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

June 13, 1991

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

Attention: ~~Mr. Larry Seto~~

RE: Unocal Service Station #7004
15599 Hesperian Blvd.
San Leandro, California 94578

Dear Mr. Seto:

Per the request of Mr. Rick Sisk of Unocal Corporation, enclosed please find our report and work plan/proposal, both dated May 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: Rick Sisk, Unocal Corporation

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KEI-P90-1003.R4
May 31, 1991

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

Attention: Mr. Rick Sisk

RE: **Preliminary Ground Water Investigation at**
Unocal Service Station #7004
15599 Hesperian Blvd.
San Leandro, California

Dear Mr. Sisk:

This report presents the results of soil and ground water investigation for the referenced site in accordance with Kaprealian Engineering, Inc's. (KEI) proposal KEI-P90-1003.P1 dated November 7, 1990. The purpose of the investigation was to determine the ground water flow direction, and to begin to determine the degree and extent of the subsurface soil and ground water contamination at the site. The scope of the work performed by KEI consisted of the following:

Coordination with regulatory agencies.

Geologic logging of three borings for the installation of three monitoring wells.

Soil sampling.

Ground water monitoring, purging and sampling.

Laboratory analyses.

Data analysis and report preparation.

SITE DESCRIPTION AND BACKGROUND

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 report.

KEI's 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.

RECENT FIELD ACTIVITIES

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 wells were drilled, constructed and completed in accordance with the guidelines of the Regional Water Quality Control Board (RWQCB), and the California Well Standards per Bulletin 74-90.

The subsurface materials penetrated and details of the construction of the wells are described in the attached Boring Logs.

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. Soil samples were taken for laboratory analysis and lithologic logging purposes at a maximum interval of 5 foot, at obvious areas of contamination, and at the soil/ground water interface beginning at a depth of approximately 4-1/2 feet below grade until ground water was encountered. Soil samples were obtained below the first encountered ground water at the depths indicated on the attached Boring Logs for lithologic logging purposes only. The undisturbed soil samples were taken by driving a California-modified split-spoon sampler lined with brass liners ahead of the drilling augers. The two-inch diameter brass liners holding the samples were sealed with aluminum foil, plastic caps and tape, placed in plastic zip-lock baggies, and stored in a cooled ice chest for delivery to a certified laboratory. Each well casing was installed with a watertight cap and padlock. A round, watertight, flush-mounted well cover was cemented in place over each well casing.

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, 1991. Prior to development, the wells were checked for depth to the water table using an electronic sounder, presence of free product (using an interface probe or paste tape) and sheen. No free product or sheen was noted in any of the wells. After recording the monitoring data, the wells were developed with a surface pump until the evacuated water was clear and free of suspended sediment. During development, the wells were purged of 55 to 77 gallons. Monitoring and well development data are summarized in Table 1.

The wells were sampled on May 4, 1991. Prior to sampling, monitoring data was collected and the wells were each purged of 15 gallons. Water samples were then collected using a clean Teflon bailer, which was rinsed with distilled water prior to sampling

each well. The samples were decanted into clean glass VOA vials, sealed with Teflon-lined screw caps, and labeled and stored in a cooler on ice until delivery to a certified laboratory.

ANALYTICAL RESULTS

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Concord, California. All samples were accompanied by properly executed Chain of Custody documentation. Soil and water 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 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 indicate 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. Copies of the laboratory analyses and Chain of Custody documentation are attached to this report.

HYDROLOGY AND 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).

Based on review of regional geologic maps (U.S. Geological Survey Professional Paper 943 "Flatland Deposits - 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 sand 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.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results, KEI recommends implementation of a monitoring and sampling program. **The wells should be monitored on a monthly basis,** and should be purged and sampled on a quarterly basis. The proposed program should be conducted for a period of 12 months. The results of the monitoring program will be documented and evaluated after each monitoring and sampling event. Recommendations for altering or terminating the program will be made as needed. **In addition, KEI recommends the installation of three additional wells to further define the extent of soil and ground water contamination.** Our proposal for this work is attached for your review and consideration.

DISTRIBUTION

A copy of this report should be sent to the City of San Leandro Fire Department, 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 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.

