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

April 23, 1991

Alameda County
Department of Environmental Health
470 - 27th Street, Room 322
Oakland, CA 94612

RE: Unocal Service Station #5901
11976 Dublin Boulevard
Dublin, California

Gentlemen:

Per the request of Mr. Rick Sisk of Unocal Corporation, enclosed please find our report dated April 23, 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\32

Enclosure

91 APR 26 AM 10:33

cc: Rick Sisk, Unocal Corporation

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P.O. BOX 996 • BENICIA, CA 94510
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KEI-P90-0606.QR1
April 23, 1991

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

Attention: Mr. Rick Sisk

RE: Quarterly Report
Unocal Service Station #5901
11976 Dublin Boulevard
Dublin, California

Dear Mr. Sisk:

This report presents the results of the first quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per proposal KEI-P90-0606.P2 dated December 17, 1990. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from February through April, 1991.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. The site is situated on relatively gently sloping, eastward trending topography, and is located approximately 700 feet northwest of a channelized portion of Dublin Creek. The site is also located near the southwest end of the San Ramon Valley near Amador Valley. A Location Map and Site Plans are attached to this report.

KEI's initial field work was conducted on June 13, 1990, when two underground fuel storage tanks and one waste oil tank were removed from the site. The tanks consisted of one 10,000 gallon super unleaded fuel storage tank, one 10,000 gallon regular unleaded fuel storage tank, and one 280 gallon waste oil tank. The tanks were made of steel and at least one hole of 1/4-inch diameter was observed in each of the fuel tanks. Numerous holes up to 1/2-inch in diameter were observed in the waste oil tank. Mr. Ravi Arulanantham of the ACHA was present during tank removal and subsequent soil sampling.

Water was encountered in the fuel tank pit at a depth of approximately 7 feet below grade, thus prohibiting the collection of any soil samples from immediately beneath the tanks. Six soil samples, labeled SW1 through SW6, were collected from the sidewalls of the fuel tank pit approximately 6 to 12 inches above the observed water

table. One soil sample, labeled WO1, was collected from beneath the waste oil tank at a depth of approximately 6.5 feet. An additional soil sample, labeled SWA, was collected from the waste oil tank pit sidewall at a depth of approximately 6.5 feet. Sample point locations are as shown on the attached Site Plan, Figure 2.

KEI returned to the site on June 15, 1990, in order to collect soil samples from the product pipe trenches. Four samples, labeled P1 through P4, were collected from trenches by using a driven tube-type soil sampler at a depth of 6 feet. After the soil sampling was completed, pipe trenches were excavated to ground water over the area indicated on the attached Site Plan, Figure 3. Pipe trench sample point locations are shown on the attached Site Plan, Figure 2.

On June 15, 1990, after reviewing the analytical results of the soil samples (SW1 through SW6), four additional soil samples, labeled SW1(3), SW2(3), SW5(2.5) and SW6(3), were collected from the sidewalls of the fuel tank pit approximately 6 to 12 inches above ground water in the vicinity of sample point locations SW1, SW2, SW5 and SW6, respectively.

After soil sampling was completed, approximately 25,000 gallons of ground water were pumped from the fuel tank pit. On June 20, 1990, one water sample, labeled W1, was collected from the fuel tank pit.

Also on June 20, 1990, based on analytical results of soil samples SW1(3) and SW2(3), two additional soil samples, labeled SW1(6.5) and SW2(6.5), were collected from the northerly sidewall of the fuel tank pit approximately 6 to 12 inches above ground water in the vicinity of sample point locations SW1(3) and SW2(3). The sample point locations and the area excavated are as indicated on the attached Site Plan, Figure 2.

On June 26, 1990, KEI again returned to the site in order to collect soil samples from the sidewalls of the new underground fuel storage tank pit located to the west of the pump islands. Four soil samples, labeled SW11, SW12, SW13 and SW14, were collected from the sidewalls of the excavation 6 to 12 inches above ground water. Sample point locations are as shown on the attached Site Plan, Figure 4.

On July 3, 1990, after having pumped approximately 10,000 gallons of ground water from the new fuel tank pit, a water sample, labeled W2, was collected from the pit.

All samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California. All soil samples, except the waste oil

tank pit sidewall sample SWA, were analyzed for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, xylenes and ethylbenzene (BTX&E). In addition to TPH as gasoline and BTX&E, the soil sample WO1, collected from the waste oil tank pit, was analyzed for TPH as diesel, total oil and grease (TOG), and EPA method 8010 constituents. The waste oil tank pit sidewall sample, SWA, was analyzed for TOG only. In addition to TPH as gasoline and BTX&E, sample SW11 from the new fuel tank pit was also analyzed for TOG.

Both water samples were analyzed for TPH as gasoline and BTX&E. In addition, water sample W2 collected from the new fuel tank pit was analyzed for TOG.

Analytical results of the soil samples SW1, SW2, SW5 and SW6, collected from the sidewalls of the former fuel tank pit, indicated levels of TPH as gasoline ranging from 120 ppm to 5,700 ppm. Samples SW3 and SW4 indicated levels of TPH as gasoline at non-detectable and 8.0 ppm, respectively. However, after additional excavation, analytical results of the final sidewall soil samples SW1(6.5), SW2(6.5), SW5(2.5) and SW6(3), collected laterally beyond the samples SW1, SW2, SW5 and SW6 at a depth of approximately 6 feet, indicated levels of TPH as gasoline ranging from 1.2 ppm to 32 ppm.

Analytical results of soil samples collected from the pipe trenches, indicated levels of TPH as gasoline ranging from 2.5 ppm to 37 ppm. Benzene was detected in all pipe trench samples at concentrations ranging from 0.28 ppm to 0.78 ppm.

Analytical results of the soil sample WO1, collected from beneath the waste oil tank pit, indicated levels of TPH as gasoline at 36 ppm, TPH as diesel at 120 ppm, and TOG at 1,500 ppm, with non-detectable concentrations of all EPA method 8010 constituents, except 1,2-dichlorobenzene at 210 ppb. Analytical results of soil sample SWA, collected from the sidewall of the waste oil tank pit, indicated levels of TOG at 3,500 ppm.

Analytical results of the soil samples (SW11, SW12, SW13 and SW14), collected from the new fuel tank pit, indicated non-detectable levels of TPH as gasoline and benzene for all samples. Analytical results of sample SW11 for TOG indicated 78 ppm. Results of all soil analyses are summarized in Table 4.

