KAPREALIAN ENGINEERING, INC.
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KEI-P90-1003.P2
May 31, 1991

Unocal Corporation
2000 Crow Canyon Place, Suite 400
San Ramon, CA 94583

Attention: Mr. Rick Sisk

RE: **Work Plan/Proposal**
Unocal Service Station #7004
15599 Hesperian Boulevard
San Leandro, California

INTRODUCTION

1. Background:

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

Kaprealian Engineering, Inc.'s (KEI) initial field work was conducted on October 12, 1990, when three underground fuel storage tanks were removed from the site. The tanks consisted of one 12,000 gallon super unleaded gasoline tank, and two 12,000 gallon regular unleaded fuel storage tanks. The tanks were made of steel and no apparent holes or cracks were observed in the tanks.

Nine soil samples, labeled A1, A2, A3, B1, B2, B3, C1, C2 and C3, were collected from beneath the fuel tanks at depths of approximately 14 to 15 feet below grade. Sample locations are as shown on the attached Site Plan, Figure 2.

In an attempt to remove as much of the contaminated soil as possible, KEI returned to the site on October 19, 1990, to observe additional soil excavation in the fuel tank pit. Soil was excavated from a depth below grade of 15 feet to a depth of 19 feet. Water was encountered in the fuel tank pit at a depth of approximately 18.5 feet, thus prohibiting the collection of any additional soil samples from the bottom of the fuel tank pit. Four soil samples, labeled SW1 through SW4, were collected from the sidewalls of the fuel tank pit approximately six inches above the observed water table at lateral distances of 2, 4, 17 and 4 feet, respectively, from the original tank pit sidewalls. Sample point locations are as shown on the attached Site Plan, Figure 2.

KEI returned to the site on October 22, 1990, in order to complete the fuel tank pit sidewall sampling. One soil sample, labeled SW5, was collected from the south sidewall at a depth of about 18 feet below grade. Due to obvious contamination observed in the area of sample point SW5, one additional soil sample, labeled SW5(20), was collected at a depth of 18 feet at a lateral distance of 20 feet from the original tank pit south sidewall.

After soil sampling was completed, the entire fuel tank pit was excavated 4 feet laterally and to a depth of approximately 19 feet. Following soil excavation, approximately 5,000 gallons of ground water were pumped from the fuel tank pit. On October 24, 1990, one water sample, labeled W1, was collected from the fuel tank pit.

KEI returned to the site on October 31, 1990, in order to collect soil samples from the product pipe trenches. Four samples, labeled P1 through P4, were collected from the pipe trenches at depths ranging from 2.5 to 3 feet below grade. After additional excavation in the area of sample point P2, one soil sample, labeled P2(7.5), was collected at a depth of 7.5 feet below grade. After the soil sampling was completed, pipe trenches were excavated to the depth of the sample points.

After reviewing the laboratory analyses and in an attempt to remove as much of the contaminated soil as possible, KEI returned to the site on November 2, 1990, to observe additional soil excavation in the area of sample points P1 and P3. Additional soil samples, labeled P1(8) and P3(5.5), were collected at depths of 8 and 5.5 feet, respectively. Sample point locations are shown on the attached Site Plan, Figure 2.

All samples were analyzed by Sequoia Analytical Laboratory in Concord, California. All soil and water samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline using EPA method 5030 in conjunction with modified 8015, and benzene, toluene, xylenes and ethylbenzene (BTX&E) using EPA method 8020.

Analytical results of the soil samples, collected from beneath the fuel tanks, indicated levels of TPH as gasoline ranging from 180 ppm to 1,900 ppm, and benzene ranging from 0.64 ppm to 9.7 ppm. Samples collected from the fuel tank pit sidewalls showed levels of TPH as gasoline ranging from non-detectable to 4.5 ppm, except for sample SW5, which showed 998 ppm of TPH as gasoline. However, the additional sample SW5(20), collected at a depth of 18 feet and a lateral

distance of 16 feet from sample SW5, indicated 30 ppm of TPH as gasoline.