KEI-P90-1003.R4

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

Don R. Braun
Certified Engineering Geologist

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

Timothy R. Ross
Project Manager

\bam

Attachments: Tables 1 through 5
Location Map
Site Plans - Figures 1 & 2
Boring Logs
Laboratory Results
Chain of Custody documentation
Work Plan/Proposal

KEI-P90-1003.R4
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	No	55
MW2	21.15	16.20	0	No	77
MW3	21.07	16.15	0	No	68
(Monitored and Sampled on May 4, 1991)					
MW1	21.14	15.75	0	No	15
MW2	21.18	16.17	0	No	15
MW3	21.07	16.15	0	No	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.

KEI-P90-1003.R4
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.R4
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.R4
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.R4
May 31, 1991

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
San Leandro, CA

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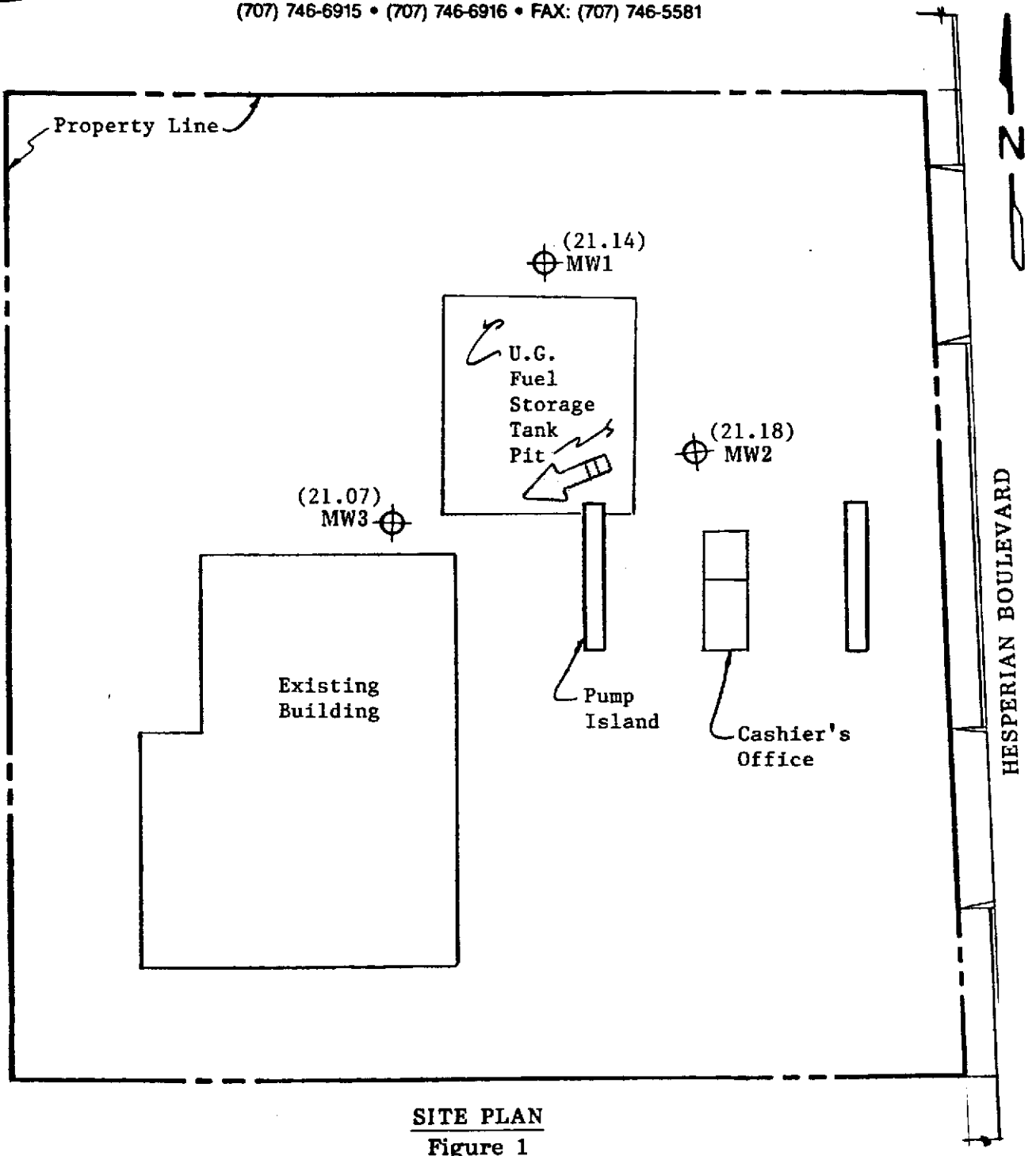