Analytical results of the water sample (W1), collected from the former fuel tank pit, indicated levels of TPH as gasoline at 2,300 ppb, and levels of benzene at 3.1 ppb. Analytical results of the water sample (W2), collected from the new fuel tank pit, indicated

non-detectable levels of TPH as gasoline, TOG, and benzene. The results of the water analyses are summarized in Table 5.

KEI returned to the site on July 16, 1990 when three trenches were excavated laterally from the easterly, northerly and westerly waste oil tank pit sidewalls. Water was encountered at a depth of approximately 7 feet below grade. Three soil samples, labeled SWB(13), SWC(10) and SWD(14), were collected from the sidewalls of the trenches at approximately 6 to 12 inches above the observed water table. Sample point locations are as shown on the attached Site Plan, Figure 4. After sampling, the sidewalls of the waste oil tank pit were excavated laterally to the sample point locations to a depth of approximately 1 foot below the water table (or about 8 feet below grade).

On July 19, 1990, after having pumped approximately 5,000 gallons of ground water from the waste oil excavation, a water sample, labeled W3, was collected from the pit.

On July 20, 1990, KEI returned to the site to collect the additional soil samples required by the ACHA. Four soil samples, labeled SWE, SWF, SWG and SWH, were collected approximately 6 to 12 inches above the ground water level from the four corners of the waste oil tank excavation. Sample point locations are also shown on the attached Site Plan, Figure 5.

All samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California. All soil samples were analyzed for TPH as gasoline, BTX&E, TPH as diesel, TOG, and EPA method 8010 constituents. The water sample was analyzed for TPH as gasoline, BTX&E, TPH as diesel, TOG and EPA method 8010 constituents.

Analytical results of the soil samples indicated non-detectable levels of TPH as diesel, TOG and all EPA method 8010 constituents for all samples. Analytical results also indicated non-detectable levels of TPH as gasoline for all samples except SWC(10), which showed a level of TPH as gasoline at 1.1 ppm. Analytical results of the water sample indicated non-detectable levels of all constituents. Results of the soil analyses are summarized in Table 6; and the results of the water analyses are summarized in Table 7.

To comply with the requirements of the regulatory agencies and based on the analytical results, KEI proposed installation of four monitoring wells. Results of the soil samples from the fuel and waste oil tank excavations are summarized in KEI's reports (KEI-J90-0606.R1 and KEI-J90-0606.R4) dated July 16, 1990 and July 30, 1990, respectively.

On November 6 and 7, 1990, four two-inch diameter monitoring wells (designated as MW1, MW2, MW3 and MW4 on the attached Site Plan, Figure 1) were installed at the site. The monitoring wells were drilled and completed to total depths ranging from 20 to 24 feet. Ground water was encountered at depths ranging from about 5.4 to 9.5 feet beneath the surface during drilling in all wells except MW3 in which ground water was not encountered until a depth of about 15.2 feet below grade. All four wells were surveyed by a licensed land surveyor (Kier & Wright of Pleasanton, California) to Mean Sea Level and to a vertical accuracy of 0.01 feet. The wells were developed on November 12, 1990, and initially sampled on November 16, 1990.

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Concord, 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 the soil samples, collected from the borings for monitoring wells (MW1 through MW4), indicated non-detectable levels of TPH as gasoline and BTX&E in all soil samples. Analytical results of the soil sample, MW1(5), indicated non-detectable levels of TPH as diesel, TOG and EPA method 8010 compounds.

Analytical results of the ground water samples collected from monitoring wells MW1 through MW4 indicated non-detectable levels of TPH as gasoline and BTX&E. Analytical results of the water sample, collected from MW1, indicated non-detectable levels of TPH as diesel, TOG and EPA method 8010 constituents. Results of the soil analyses are summarized in Table 3, and the 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 sample results are presented in KEI's report (KEI-P90-0606.R6) dated December 17, 1990.

RECENT FIELD ACTIVITIES

The four wells (MW1 through MW4) were monitored three times and sampled once during the quarter. During monitoring, the wells were checked for depth to water and presence of free product and sheen. No free product or sheen was noted in any of the wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the wells on April 1, 1991. Prior to sampling, the wells were purged of between 5 and 16 gallons each using a surface pump. 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

Based on the water level data gathered during the quarter, ground water flow direction appeared to be toward north-northeast over the majority of the site (area west of the inferred trace of the Calaveras Fault) on April 1, 1991, similar to the flow direction initially determined on November 16, 1990. The average hydraulic gradient over the majority of the site is approximately 0.004. The ground water elevation for monitoring well MW3 is approximately 10 feet lower than in the other three monitoring wells. As indicated below, KEI infers that a splay of the Calaveras Fault crosses the site somewhere between wells MW2 and MW3 (as shown on the attached Site Plan, Figure 1), which accounts for the approximate 10 foot differential in the water table elevation of MW3 in comparison to all other wells. The above reported ground water flow direction and gradient excluded data from well MW3.

Water levels have fluctuated during the quarter, showing a net increase of 0.43 to 1.36 feet in all wells since November 16, 1990. The measured depth to ground water at the site on April 1, 1991 ranged between 5.20 and 5.76 feet in all wells except in MW3, where the depth to water was 15.29 feet.

The site is situated within the Dublin Subbasin of the larger Livermore Valley Ground Water Basin as defined by the Alameda County Flood Control and Water Conservation District and the regional ground water flow direction, as of Spring, 1990, is toward the southeast.

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 Quaternary-age alluvium. The surficial alluvium has been mapped as Holocene coarse-grained alluvium (Qhac) typically consisting of unconsolidated, permeable sand and silt with locally coarse sand and gravel materials and ranges in thickness from less than 10 feet to as much as 50 feet. This coarse-grained alluvium zone appears to have been deposited from sediments generated from erosion within Dublin Canyon situated immediately west of the site. The site is situated at the northern perimeter of the coarse-grained alluvium near a mapped geologic contact with Late-Pleistocene alluvium (Qpa). The Late Pleistocene

alluvium is described as typically consisting of weakly consolidated, irregular interbedded clay, silt, sand, and gravel materials. The overall thickness of the alluvium underlying the site is presently unknown to KEI.

In addition, the site is situated at or is closely adjacent to the mapped trace of the active Calaveras Fault. The Calaveras Fault is a major structural break within the Coast Ranges near San Francisco Bay and most likely forms a significant barrier to the migration of ground water in the alluvial materials from the hillside areas immediately west of the site.

The results of our subsurface study indicate that the site is underlain by fill materials extending to depths below grade of about 5 feet at MW1 and MW2 and extending to a depth of about 1 foot at MW3 and MW4. The fill materials are inturn underlain predominantly by silty clay and clayey silt materials, which extend to a depth of at least 23.5 feet. However, at MW3, an approximately 1 foot thick silty gravel lens was encountered at depths of about 15 to 16 feet below grade, and at MW2, a silty sand/sandy silt lens was encountered at a depth of 23.5 to 24 feet (maximum depth explored). These two relatively coarse-grained lenses discussed above were the only coarse-grained soils encountered during our subsurface study.