Analytical results of soil samples, P1 through P4, collected from the pipe trenches, indicated levels of TPH as gasoline at 1,400 ppm, 3,900 ppm, 100 ppm and 19 ppm, respectively. However, after additional excavation, the levels of TPH as gasoline in samples P1(8), P2(7.5) and P3(5.5), collected beneath the samples P1, P2 and P3, respectively, were detected at 5.7 ppm, 20 ppm and 9.8 ppm, respectively. Results of the soil analyses are summarized in Table 4.

Analytical results of the water sample (W1), collected from the fuel tank pit, indicated 4,300 ppb of TPH as gasoline and 40 ppb of benzene. The results of the water analyses are summarized in Table 5.

Results of the soil samples from the tank excavation are summarized in KEI's report (KEI-J90-1003.R1) dated November 26, 1990. To comply with the requirements of the regulatory agencies and based on the analytical results, KEI proposed installation of three monitoring wells.

On April 22, 1991, 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 monitoring wells were each drilled and completed to a total depth of 25 feet. Ground water was encountered at depths ranging from 16.5 to 18 feet beneath the surface during drilling. The surface of each well cover was surveyed by Kier & Wright of Pleasanton, California, to Mean Sea Level and to a vertical accuracy of 0.01 feet. The wells were developed on April 23, and initially sampled on May 4, 1991.

Water and selected soil samples from MW1, MW2 and MW3 were analyzed at Sequoia Analytical Laboratory in Concord, California. Soil and water samples were analyzed for TPH as gasoline and BTX&E.

Analytical results of the soil samples, collected from the borings for monitoring wells MW1, MW2 and MW3, indicate levels of TPH as gasoline and benzene ranging from non-detectable to 6.8 ppm, and non-detectable to 0.025 ppm, respectively, except for samples MW3(15) and MW3(17.5), collected from depths of 15 feet and 17.5 feet, respectively, which showed TPH as gasoline levels of 4,800 ppm and 1,000 ppm and benzene levels of 23 ppm and 8.4 ppm, respectively.

Analytical results of the ground water samples collected from monitoring wells MW1 and MW2 indicated non-detectable levels of TPH as gasoline and BTX&E. In well MW3, levels of TPH as gasoline were 34,000 ppb with benzene at 6,100 ppb. Results of the soil analyses are summarized in Table 3, and the water analyses in Table 2.

2. Site Description:

The subject site is presently used as a self-service gasoline station and is located adjacent to a Kragen Auto Parts store. The site is situated on gently sloping southwest trending topography and is located approximately 700 to 800 feet northeast of San Lorenzo Creek, and 2.1 miles northeast of the present shoreline of San Francisco Bay. A former Chevron Service Station is located approximately 450 feet north-northeast from Unocal at the intersection of Sycamore Street with Hesperian Blvd. A Location Map and Site Plans are attached to this work plan.

3. Hydrology and Regional Geology:

The water table stabilized in the monitoring wells at depths ranging from 15.75 to 16.17 feet below the surface. The ground water flow direction appeared to be toward the west-southwest on May 4, 1991, with a hydraulic gradient of approximately .0018, (based on water level data collected from the three monitoring wells prior to purging and sampling). All monitoring data is summarized on the attached Table 1.

Based on review of regional geologic maps (U.S. Geological Survey Professional Paper 943 "Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties and their Importance to Comprehensive Planning", by E.J. Helley and K.R. Lajoie, 1979), the subject site is underlain by Holocene Coarse-grained Alluvium (Qhac). The coarse-grained alluvium is described as typically consisting of unconsolidated, moderately sorted, permeable sand and silt with a thickness ranging from less than 10 feet to as much as 50 feet.

