KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
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91 FEB 8 AM 10:57

February 7, 1991

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

Attention: Mr. ~~Gil Wistar~~ PS

RE: Unocal Service Station #5781
3535 Pierson Street
Oakland, California

Dear Mr. Wistar:

Per the request of Mr. Rick Sisk of Unocal Corporation, enclosed please find our report and proposal, both dated January 21, 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

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
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KEI-P89-1204.R8
January 21, 1991

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

Attention: Mr. Rick Sisk

RE: Preliminary Ground Water Investigation at
Unocal Service Station #5781
3535 Pierson Street
Oakland, California

Dear Mr. Sisk:

This report presents the results of Kaprealian Engineering, Inc's. (KEI) soil and ground water investigation for the referenced site in accordance with proposal KEI-P89-1204.P3 dated August 23, 1990. The purpose of the investigation was to begin to determine the degree of any 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 one boring for the installation of one monitoring well.

Soil sampling.

Ground water monitoring, purging and sampling.

Laboratory analyses.

Data analysis, interpretation and report preparation.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The station occupies the northwest corner at the intersection of Pierson Street with MacArthur Boulevard in Oakland, California. In addition, the site is situated southwest of and adjacent to the Highway 580 off-ramp for MacArthur Boulevard. The site is located near the base of a east-northeast trending hillside area on relatively gently sloping developed property. Also, a City sewer easement crosses the west corner of the subject site as shown on the attached Site Plans, Figures 2 and 3. Based on review of the

City of Oakland Public Works utility maps, the sewer pipeline which crosses the western corner of the site has a flow line (bottom inside of pipeline) at the northwest perimeter of the site of approximately 146.5 feet (Mean Sea Level) with a flow line near the southwest perimeter of the site at approximately 142.5 feet (Mean Sea Level). A Location Map and Site Plans are attached to this report.

KEI's initial field work was conducted on December 14, 1989, when three underground storage tanks were removed from the site. The tanks consisted of two 10,000 gallon fuel storage tanks, and one 280 gallon waste oil tank. The fuel tanks were made of steel and no apparent holes or cracks were observed. However, the waste oil tank had one hole of approximately 1.25 square inches.

Three soil samples, labeled A1, B1, and A2/B2, were collected from beneath the fuel tanks at a depth of about 12.5 feet. In addition, two soil samples, labeled SW1 and SW2, were collected from the fuel tank pit sidewall samples at a depth of 10.5 feet. The fuel tank pit sidewall samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline and benzene, toluene, xylenes and ethylbenzene (BTX&E). The samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California. The analytical results of soil samples collected from the fuel tank pit indicated levels of TPH as gasoline ranging from non-detectable to 46 ppm, with non-detectable levels of BTX&E in all samples, except for samples A2/B2 and SW2, which showed benzene levels at 0.10 ppm and 0.65 ppm, respectively.

Also on December 14, 1989, one soil sample, labeled WO1, was collected from beneath the waste oil tank at a depth of 6 feet. The waste oil tank pit sample was analyzed by Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline, BTX&E, TPH as diesel, total oil and grease (TOG), EPA method 8010 compounds and metals - cadmium, chromium, lead and zinc. The analytical results of soil sample WO1 indicated TPH as gasoline at 670 ppm, 5.4 ppm benzene, TPH as diesel at 8,300 ppm and TOG at 48,000 ppm. EPA method 8010 results showed 1,2-dichlorobenzene at 10 ppb, tetrachloroethene at 77 ppb, and 1,1,1-trichloroethane at 15 ppb. Metals concentrations were as follows: cadmium was non-detectable; chromium was 8.3 ppm, lead was 340 ppm, and zinc was 70 ppm.

On January 17, 1990, two soil samples, labeled P1 and P2, were collected from beneath the product pipe trenches at depths of 5.5 to 6 feet. Analytical results of these samples by Sequoia Analytical indicated non-detectable levels of TPH as gasoline and BTX&E constituents for both samples.

Based on the analytical results, KEI recommended further soil excavation in the area of the waste oil tank, and the installation of three monitoring wells at the site, to begin to define the vertical extent of soil contamination, to determine the ground water flow direction, and to determine if the ground water had been impacted. Documentation of the soil sampling activities are presented in KEI's report (KEI-J89-1204.R2) dated February 9, 1990. The results of the analyses for the soil samples collected from underground storage tanks and from pipe trenches are summarized in Table 4, and sample collection locations are shown on the attached Site Plan, Figure 1.

On February 22, 1990, KEI returned to the site to collect additional soil samples from the excavated waste oil tank pit. On this date, one soil sample, labeled WO1(16), was collected from beneath the waste oil tank at a depth of 16 feet. In addition, four soil samples, labeled SWA through SWD, were collected from the sidewalls of the waste oil tank pit excavation at depths of 9 to 10 feet. The lateral excavation was terminated due to the presence of underground sewer and gas lines on the south and west sides, and the existing building on the north side. A 12-inch diameter conductor casing was installed in the excavation at sample location WO1(16) prior to backfilling. All soil samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California for TPH as gasoline, BTX&E, TPH as diesel, TOG, and EPA method 8010 compounds. Analytical results of sidewall soil sample SWB indicated non-detectable levels of all constituents analyzed, except for TPH as gasoline, which was 2.0 ppm. Analytical results of the soil sample, WO1(16), collected from the bottom of the excavation at a depth of 16 feet, indicate levels of TPH as gasoline at 15 ppm with 0.06 ppm benzene, 74 ppm TPH as diesel, 910 ppm TOG, and non-detectable levels of all EPA method 8010 compounds. Analytical results of the remaining three sidewall samples, SWA, SWC and SWD, showed levels of TOG ranging from 4,100 ppm to 17,000 ppm, TPH as diesel ranging from 360 ppm to 1,400 ppm, TPH as gasoline ranging from 40 ppm to 220 ppm, benzene levels ranging from 0.31 to 2.3 ppm and non-detectable levels of all EPA method 8010 compounds except tetrachloroethene, which ranged from 40 ppb to 160 ppb. Sample SWD also showed 1,1,1-trichloroethane at 5.8 ppb. The results of the additional soil sampling activities are presented in KEI's report (KEI-P89-1204.R3) dated March 30, 1990. The analytical results of the soil samples, collected from the waste oil tank pit, are summarized in Table 5, and the locations of soil samples are shown on the attached Site Plan, Figure 2.

