KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
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91 JUN 10 PM 1:36

June 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 dated June 6, 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.

Barbara Mix

Barbara Mix

bam\82

Enclosure

cc: Rick Sisk, Unocal Corporation

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
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KEI-P89-1204.QR1
June 6, 1991

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

Attention: Mr. Rick Sisk

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

Dear Mr. Sisk:

This report presents the results of the first quarter of monitoring and sampling of the monitoring well at the referenced site by Kaprealian Engineering, Inc. (KEI), per proposal KEI-P89-1204.P4 dated January 21, 1991. The well is currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from March through May, 1991.

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 1 and 2. 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 3.

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 1) 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 and BTX&E. In addition, samples collected from MW1 were analyzed for TPH as diesel, TOG, 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 method 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 1) 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, TPH as diesel, BTX&E, TOG, 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 in 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.

On December 11, 1990, one two-inch diameter monitoring well (designated as MWA on the attached Site Plan, Figure 1) was installed at the site. 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. The well was developed on December 13, 1990, and initially sampled on December 18, 1990.

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. The soil and water samples were analyzed for TPH as gasoline, TPH as diesel, TOG, and for EPA method 8010 compounds.

The analytical results of the soil sample (MWA{32.5}) showed 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. Based on the analytical results, KEI recommended implementation of a monthly monitoring and quarterly sampling program. Documentation of well installation, sample collection and analytical results are presented in KEI's report (KEI-P89-1204.R8) dated January 21, 1991.

RECENT FIELD ACTIVITIES

The one well (MWA) was monitored three times and sampled once during the quarter. During monitoring, the well was checked for depth to water and presence of free product and sheen. No free product or sheen was noted in the well during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the well on May 3, 1991. Prior to sampling, the well was purged of 15 gallons using a bailer. Samples were then collected using a clean Teflon bailer. Samples were decanted into clean VOA vials and/or one liter amber bottles as appropriate which were sealed with Teflon-lined screw caps and stored in a cooler on ice until delivery to the state certified laboratory.

HYDROLOGY AND GEOLOGY

The measured depth to ground water at the site on May 3, 1991 was 18.53 feet below grade. The regional ground water flow direction is not known to KEI at this time. Water levels have steadily increased in well MWA during the monitoring period, showing a net increase of 0.87 feet since December 18, 1990.

Ground water was not encountered during drilling activities until a depth of 33 feet below grade. Thus, the recent ground water elevation in well MWA indicates that a confined ground water table exists. 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. It should be noted that 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).

ANALYTICAL RESULTS

Ground water samples were analyzed at Sequoia Analytical Laboratory in Concord, California, and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, and BTX&E using EPA method 8020. In addition, the ground water sample was analyzed for TPH as diesel using EPA method 3510 in conjunction with modified 8015, TOG using Standard Method 5520B&F, and halogenated volatile organics using EPA method 8010.

Analytical results of the ground water sample, collected from monitoring well MWA, indicate non-detectable levels of TPH as gasoline, BTX&E, TPH as diesel, TOG and all EPA method 8010 compounds. Results of the analyses are summarized in Table 2. Copies of the analytical results and Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results collected and evaluated to date and no evidence of free product or sheen in the well, KEI recommends the continuation of the current monitoring and sampling program of the existing well per KEI's proposal (KEI-P89-1204.P4) dated January 21, 1991.

DISTRIBUTION

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

LIMITATIONS

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

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

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

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

Sincerely,

Kaprealian Engineering, Inc.

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

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Attachments: Tables 1 through 8
Location Map
Site Plans - Figures 1, 2 & 3
Laboratory Analyses
Chain of Custody documentation

KEI-P89-1204.QR1
June 6, 1991

TABLE 1

SUMMARY OF MONITORING DATA

Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Water Bailed (gallons)
(Monitored and Sampled on May 3, 1991)					
MWA	N/A	18.53	0	No	15
(Monitored on April 15, 1991)					
MWA	N/A	21.30	0	No	0
(Monitored on March 5, 1991)					
MWA	N/A	23.25	0	No	0

N/A = Not Applicable.

KEI-P89-1204.QR1
June 6, 1991

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Well #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
5/03/91	MWA*	ND	ND	ND	ND	ND	ND
12/18/90	MWA*	73	ND	ND	ND	ND	ND
Detection Limits		50	30	0.3	0.3	0.3	0.3

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

ND = Non-detectable.