The results of our subsurface study indicate that the site is underlain by artificial fill materials to depths below grade of 1-1/2 to about 3-1/2 feet. The fill materials are inturn underlain predominantly be silty clay and clayey silt materials to the maximum depth drilled (25 feet). However, two distinct sand lenses (varying from about 2-1/2 to 3-3/4 feet in thickness) were encountered. The upper sand lens was encountered at depths of about 10 to 13-1/4 feet at MW2 and

about 8-1/4 to 12 feet at MW1, but was not encountered at MW3. The deeper and generally saturated clayey sand lens was encountered at depths below grade of about 17-1/2 to 20 feet at MW3 and at about 16-1/2 to 19-3/4 feet at MW2. This deeper saturated clayey land lens was not observed at MW1; however, the interval below 16-1/2 to 20 feet was not sampled and it is therefore inferred that this deeper clayey sand lens may be present at MW1 and represents the upper aquifer at the subject site.

PROPOSED FIELD WORK

PHASE II - DEFINING THE EXTENT OF SUBSURFACE CONTAMINATION

1. **KEI proposes to install three two-inch diameter monitoring wells, designated as MW4, MW5 and MW6** on the attached Site Plan, Figure 3, using hollow-stem auger equipment. Permits will be obtained from the Alameda County Flood Control District prior to beginning work.

   The wells will be drilled about 10 feet into the saturated zone of the first encountered ground water unless a 5 foot thick clay aquitard is encountered first, at which time drilling will be terminated. Based on our previous experience at the site, it is estimated that the total depth of each well will be about 25 feet.

2. Soil samples will be collected at a maximum spacing of 5 foot intervals, significant changes in lithology, at obvious areas of contamination, and at/or within the soil/ground water interface beginning at a depth of about 4 to 5 feet below grade. However, the first boring drilled will be sampled on approximate 2-1/2 foot intervals to the total depth drilled. Sampling for laboratory analyses and lithologic logging purposes will continue until the first water table is encountered. Sampling for lithologic logging purposes only will continue below the water table to the total depth drilled. Classification of soil will be done using the Unified Soils Classification System (USCS) by KEI's field engineer or geologist. Samples will be collected in a California modified split-spoon sampler with two-inch diameter brass liners. The sampler will be advanced ahead of the drilling augers at designated depths by dropping a 140 pound hammer 30 inches. Blow counts will be recorded. Samples will be removed from the sampler and retained in brass liners. The liners will be sealed with aluminum foil, plastic caps and tape. They will be labeled and stored on ice for delivery to a state certified laboratory.

Wells will be checked for free product and sheen (using an interface probe and/or paste tape) prior to development and sampling.

Properly executed Chain of Custody documentation will accompany all samples.

8. Laboratory Analyses:

Water and selected soil samples will be analyzed by Sequoia Analytical Laboratory in either Concord or Redwood City, California, both state certified laboratories, for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, and BTX&E using EPA method 8020, as recommended by the RWQCB, and as specified in the Tri-regional guidelines.

Analytical results will be presented in tabular form, showing sample depths, results and detection limits.

The analytical results will be used to delineate the vertical and lateral extent of the contaminants in soil and ground water.

9. Hydrology:

Ground water flow direction will be determined from the survey data and water table depths from both the new and existing wells. The flow direction will be shown on the Site Plan.

10. Ongoing Pumping, Monitoring and Sampling:

10.1 **Monitor all monitoring wells on-site on a monthly basis.** Record the elevation of the water table and any abnormal conditions noted during inspection, including presence of product and sheen.

10.2 **Purge and sample ground water from all monitoring wells, and analyze for TPH as gasoline and BTX&E on a quarterly basis.** Prior to sampling, water table elevation will be recorded as well as the presence of any free product.

10.3 Preparation and submission of quarterly technical reports summarizing the field activity water sampling and analyses with discussion and recommendations.

11. Conclusions:

Conclusions and results of Phase II will be described in a technical report.