SITE PLAN
Figure 1

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

Unocal S/S #7004
15599 Hesperian Blvd.
San Leandro, CA

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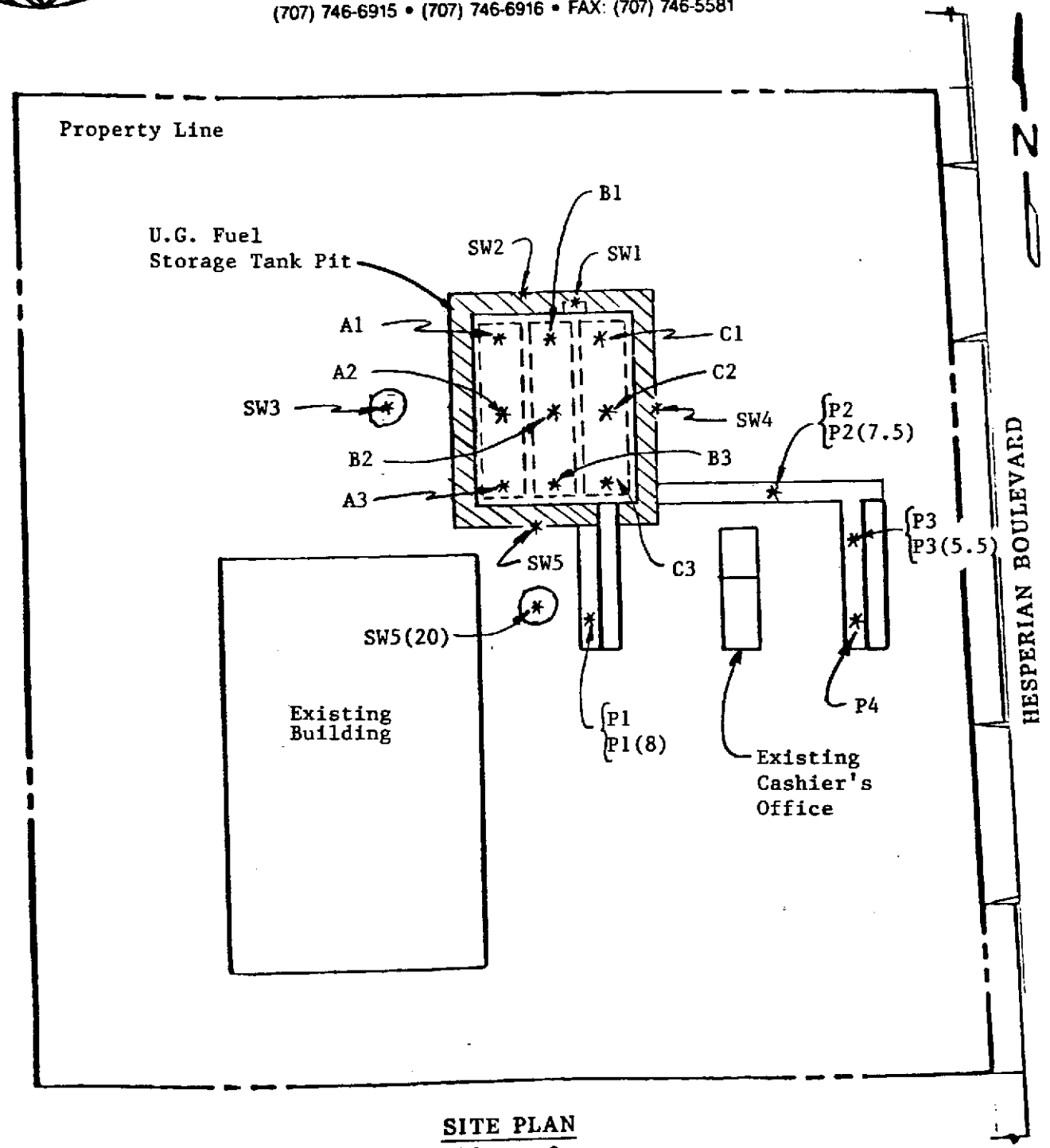


