KAPREALIAN ENGINEERING
INCORPORATED

KEI-P90-1103.R5
November 17, 1992

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

Attention: Mr. Tim Howard

RE: Continuing Ground Water Investigation at
Unocal Service Station #0752
800 Harrison Street
Oakland, California

Dear Mr. Howard:

This report presents the results of Kaprealian Engineering, Inc's. (KEI) soil and ground water investigation for the referenced site, in accordance with KEI's proposal (KEI-P90-1103.P2) dated November 13, 1991. The purpose of the investigation was to further determine the degree and extent of soil and ground water contamination at the site. The scope of the work performed by KEI consisted of the following:

Coordination with regulatory agencies

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

Soil sampling

Ground water monitoring, purging, and sampling

Laboratory analyses

Data analysis, interpretation, and report preparation

SITE DESCRIPTION AND BACKGROUND

The subject site contains a Unocal service station facility. The site is characterized by gently sloping, southward trending topography, and is located approximately 0.5 miles north-northeast of the Oakland Inner Harbor. The site is also located northeast and across 8th Street from a Shell service station that is located adjacent to and northeast of a currently closed Arco service station (which is located at the intersection of 7th Street with Harrison). In addition, a gasoline and diesel service station referred to as "Mandarin Auto Service" is located east-southeast of the Unocal site at Alice Street and 8th Street.

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510.602.5100 Fax: 510.687.0602

KEI's initial field work was conducted on November 9, 1990, when two underground gasoline storage tanks and one waste oil tank were removed from the site. The tanks consisted of one 10,000 gallon regular unleaded gasoline storage tank, one 10,000 gallon super unleaded gasoline storage tank, and one 280 gallon waste oil tank. The tanks were made of steel, and no apparent holes or cracks were observed in the fuel tanks; however, the waste oil tank contained one 1/8th-inch square hole. Mr. Dennis Byrne of the Alameda County Health Care Services Agency (ACHCS) was present during tank removal and subsequent soil sampling.

Two soil samples, labeled A1 and B1, were collected from beneath the fuel tanks at depths of approximately 14 feet below grade. Two soil samples, labeled A2 and B2, were collected from the fuel tank pit south sidewall at depths of approximately 12 feet below grade. One soil sample, labeled WO1, was collected from beneath the waste oil tank at a depth of approximately 6.5 feet below grade. The sample point locations are as shown on the attached Figure 3.

On November 12, 1990, due to observed soil contamination in the area of sample point A1, KEI collected an additional soil sample, labeled C(19), from the fuel tank pit at a depth of approximately 19 feet below grade.

KEI returned to the site on December 20, 1990, in order to collect soil samples from beneath the pump islands. Six samples, labeled D1 through D6, were collected from beneath the six fuel dispensers; one sample, labeled P1, was collected from the product pipe trench. These samples were collected at depths of about 2.5 feet below grade. The sample point locations are shown on the attached Figure 3.

KEI again returned to the site on December 26, 1990, in order to collect a sample from the pump island excavation (due to obvious contamination observed in the area beneath sample point D2 during previous excavation activities). One additional soil sample, labeled D2(6), was collected from beneath the fuel dispenser and below the sample point D2 at a depth of about 6 feet below grade.

At the request of the ACHCS, on January 3, 1991, KEI returned to the site in order to collect one additional soil sample, labeled WO1(9.5), from the waste oil tank pit. The sample point locations are as shown on the attached Figure 3. After sampling, the waste oil tank pit was excavated to the sample depth of 9.5 feet below grade.

All samples were analyzed by Sequoia Analytical Laboratory in Concord, California. All soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene,

xylenes, and ethylbenzene (BTX&E). In addition, the soil sample (WO1) collected from the waste oil tank pit was analyzed for TPH as diesel, total oil and grease (TOG), EPA method 8010 and 8270 constituents, and the metals cadmium, chromium, lead, zinc, and nickel. Soil sample WO1(9.5), collected beneath sample WO1, was analyzed for TPH as gasoline, BTX&E, TOG, and the metals chromium, lead, zinc, and nickel.

Analytical results of the soil samples (A2 and B2) collected from the fuel tank pit sidewall indicated non-detectable levels of TPH as gasoline. Analytical results of the soil samples [A1, B1, and C(19)] collected from the bottom of the fuel tank pit indicated levels of TPH as gasoline at 1,200 ppm, 45 ppm, and 3,800 ppm, respectively.

Analytical results of soil samples collected from beneath the dispensers and the pipe trench indicated non-detectable levels of TPH as gasoline and benzene for samples P1 and D1 through D6, except for sample D2, which showed 45 ppm of TPH as gasoline and 0.22 ppm of benzene. However, sample D2(6), collected beneath sample D2 at a depth of 6 feet below grade, showed 1,200 ppm of TPH as gasoline and 0.24 ppm of benzene.

