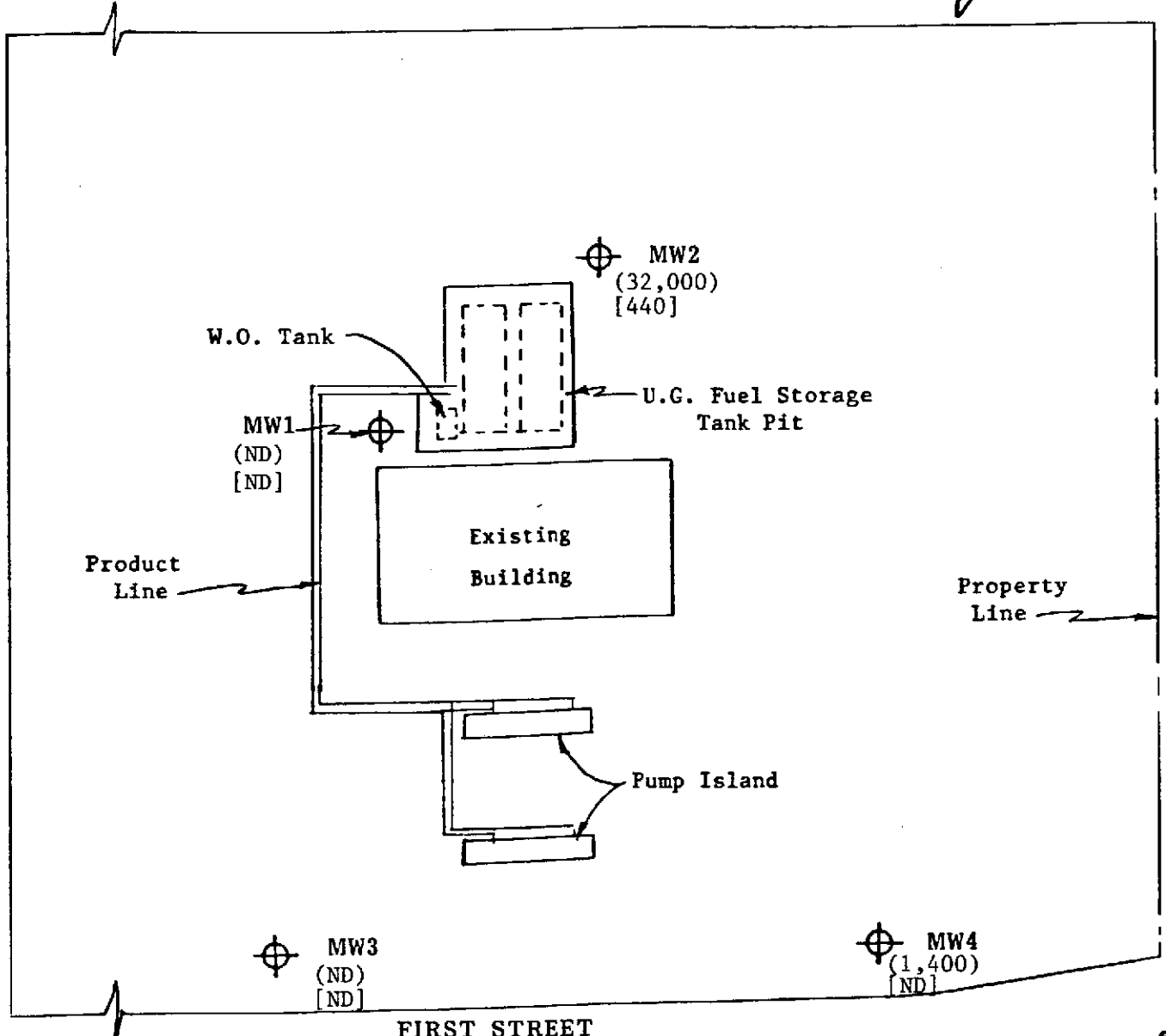
**Unocal S/S #6034**  
**4700 First Street**  
**Livermore, CA**






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**LEGEND**

**SITE PLAN**  
Figure 1a

-  Monitoring Well
- ( ) Concentration of TPH as gasoline in ppb on 12/24/90
- [ ] Concentration of benzene in ppb on 12/24/90