SITE PLAN
Figure 2

0 30 60
Approx. scale feet

LEGEND

* Sample Point Location

▨ Area of Additional Excavation

Unocal S/S #7004
15599 Hesperian Boulevard
San Leandro, CA

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian S. L.	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW1	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		2" asphalt pavement over 8" concrete slab, underlain by fill material consisting of clay with gravel and sand.
			ML/ MH	Sandy silt, trace angular gravel to 3/4" diameter, moist, stiff, olive gray.
4/5/7		5		Silt, moist, stiff, olive gray.
			SP/ SM	Sand, with silt, trace gravel to 3/4" diameter, poorly graded, moist, loose to medium dense.
6/5/2		10		
			ML/ MH to CL/ CH	Clayey silt to silty clay, trace sand, trace caliche, moist to saturated below 16', firm to stiff, dark gray.
2/4/4	▽	15		
		20	CL	Clay, grayish brown.

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian S. L.	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW1	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
6/11/13		25 30 35 40	CL/ CH	Clay, with sand, trace gravel to 1/2" diameter, trace rootlets, very moist to saturated, very stiff, grayish brown.
				TOTAL DEPTH: 25'

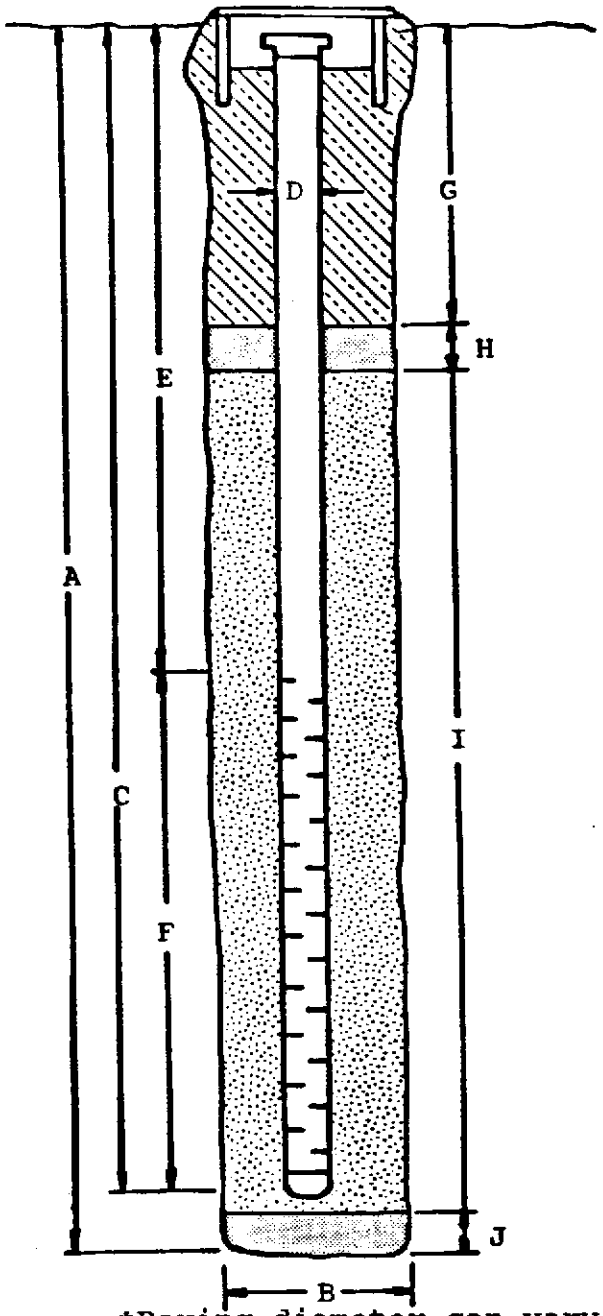
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal 15599 Hesperian San Leandro BORING/WELL NO. MW1

PROJECT NUMBER: KEI-P90-1003

WELL PERMIT NO.:

Flush-mounted Well Cover



A. Total Depth: 25'

B. Boring Diameter*: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 25'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375" ID = 2.067"

E. Depth to Perforations: 10'

F. Perforated Length: 15'

Perforation Type: Machined Slot

Perforation Size: 0.010"

G. Surface Seal: 6'

Seal Material: Concrete

H. Seal: 2'

Seal Material: Bentonite

I. Gravel Pack: 17'

Pack Material: RMC Lonestar Sand

Size: #2/16

J. Bottom Seal: None

Seal Material: N/A

*Boring diameter can vary from 8-1/4" to 9" depending on bit wear.