Analytical results of the soil sample (WO1) collected from beneath the waste oil tank pit indicated non-detectable levels of TPH as gasoline, BTX&E, TPH as diesel, TOG, EPA methods 8010 and 8270 constituents, and cadmium. Chromium, lead, zinc, and nickel were detected at concentrations of 43 ppm, 1,100 ppm, 130 ppm, and 12 ppm, respectively. However, sample WO1(9.5), collected from beneath sample WO1 at a depth of 9.5 feet below grade, showed non-detectable levels of TPH as gasoline, BTX&E, TOG, and lead. Chromium, zinc, and nickel were detected at concentrations of 61 ppm, 20 ppm, and 40 ppm, respectively. The results of the soil analyses are summarized in Table 7.

Based on the analytical results, KEI recommended that an in-situ remediation system design be developed and implemented to remediate the residual soil contamination in the fuel tank pit in the vicinity of sample point locations A1 and C(19), and at the southerly pump island in the vicinity of sample location D2(6). However, prior to designing the recommended remediation system, and in order to comply with the requirements of the Regional Water Quality Control Board (RWQCB) and the ACHCS, KEI recommended the installation of three monitoring wells and two exploratory borings at the site. Documentation of the tank and piping removal procedures, sample collection techniques, and the analytical results are summarized in KEI's report (KEI-J90-1103.R1) dated February 1, 1991.

On May 29 and 30, 1991, three two-inch diameter monitoring wells and two exploratory borings (designated as MW1, MW2, and MW3, and EB1 and EB2, respectively, on the attached Figure 1) were installed at the site. The monitoring wells were drilled and completed to total depths ranging from 33 to 35 feet below grade. The exploratory borings were each drilled to total depths of 23 feet below grade and were subsequently fully grouted with neat Portland cement. Ground water was encountered at depths ranging from about 22.5 to 24 feet beneath the surface during drilling. The wells were developed on June 1, 1991, and were initially sampled on June 5, 1991.

Water samples from MW1, MW2, and MW3, and selected soil samples from EB1, EB2, MW1, MW2, and MW3, were analyzed at Sequoia Analytical Laboratory in Concord, California. All of the soil and water samples were analyzed for TPH as gasoline and BTX&E. In addition, the soil and water samples collected from MW1 (adjacent to the waste oil tank) were analyzed for TPH as diesel, TOG, EPA method 8010 constituents, and for the metals cadmium, chromium, lead, nickel, and zinc.

The analytical results of the soil samples collected from the borings for monitoring wells MW1, MW2, and MW3, and from soil borings EB1 and EB2, indicated non-detectable levels of TPH as gasoline and benzene in all samples, except for samples MW1(5), MW1(10), MW1(15), and MW3(23), which showed levels of TPH as gasoline at levels of 1.1 ppm, 43 ppm, 250 ppm, and 2.9 ppm, respectively, and in samples EB1(15), MW1(15), MW2(15.5), MW2(20), and MW3(23), which showed benzene levels ranging from 0.0079 ppm to 0.80 ppm. In MW1, TPH as diesel, TOG, and all EPA method 8010 compounds were non-detectable in all samples, except for samples MW1(5), MW1(10), and MW1(15), which showed levels of TPH as diesel at 2.2 ppm, 43 ppm, and 120 ppm, respectively. Also in MW1, cadmium was non-detectable for all samples; chromium was detected at levels ranging from 20 ppm to 110 ppm; lead was detected at levels ranging from 4.2 ppm to 11 ppm; nickel was detected at levels ranging from 24 ppm to 42 ppm; and zinc was detected at levels ranging from 23 ppm to 30 ppm.

The analytical results of the ground water samples collected from monitoring wells MW1 and MW2 indicated levels of TPH as gasoline ranging from 47 ppb to 49 ppb, with non-detectable levels of BTX&E. In MW3, TPH as gasoline was detected at a level of 5,800 ppb and benzene was detected at a level of 1,200 ppb. In MW1, TPH as diesel, TOG, and EPA method 8010 constituents were all non-detectable, except for chloroform at 7.8 ppb, tetrachloroethene at 2.9 ppb, and trichloroethene at 1.3 ppb. Also in MW1, chromium, lead, nickel, and zinc were detected at concentrations of 0.0083 ppm, 0.011 ppm, 0.063 ppm and 0.023 ppm, respectively, and cadmium

was non-detectable. The results of the soil analyses are summarized in Tables 5 and 6, and the results of the water analyses are summarized in Tables 2, 3, and 4.

Based on the analytical results, KEI recommended the implementation of a monthly monitoring and quarterly sampling program. Documentation of monitoring well and exploratory boring installation procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P90-1103.R4) dated July 5, 1991.