KEI-P90-1003.P2
May 31, 1991

TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Gallons Pumped
(Monitored and Developed on April 23, 1991)					
MW1	21.14	15.75	0	None	55
MW2	21.15	16.20	0	None	77
MW3	21.07	16.15	0	None	68
(Monitored and Sampled on May 4, 1991)					
MW1	21.14	15.75	0	None	15
MW2	21.18	16.17	0	None	15
MW3	21.07	16.15	0	None	15

Well #	Surface Elevation* (feet)
MW1	36.89
MW2	37.35
MW3	37.22

* Elevation of top of well covers surveyed to Mean Sea Level (MSL).

KEI-P90-1003.P2
May 31, 1991

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
5/04/91	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	ND	ND	ND
	MW3	34,000	6,100	32	6,100	1,200
Detection Limits		30	0.3	0.3	0.3	0.3

ND = Non-detectable.

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

KEI-P90-1003.P2
May 31, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
4/22/91	MW1(5)	5	ND	ND	ND	0.012	ND
	MW1(10)	10	ND	ND	ND	ND	ND
	MW1(16)	16	1.5	ND	ND	ND	ND
	MW2(5)	5	4.5	0.015	ND	0.079	0.034
	MW2(10)	10	6.8	0.025	ND	0.043	0.035
	MW2(15.5)	15.5	ND	ND	ND	ND	ND
	MW2(17)	17	ND	0.014	ND	ND	ND
	MW3(5)	5	2.0	0.025	ND	0.011	ND
	MW3(10)	10	ND	0.018	ND	ND	ND
	MW3(15)	15	4,800	23	9.1	290	63
	MW3(17.5)	17.5	1,000	8.4	4.6	64	17
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-P90-1003.P2
May 31, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on October 12, 19, 22 & 31 and
November 2, 1990)

Sample	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
A1	14.5	350	2.0	3.6	47	7.7
A2	14.5	480	2.4	7.3	49	7.4
A3	14.0	570	0.97	5.6	50	8.3
B1	15.0	180	0.64	0.84	11	3.0
B2	15.0	1,900	9.7	120	250	33
B3	15.0	990	6.3	52	120	16
C1	15.0	270	0.64	3.7	22	5.4
C2	15.0	1,200	4.9	41	150	24
C3	15.0	590	4.6	23	80	9.4
SW1	18.0	3.7	0.21	0.024	0.42	0.14
SW2	18.0	4.5	0.46	0.024	0.46	0.26
SW3	18.0	4.1	0.024	0.0080	0.088	0.058
SW4	18.0	ND	0.0090	ND	0.0070	ND
SW5	18.0	998	0.58	ND	21	19
SW5(20)	18.0	30	0.054	0.047	0.054	0.46
P1	2.5	1,400	0.22	3.3	72	8.9
P1(8)	8.0	5.7	0.0078	0.0054	0.18	0.033
P2	3.0	3,900	1.1	23	280	41
P2(7.5)	7.5	20	ND	0.11	1.3	0.12
P3	2.5	100	0.057	0.63	12	0.97
P3(5.5)	5.5	9.8	0.015	0.15	1.3	0.13
P4	2.5	19	ND	0.10	0.13	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-P90-1003.P2
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TABLE 5

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample #	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/24/90	W1	4,300	40	1.9	520	0.54
Detection Limits		30.0	0.3	0.3	0.3	0.3

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

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LOCATION MAP

Base from U.S.G.S. 7.5 min. Hayward and San Leandro Quadrangles (photorevised 1980)