Also, the significant decrease (about 10 feet) in the observed ground water table elevation at MW3 in comparison to the other wells is difficult to explain and may be possibly related to a fault contact (of the adjacent Calaveras Fault zone), which may cross the subject site somewhere between well MW3 and well MW2.

In addition, KEI conducted a review of geologic fault study reports available for inspection at the California Division of Mines and Geology (CDMG) in Pleasant Hill, California on November 13, 1990. Studies conducted at the adjacent parcel immediately north of the subject site encountered what is described as the western side of the Calaveras Fault zone. This fault was determined to be located between approximately 130 to 136 feet west of the curb along San Ramon Road, and roughly parallel to San Ramon Road. The fault trends approximately N4°W and significant changes in the color of the soil materials and depth to ground water on either side of the fault were noted. Depth to ground water on the western side of the fault was noted to be significantly higher than on the eastern side of the fault. Geologic maps produced for this study project the trace of the Calaveras Fault onto the subject Unocal site.

Based on the results of our file review at the CDMG and our monitoring activities of the four wells at the subject site, it is KEI's opinion that the trace of the active Calaveras Fault crosses the eastern portion of the site in such a manner that well MW3 is east of the fault, while wells MW1, MW2 and MW4 are west of the fault, as shown on the attached Site Plan, Figure 1. Therefore, all future ground water gradient determinations at the site should represent two distinct ground water tables with data from wells MW1, MW2 and MW4 representing one distinct ground water table and data from well MW3 representing a separate ground water table with the fault representing a significant ground water barrier.

ANALYTICAL RESULTS

Ground water samples were analyzed at Sequoia Analytical Laboratory in Concord, California, and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline using EPA method 5030 in conjunction with modified 8015, and BTX&E using EPA method 8020. In addition, the ground water sample collected from MW1 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 samples, collected from monitoring wells MW1 through MW4, indicate non-detectable levels of TPH as gasoline and BTX&E for all samples. In MW1, TPH as diesel, TOG and all EPA method 8010 constituents were non-detectable. 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 any of the wells, KEI recommends the continuation of the current monitoring and sampling program of the existing wells per KEI's proposal (KEI-P90-0606.P2) dated December 17, 1990.

DISTRIBUTION

A copy of this report should be sent to Alameda County Department of Environmental Health, 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 7
Location Map
Site Plans - Figures 1 through 5
Laboratory Analyses
Chain of Custody documentation

KEI-P90-0606.QR1
April 23, 1991

TABLE 1

SUMMARY OF MONITORING DATA

Date	Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Water Bailed (gallons)
4/01/91	MW1	362.06	5.39	0	None	16
	MW2	362.11	5.20	0	None	15
	MW3	352.00	15.29	0	None	5
	MW4	362.45	5.76	0	None	16
3/02/91	MW1	362.47	4.98	0	None	0
	MW2	362.48	4.83	0	None	0
	MW3	351.69	15.60	0	None	0
	MW4	362.75	5.46	0	None	0
2/01/91	MW1	361.65	5.80	0	None	0
	MW2	361.70	5.61	0	None	0
	MW3	351.03	16.26	0	None	0
	MW4	361.98	6.23	0	None	0

Well #	Surface Elevation* (feet)
MW1	367.45
MW2	367.31
MW3	367.29
MW4	368.21

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

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected on November 16, 1990)

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
4/01/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2	--	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
11/16/90	MW1*	ND	ND	ND	ND	ND	ND
	MW2	--	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
Detection Limits		50	30	0.3	0.3	0.3	0.3

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

ND = Non-detectable.

-- Indicates analysis not performed.

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

KEI-P90-0606.QR1
April 23, 1991

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on November 6 & 7, 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(8)	8	--	ND	ND	ND	ND	ND
MW2(5)	5	--	ND	ND	ND	ND	ND
MW2(7.5)	7.5	--	ND	ND	ND	ND	ND
MW2(9)	9	--	ND	ND	ND	ND	ND
MW3(5)	5	--	ND	ND	ND	ND	ND
MW3(10)	10	--	ND	ND	ND	ND	ND
MW3(15)	15	--	ND	ND	ND	ND	ND
MW4(5)	5	--	ND	ND	ND	ND	ND
Detection Limits		1.0	1.0	0.0050	0.0050	0.0050	0.0050

* TOG and EPA method 8010 constituents were non-detectable.

ND = Non-detectable.

-- Indicates analysis not performed.

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

KEI-P90-0606.QR1
April 23, 1991

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on June 13, 15, 20 & 26, 1990)

Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
SW1	6.0	--	5,700	2.1	41	640	110
SW1(3)	6.0	--	2,200	1.8	6.3	76	30
SW1(6.5)	6.0	--	32	0.020	0.14	0.17	0.13
SW2	6.0	--	1,500	0.35	0.57	56	8.0
SW2(3)	6.0	--	360	ND	1.0	2.0	3.0
SW2(6.5)	6.5	--	6.8	0.020	0.052	0.063	0.029
SW3	6.0	--	ND	ND	ND	ND	ND
SW4	6.0	--	8.0	0.019	0.088	0.16	0.0071
SW5	6.5	--	340	0.80	0.26	3.6	2.5
SW5(2.5)	6.0	--	11	0.027	0.054	0.12	0.070
SW6	6.5	--	120	ND	0.21	0.14	0.19
SW6(3)	6.0	--	1.2	0.0084	0.012	0.021	0.012
P1	6.0	--	2.5	0.099	0.079	0.034	ND
P2	6.0	--	37	0.78	0.14	3.8	0.43
P3	6.0	--	8.5	0.028	0.016	0.080	0.35
P4	6.0	--	16	0.091	ND	1.3	0.52
SW11***	6.0	--	ND	ND	ND	0.0079	ND
SW12	6.0	--	ND	ND	ND	ND	ND
SW13	6.0	--	ND	ND	0.022	ND	ND
SW14	6.0	--	ND	ND	ND	0.020	ND
WO1*	6.5	120	36	0.091	0.17	1.8	0.38
SWA**	6.0	--	--	--	--	--	--
Detection Limits		1.0	1.0	0.0050	0.0050	0.0050	0.0050

-- Indicates analysis not performed.

ND = Non-detectable.

* TOG was 1,500 ppm, and all EPA method 8010 constituents were non-detectable, except 1,2-dichlorobenzene at 210 ppb.