A representative of KEI reviewed the RWQCB's files on August 13, 1991, in order to obtain information on sites with documented ground water contamination in the vicinity of the Unocal site. KEI conducted a follow-up file review at the RWQCB on March 25, 1992. The following is a summary of these file reviews:

Fire Station #12, 822 Alice Street

This site is located southeast of and within 300 feet of the Unocal site (between 8th Street and 9th Street). A 280 gallon underground diesel tank was removed in 1989. The analytical results of the soil samples collected from immediately beneath the tank showed total extractable hydrocarbons and TOG, at concentrations up to 860 ppm and 250 ppm, respectively. On June 12 through June 14, 1989, one monitoring well and two piezometers were drilled to a depth of between 20 and 21 feet below grade. The analytical results of the soil samples from well MW1 indicated non-detectable levels of TPH as gasoline and BTX&E. TOG was detected at concentrations ranging from 74 ppm to 78 ppm in the soil samples collected from depths of 5 to 20 feet below grade. The analytical results of the ground water samples collected from well MW1 (at high detection limits) indicated non-detectable levels of TPH as gasoline, BTX&E, and TPH as diesel. Also, TPH as diesel was non-detectable in the ground water samples collected from monitoring well MW1 as of May 2, 1990. Based on a south to southwesterly ground water flow direction at the Unocal site, it is not considered likely that contamination from the Unocal site and the fire station have commingled. All of the above information was based on a report prepared by Subsurface Consultants, Inc., dated August 3, 1989.

Former Shell Station, 416 Eighth Street at Broadway

This site is located three blocks north-northwest of the Unocal site. This site reportedly had seven monitoring wells (S-1 through S-7), which were apparently installed by Groundwater Technology Inc. (GTI) in August 1981. In 1985, monitoring well S-7 was destroyed for freeway construction. Monitoring wells S-1 through S-3 were reported as "inaccessible" and "believed to be destroyed"

during a station demolition. Quarterly ground water sampling of wells S-4, S-5, and S-6 began in October of 1988. Ground water samples collected from these wells were analyzed for TPH as gasoline and BTX&E. Free product levels of up to 0.25 feet have been detected in well S-5 since October of 1990. Monitoring well S-4 was not sampled since June 1991, due to insufficient water for sampling. The ground water flow direction was reported as varying from the north-northwest to the northwest on April 8, 1991. Based on the opposing directions of ground water flows and the distance from the Unocal site, it is not considered likely that contamination from the Unocal site and the former Shell station have commingled. All of the above information was based on a quarterly report prepared by GeoStrategies, Inc., dated January 6, 1992.

Other Sites

No information was contained in the RWQCB files for the adjacent Shell service station (see the attached Site Vicinity Map, Figure 4), the former Arco service station (Seventh Street at Harrison Street), the Mandarin Auto service station, or the Rind gas station (both the Mandarin Auto and Rind stations are located at the intersection of Eighth Street and Alice Street).

→ you mean Vic's Auto Repair? 245-8th St?

Based upon the lack of information available for these nearby sites, KEI recommended that the RWQCB files be periodically re-reviewed to determine if any new information is available for the sites.

RECENT FIELD ACTIVITIES

On September 30 and October 1, 1992, three additional two-inch diameter monitoring wells (designated as MW4, MW5, and MW6 on the attached Figure 1) were installed at and in the vicinity of the site. The wells were each drilled, constructed, and completed in accordance with the guidelines of the RWQCB and the California Well Standards (per Bulletin 74-90). The subsurface materials penetrated and details of the construction of the wells are described in the attached Boring Logs.

The three new wells were each drilled and completed to total depths ranging from 32 to 33 feet below grade. Ground water was encountered at depths ranging from 21.5 to 23 feet below grade during drilling. Soil samples were collected for laboratory analysis and for lithologic logging purposes at a maximum spacing of 5 foot intervals, at significant changes in lithology, at 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 ground water was encountered. Soil sampling conducted below the ground water table was for lithologic logging

purposes only. The undisturbed soil samples were collected by driving a California-modified split-spoon sampler (lined with brass liners) ahead of the drilling augers. The two-inch diameter brass liners holding the samples were then sealed with aluminum foil, plastic caps and tape, labeled, and stored in a cooler, on ice, until delivery to a state-certified laboratory. Each well casing was installed with a watertight cap and padlock. A round, watertight, flush-mounted well cover was cemented in place over each well casing.

The surface of each well cover was surveyed by Kier & Wright of Pleasanton, California, to Mean Sea Level (MSL) and to a vertical accuracy of 0.01 feet.

The new wells were developed on October 15, 1992. Prior to development, the wells were checked for the depth to the water table (by the use of an electronic sounder) and the presence of free product (by the use of an interface probe or paste tape). No free product was noted in any of the wells. After recording the monitoring data, the three new wells were each purged (by the use of a surface pump) of 55 gallons of water (until the evacuated water was clear and free of suspended sediment). Monitoring and well development data are summarized in Table 1.