On April 9 and 10, 1990, three eight-inch diameter exploratory borings (designated as MW1, MW2 and MW3 on the attached Site Plan, Figure 3) were drilled at the site. The borings were drilled to total depths ranging from 40 to 50 feet. Ground water was not encountered during drilling activities. The borings were observed for ground water accumulation for a period of up to 15 hours prior to backfilling with neat cement. The borings were not converted to monitoring wells because ground water was not encountered.

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. In addition, samples collected from MW1 were analyzed for TPH as diesel by EPA method 3550 in conjunction with modified 8015, for TOG by EPA 418.1 with clean up, and for EPA method 8010 compounds.

Analytical results of all of the soil samples, collected from the borings (MW1, MW2 and MW3), indicated non-detectable levels of TPH as gasoline and BTX&E in all soil samples. In boring MW1, TPH as diesel, TOG and EPA 8010 compounds were non-detectable in all samples. Results of the soil analyses are summarized in Table 6.

Due to the confirmed soil contamination in the vicinity of the waste oil tank pit, and in order to determine the lateral and vertical extent of the soil contamination, KEI recommended that three additional exploratory borings be drilled closely adjacent to the former waste oil tank pit to a maximum depth of 50 feet. Details of the exploratory boring drilling and sampling activities are summarized in KEI's report (KEI-P89-1204.R6) dated May 21, 1990.

On July 5 and 6, 1990, two exploratory borings (designated as EB1 and EB2 on the attached Site Plan, Figure 3) were drilled at the site. A third proposed boring could not be drilled, as originally proposed within the conductor casing in the waste oil tank pit, due to drill rig access limitation with the roof overhang.

The two borings were drilled to depths of 34.5 to 38 feet. Ground water was encountered at depths of 33.5 to approximately 36.7 feet beneath the surface. Drilling was stopped about 1 to 1.5 feet after intersecting the first water table, and water samples were collected from each of the borings. After the water samples were collected, the borings were backfilled to the surface using a 9-sack sand slurry.

Samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California. Water and selected soil samples collected from borings EB1 and EB2 were analyzed for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, for TPH as diesel by EPA method 3550 in conjunction with modified 8015, BTX&E using EPA method 8020, TOG by methods 503D&E and 503A&E, and purgeable halocarbons by EPA method 8010. The results of soil analyses are summarized in Table 7, and the results of the water analyses are summarized in Table 8.

Analytical results of the soil samples collected from borings EB1 and EB2 showed non-detectable levels of TPH as gasoline, TPH as diesel and benzene in all soil samples, except EB2(9.5), which showed a level of TPH as gasoline at 1.2 ppm, and sample EB2(12.5), which showed a level of benzene at 0.0090 ppm. Also, TOG and EPA method 8010 compounds were non-detectable, except for sample EB1(28.5), which showed 6.2 ppb of 1,1,1-trichloroethane.

Analytical results of the water samples, collected from borings EB1 and EB2, showed non-detectable levels of TPH as gasoline, TPH as diesel, benzene, TOG, and EPA method 8010 compounds, except in sample EB1 which showed a level of TPH as diesel at 6.7 ppb, and sample EB2 which showed a level of benzene at 0.61 ppb.

Based on the analytical results, KEI concluded that soil contamination previously identified in the waste oil tank pit was very isolated. However, because ground water was encountered in borings EB1 and EB2, KEI recommended that one monitoring well be installed to determine if the ground water had been impacted at the site. Results of the supplementary subsurface investigation are presented in KEI's report (KEI-P89-1204.R7) dated August 23, 1990.

FIELD ACTIVITIES

On December 11, 1990, one two-inch diameter monitoring well (designated as MWA on the attached Site Plan, Figure 3) was installed at the site. The well was drilled, constructed and completed in accordance with the guidelines of the Regional Water Quality Control Board (RWQCB), and 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 one well was drilled and completed to a total depth of 45 feet. Ground water was encountered at a depth of 33 feet beneath the surface during drilling. Soil samples were obtained at a maximum spacing of 5 foot intervals, significant changes in lithology,

obvious areas of contamination, and at or within the soil/ground water interface beginning at a depth of approximately 5 feet below grade and continuing until the boring was terminated at a depth of 45 feet. The undisturbed soil samples were taken by driving a California-modified split-spoon sampler ahead of the drilling augers. The two-inch diameter brass liners holding the samples were sealed with aluminum foil, plastic caps and tape, and stored in a cooled ice chest for delivery to a certified laboratory. The well casing was installed with a watertight cap and padlock. A round, watertight, flush-mounted well cover was cemented in place over the well casing.

The well was developed on December 13, 1990. Prior to development, the well was checked for depth to water table using an electronic sounder, presence of free product (using paste tape) and sheen. No free product or sheen was noted in the well. After recording the monitoring data, the well was purged with a surface pump of 30 gallons until the evacuated water was clear and free of suspended sediment. Monitoring and well development data are summarized in Table 1.

The well was sampled on December 18, 1990. Prior to sampling, monitoring data was collected, the well was purged of 15 gallons, and water samples were then collected using a clean Teflon bailer. The samples were decanted into clean glass VOA vials, sealed with Teflon-lined screw caps, and labeled and stored on ice until delivery to a certified laboratory.

ANALYTICAL RESULTS

Water and one soil sample from a depth of 32.5 feet below grade (at the soil/ground water interface) were analyzed at Sequoia Analytical Laboratory in Concord, California. All samples analyzed were accompanied by properly executed Chain of Custody documentation. The soil and water samples were analyzed for TPH as gasoline by EPA method 5030 in conjunction with modified 8015, BTX&E by EPA method 8020, TPH as diesel using EPA methods 3550 (soil) and 3510 (water) in conjunction with modified 8015, TOG by SM 503A&E/503D&E, and for chlorinated solvents (halogenated volatile organics) using EPA method 8010.