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

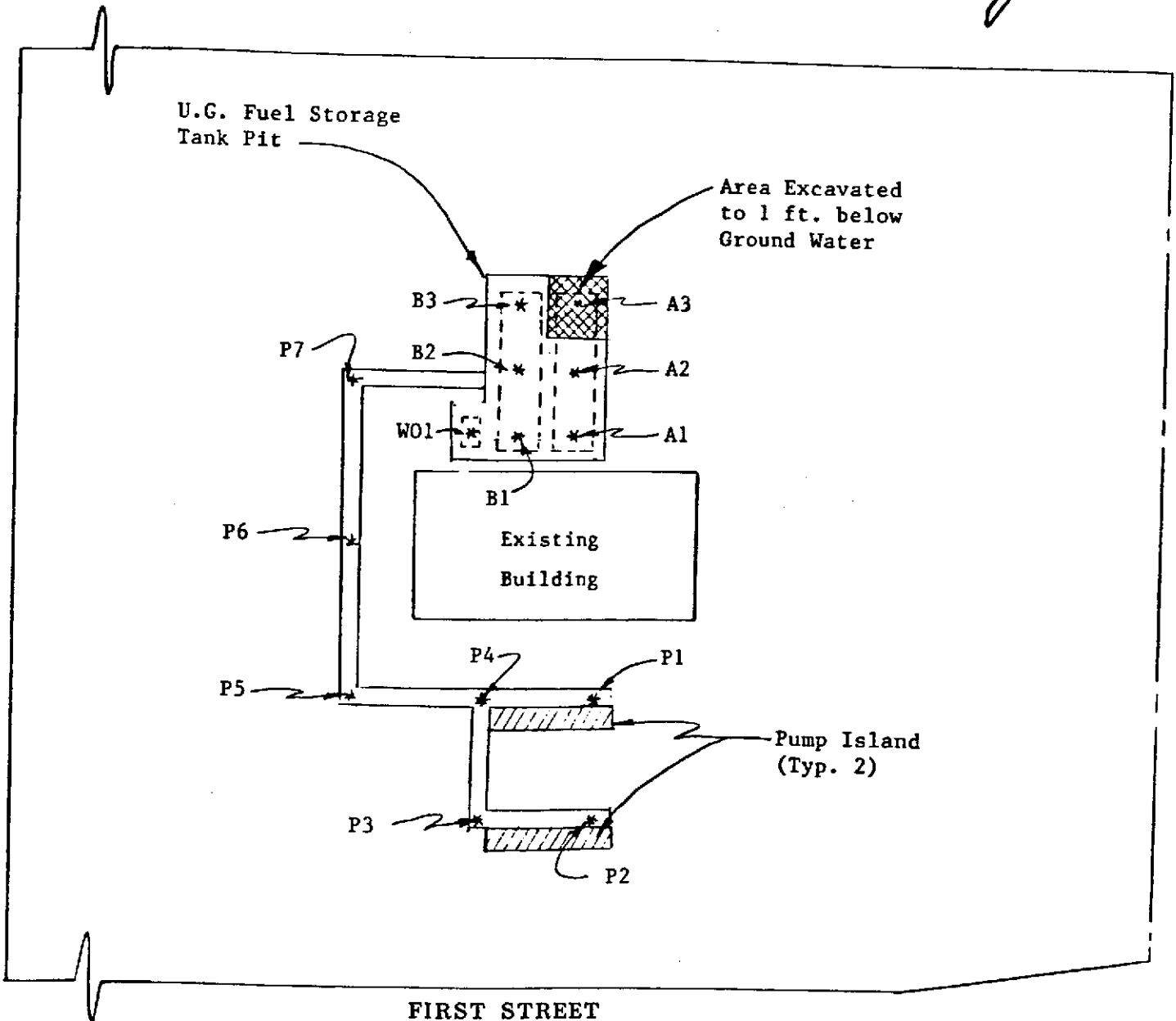
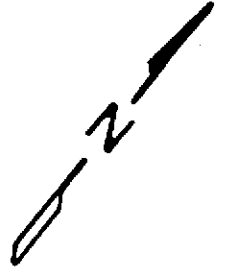


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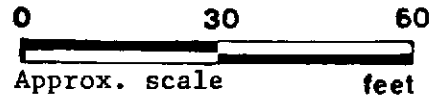
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FIRST STREET