** TOG was 3,500 ppm.

*** TOG was 78 ppm.

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

KEI-P90-0606.QR1
April 23, 1991

TABLE 5

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected on June 20 & July 3, 1990)

Sample #	TOG	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethylbenzene
W1*	--	2,300	3.1	0.88	250	0.39
W2**	ND	ND	ND	0.96	ND	ND
Detection Limits		30	0.30	0.30	0.30	0.30

* Collected from the former fuel storage tank pit.

** Collected from the new fuel storage tank pit.

-- Indicates analysis not performed.

ND = Non-detectable.

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

KEI-P90-0606.QR1
April 23, 1991

TABLE 6

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on July 16 & 20, 1990)

Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
SWB(13)*	6.0	ND	ND	ND	0.0095	ND	ND
SWC(10)*	6.0	ND	1.1	0.0061	0.0330	0.044	0.024
SWD(14)*	6.0	ND	ND	0.0052	0.015	ND	ND
SWE*	6.3	ND	ND	ND	0.031	ND	ND
SWF*	6.3	ND	ND	ND	0.029	0.013	0.0059
SWG*	6.3	ND	ND	ND	0.028	ND	ND
SWH*	6.3	ND	ND	ND	0.015	ND	ND
Detection Limits		1.0	1.0	0.005	0.005	0.005	0.005

* TOG and all EPA method 8010 constituents were non-detectable for all samples.

ND = Non-detectable.

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

KEI-P90-0606.QR1
April 23, 1991

TABLE 7

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected on July 19, 1990)

Sample #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
W3*	ND	ND	ND	ND	ND	ND
Detection Limits	50	30	0.30	0.30	0.30	0.30

ND = Non-detectable.

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

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

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
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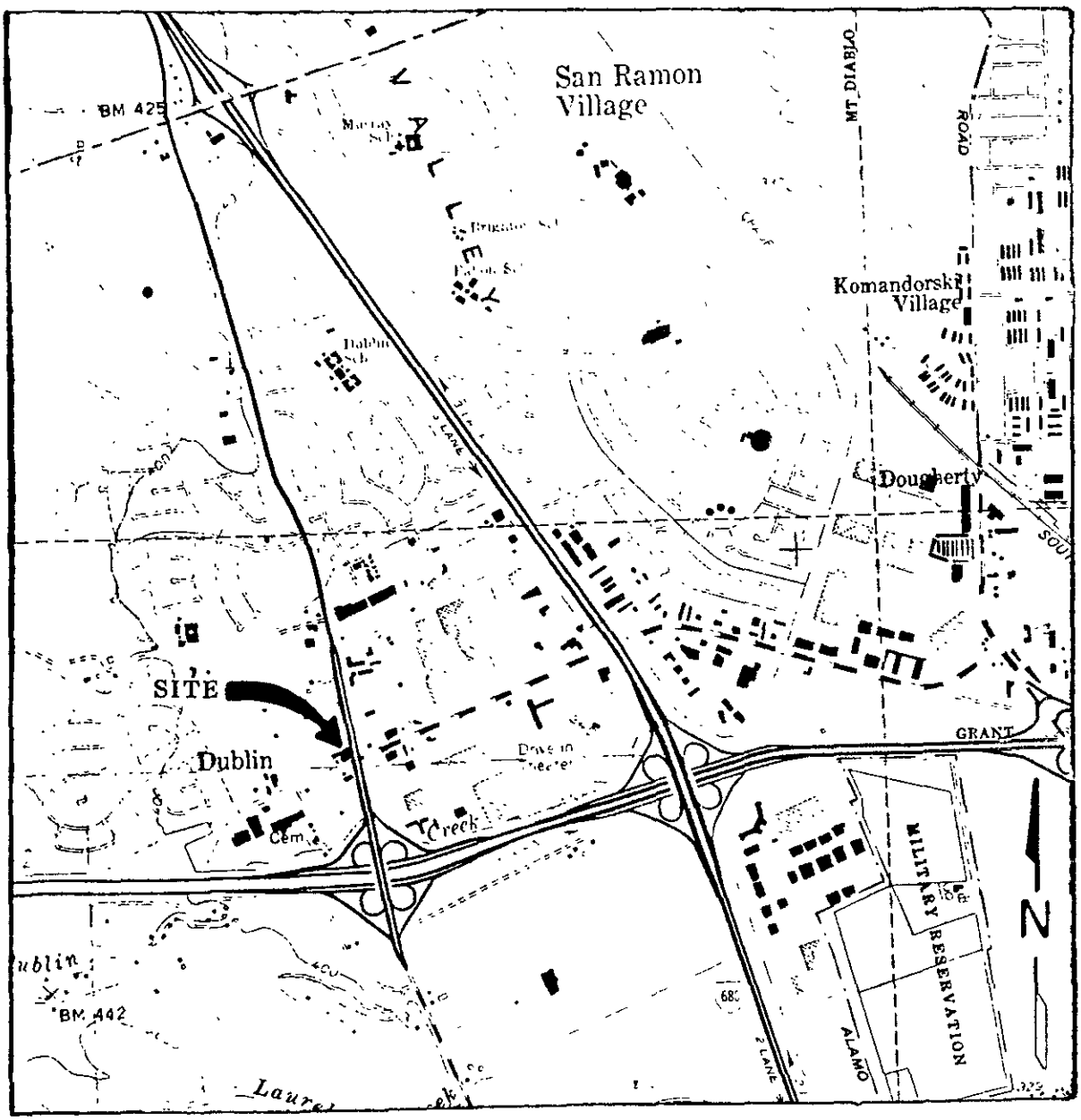