The three new wells (MW4, MW5, and MW6) were sampled on October 19, 1992. Prior to sampling, monitoring data were collected, and the new wells were each purged of 9 gallons of water by the use of a surface pump/bailer. Water samples were collected by the use of a clean Teflon bailer. Samples were decanted into clean VOA vials that were then sealed with Teflon-lined screw caps, labeled, and stored in a cooler, on ice, until delivery to a state-certified laboratory.

ANALYTICAL RESULTS

Water and selected soil samples from the borings of MW4, MW5 and MW6 were analyzed at Sequoia Analytical Laboratory. All samples analyzed were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline by EPA method 5030/modified 8015, and BTX&E by EPA method 8020.

The concentrations of TPH as gasoline and benzene detected in the ground water samples collected on October 19, 1992, are shown on the attached Figure 2. The results of the soil analyses are summarized in Table 5, and the results of the water analyses are summarized in Table 2. Copies of the laboratory analyses and the Chain of Custody documentation are attached to this report.

HYDROLOGY AND GEOLOGY

The measured depth to ground water at the site on October 19, 1992, ranged between 19.53 and 21.49 feet below grade. The ground water flow direction appeared to be to the ~~south-southwest~~ (see Figure 1) on October 19, 1992, with a hydraulic gradient of approximately 0.009 (based on the water level data from the six existing monitoring wells prior to purging).

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 dune sand deposits referred to as the Merritt Sand (Qps). The Merritt Sand is described as typically consisting of loose, well-sorted, fine-to medium-grained sand with silt. This sand apparently reaches a maximum depth of about 50 feet below grade in the Oakland area.

Based on the results of our subsurface studies, the site is underlain by fill materials to depths between 1 and 3.5 feet below grade. The fill is in turn underlain by alluvium to the maximum depth explored (35 feet below grade).

The alluvium underlying the site consists initially of fine-grained sand with silt. This material is underlain by silty to sandy clay beginning at a depth of between 30 and 33 feet below grade and extending to the total depth explored (35 feet below grade).

The unsaturated zone beneath the site is approximately 22 feet thick and consists of fine-grained sand with silt. The base of the unsaturated zone and the saturated zone also predominantly consists of the same fine-grained sand with silt that composes the greater part of the alluvium encountered in the existing wells.

A particle size analysis (sieve analysis) was previously performed on a saturated sample collected from the boring for well MW2 at a depth of 30 feet below grade. The analysis indicated that the sample consisted of approximately 90% fine sand, 8% medium sand, and 2% silt and clay. The sample is classified as fine-grained brown sand (SP). The results of the particle size analysis are presented in the attached Plate 1.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results of the samples collected and evaluated to date, the extent of ground water contamination has not been defined at and in the vicinity of the site. However, in order to verify the analytical results of the ground water samples

collected from the three recently installed wells, KEI recommends the continuation of the ground water monitoring and sampling program, per KEI's proposal (KEI-P90-1103.P2) dated November 13, 1991, and as modified in KEI's quarterly report (KEI-P90-1103.QR4) dated July 27, 1992, for an additional quarter. The wells are currently monitored monthly and sampled quarterly. At the end of the next quarter, KEI will make recommendations pertaining to additional monitoring, contamination delineation, or contamination remediation work that is warranted for the subject site. KEI will also conduct a site vicinity reconnaissance in the upcoming quarter in order to identify suitable locations for potential off-site monitoring wells. ok

DISTRIBUTION

Copies of this report should be sent to Ms. Jennifer Eberle of the ACHCS, 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 at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

Thomas J. Berkins
Senior Environmental Engineer

Joel G. Greger, C.E.G.
Senior Engineering Geologist

License No. 1633
Exp. Date 6/30/94

Timothy R. Ross
Project Manager

/bp

Attachments: Tables 1 through 7
Location Map
Potentiometric Surface Map - Figure 1
Petroleum Hydrocarbon Concentration Map - Figure 2
Soil Sample Point Location Map - Figure 3
Site Vicinity Map - Figure 4
Boring Logs
Particle Size Analysis - Plate 1
Laboratory Analyses
Chain of Custody documentation

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TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Water Purged (Gallons)
(Monitored and Sampled on October 19, 1992)					
MW1*	13.45	21.49	0	--	0
MW2*	13.83	21.14	0	--	0
MW3*	13.03	20.36	0	--	0
MW4	13.02	20.10	0	No	9
MW5	13.18	20.07	0	No	9
MW6	12.89	19.53	0	No	9
(Monitored and Developed on October 15, 1992)					
MW4	12.96	20.16	0	--	55
MW5	13.12	20.13	0	--	55
MW6	12.81	19.61	0	--	55

Well #	Surface Elevation** (feet)
MW1	34.94
MW2	34.97
MW3	33.39
MW4	33.12
MW5	33.25
MW6	32.42

-- Sheen determination was not performed.

* Monitored only.

** The elevations of the tops of the well covers have been surveyed to MSL, per the City of Oakland Benchmark 25/A, which is located at the northeast corner of 7th Street and Harrison Street.