### SITE PLAN

Figure 2



### LEGEND

\* Sample Point Location

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

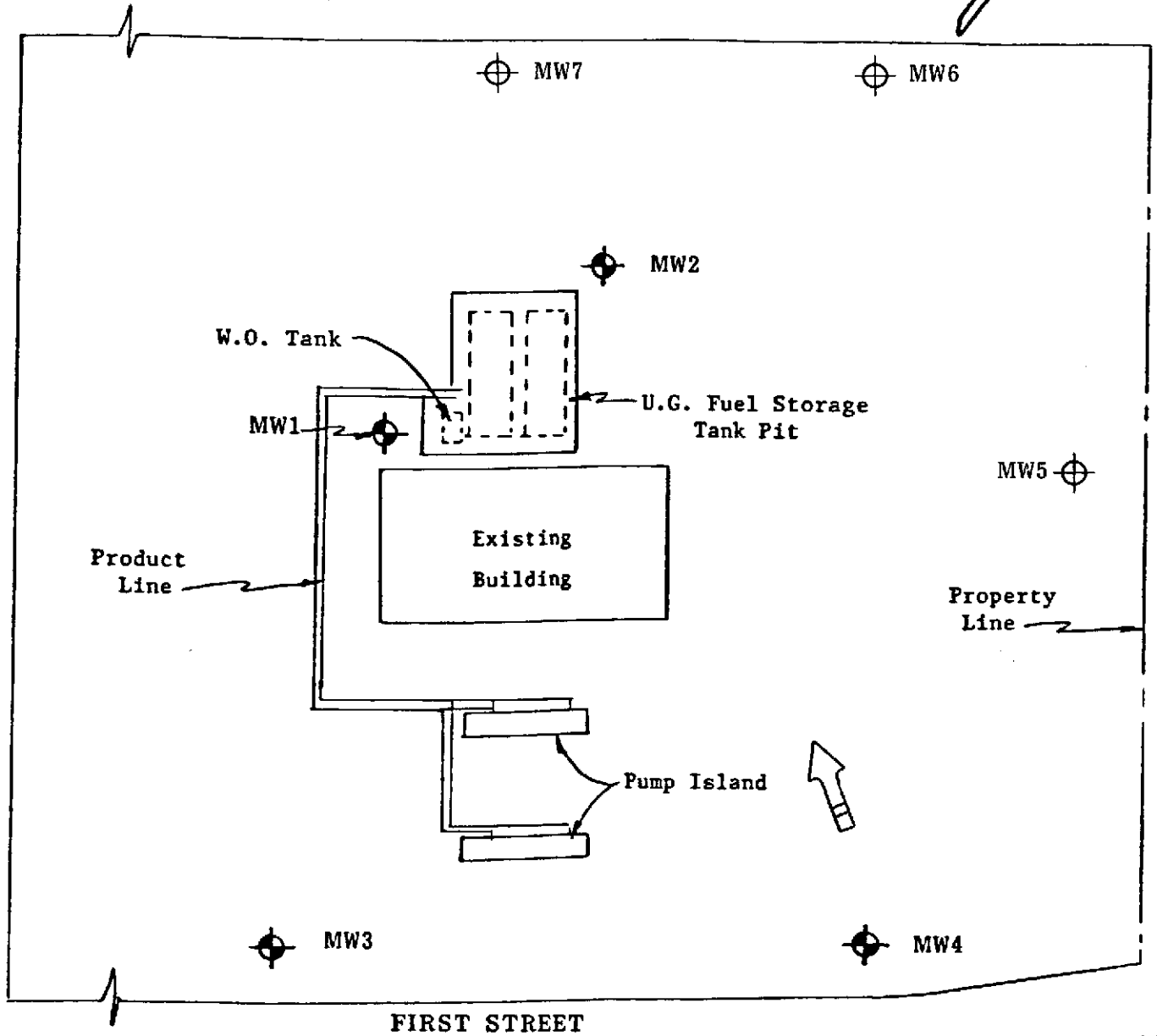


# KAPREALIAN ENGINEERING, INC.


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### LEGEND

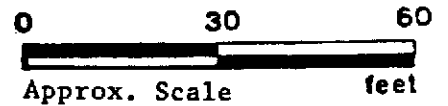
 Monitoring Well (Existing)

 Monitoring Well (Proposed)

 Direction of Ground Water Flow

### SITE PLAN

Figure 3



Unocal S/S #6034  
4700 First Street  
Livermore, 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 #6034, 4700 First St., Livermore	Sampled: Dec 24, 1990
P.O. Box 996	Matrix Descript: Water	Received: Dec 27, 1990
Benicia, CA 94510	Analysis Method: EPA 5030/8015/8020	Analyzed: Dec 28, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #: 012-0546 A-B	Reported: Jan 4, 1991

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons	Benzene	Toluene	Ethyl Benzene	Xylenes
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
012-0546 A-B	MW-1	N.D.	N.D.	N.D.	N.D.	0.40
012-0547 A-B	MW-2	32,000	440	340	460	13,000
012-0548 A-B	MW-3	N.D.	N.D.	N.D.	N.D.	N.D.
012-0549 A-B	MW-4	1,400	N.D.	8.7	15	10