LOCATION MAP

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, CA

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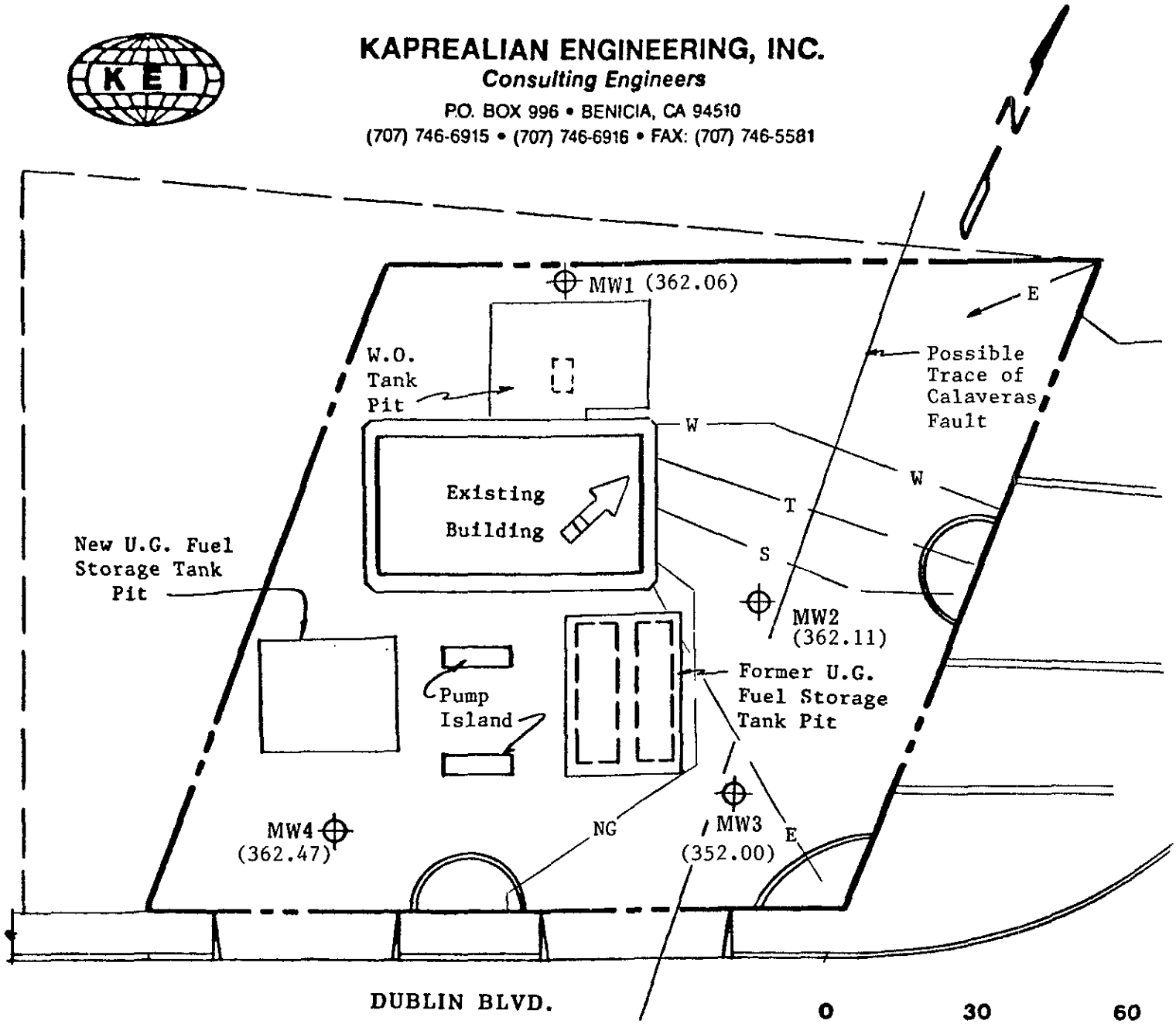


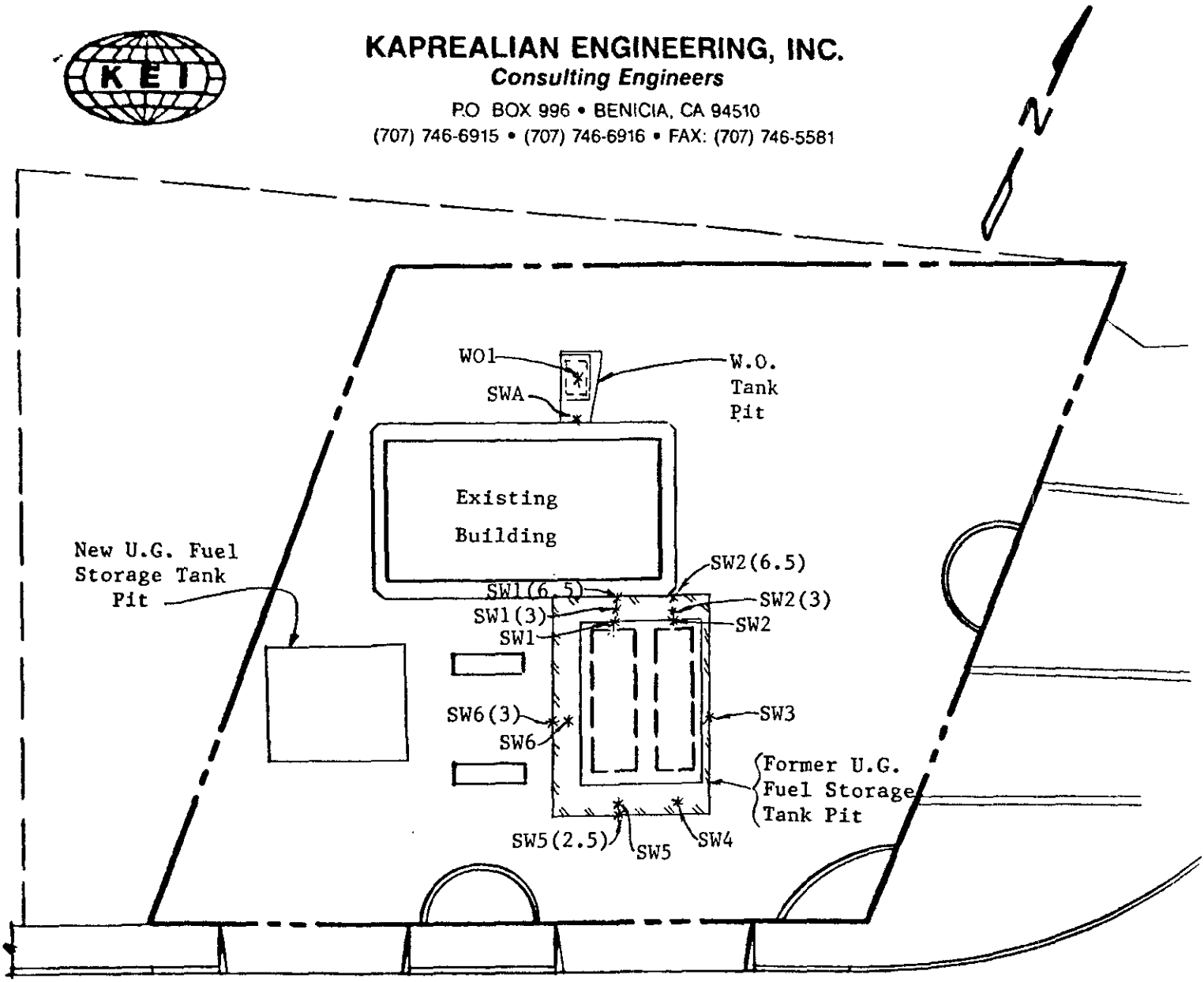
SITE PLAN
Figure 1

LEGEND

- Monitoring Well
- Direction of Ground Water flow
- ( ) Ground Water Table Elevation in feet above Mean Sea Level on 4/1/91