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/19/92	MW4	--	480	0.51	2.1	6.8	2.8
	MW5	--	2,700	61	5.0	61	100
	MW6	--	3,900	420	12	28	60
9/15/92	MW1	ND	76	1.0	ND	ND	ND
	MW2	--	1,300	91	5.7	110	80
	MW3	--	10,000	1,900	330	580	400
6/30/92	MW1	120	ND	ND	ND	ND	ND
	MW2	--	76	9.3	0.76	6.9	4.8
	MW3	--	8,900	1,900	210	550	430
4/02/92	MW1	94	ND	ND	ND	ND	ND
	MW2	--	88	12	0.32	7.2	6.3
	MW3	--	8,000	1,400	200	310	300
12/30/91	MW1	ND	ND	ND	ND	ND	ND
	MW2	--	91	16	0.89	1.9	11
	MW3	--	7,200	2,100	690	550	410
9/30/91	MW1	ND	ND	ND	ND	ND	ND
	MW2	--	130	18	0.53	9.6	14
	MW3	--	6,800	1,400	130	240	290
6/05/91	MW1	ND	47	ND	ND	ND	ND
	MW2	--	49	ND	ND	ND	ND
	MW3	--	5,800	1,200	40	97	140

ND = Non-detectable.

-- Indicates analysis was not performed.

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

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TABLE 3

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	Chloroform	Tetrachloroethene	Trichloroethene
9/15/92	MW1*	12	2.2	1.3
6/30/92	MW1*	9.5	2.2	1.3
4/02/92	MW1*	7.1	2.6	1.4
12/30/91	MW1*	6.4	2.1	0.9
9/30/91	MW1	--	--	--
6/04/91	MW1*	7.8	2.9	1.3

* All EPA method 8010 constituents were non-detectable, except for the above compounds.

-- Indicates analysis was not performed.

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

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TABLE 4

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TOG	Cadmium	Chromium	Lead	Nickel	Zinc
4/02/92	MW1	ND	ND	0.015	0.016	ND	0.020
12/30/91	MW1	ND	ND	0.0078	0.0057	ND	0.046
9/30/91	MW1	ND	ND	0.019	ND	ND	0.11
6/05/91	MW1	ND	ND	0.0083	0.011	0.063	0.023

ND = Non-detectable.

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

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TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
5/23/91	MW1(5)*	5.0	2.2	1.1	ND	ND	0.010	ND
&	MW1(10)*	10.0	43	43	ND	0.0059	0.43	0.0074
5/30/91	MW1(15)*	15.0	120	250	0.80	0.73	2.9	0.91
	MW1(20)*	20.0	ND	ND	ND	ND	ND	ND
	MW1(24)*	24.0	ND	ND	ND	ND	0.0073	ND
	MW2(5)	5.0	--	ND	ND	ND	0.0054	ND
	MW2(10)	10.0	--	ND	ND	ND	ND	ND
	MW2(15.5)	15.5	--	ND	0.015	ND	0.025	0.0064
	MW2(20)	20.0	--	ND	0.0086	ND	ND	ND
	MW2(22)	22.0	--	ND	ND	ND	ND	ND
	MW3(5)	5.0	--	ND	ND	ND	ND	ND
	MW3(10)	10.0	--	ND	ND	ND	ND	ND
	MW3(15)	15.0	--	ND	ND	ND	ND	ND
	MW3(20)	20.0	--	ND	ND	ND	ND	ND
	MW3(23)	23.0	--	2.9	0.0079	ND	0.031	0.012
	EB1(5.5)	5.5	--	ND	ND	ND	ND	ND
	EB1(10)	10.0	--	ND	ND	ND	ND	ND
	EB1(15)	15.0	--	ND	0.0087	ND	ND	ND
	EB1(20)	20.0	--	ND	ND	ND	ND	ND
	EB1(22)	22.0	--	ND	ND	ND	ND	ND
	EB2(5.5)	5.5	--	ND	ND	ND	ND	ND
	EB2(10)	10.0	--	ND	ND	ND	ND	ND
	EB2(15)	15.0	--	ND	ND	ND	ND	ND
	EB2(20)	20.0	--	ND	ND	ND	ND	ND
	EB2(22.5)	22.5	--	ND	ND	ND	ND	ND
9/30/92	MW4(5)	5.0	--	ND	ND	ND	ND	ND
&	MW4(10)	10.0	--	ND	ND	ND	ND	ND
10/01/92	MW4(15)	15.0	--	ND	ND	ND	ND	ND
	MW4(20)	20.0	--	ND	ND	ND	ND	ND
	MW4(22.5)	22.5	--	27♦	ND	ND	ND (.45)	ND
	MW5(5)	5.0	--	ND	ND	ND	ND	ND
	MW5(10)	10.0	--	ND	ND	ND	ND	ND
	MW5(15)	15.0	--	ND	ND	ND	ND	ND
	MW5(20)	20.0	--	ND	ND	ND	ND	ND
	MW5(22)	22.0	--	1.1	ND	0.0060	0.014	ND

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TABLE 5 (Continued)

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
9/30/92	MW6(5)	5.0	--	ND	ND	ND	ND	ND
&	MW6(10)	10.0	--	ND	ND	ND	ND	ND
10/01/92	MW6(15)	15.0	--	ND	ND	ND	ND	ND
	MW6(20)	20.0	--	ND	ND	ND	ND	ND
	MW6(21.5)	21.5	--	170	ND	0.38	4.5	1.8

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

♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be gasoline.