The analytical results of the soil sample (MWA{32.5}) show non-detectable levels of TPH as gasoline, TPH as diesel, BTX&E and all halogenated volatile organics. However, TOG was detected in the soil sample collected from the soil/ground water interface at a level of 36 ppm. Since well MWA was drilled within 8 feet laterally of boring EB1, of which soil samples were previously analyzed from 8.5 feet to 28.5 feet, additional soil samples from

this interval were not analyzed. The analytical results of the water sample collected from monitoring well MWA show non-detectable levels of TPH as gasoline, BTX&E, TOG and all halogenated volatile organics. However, TPH as diesel was detected at a level of 73 ppb. Results of the soil analyses are summarized in Table 3, and 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 well at a depth of 19.40 feet below the surface. Ground water was not encountered during drilling activities until a depth of 33 feet below grade indicating a confined ground water table. However, it should be pointed out that ground water was not encountered during drilling of borings MW1, MW2 or MW3, which were drilled to depths of between 40 and 50 feet below grade. Also, ground water was encountered in boring EB1 at a depth of 33.5 feet (drilled approximately 8 feet laterally from MWA) and was encountered in boring EB2 at a depth of 37.7 feet. Also, ground water was only encountered at the site in the area located approximately due west of the City of Oakland sewer pipeline easement, which crosses the western corner of the subject site. The significance of the sewer pipeline and the limited area of encountered ground water is unclear at this time.

Based on review of regional geologic maps ("Areal and Engineering Geology of the Oakland East Quadrangle, California" by Dorothy H. Radbruch (1969) in U.S.G.S. Map GQ-769; and "Map Showing Recently Active Breaks Along the Hayward Fault Zone and the Southern Part of the Calaveras Fault Zone, California" by Dorothy H. Radbruch-Hall (1974) in U.S.G.S. Map I-813), the subject site is underlain by undivided Quaternary deposits (Qu) and is closely adjacent to a mapped geologic contact with the upper member of the Quaternary San Antonio Formation (Qsu). In addition, the site is situated approximately 1,200 to 2,800 feet southwest of mapped splays of the active Hayward Fault Zone.

The results of our previous subsurface studies indicate that the site is generally underlain by very stiff clay and silty clay to the maximum depth explored (50 feet). Locally, interbedded zones of clayey gravel, well-to-poorly-graded gravel, clayey sand, and silt beds were encountered in each boring to depths below grade of about 22-1/2, 20 and 14-1/2 feet in borings MW1, MW2 and MW3, respectively, and extending to depths of only 6 and 5 feet in borings EB1 and EB2, respectively. However, in boring EB2, a clayey silt bed was encountered between depths of 29.5 to about 34.5 feet, and is inturn underlain by a clayey sand bed to the maximum depth explored (38 feet).

The results of our recent subsurface study (log of boring for well EBA) indicates that the vicinity of EBA is underlain by silty clay and clayey silt materials to a depth of approximately 41 feet below grade. This thick zone of fine-grained materials is inturn underlain by a well-graded saturated sand layer, which is approximately 2 feet thick, and which is underlain by clayey silt to the maximum depth explored (45 feet).

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results, KEI recommends implementation of a monitoring and sampling program. The well should be monitored on a monthly basis. In addition, the well should be purged and sampled on a quarterly basis. The proposed program should be conducted for a period of 12 months. 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. Our proposal for this work is attached for your consideration.

DISTRIBUTION

A copy of this report should be sent to the Alameda County Health Care Services, the Alameda County Flood Control and Water Conservation District, and to the RWQCB, San Francisco Bay Region.

LIMITATIONS

Soil deposits and rock formations may vary in thickness, lithology, saturation, strength and other properties across any site. In addition, environmental changes, either naturally-occurring or artificially-induced, may cause changes in the extent and concentration of any contaminants. Our studies assume that the field and laboratory data are reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

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

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

Sincerely,

Kaprealian Engineering, Inc.

Don R. Braun
Certified Engineering Geologist

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

Thomas J. Berkins
Senior Environmental Engineer

Mardo Kaprealian
President

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Attachments: Tables 1 through 8
Location Map
Site Plans - Figures 1 through 3
Boring Log
Laboratory Results
Chain of Custody documentation
Proposal

KEI-P89-1204.R8
January 21, 1991

TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Elevation of Surface of Well Cover	Depth to Water (feet)	Elevation of Water Table	Product Thickness	Sheen	Gallons Pumped
(Monitored and Developed on December 13, 1990)						
MWA	N/A	24.00	N/A	0	None	30
(Monitored and Sampled on December 18, 1990)						
MWA	N/A	19.40	N/A	0	None	15

N/A = Not applicable.

KEI-P89-1204.R8
January 21, 1991

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected on December 18, 1990)

Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
MWA*	73	ND	ND	ND	ND	ND
Detection Limits	50	30	0.3	0.3	0.3	0.3

* TOG and halogenated volatile organics (EPA method 8010) were non-detectable.

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on December 11, 1990)

Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
MWA(32.5)*	32.5	ND	ND	ND	ND	ND	ND
Detection Limits		1.0	1.0	0.0050	0.0050	0.0050	0.0050

* TOG was 36 ppm and all halogenated volatile organics per EPA method 8010 were non-detectable.

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on December 14, 1989 & January 17, 1990)

Sample	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
A1	12.5	3.5	ND	ND	ND	ND
B1	12.5	ND	ND	ND	ND	ND
A2/B2	12.5	5.8	0.10	ND	ND	ND
SW1	10.5	15	ND	ND	ND	ND
SW2	10.5	46	0.65	ND	ND	ND
P1	5.5	ND	ND	ND	ND	ND
P2	6.0	ND	ND	ND	ND	ND
WO1*	6	670	5.4	15	17	2.3
Detection Limits		1.0	0.05	0.1	0.1	0.1

* All EPA method 8010 compounds were non-detectable, except 1,2-dichlorobenzene at 10 ppb, tetrachloroethene at 77 ppb, and 1,1,1-trichloroethane at 15 ppb. Metals concentrations were as follows: cadmium non-detectable, chromium 8.3 ppm, lead 340 ppm, and zinc 70 ppm. TPH as diesel showed 8,300 ppm, and TOG showed 48,000 ppm.