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, 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

LEGEND

* Sample Point Location

Additional Area Excavated

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, CA

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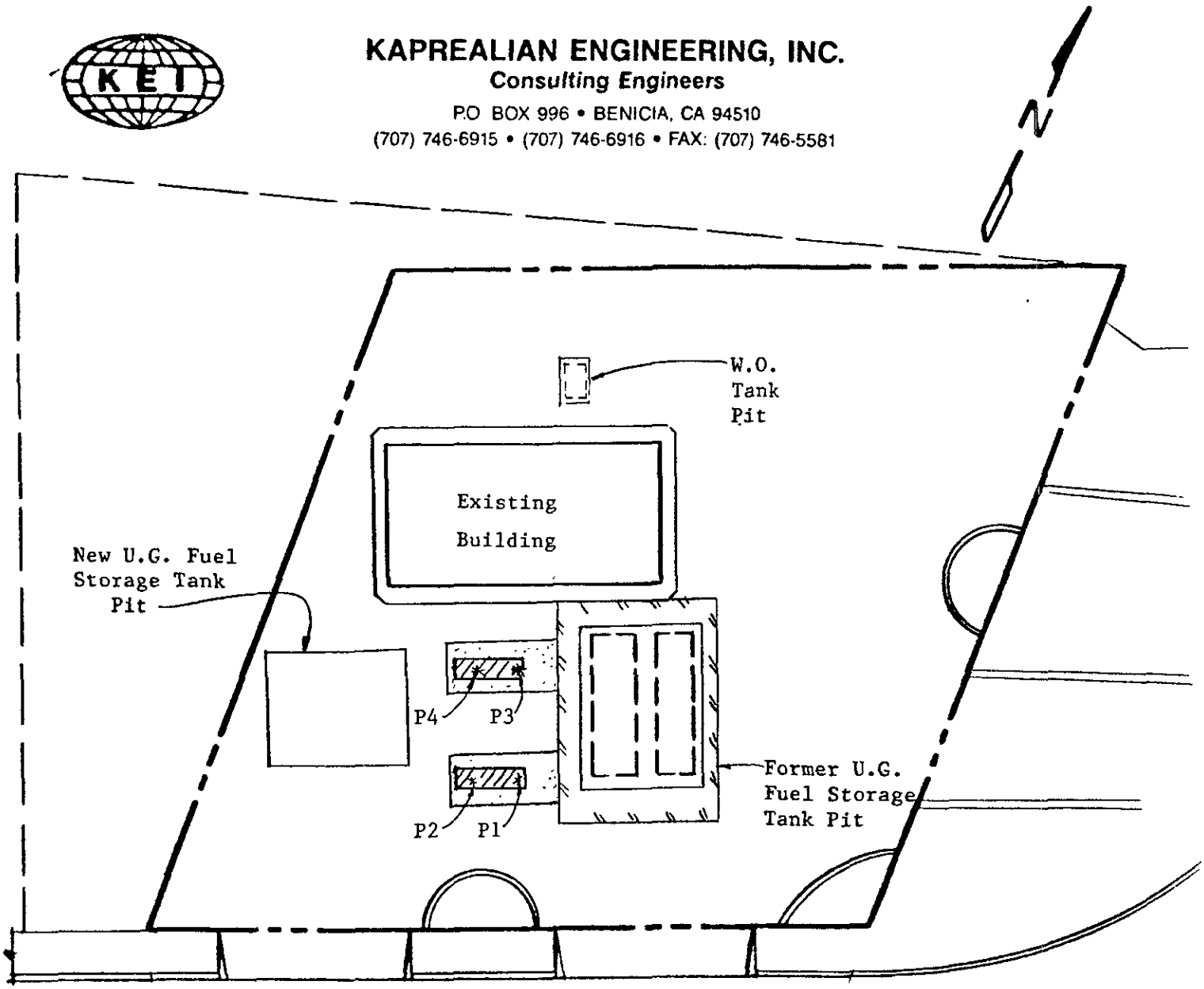

SITE PLAN
Figure 3

* Sample Point Location

Area of Additional Tank Pit Excavation

Area of Additional Pipe Trench Excavation

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, CA

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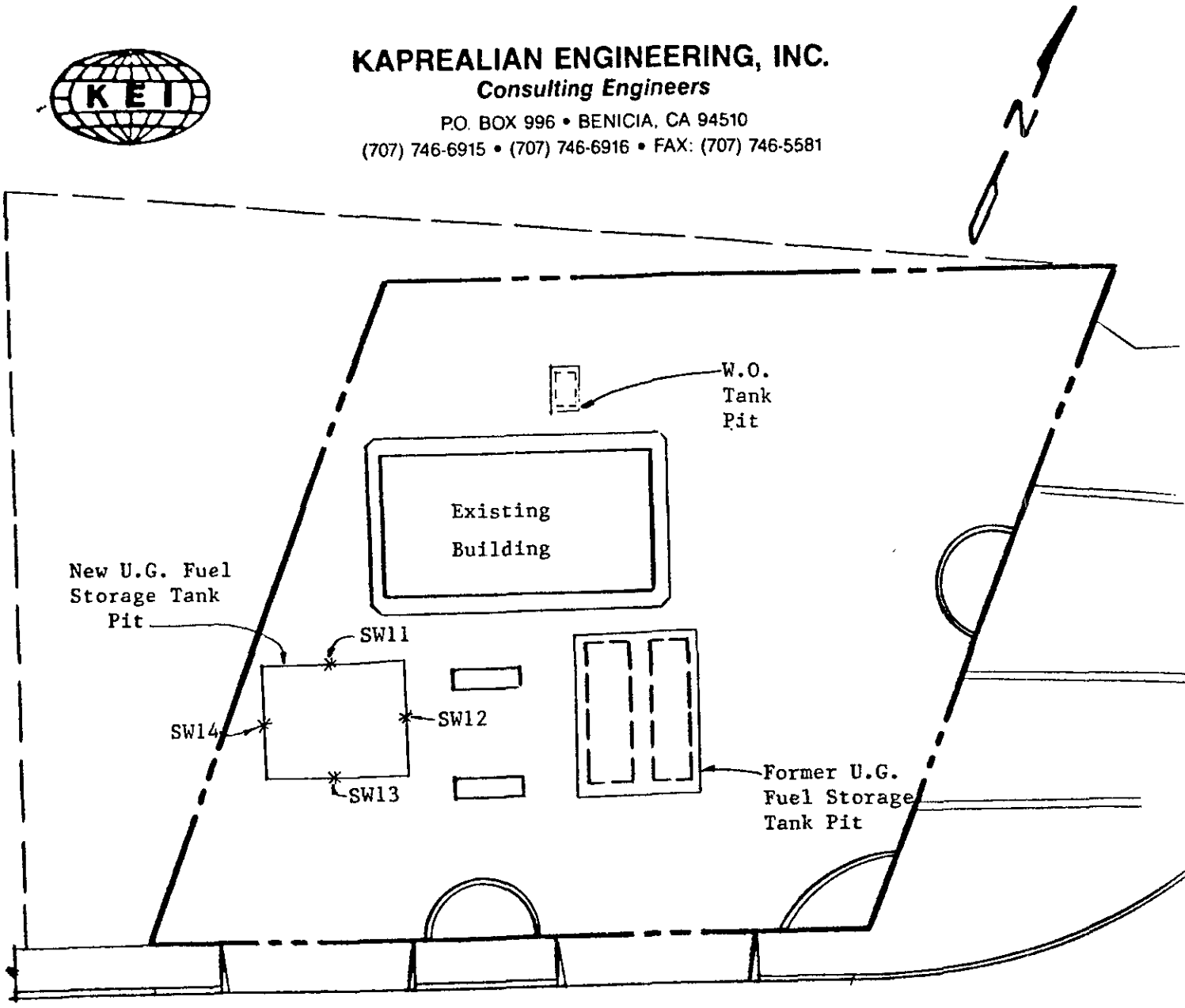