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

KEI-P89-1204.QR1
June 6, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
12/11/90	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.QR1
June 6, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
12/14/89	A1	12.5	3.5	ND	ND	ND	ND
&	B1	12.5	ND	ND	ND	ND	ND
1/17/90	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.QR1
June 6, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	TOG	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
2/22/90	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.QR1
June 6, 1991

TABLE 6

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
4/09/90	MW1(5)*	5	ND	ND	ND	ND	ND	ND
&	MW1(9.5)*	9.5	ND	ND	ND	ND	ND	ND
4/10/90	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.QR1
June 6, 1991

TABLE 7

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
7/05/90	EB1(8.5)*	ND	ND	ND	0.014	0.0056	ND
&	EB1(13.5)*	ND	ND	ND	0.015	ND	ND
7/06/90	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 method 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.QR1
June 6, 1991

TABLE 8

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
7/6/90	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 method 8010 compounds were non-detectable.

ND = Non-detectable.

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

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P.O. BOX 996 • BENICIA, CA 94510
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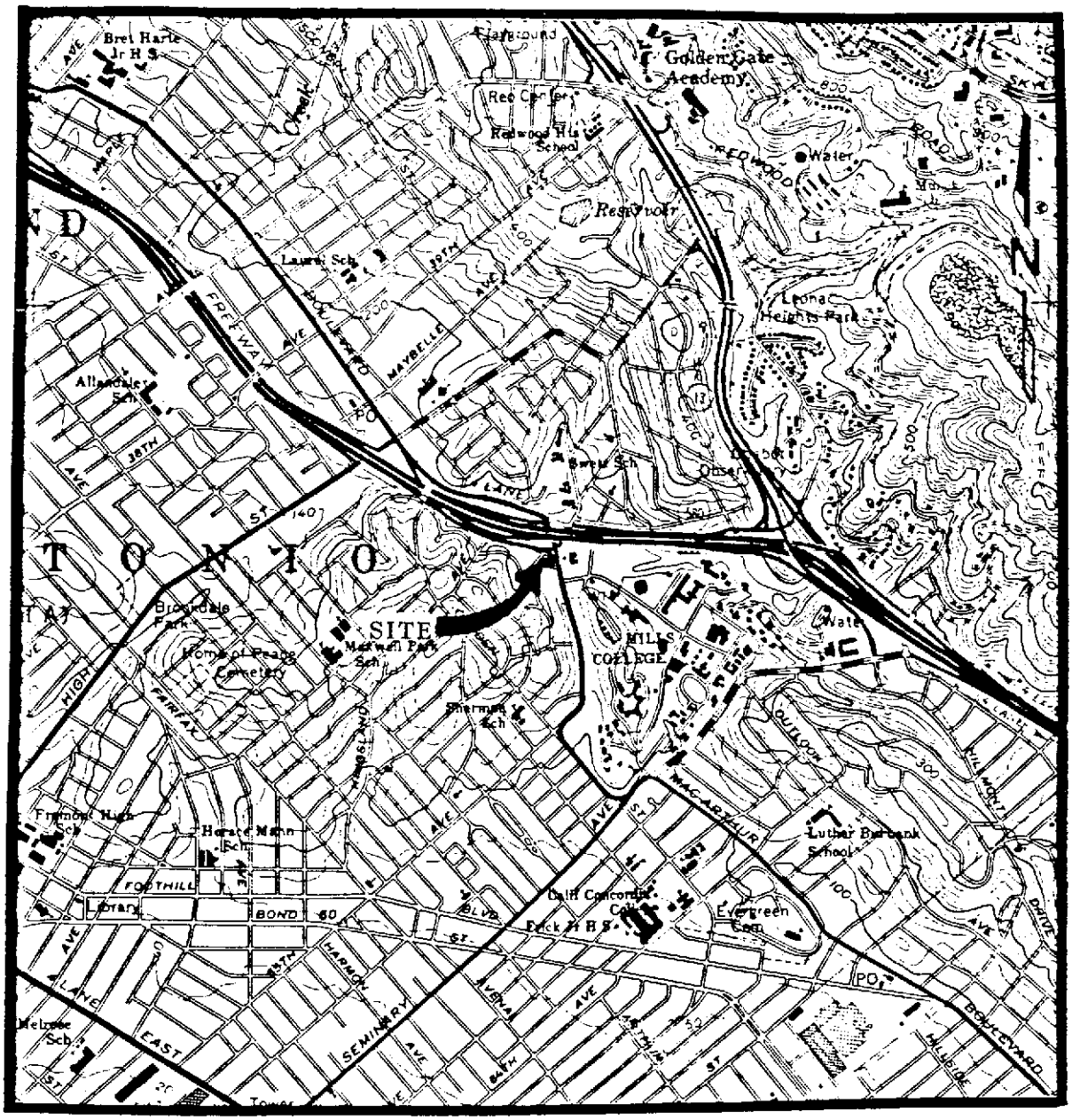