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on February 22, 1990)

Sample	Depth (feet)	TOG	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
WO1(16)*	16.0	910	74	15	0.060	ND	2.0	0.10
SWA**	9.0	17,000	1,400	220	2.3	2.1	23	7.3
SWB*	10.0	ND	ND	2.0	ND	ND	ND	ND
SWC***	10.0	4,100	460	63	0.31	0.33	2.2	1.3
SWD+	10.0	6,400	360	40	0.32	ND	4.0	0.49
Detection Limits		50	1.0	1.0	0.05	0.10	0.10	0.10

* All EPA method 8010 compounds were non-detectable.

** All EPA method 8010 compounds were non-detectable, except tetrachloroethene at 160 ppb.

*** All EPA method 8010 compounds were non-detectable, except tetrachloroethene at 56 ppb.

\+ All EPA method 8010 compounds were non-detectable, except tetrachloroethene at 40 ppb and 1,1,1-trichloroethane at 5.8 ppb.

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 6

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on April 9 & 10, 1990)

Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
MW1(5)*	5	ND	ND	ND	ND	ND	ND
MW1(9.5)*	9.5	ND	ND	ND	ND	ND	ND
MW1(15)*	15	ND	ND	ND	ND	ND	ND
MW1(20)*	20	ND	ND	ND	ND	ND	ND
MW1(25)*	25	ND	ND	ND	ND	ND	ND
MW1(30)*	30	ND	ND	ND	ND	ND	ND
MW1(35)*	35	ND	ND	ND	ND	ND	ND
MW1(40)*	40	ND	ND	ND	ND	ND	ND
MW1(45)*	45	ND	ND	ND	ND	ND	ND
MW1(50)*	50	ND	ND	ND	ND	ND	ND
MW2(5)	5	ND	ND	ND	ND	ND	ND
MW2(10)	9.5	ND	ND	ND	ND	ND	ND
MW2(12)	12	ND	ND	ND	ND	ND	ND
MW2(15)	15	ND	ND	ND	ND	ND	ND
MW2(20)	20	ND	ND	ND	ND	ND	ND
MW2(25)	25	ND	ND	ND	ND	ND	ND
MW2(30)	30	ND	ND	ND	ND	ND	ND
MW2(35)	35	ND	ND	ND	ND	ND	ND
MW2(40)	39.5	ND	ND	ND	ND	ND	ND
MW3(5)	5	ND	ND	ND	ND	ND	ND
MW3(10)	10	ND	ND	ND	ND	ND	ND
MW3(15)	15	ND	ND	ND	ND	ND	ND
MW3(20)	20	ND	ND	ND	ND	ND	ND
MW3(25)	25	ND	ND	ND	ND	ND	ND
MW3(30)	30	ND	ND	ND	ND	ND	ND
MW3(35)	35	ND	ND	ND	ND	ND	ND
MW3(40)	40	ND	ND	ND	ND	ND	ND
Detection Limits		1.0	1.0	0.0050	0.0050	0.0050	0.0050

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

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 7

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on July 5 & 6, 1990)

Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
EB1(8.5)*	ND	ND	ND	0.014	0.0056	ND
EB1(13.5)*	ND	ND	ND	0.015	ND	ND
EB1(18.5)*	ND	ND	ND	0.017	0.024	0.011
EB1(23.5)*	ND	ND	ND	0.011	ND	ND
EB1(28.5)*	ND	ND	ND	0.012	ND	ND
EB2(9.5)*	ND	1.2	ND	0.038	0.016	0.012
EB2(12.5)*	ND	ND	0.0090	0.025	0.0060	ND
EB2(16.5)*	ND	ND	ND	0.021	0.0050	ND
EB2(22)*	ND	ND	ND	0.020	ND	ND
EB2(26.5)*	ND	ND	ND	0.017	ND	ND
EB2(32)	ND	ND	ND	ND	ND	ND
Detection Limits	1.0	1.0	0.0050	0.0050	0.0050	0.0050

* TOG and all EPA 8010 compounds were non-detectable, except 1,1,1-trichloroethane at 6.2 ppb in EB1(28.5).

ND = Non-detectable.

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

KEI-P89-1204.R8
January 21, 1991

TABLE 8

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected on July 6, 1990)

Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
EB1*	6.7	ND	ND	1.5	1.0	ND
EB2*	ND	ND	0.61	1.5	1.0	ND
Detection Limits	50	30	0.3	0.3	0.3	0.3

* TOG and EPA 8010 compounds were non-detectable.

ND = Non-detectable.