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian S. L.	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW2	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		Asphalt pavement over sand and gravel. Fill material consisting of clay with gravel and sand, trace silt, moist, firm, brown, gravel to 2-1/2" diameter.
4/5/6		5	CL/ CH	Silty clay, trace sand, moist, stiff, greenish gray with slight grayish brown, mottling.
				Clay, with silt, trace sand, moist, firm, dark gray to dark greenish gray.
3/4/4		10	SP	Sand, trace silt, sand is predominantly fine-grained, moist, loose, dark greenish gray.
			CL/ CH	Silty clay, trace sand, moist, firm, dark gray.
2/3/4		15		
3/4/5	▽		SC	Clayey sand, trace gravel to 1/2" diameter, saturated below 17.5', loose, dark grayish brown.
		20	CL	Clay, very dark grayish brown.

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian S. L.	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW2	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
3/4/6		25	CL/ CH	Clay, trace silt, trace sand, trace rootlets, porous, moist, stiff, very dark grayish brown.
		30		
		35		
		40		TOTAL DEPTH: 25'

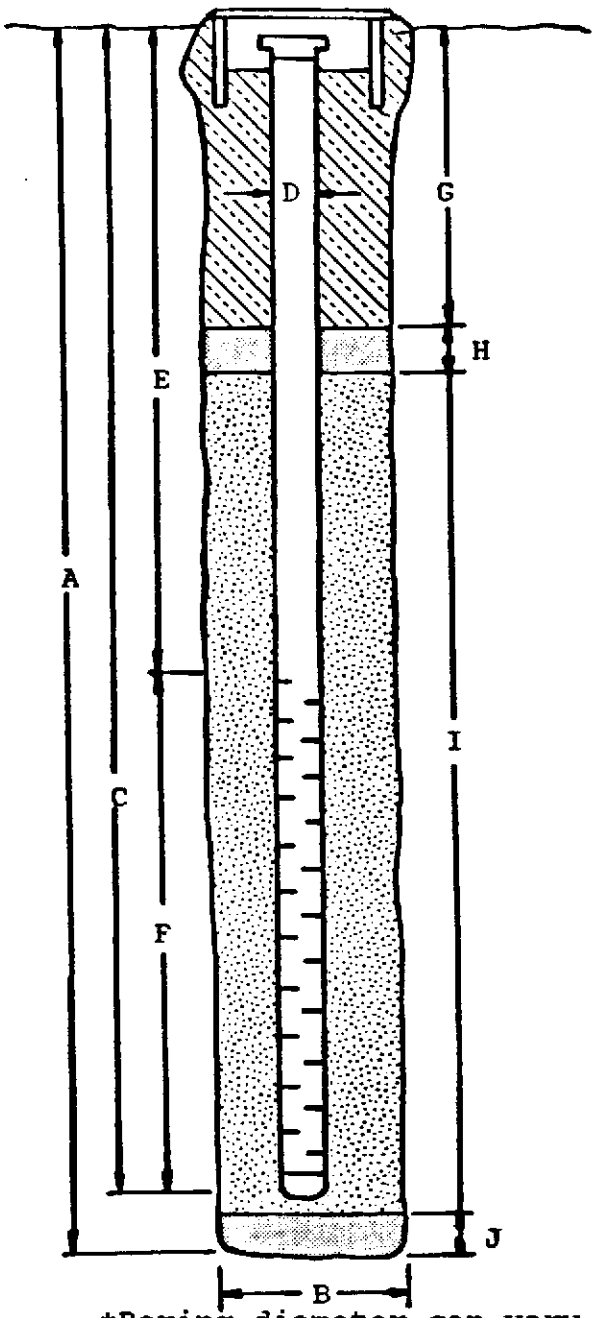
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal 15599 Hesperian San Leandro BORING/WELL NO. MW2

PROJECT NUMBER: KEI-P90-1003

WELL PERMIT NO.:

Flush-mounted Well Cover



A. Total Depth: 25'

B. Boring Diameter*: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 25'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375" ID = 2.067"

E. Depth to Perforations: 10'

F. Perforated Length: 15'

Perforation Type: Machined Slot

Perforation Size: 0.010"

G. Surface Seal: 6'

Seal Material: Concrete

H. Seal: 2'

Seal Material: Bentonite

I. Gravel Pack: 17'

Pack Material: RMC Lonestar Sand

Size: #2/16

J. Bottom Seal: None

Seal Material: N/A

*Boring diameter can vary from 8-1/4" to 9" depending on bit wear.