LOCATION MAP

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.
Consulting Engineers
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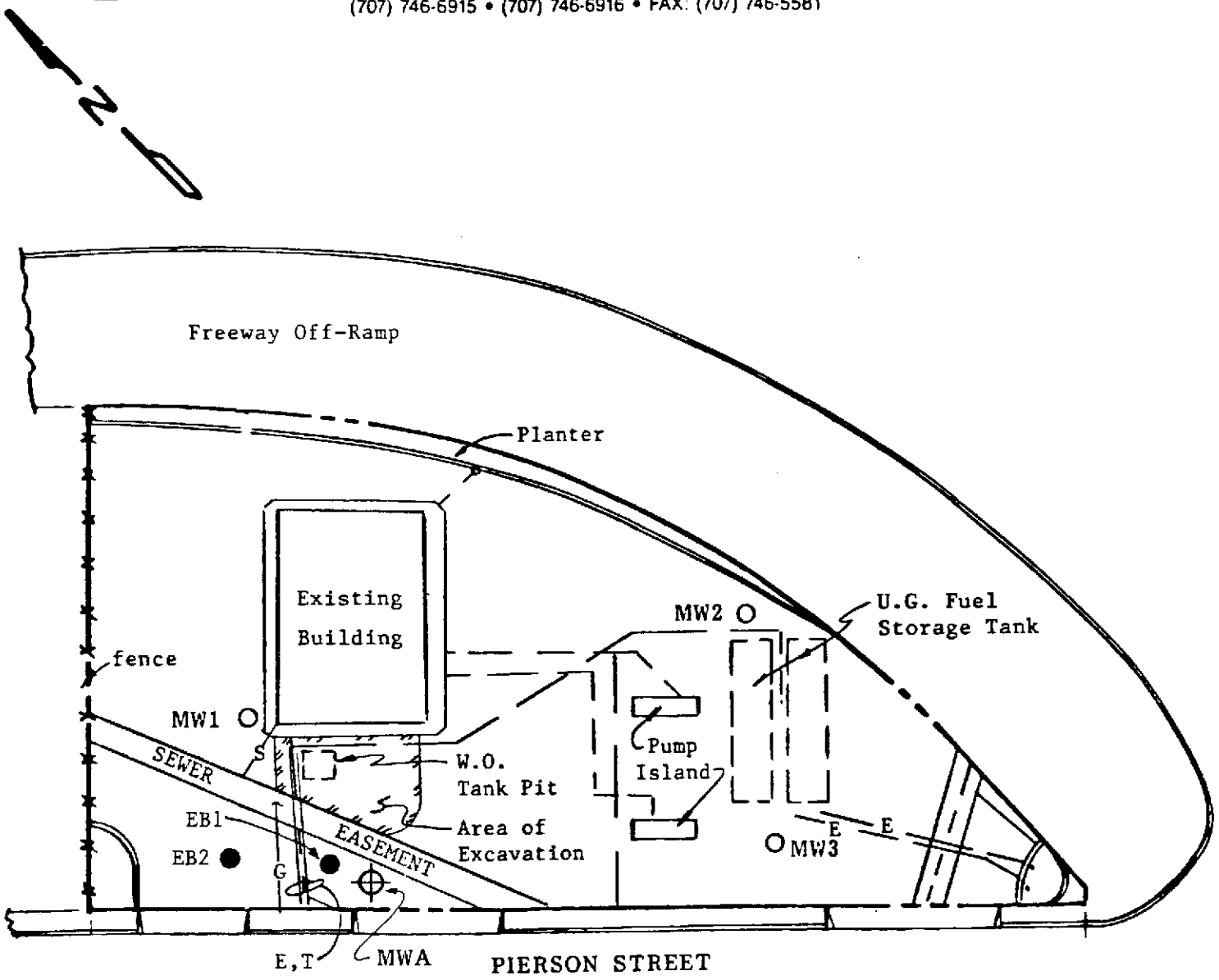