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

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
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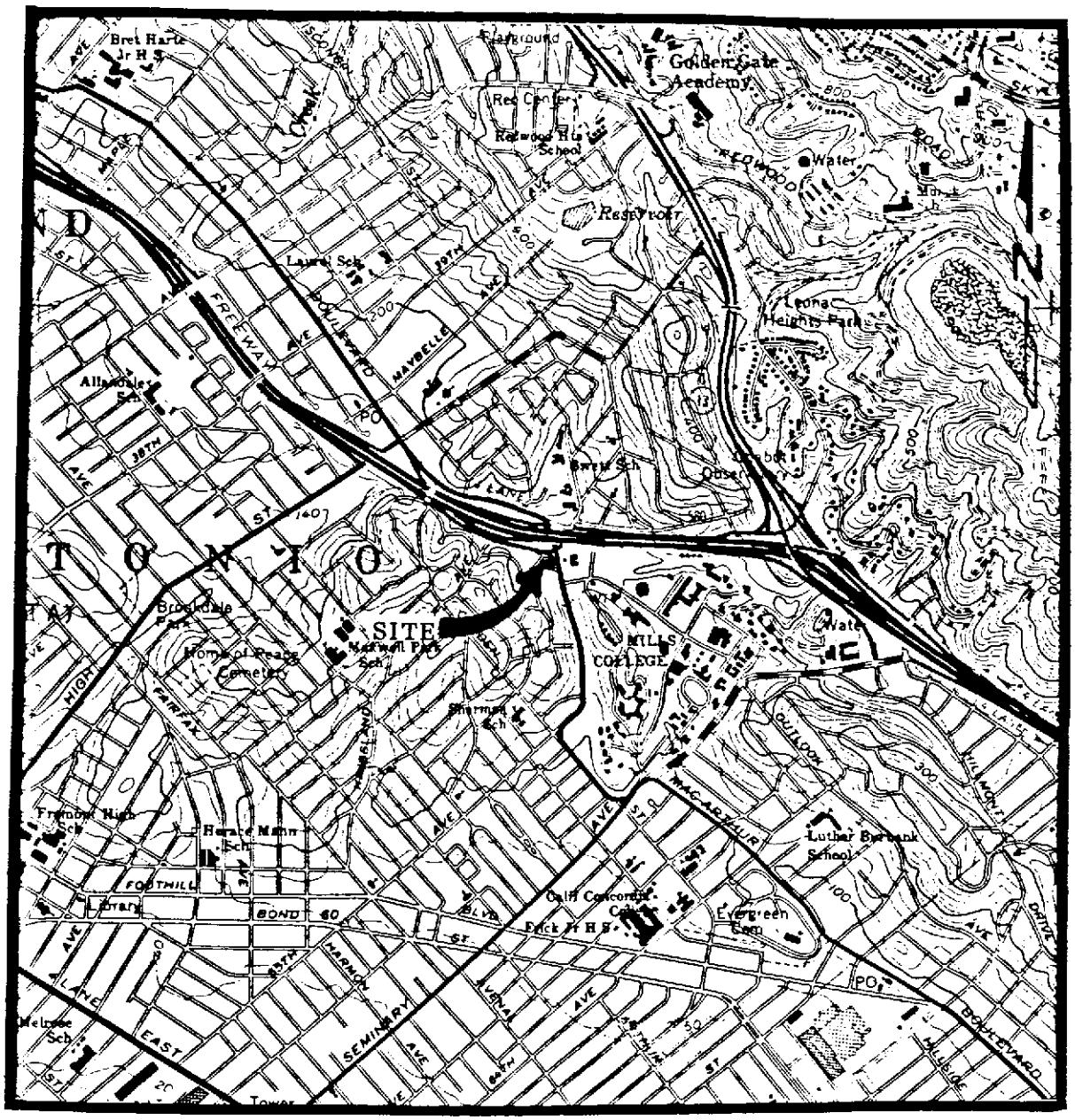

LOCATION MAP

Base from U.S.G.S 7.5 minute Oakland East Quadrangle
(photorevised 1980)

Unocal S/S #5781
3535 Pierson Street
Oakland, CA

KAPREALIAN ENGINEERING, INC.
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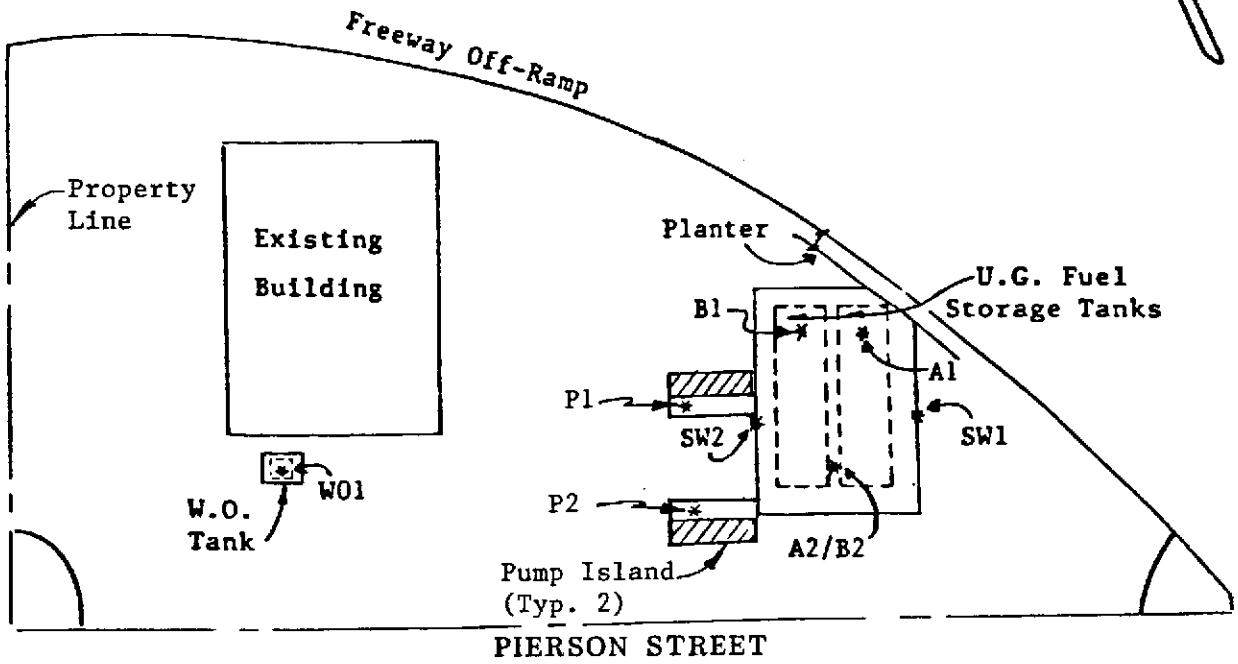
(707) 746-6915 • (707) 746-6916 • FAX: (707) 746-5581