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian San L	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW3	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		Asphalt pavement over sand and gravel. Fill material consisting of silty clay with gravel to 2-1/2" diameter, moist, firm, gray to brown.
			CL/ CH	
			MH	Silt, with clay, trace sand, moist, firm to soft, very dark gray.
2/2/2		5		
			CL/ CH	Silty clay, moist, soft, gray to greenish gray, trace rootlets.
			ML/ MH	Silt and clayey silt, moist, firm, greenish gray, trace caliche.
3/3/4		10		
				Clayey silt, trace sand, trace root-lets, moist, firm, very dark gray.
2/3/4		15		
3/4/4	▽		SC	Clayey sand, with silt, trace gravel to 3/8" diameter, saturated below 18', free product present, firm to stiff, dark gray.
		20		Silt, greenish gray.
			ML	

BORING LOG

Project No.	Boring & Casing Diameter	Logged By
KEI-P90-1003	9" 2"	W.W.
Project Name Unocal 15599 Hesperian San L	**Well Cover Elevation**	**Date Drilled** 4/22/91
Boring No. MW3	**Drilling Method** Hollow-stem Auger	**Drilling Company** EGI

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
			ML/MH	Clayey silt, saturated, porous, greenish gray.
5/7/8				Clay, trace sand and rootlets, moist, stiff, very dark gray and very dark grayish brown mottled.
4/5/6			CL/CH	Clay, trace sand and rootlets, moist, stiff, gray to dark gray.
		25		
		30		
		35		
		40		TOTAL DEPTH: 25'

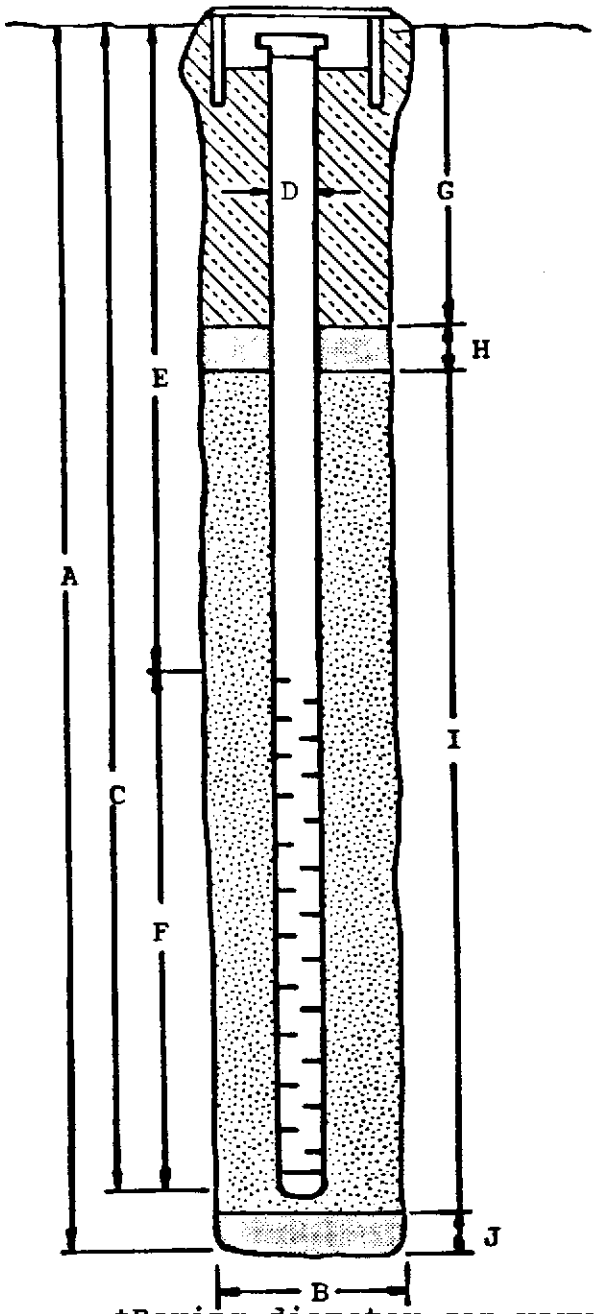
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal 15599 Hesperian San Leandro BORING/WELL NO. MW3