Unocal S/S #7004
15599 Hesperian Boulevard
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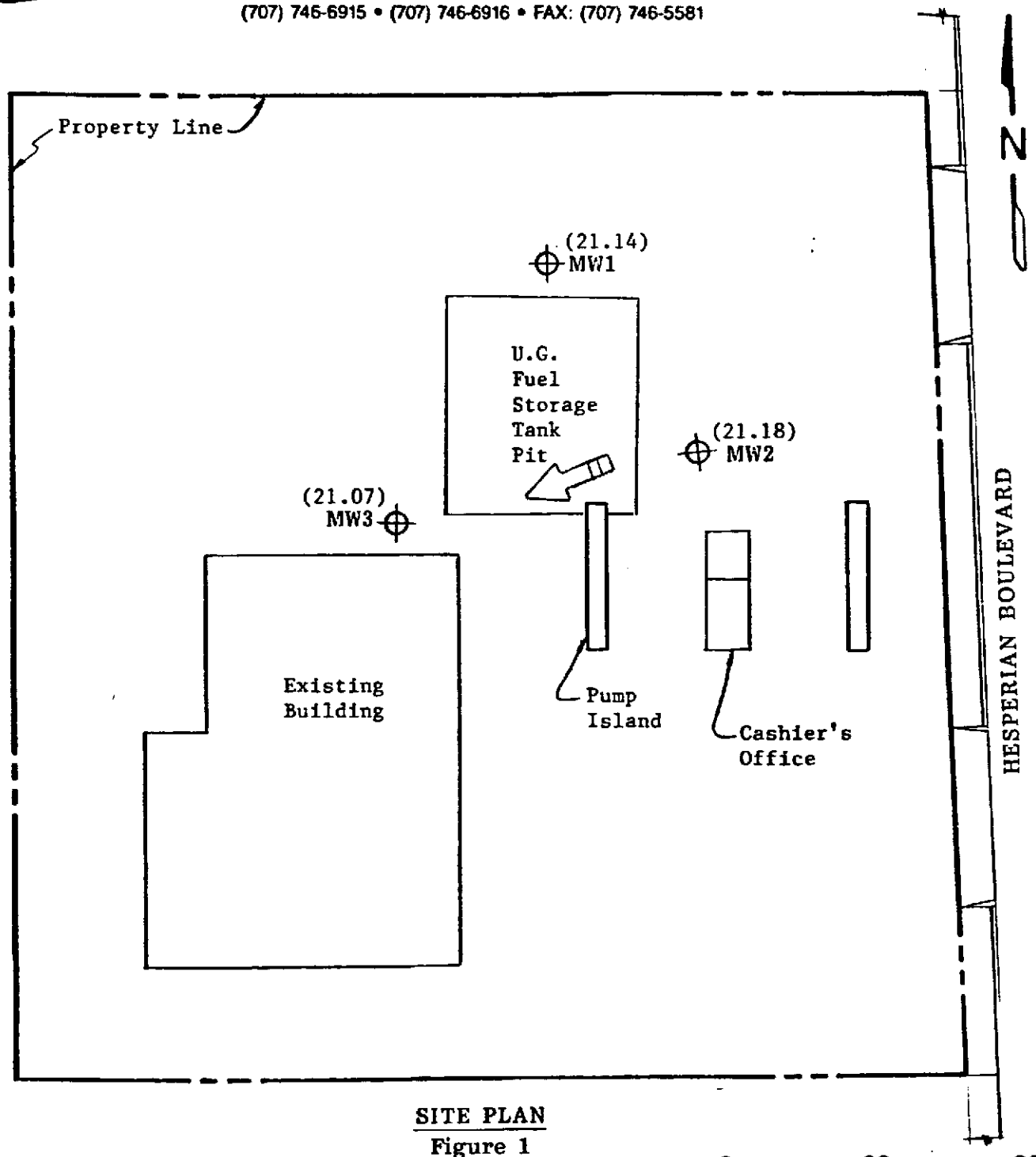

SITE PLAN
Figure 1

LEGEND

- Monitoring well
- ( ) Ground water table elevation in feet above Mean Sea Level on 5/4/91
- Direction of ground water flow