ND = Non-detectable.

-- Indicates analysis was not performed.

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

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TABLE 6

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	Cadmium	Chromium	Lead	Nickel	Zinc
5/29/91	MW1(5)	5	ND	64	11	32	30
	MW1(10)	10	ND	48	7.1	24	27
	MW1(15)	15	ND	11	06.0	42	28
	MW1(20)	20	ND	32	4.2	36	23
	MW1(24)	24	ND	20	5.0	31	23

ND = Non-detectable.

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

KEI-P90-1103.R5
November 17, 1992

TABLE 7

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected on November 9 & 12, December 20 & 26, 1990, and January 3, 1991)

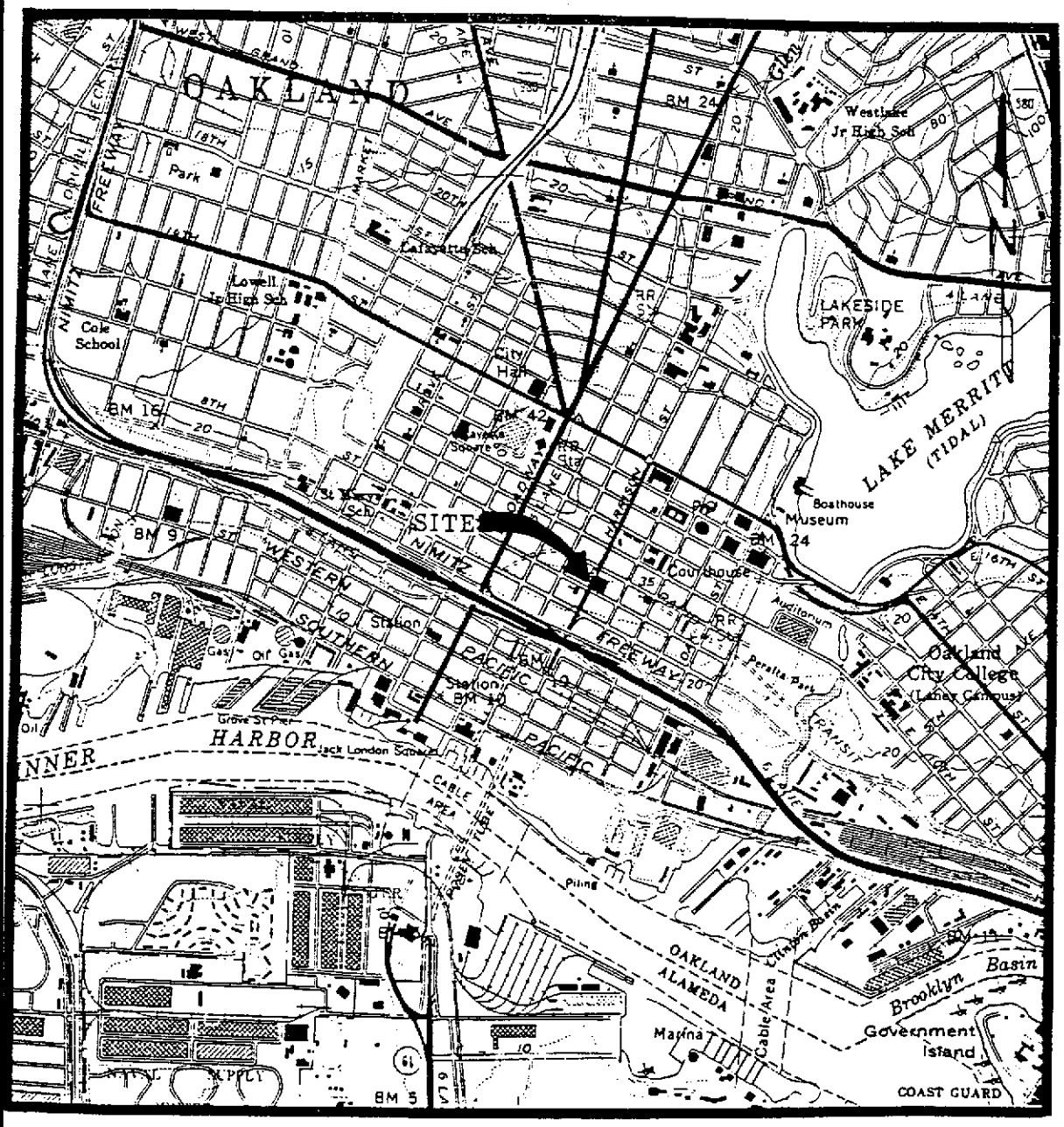
Sample	Depth (feet)	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
A1	14.0	1,200	3.0	38	170	25
A2	12.0	ND	ND	0.0082	0.024	ND
B1	14.0	45	0.29	2.7	10	1.4
B2	12.0	ND	0.0063	0.0056	0.011	ND
C(19)	19.0	3,800	11	90	210	36
WO1*	6.5	ND	ND	ND	ND	ND
WO1(9.5)**	9.5	ND	ND	ND	ND	ND
D1	2.5	ND	ND	ND	ND	ND
D2	2.5	45	0.22	1.8	5.5	0.71
D2(6)	6.0	1,200	0.24	28	170	28
D3	2.5	ND	ND	ND	ND	ND
D4	2.5	ND	ND	ND	ND	ND
D5	2.5	ND	ND	ND	ND	ND
D6	2.5	ND	ND	ND	ND	0.018
P1	2.5	ND	ND	ND	ND	ND