PROJECT NUMBER: KEI-P90-1003

WELL PERMIT NO.:

Flush-mounted Well Cover



A. Total Depth: 25'

B. Boring Diameter*: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 25'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375" ID = 2.067"

E. Depth to Perforations: 10'

F. Perforated Length: 15'

Perforation Type: Machined Slot

Perforation Size: 0.010"

G. Surface Seal: 6'

Seal Material: Concrete

H. Seal: 2'

Seal Material: Bentonite

I. Gravel Pack: 17'

Pack Material: RMC Lonestar Sand

Size: #2/16

J. Bottom Seal: None

Seal Material: N/A

*Boring diameter can vary from 8-1/4" to 9" depending on bit wear.

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 15599 Hesperian Blvd., San Leandro	Sampled:	May 4, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	May 8, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	May 16, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	105-0258 AB	Reported:	May 22, 1991

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)
105-0258 AB	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
105-0259 AB	MW-2	N.D.	N.D.	N.D.	N.D.	N.D.
105-0260 AB	MW-3	34,000	6,100	32	1,200	6,100
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

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 15599 Hesperian Blvd., San Leandro	Sampled: - - - - - -
P.O. Box 996	Sample Descript.:	D I Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	EPA 5030/ 8015/8020	Analyzed: May 16, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	- - - - - -	Reported: May 22, 1991

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

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Low to Medium Boiling Point Hydrocarbons	30	N.D.
Benzene	0.30	N.D.
Toluene	0.30	N.D.
Ethyl Benzene	0.30	N.D.
Xylenes	0.30	N.D.

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.

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Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 15599 Hesperian Blvd., San Leandro
QC Sample Group: 1050258-60
Reported: May 22, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	J. Fontecha	J. Fontecha	J. Fontecha	J. Fontecha
Reporting Units:	ppb	ppb	ppb	ppb
Date Analyzed:	May 16, 1991	May 16, 1991	May 16, 1991	May 16, 1991
QC Sample #:	105-0092	105-0092	105-0092	105-0092
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	21	20	21	61
Matrix Spike % Recovery:	110	100	110	100
Conc. Matrix Spike Dup.:	21	20	21	62
Matrix Spike Duplicate % Recovery:	110	100	110	100
Relative % Difference:	0	0	0	1.6

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

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

Client Project ID: Unocal, 15599 Hesperian Blvd., San Leandro
QC Sample Group: 1050258-60
Reported: May 22, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	J. Fontecha	J. Fontecha	J. Fontecha	J. Fontecha
Reporting Units:	ppb	ppb	ppb	ppb
Date Analyzed:	May 16, 1991	May 16, 1991	May 16, 1991	May 16, 1991
Sample #:	105-0258	105-0259	105-0260	Blank
Surrogate % Recovery:	94	92	97	100

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 / San Leandro
15599 Hesperian

ANALYSES REQUESTED: TPHG, BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG, BTXE	ANALYSES REQUESTED	REMARKS
MW-1	5/4/91	11:35		✓	✓		2	MW	✓	8015/8020 DB	VOA's preserved
MW-2	"	10:30		✓	✓		2	"	✓	259	
MW-3	"	10:30		✓	✓		2	"	✓	260	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	5/6/91 14:30	[signature]
[signature]	5/8/91 1555	
	5/6/91 1530	[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	Title	Date
BS	Lab	5/6/91

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 15599 Hesperian Blvd., San Leandro	Sampled:	Apr 22, 1991
P.O. Box 996	Matrix Descript:	Soil	Received:	Apr 24, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Apr 29, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	104-0852	Reported:	May 3, 1991