SITE PLAN
Figure 1

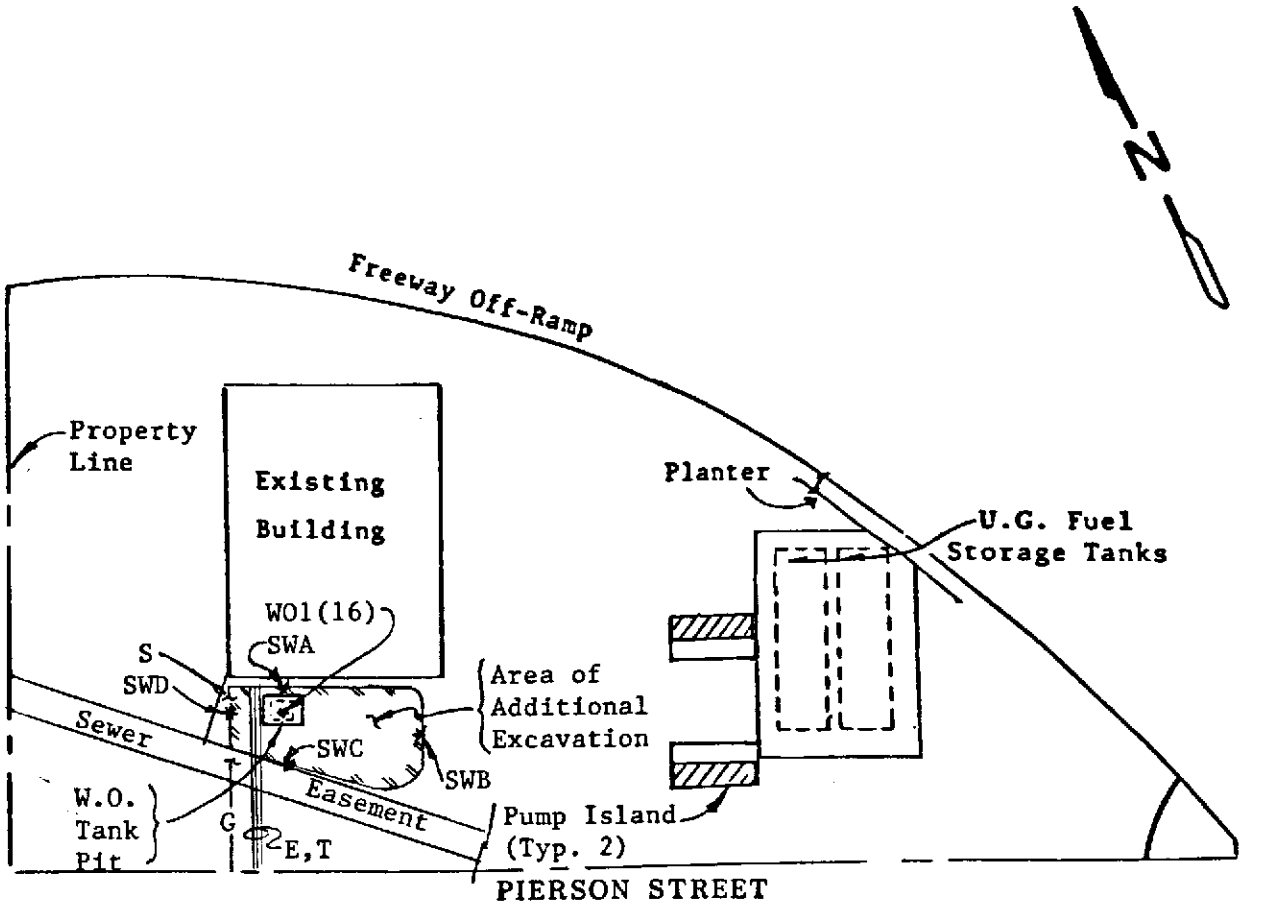
0 30 60
Approx. Scale feet

LEGEND

* Sample Point Location

Unocal S/S #5781
3535 Pierson Street
Oakland, CA

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
E Electrical
T Telephone
G Natural Gas
S Sewer

Unocal S/S #5781
3535 Pierson Street
Oakland, CA

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Consulting Engineers
PO. BOX 996 • BENICIA, CA 94510
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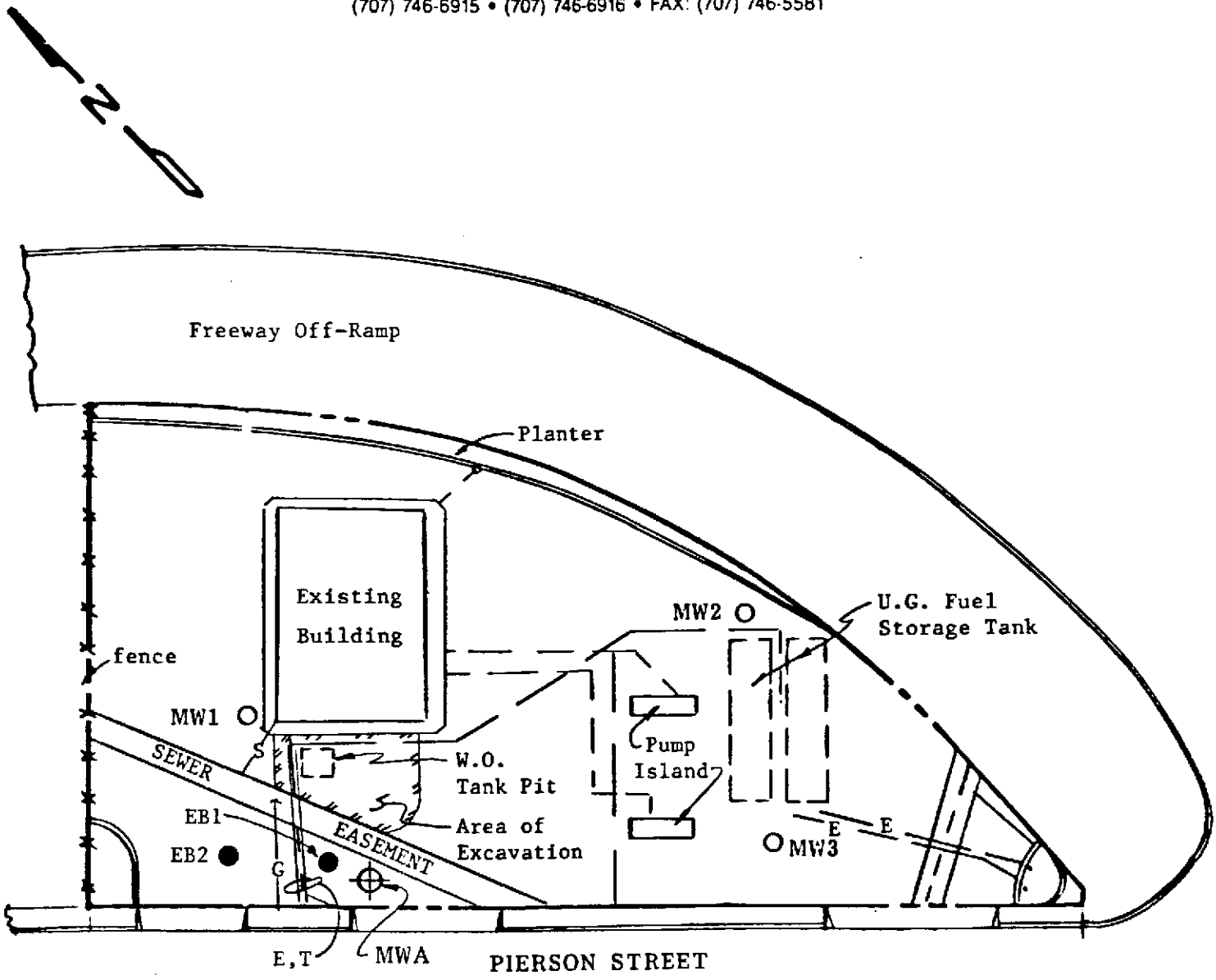