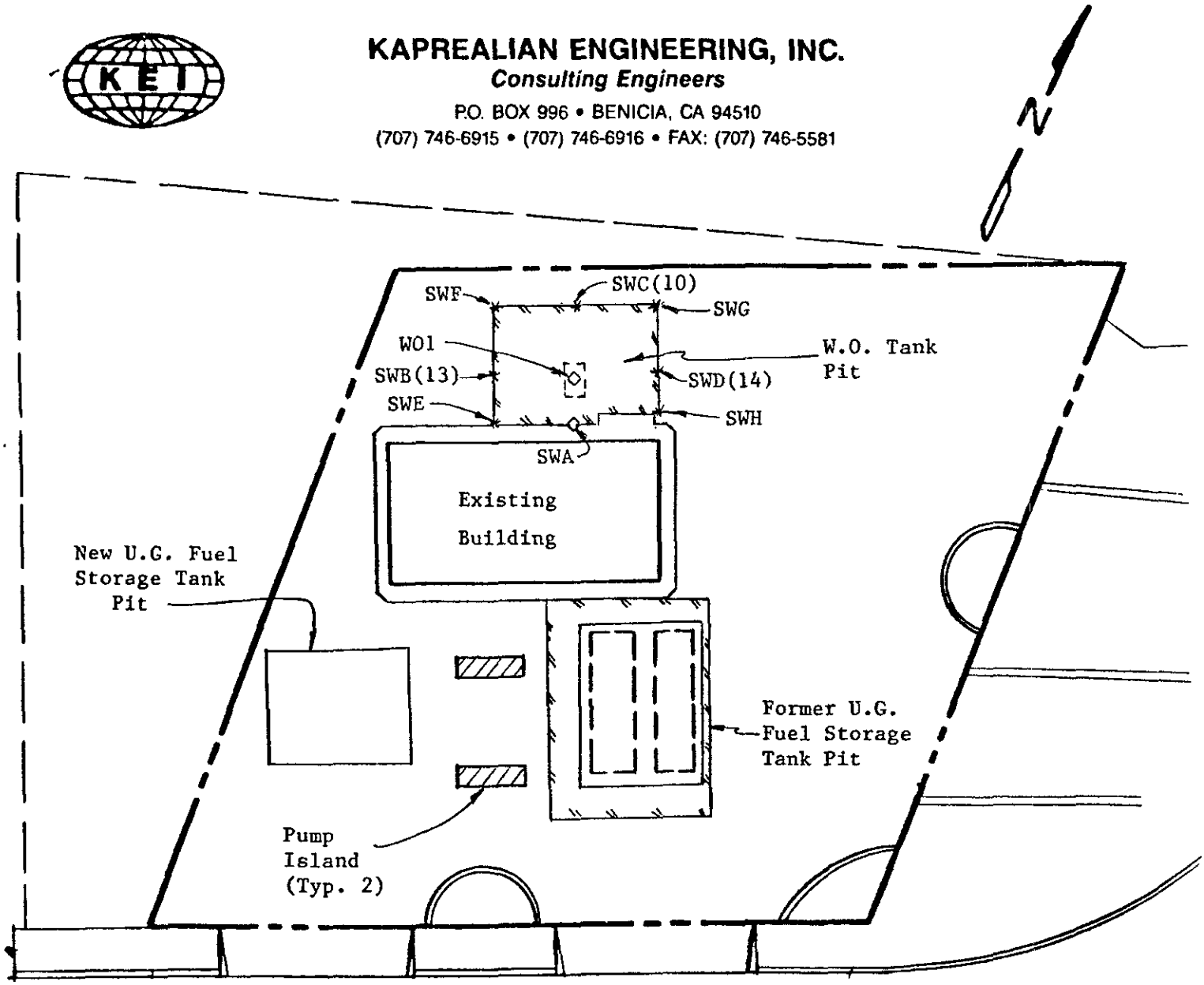
SITE PLAN
Figure 4

LEGEND

* Sample Point Location

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, 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 5

LEGEND

* Sample Point Location

◇ Previous Sample Point Location

Area of Additional Excavation

Unocal S/S #5901
11976 Dublin Blvd.
Dublin, 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, 11976 Dublin Blvd., Dublin	Sampled:	Apr 1, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Apr 1, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	4/12-4/13/91
Attention: Mardo Kaprealian, P.E.	First Sample #:	104-0031	Reported:	Apr 17, 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)
104-0031	MW1	N.D.	N.D.	N.D.	N.D.	N.D.
104-0032	MW2	N.D.	N.D.	N.D.	N.D.	N.D.
104-0033	MW3	N.D.	N.D.	N.D.	N.D.	N.D.
104-0034	MW4	N.D.	N.D.	N.D.	N.D.	N.D.
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