* TOG, TPH as diesel, cadmium, and all EPA methods 8010 and 8270 constituents were non-detectable. Chromium, lead, zinc, and nickel were detected at 43 ppm, 1,100 ppm, 130 ppm, and 12 ppm, respectively.

** TOG and lead were non-detectable. Chromium, zinc, and nickel were detected at 61 ppm, 20 ppm, and 40 ppm, respectively.

ND = Non-detectable.

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



ed from 7.5 minute U.S.G.S. Oakland West Quadrangle
d 1980)

0 2000 4000
Approx. scale feet

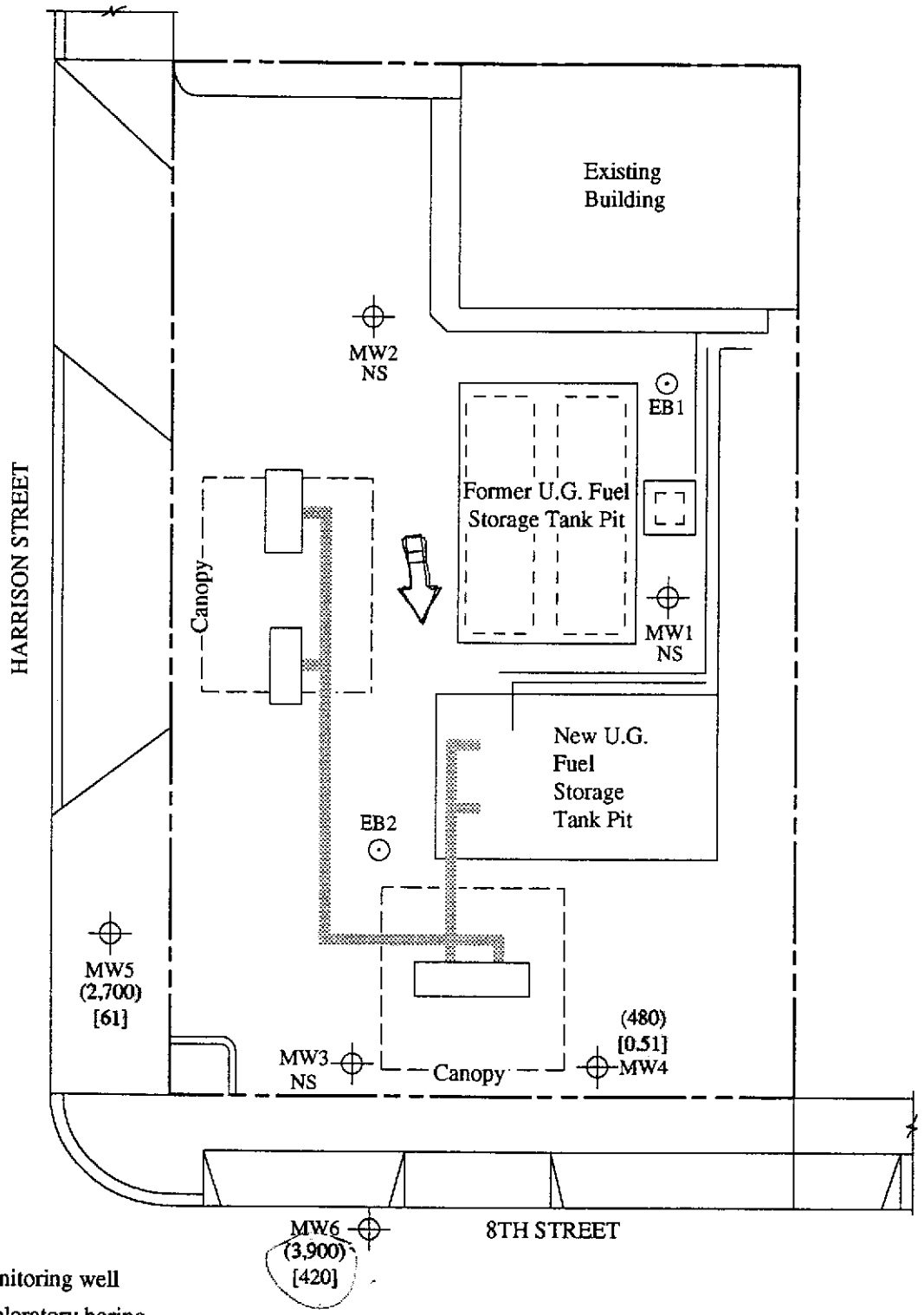
40
feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