SITE PLAN
Figure 3

0 30 60
Approx. Scale feet

LEGEND

- ● Exploratory Boring (drilled 7/5 & 7/6/90)
- E U.G. Electrical Line
- T U.G. Telephone Line
- G U.G. Natural Gas Line
- S U.G. Sewer Line
- ○ Exploratory Boring (drilled 4/9 & 4/10/90)
- ⊕ Monitoring Well

Unocal Service Station #5781
3535 Pierson Street
Oakland, California

BORING LOG

Project No. KEI-P89-1204	**Boring & Casing Diameter** 9" 2"	**Logged By** W.W. DRB
Project Name Unocal 3535 Pierson St. Oakl	**Well Head Elevation** N/A	**Date Drilled** 12/11/90
Boring No. MWA	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Stratigraphy USCS	Description
		0		Asphalt pavement over sand and gravel.
			CL/ CH	Clay with gravel, gravel to 2-1/2" diameter, 5% sand, moist, yellowish brown. Base of fill.
			ML/ MH	Clayey silt, trace sand, trace fine gravel to 3/8" diameter, moist, firm to stiff, olive brown to olive gray.
		5		
4/4/6			CL/ CH	Clay, with silt, fine- to medium-grained sand, moist, stiff, brown.
		10		
4/9/15				Clay, trace subangular gravel to 3/8" diameter, trace sand, moist, very stiff, olive brown.
		15		
7/13/21				Silty clay, trace organic matter, moist, hard, dark yellowish brown.
			CL/ CH to ML/ MH	Silty clay to clayey silt, trace organic matter, moist, hard, light yellowish brown.
9/15		20		

BORING LOG

Project No. KEI-P89-1204	Boring & Casing Diameter 9" 2"	Logged By W.W.
Project Name Unocal 3535 Pierson St. Oakl	Well Head Elevation N/A	Date Drilled 12/11/90
Boring No. MWA	Drilling Method Hollow-stem Auger	Drilling Company Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
/27			CL/ CH to ML/ MH	Silty clay to clayey silt, trace organic matter, moist, hard, light yellowish brown.
11/18/29		25	ML/ MH	Silt, with clay, trace organic matter, very moist, hard, light yellowish brown.
6/12/20		30		Silt with clay, trace organic matter, moist, very stiff to hard, light olive brown mottled with light yellowish brown.
11/24/28	▼			Free water encountered at 33'.
15/25/38		35		Silt, with clay, trace organic matter, trace fine- to medium-grained sand, moist to very moist, hard, light yellowish brown mottled with yellowish brown.
9/		40		

BORING LOG

Project No. KEI-P89-1204	Boring & Casing Diameter 9" 2"	Logged By W.W.
Project Name Unocal 3535 Pierson St. Oakl	Well Head Elevation N/A	Date Drilled 12/11/90
Boring No. MWA	Drilling Method Hollow-stem Auger	Drilling Company Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
			ML	Silt with clay, as above.
18/26			SW	Sand, well graded, trace silt, saturated, dense, yellowish brown.
15/24/30			ML/MH	Silt with clay, trace organic matter, moist, hard, brown mottled with light yellowish brown.
		45		
		50		
		55		
		60		TOTAL DEPTH: 45'

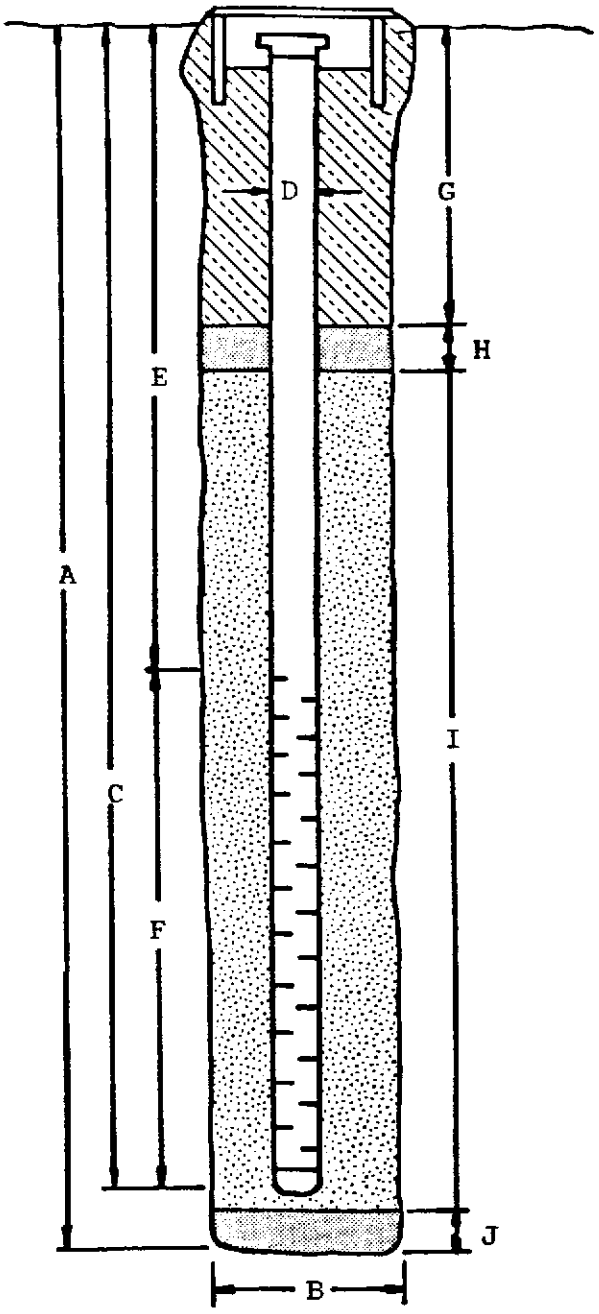
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal 3535 Pierson St. Oakland BORING/WELL NO. MWA