1900 Bates Avenue • Suite LM • Concord, California 94520
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Kapreallan Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled: - - - - - -
P.O. Box 996	Sample Descript.:	DI Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	EPA 5030/ 8015/8020	Analyzed: 4/12-4/13/91
Attention: Mardo Kapreallan, P.E.	Lab Number:	- - - - - -	Reported: Apr 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

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, 11976 Dublin Blvd., Dublin
QC Sample Group: 1040031-34
Reported: Apr 17, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	B. Fletcher	B. Fletcher	B. Fletcher	B. Fletcher	B. Fletcher
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	4/12-4/13/91	4/12-4/13/91	4/12-4/13/91	4/12-4/13/91	4/12-4/13/91
Sample #:	104-0031	104-0032	104-0033	104-0034	Blank
Surrogate % Recovery:	118	116	115	106	110

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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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Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 11976 Dublin Blvd., Dublin
QC Sample Group: 1040031-34
Reported: Apr 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA8015/8020	EPA8015/8020	EPA8015/8020	EPA8015/8020
Analyst:	B. Fletcher	B. Fletcher	B. Fletcher	B. Fletcher
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	4/12-4/13/91	4/12-4/13/91	4/12-4/13/91	4/12-4/13/91
QC Sample #:	104-0431	104-0431	104-0431	104-0431
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	5.0	5.0	5.0	15.0
Conc. Matrix Spike:	4.6	4.8	5.2	15
Matrix Spike % Recovery:	92	96	100	97
Conc. Matrix Spike Dup.:	4.8	5.0	5.2	15
Matrix Spike Duplicate % Recovery:	96	100	100	100
Relative % Difference:	4.2	4.1	0	4.0

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled:	Apr 1, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Apr 1, 1991
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted:	Apr 8, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	104-0031 C	Analyzed:	Apr 9, 1991
			Reported:	Apr 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
104-0031 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.

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Belinda C. Vega
Laboratory Director

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled:	- - - - - -
P.O. Box 996	Matrix Descript:	DI Blank	Received:	- - - - - -
Benicia, CA 94510	Analysis Method:	EPA 3510/8015	Extracted:	Apr 8, 1991
Attention: Mardo Kaprealian, P.E.	First Sample #:	- - - - - -	Analyzed:	Apr 9, 1991
			Reported:	Apr 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
- - - - - -	DI 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

Belinda C. Vega
Laboratory Director

1040031.KEI <6>

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

Client Project ID: Unocal, 11976 Dublin Blvd., Dublin
QC Sample Group: 104-0045
Reported: Apr 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel
Method:	EPA 8015
Analyst:	K. Lee
Reporting Units:	µg/L
Date Analyzed:	Apr 9, 1991
QC Sample #:	BLK040891
Sample Conc.:	N.D.
Spike Conc. Added:	300
Conc. Matrix Spike:	300
Matrix Spike % Recovery:	100
Conc. Matrix Spike Dup.:	340
Matrix Spike Duplicate % Recovery:	110
Relative % Difference:	13

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled:	Apr 1, 1991
P.O. Box 996	Matrix Descript:	Water	Received:	Apr 1, 1991
Benicia, CA 94510	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	Apr 5, 1991
Attention: Mardo Kapreallan, P.E.	First Sample #:	104-0031 D	Analyzed:	Apr 9, 1991
			Reported:	Apr 17, 1991

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
104-0031 D	MW-1	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.
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 11976 Dublin Blvd., Dublin
QC Sample Group: 104-0031
Reported: Apr 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Oil & Grease
Method:	SM 5520 B&F
Analyst:	S. Le
Reporting Units:	ppm
Date Analyzed:	Apr 9, 1991
QC Sample #:	BLK040591
Sample Conc.:	N.D.
Spike Conc. Added:	100
Conc. Matrix Spike:	68
Matrix Spike % Recovery:	68
Conc. Matrix Spike Dup.:	63
Matrix Spike Duplicate % Recovery:	63
Relative % Difference:	7.6

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Belinda C. Vega
Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled:	Apr 1, 1991
P.O. Box 996	Sample Descript:	Water, MW-1	Received:	Apr 1, 1991
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	Apr 4, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	104-0031 EF	Reported:	Apr 17, 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.
cis-1,2-Dichloroethene	1.0	N.D.
trans-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

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1900 Bates Avenue • Suite LM • Concord, California 94520
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Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 11976 Dublin Blvd., Dublin	Sampled: - - - - - -
P.O. Box 996	Sample Descript:	DI Blank	Received: - - - - - -
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed: Apr 4, 1991
Attention: Mardo Kaprealian, P.E.	Lab Number:	- - - - - -	Reported: Apr 17, 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.
cis-1,2-Dichloroethene	1.0	N.D.
trans-1,2-Dichloroethene	1.0	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	2.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	N.D.
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	1.0	N.D.
Vinyl chloride	2.0	N.D.

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

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

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

Client Project ID: Unocal, 11976 Dublin Blvd., Dublin
QC Sample Group: 104-0031
Reported: Apr 17, 1991

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8010	EPA 8010
Analyst:	EH	EH
Reporting Units:	ug/L	ug/L
Date Analyzed:	Apr 4, 1991	Apr 4, 1991
Sample #:	104-0031	Blank
Surrogate #1 % Recovery:	85	74
Surrogate #2 % Recovery:	80	80

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, 11976 Dublin Blvd., Dublin
QC Sample Group: 1040031-34
Reported: Apr 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:	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton	E. Hamilton
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Apr 4, 1991	Apr 4, 1991	Apr 4, 1991	Apr 4, 1991	Apr 4, 1991	Apr 4, 1991
QC Sample #:	103-0895	103-0895	103-0895	103-0895	103-0895	103-0895
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:	7.0	8.6	11	8.5	8.3	9.3
Matrix Spike % Recovery:	70	86	110	85	83	93
Conc. Matrix Spike Dup.:	7.4	8.9	11	8.7	8.6	9.7
Matrix Spike Duplicate % Recovery:	74	89	110	87	86	97
Relative % Difference:	5.6	3.4	0	2.3	3.6	4.2

SEQUOIA ANALYTICAL

Belinda C. Vega
Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Ray (KEI)

WITNESSING AGENCY:

SITE NAME & ADDRESS: UNOCAL DUBLIN
11976 DUBLIN BLVD

ANALYSES REQUESTED: TPHG, BTXE, TOG (5520 B&F), TPHD as diesel 8010

TURN AROUND TIME: REGULAR

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	REMARKS
MW1	4-1			X	X		2 AMB 4 VOA		
MW2	"			X	X		2 VOA		
MW3	"			X	X		"		
MW4	"			X	X		"		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Ray (KEI)	4-1-91	K. Walters 2:20 4/1

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: KC Title: LCQA Date: 4/1/91