SITE PLAN
Figure 1

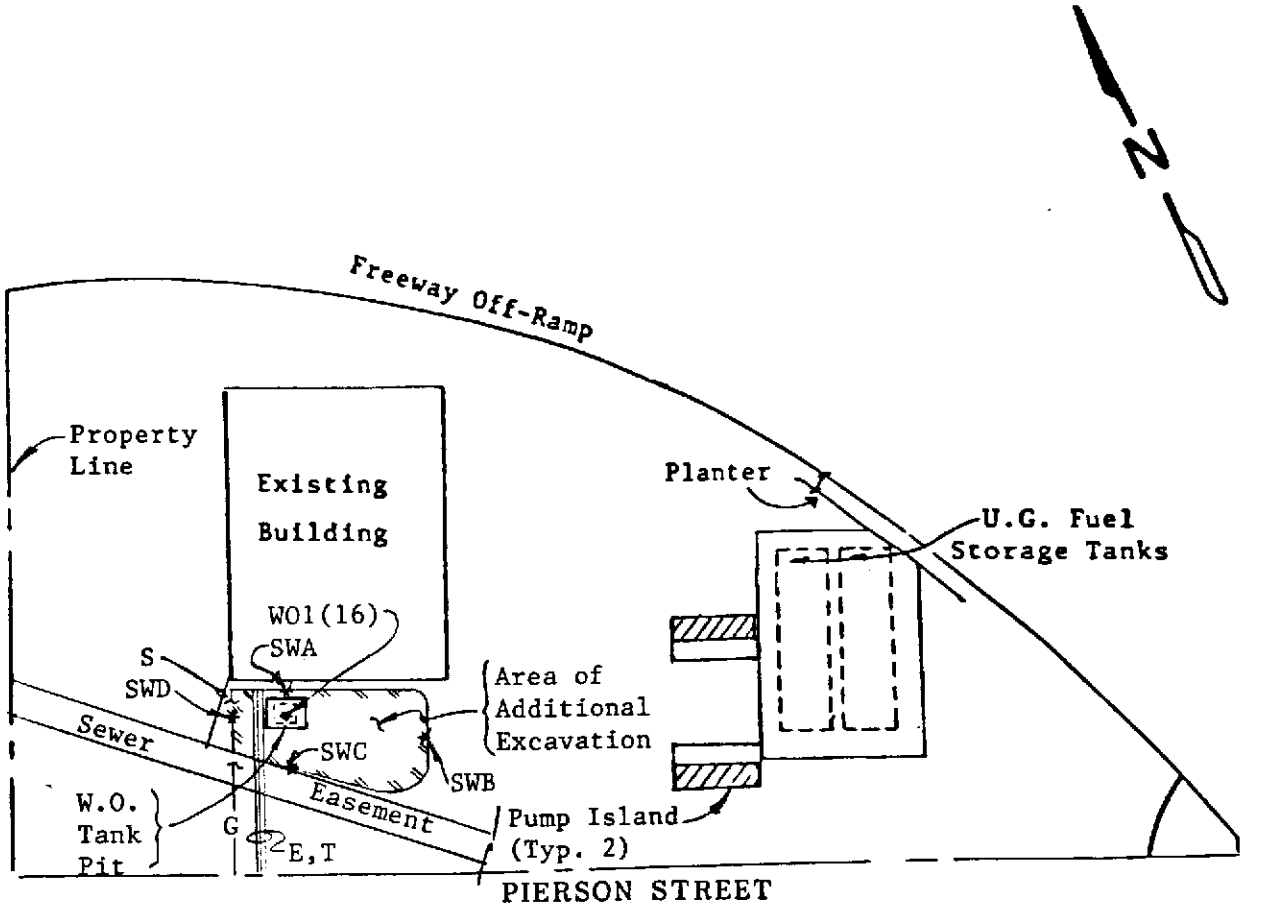
0 30 60
Approx. Scale feet

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

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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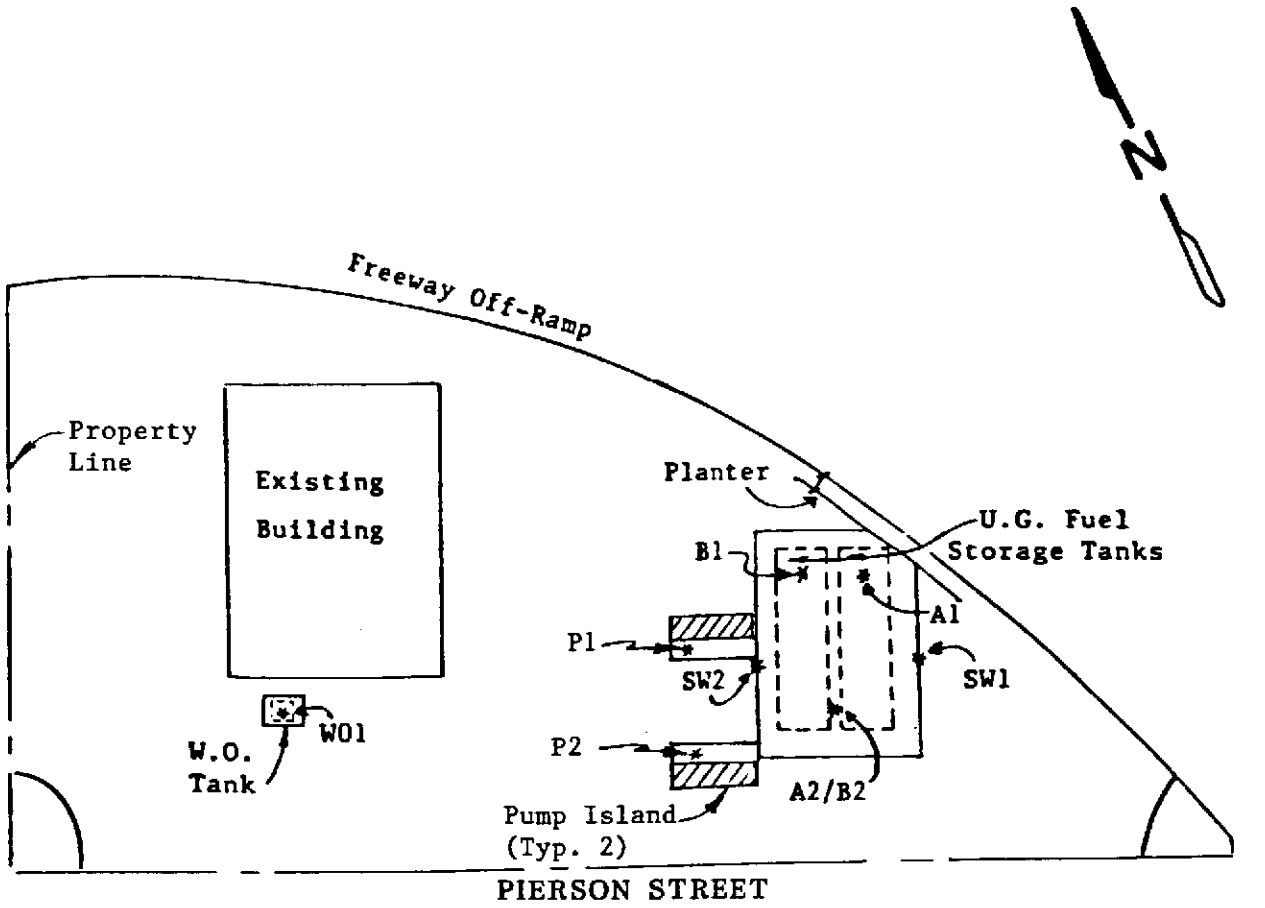

SITE PLAN
Figure 3

0 30 60
Approx. Scale feet

LEGEND

* Sample Point Location

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

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled:	May 3, 1991
P.O. Box 996	Sample Descript.:	Water, MW-1	Received:	May 3, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/ 8015/8020	Analyzed:	May 16, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	105-0101 AB	Reported:	May 17, 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.

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	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 17, 1991

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

Analyte	Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
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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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Julia R. Malerstein
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Kaprealian Engineering, Inc.
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 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

Julia R. Malerstein
Project Manager

% 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.
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Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020
Analyst:	J. Fontecha	J. Fontecha
Reporting Units:	ppb	ppb
Date Analyzed:	May 16, 1991	May 16, 1991
Sample #:	105-0101	Blank
Surrogate % Recovery:	92	100

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

% 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.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled:	May 3, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	May 3, 1991
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted:	May 7, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	105-0101 C	Analyzed:	May 8, 1991
			Reported:	May 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
105-0101 C	MW-1	N.D.