0 30 60
Approx. scale feet

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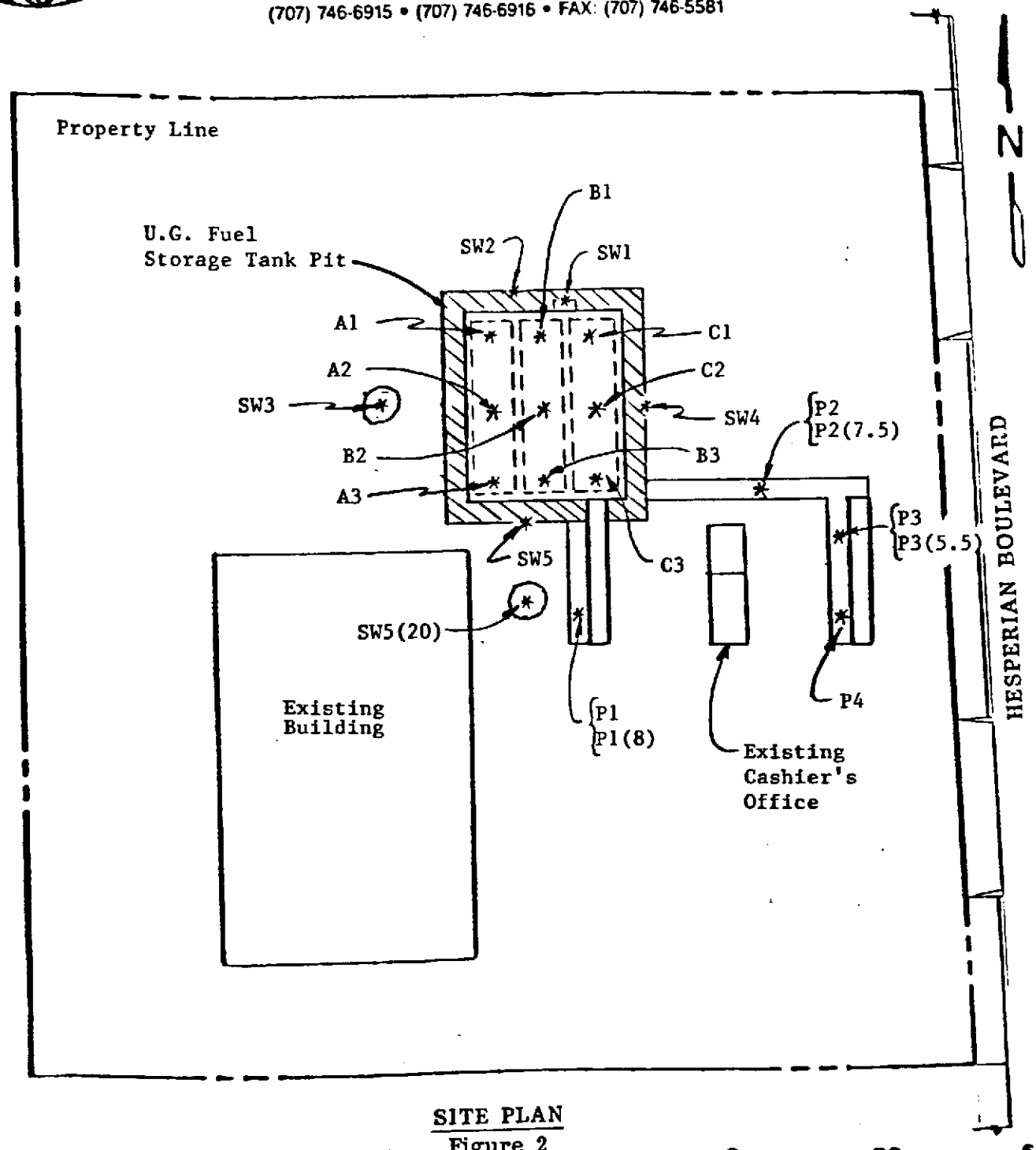