PROJECT NUMBER: KEI-P89-1204

WELL PERMIT NO.:

Flush-mounted Well Cover



A. Total Depth: 45'

B. Boring Diameter*: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 45'

Material: Schedule 40 PVC

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

E. Depth to Perforations: 25'

F. Perforated Length: 20'

Perforation Type: Machined Slot

Perforation Size: 0.010"

G. Surface Seal: 21'

Seal Material: Concrete

H. Seal: 2'

Seal Material: Bentonite

I. Gravel Pack: 22'

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

1900 Bates Avenue • Suite LM • Concord, California 94520
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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 11, 1990
P.O. Box 996	Sample Descript.:	Soil, MWA - (32.5)	Received:	Dec 12, 1990
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 19, 1990
Attention: Mardo Kaprealian, P.E.	Lab Number:	012-0252	Reported:	Dec 28, 1990

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	N.D.
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.

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 11, 1990
P.O. Box 996	Matrix Descript:	Soil	Received:	Dec 12, 1990
Benicia, CA 94510	Analysis Method:	EPA 3550/8015	Extracted:	Dec 26, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #:	012-0252	Analyzed:	Dec 27, 1990
			Reported:	Dec 28, 1990

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons mg/kg (ppm)
012-0252	MWA - (32.5)	N.D.

Detection Limits:	1.0

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.

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Belinda C. Vega
Laboratory Director

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 11, 1990
P.O. Box 996	Matrix Descript:	Soil	Received:	Dec 12, 1990
Benicia, CA 94510	Analysis Method:	SM 503 D&E (Gravimetric)	Extracted:	Dec 18, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #:	012-0252	Analyzed:	Dec 18, 1990
			Reported:	Dec 28, 1990

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/kg (ppm)
012-0252	MWA - (32.5)	36

Detection Limits:	30

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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(415) 686-9600 • FAX (415) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 11, 1990
P.O. Box 996	Sample Descript:	Soil, MWA - (32.5)	Received:	Dec 12, 1990
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	Dec 18, 1990
Attention: Mardo Kaprealian, P.E.	Lab Number:	012-0252	Reported:	Dec 28, 1990

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	5.0	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	25	N.D.
2-Chloroethylvinyl ether	5.0	N.D.
Chloroform	5.0	N.D.
Chloromethane	5.0	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	10	N.D.
1,3-Dichlorobenzene	10	N.D.
1,4-Dichlorobenzene	10	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
Total 1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	10	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

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

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Belinda C. Vega
Laboratory Director

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Wade Weston
WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal - Oakland
3535 Pierson ST.

ANALYSES REQUESTED: TPH-G; BTXE; TPH-D; TOG 503 D&E; 8010

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MWA (32.5)	12/11/90		✓		✓		1	See Sample I.D.#	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Wade Weston	12-12-90 900	
Relinquished by: (Signature)	Date/Time	Received by: (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 | Title: Analyst | Date: 12-12-90

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 18, 1990
P.O. Box 996	Sample Descript.:	Water, MW-A	Received:	Dec 18, 1990
Benicia, CA 94510	Analysis Method:	EPA 5030/ 8015/8020	Analyzed:	Dec 21, 1990
Attention: Mardo Kaprealian, P.E.	Lab Number:	012-0412 A-B	Reported:	Jan 3, 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.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 18, 1990
P.O. Box 996	Matrix Descript:	Water	Received:	Dec 18, 1990
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted:	Dec 21, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #:	012-0412 C	Analyzed:	Jan 2, 1991
			Reported:	Jan 3, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
012-0412 C	MW-A	73

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.

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Laboratory Director

Please Note:
The above samples do not appear to contain diesel.

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 18, 1990
P.O. Box 996	Matrix Descript:	Water	Received:	Dec 18, 1990
Benicia, CA 94510	Analysis Method:	SM 503 A&E (Gravimetric)	Extracted:	Dec 20, 1990
Attention: Mardo Kaprealian, P.E.	First Sample #:	012-0412 D	Analyzed:	Dec 26, 1990
			Reported:	Jan 3, 1991

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
012-0412 D	MW-A	N.D.

Detection Limits:	5.0

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

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Laboratory Director

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson St., Oakland	Sampled:	Dec 18, 1990
P.O. Box 996	Sample Descript:	Water, MW-A	Received:	Dec 18, 1990
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	Dec 20, 1990
Attention: Mardo Kaprealian, P.E.	Lab Number:	012-0412 E-F	Reported:	Jan 3, 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.

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Belinda C. Vega
Laboratory Director

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER	SITE NAME & ADDRESS	ANALYSES REQUESTED	TURN AROUND TIME:
Vartkes	Unocal / Oakland. 3535 Pierson st.	TPHG, BTXE; 8010; TPHD; TDG (5520 C&F)	Regular
WITNESSING AGENCY			[redacted]

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG, BTXE	8010	TPHD	TDG (5520 C&F)				REMARKS
MWA	12/18/90	A.M. 10:30		✓	✓		6	Monitoring Well A	✓	✓	✓	✓				VOA's Preserved in HCL.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Thakelian	12/18/90	K. Walters 12/18 11:45
Relinquished by: (Signature)	Date/Time	Received by: (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? ✓
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? ✓

KW — Signature; login — Title; 12/18 — Date