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
104-0852	MW1(5)	N.D.	N.D.	N.D.	N.D.	0.012
104-0853	MW1(10)	N.D.	N.D.	N.D.	N.D.	N.D.
104-0854	MW1(16)	1.5	N.D.	N.D.	N.D.	N.D.
104-0855	MW2(5)	4.5	0.015	N.D.	0.034	0.079
104-0856	MW2(10)	6.8	0.025	N.D.	0.035	0.043
104-0857	MW2(15.5)	N.D.	N.D.	N.D.	N.D.	N.D.
104-0858	MW2(17)	N.D.	0.014	N.D.	N.D.	N.D.
104-0859	MW3(5)	2.0	0.025	N.D.	N.D.	0.011
104-0860	MW3(10)	N.D.	0.018	N.D.	N.D.	N.D.
104-0861	MW3(15)	4,800	23	9.1	63	290
104-0862	MW3(17.5)	1000	8.4	4.6	17	64
Detection Limits:		**1.0**	**0.0050**	**0.0050**	**0.0050**	**0.0050**

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

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 15599 Hesperian Blvd., San Leandro	
P.O. Box 996	Sample Descript.:	Matrix Blank	
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:
Attention: Mardo Kaprealian, P.E.	Q.C. Sample Grou	1040852-62	Reported: May 3, 1991

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

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Low to Medium Boiling Point Hydrocarbons	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	**0.0050**	**0.0064**
Xylenes	0.0050	N.D.

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.

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Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 15599 Hesperian Blvd., San Leandro
QC Sample Group: 1040852-62
Reported: May 3, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton
Reporting Units:	µg/kg	µg/kg	µg/kg	µg/kg
Date Analyzed:	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991
QC Sample #:	104-0853	104-0853	104-0853	104-0853
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.40	0.40	0.40	1.2
Conc. Matrix Spike:	0.42	0.38	0.38	1.2
Matrix Spike % Recovery:	110	95	95	100
Conc. Matrix Spike Dup.:	0.42	0.40	0.38	1.2
Matrix Spike Duplicate % Recovery:	110	100	95	100
Relative % Difference:	0	5.1	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

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

Client Project ID: Unocal, 15599 Hesperian Blvd., San Leandro
QC Sample Group: 1040852-62
Reported: May 3, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton
Reporting Units:	µg/lg	µg/lg	µg/lg	µg/lg	µg/lg	µg/lg	µg/lg
Date Analyzed:	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991
Sample #:	104-0852	104-0853	104-0854	104-0855	104-0856	104-0857	104-0858
Surrogate % Recovery:	99	95	96	82	74	95	94

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

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

Client Project ID: Unocal, 15599 Hesperian Blvd., San Leandro
QC Sample Group: 1040852-62

Reported: May 3, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton
Reporting Units:	µg/lg	µg/lg	µg/lg	µg/lg	µg/lg
Date Analyzed:	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991	Apr 29, 1991
Sample #:	104-0859	104-0860	104-0861	104-0862	Blank
Surrogate % Recovery:	98	97	97	94	95

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: Wade Weston

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal - San Leandro, 15599 Hesperian Blvd.

ANALYSES REQUESTED: TPH-G/BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW1-(5)	4/22/91		✓		✓		1	See Sample ID #	1040852
MW1-(10)	"		✓		✓		1		853
MW1-(16)	"		✓		✓		1		854
MW2-(5)	"		✓		✓		1		855
MW2-(10)	"		✓		✓		1		856
MW2-(15.5)	"		✓		✓		1		857
MW2-(17)	"		✓		✓		1		858
MW3-(5)	"		✓		✓		1		859
MW3-(10)	"		✓		✓		1		860

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Wade Weston	4/19/91 8:[illegible]	[signature]
[signature]	4/24/91 9:10	[signature]
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? 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; PM — Title; 4/24/91 — Date

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Wade Weston
WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal- San Leandro
15599 Hesperian Blvd

ANALYSES REQUESTED: TPH-G/BTXE

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW3-(15)	4/23/91		✓		✓		1	See Sample ID*	10408601
MW3-(17.5)	"		✓		✓		1	↓	862

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Wade Weston	4/24/91 8:15	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	4/24/91 910	
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? Yes
2. Will samples remain refrigerated until analyzed? Yes
3. Did any samples received for analysis have head space? n/a
4. Were samples in appropriate containers and properly packaged? Yes

Signature | Title: PM | Date: 4/24

HEPORT.XLS <1>