SITE PLAN
Figure 2

0 30 60
Approx. scale feet

LEGEND

* Sample Point Location

▨ Area of Additional Excavation

Unocal S/S #7004
15599 Hesperian Boulevard
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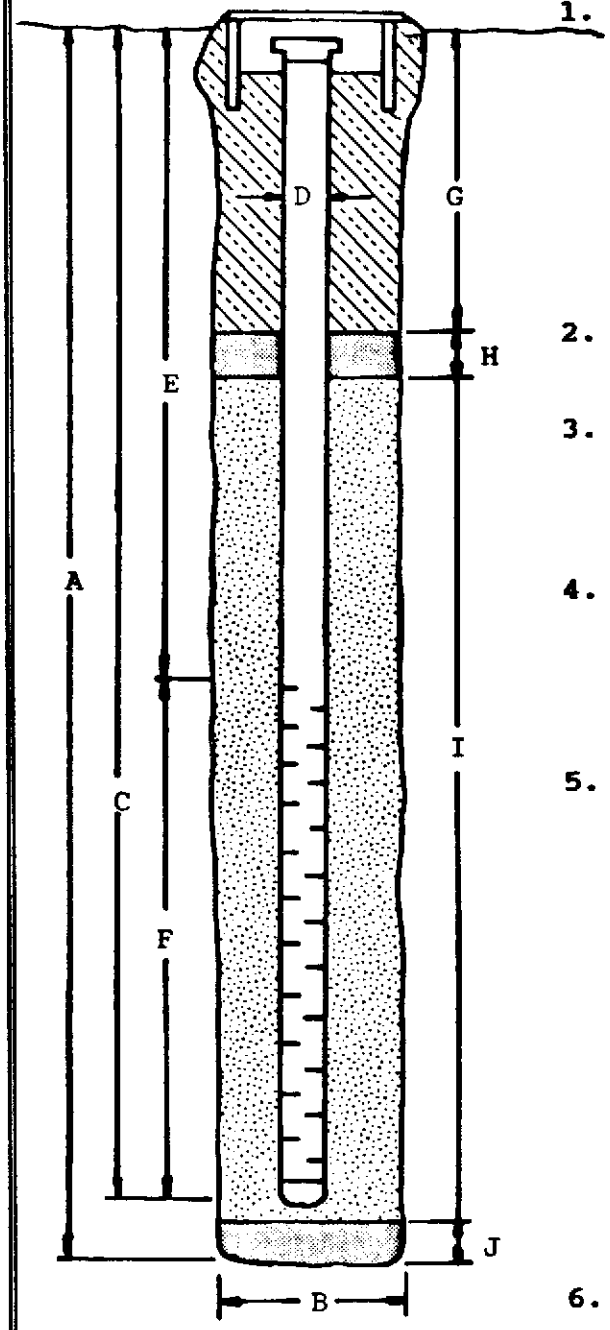
WELL COMPLETION DIAGRAM
(SCHEMATIC)

Flush-mounted Well Cover



WELL DETAILS*

1. Well will be terminated 10 to 15 feet into first ground water unless a five foot thick aquitard is encountered below the water table, in which case the aquitard will be backfilled with bentonite pellets and the well terminated at the top of this aquitard [A].
2. Boring diameter [B] is 9 inches for 2 inch wells and 12 inches for 4 inch wells.
3. Perforated interval [F] will extend from bottom of casing to five feet above first ground water table (unless water <5 feet deep).
4. Schedule 40, PVC casing, 2 inch in diameter [D], will be used [C]. Screen is 0.020 or 0.010 inch factory machined slots, depending on filter pack grain size.
5. Filter pack will be placed from bottom of casing to two feet above perforated interval [I]. (Bottom seal [J] is not installed unless required.) Two feet of bentonite [H] will be placed above the filter pack. Concrete grout [G] will be placed from top of bentonite seal to the surface (unless modified due to shallow water). Blank casing [E] will extend from the top of the perforated casing to the top of the hole.
6. The well will be installed with a waterproof cap, padlock and a flush-mounted well cover.

* See text for additional information.