Detection Limits:	50

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

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled: - - - - - -
P.O. Box 996	Matrix Descript:	D I Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted: May 7, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	- - - - - -	Analyzed: May 8, 1991
			Reported: May 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
- - - - - -	D I Blank	N.D.

Detection Limits:	50

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

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

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

Client Project ID: Unocal, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel
Method:	EPA 8015
Analyst:	JRM
Reporting Units:	µg/L
Date Analyzed:	May 8, 1991
QC Sample #:	BLK050791
Sample Conc.:	N.D.
Spike Conc. Added:	300
Conc. Matrix Spike:	220
Matrix Spike % Recovery:	73
Conc. Matrix Spike Dup.:	210
Matrix Spike Duplicate % Recovery:	70
Relative % Difference:	4.7

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

% 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, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015
Analyst:	JRM	JRM
Reporting Units:	µg/L	µg/L
Date Analyzed:	May 8, 1991	May 8, 1991
Sample #:	105-0101	Blank
Surrogate % Recovery:	100	89

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

% 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.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled:	May 3, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	May 3, 1991
Benicia, CA 94510	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	May 8, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	105-0101 D	Analyzed:	May 14, 1991
			Reported:	May 17, 1991

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
105-0101 D	MW-1	N.D.

Detection Limits:	5.0

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

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

1050101.KEI <8>

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled: - - - - - -
P.O. Box 996	Matrix Descript:	D I Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted: May 8, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	- - - - - -	Analyzed: May 14, 1991
			Reported: May 17, 1991

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
- - - - - -	D I Blank	N.D.

Detection Limits:	5.0

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

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

1050101.KEI <10>

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled:	May 3, 1991
P.O. Box 996	Sample Descript:	Water, MW-1	Received:	May 3, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	May 13, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	105-0101 EF	Reported:	May 17, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	1.0	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	1.0	N.D.
trans-1,3-Dichloropropene	1.0	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	1.0	N.D.

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

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 3535 Pierson, Oakland	Sampled: - - - - - -
P.O. Box 996	Sample Descript:	D I Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed: May 10, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	- - - - - -	Reported: May 17, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	1.0	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	1.0	N.D.
trans-1,3-Dichloropropene	1.0	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	1.0	N.D.

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

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Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloroethene	Trichloro-ethene	Chloro-benzene	Benzene	Toluene	Chloro-benzene (PID)
Method:	EPA 8010	EPA 8010	EPA 8010	EPA 8020	EPA 8020	EPA 8020
Analyst:	Son Le	Son Le	Son Le	Son Le	Son Le	Son Le
Reporting Units:	ppb	ppb	ppb	ppb	ppb	ppb
Date Analyzed:	May 13, 1991	May 13, 1991	May 13, 1991	May 13, 1991	May 13, 1991	May 13, 1991
QC Sample #:	105-0101	105-0101	105-0101	105-0101	105-0101	105-0101
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	10	10	10
Conc. Matrix Spike:	11	9.5	11	9.4	8.6	9.4
Matrix Spike % Recovery:	110	95	110	94	86	94
Conc. Matrix Spike Dup.:	11	11	11	9.7	8.9	9.1
Matrix Spike Duplicate % Recovery:	110	110	110	97	89	91
Relative % Difference:	0	15	0	3.1	3.4	3.3

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

% 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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Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 3535 Pierson, Oakland
QC Sample Group: 105-0101
Reported: May 17, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8010	EPA 8010
Analyst:	Son Le	Son Le
Reporting Units:	ppb	ppb
Date Analyzed:	May 13, 1991	May 13, 1991
Sample #:	105-0101	Blank
Surrogate #1 % Recovery:	130	140
Surrogate #2 % Recovery:	110	110

SEQUOIA ANALYTICAL

Julia R. Malerstein
Project Manager

% 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 / Oakland 3535 Pierson

ANALYSES REQUESTED: TPHG, BTXE | 8010 | TOG (5520 C&F) | TPHD

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG, BTXE	8010	TOG (5520 C&F)	TPHD	REMARKS
MW-1	5/3/91	9:38AM		✓	✓		6	MW	✓	✓	✓	-	D50001A #VOAs preserved

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	5/3/91	K. Walter 5/3 2:35
[signature]	5/6/91 0950	[signature]
[signature]	6 May 1057	[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? /

[signature] — Signature; login — Title; 5/3/91 — Date