<b>Detection Limits:</b>	<b>30</b>	<b>0.30</b>	<b>0.30</b>	<b>0.30</b>	<b>0.30</b>
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Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.  
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Julia R. Malerstein  
Project Manager



# SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID: Unocal #6034, 4700 First St., Livermore	Sampled: Dec 24, 1990
P.O. Box 996	Matrix Descript: Water	Received: Dec 27, 1990
Benicia, CA 94510	Analysis Method: EPA 3510/8015	Extracted: Dec 28, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #: 012-0546 C	Analyzed: Jan 3, 1991
		Reported: Jan 4, 1991

## TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons $\mu\text{g/L}$ (ppb)
012-0546 C	MW-1	N.D.

Detection Limits:

50

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.  
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Julia R. Malerstein  
Project Manager



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Kaprealian Engineering, Inc.	Client Project ID: Unocal #6034, 4700 First St., Livermore	Sampled: Dec 24, 1990
P.O. Box 996	Matrix Descript: Water	Received: Dec 27, 1990
Benicia, CA 94510	Analysis Method: SM 503 A&E (Gravimetric)	Extracted: Dec 28, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #: 012-0546 D	Analyzed: Dec 28, 1990
		Reported: Jan 4, 1991

## TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
012-0546 D	MW-1	N.D.

Detection Limits:

5.0

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Julia R. Malerstein  
Project Manager

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# SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520  
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Kaprealian Engineering, Inc.	Client Project ID: Unocal #6034, 4700 First St., Liverm	Sampled: Dec 24, 1990
P.O. Box 996	Sample Descript: Water, MW-1	Received: Dec 27, 1990
Benicia, CA 94510	Analysis Method: EPA 5030/8010	Analyzed: Jan 2, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number: 012-0546 E-F	Reported: Jan 4, 1991

## HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane.....	1.0	N.D.
Bromoform.....	1.0	N.D.
Bromomethane.....	1.0	N.D.
Carbon tetrachloride.....	1.0	N.D.
Chlorobenzene.....	1.0	N.D.
Chloroethane.....	5.0	N.D.
2-Chloroethylvinyl ether.....	1.0	N.D.
Chloroform.....	0.50	N.D.
Chloromethane.....	0.50	N.D.
Dibromochloromethane.....	0.50	N.D.
1,2-Dichlorobenzene.....	2.0	N.D.
1,3-Dichlorobenzene.....	2.0	N.D.
1,4-Dichlorobenzene.....	2.0	N.D.
1,1-Dichloroethane.....	0.50	N.D.
1,2-Dichloroethane.....	0.50	N.D.
1,1-Dichloroethene.....	1.0	N.D.
Total 1,2-Dichloroethene.....	1.0	N.D.
1,2-Dichloropropane.....	0.50	N.D.
cis-1,3-Dichloropropene.....	5.0	N.D.
trans-1,3-Dichloropropene.....	5.0	N.D.
Methylene chloride.....	2.0	N.D.
1,1,2,2-Tetrachloroethane.....	0.50	N.D.
Tetrachloroethene.....	0.50	N.D.
1,1,1-Trichloroethane.....	0.50	N.D.
1,1,2-Trichloroethane.....	0.50	N.D.
Trichloroethene.....	0.50	N.D.
Trichlorofluoromethane.....	1.0	N.D.
Vinyl chloride.....	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Julia R. Malerstein  
Project Manager



# KAPREALIAN ENGINEERING, INC.

## CHAIN OF CUSTODY

SAMPLER		SITE NAME & ADDRESS						ANALYSES REQUESTED				TURN AROUND TIME:	
JOE		Unocal / Livermore # 6034 4700 First st.						TPHG, BTXE 8010 TOG (5580 C4F) TPHD				Regular	
WITNESSING AGENCY												REMARKS	
SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION					
MW-1	12/21/90			✓	✓		6	MW	✓	✓	✓	✓	VOI 15205410 Δ
MW-2	"	P.M.		✓	✓		2	"	✓				547 ΔB
MW-3	"			✓	✓		2	"	✓				548 ↓
MW-4	"	A.M. 11:00		✓	✓		2	"	✓				549 ↓

Relinquished by: (Signature)

*[Signature]*

Date/Time

12/16/90 1745

Received by: (Signature)

*[Signature]*

Relinquished by: (Signature)

Date/Time

Received by: (Signature)

Relinquished by: (Signature)

Date/Time

Received by: (Signature)

Relinquished by: (Signature)

*[Signature]*

Date/Time

12/27/90  
11:34 AM

Received by: (Signature)

*[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

*[Signature]*  
Title

12-26-90  
Date