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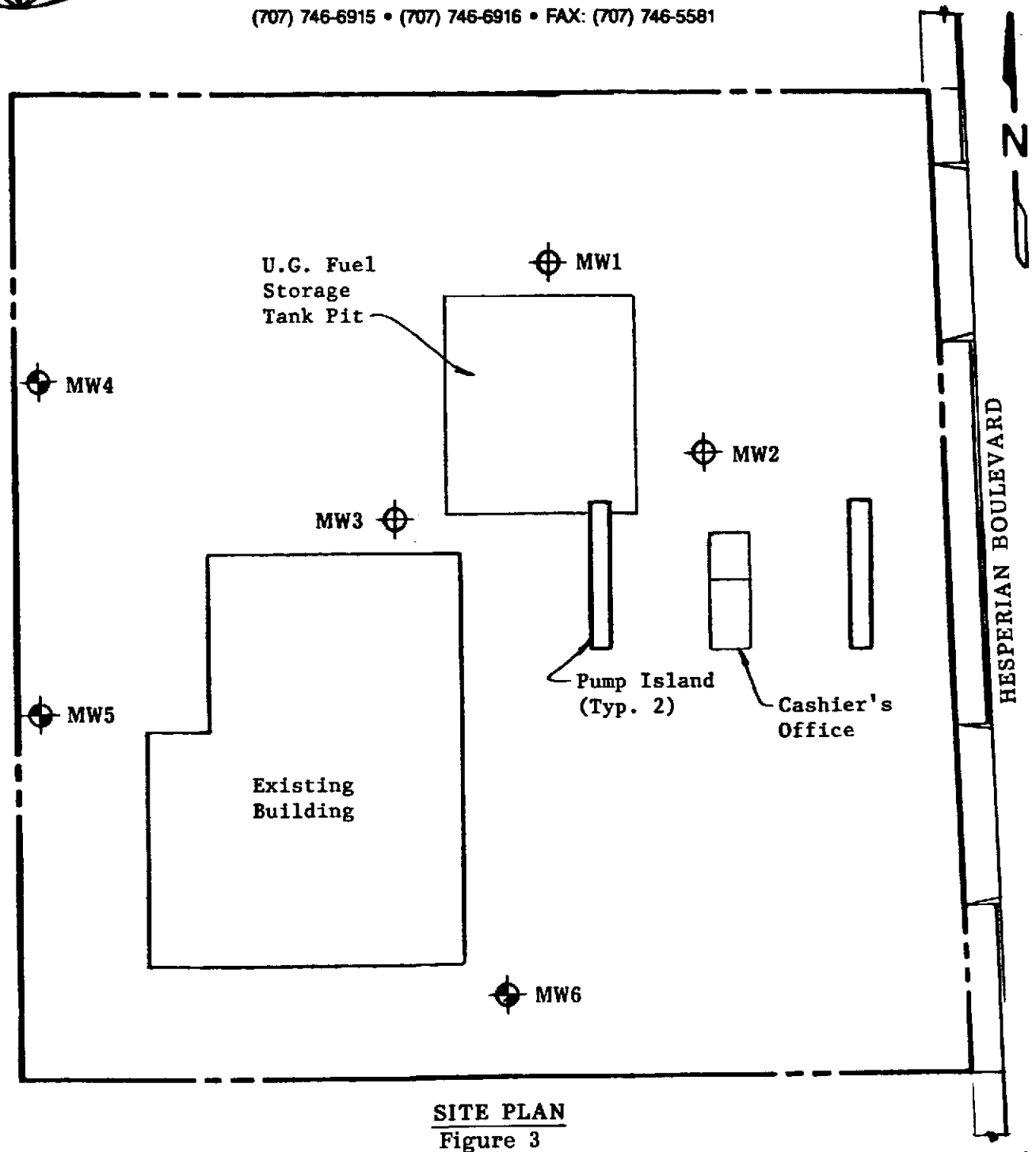

SITE PLAN
Figure 3

LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)

0 30 60
Approx. scale feet

Unocal S/S #7004
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