LOCATION MAP

IGURE
1



LEGEND

- Monitoring well
- Exploratory boring
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- NS = Not sampled
- Direction of ground water flow

0 20 40

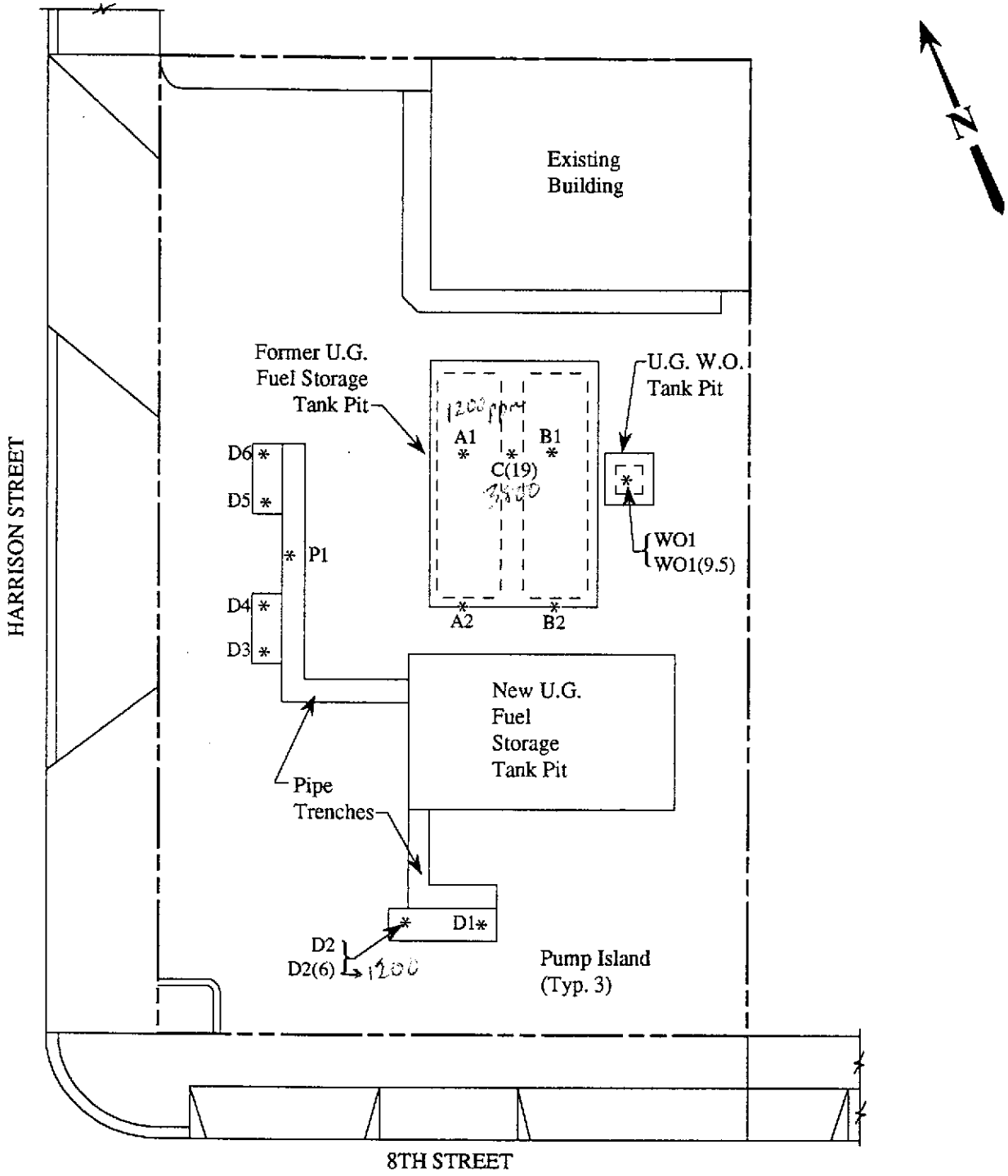
Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON OCTOBER 19, 1992

KAPREALIAN ENGINEERING INCORPORATED

UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE **2**



TPH-g

LEGEND

* Sample Point Location

0 20 40

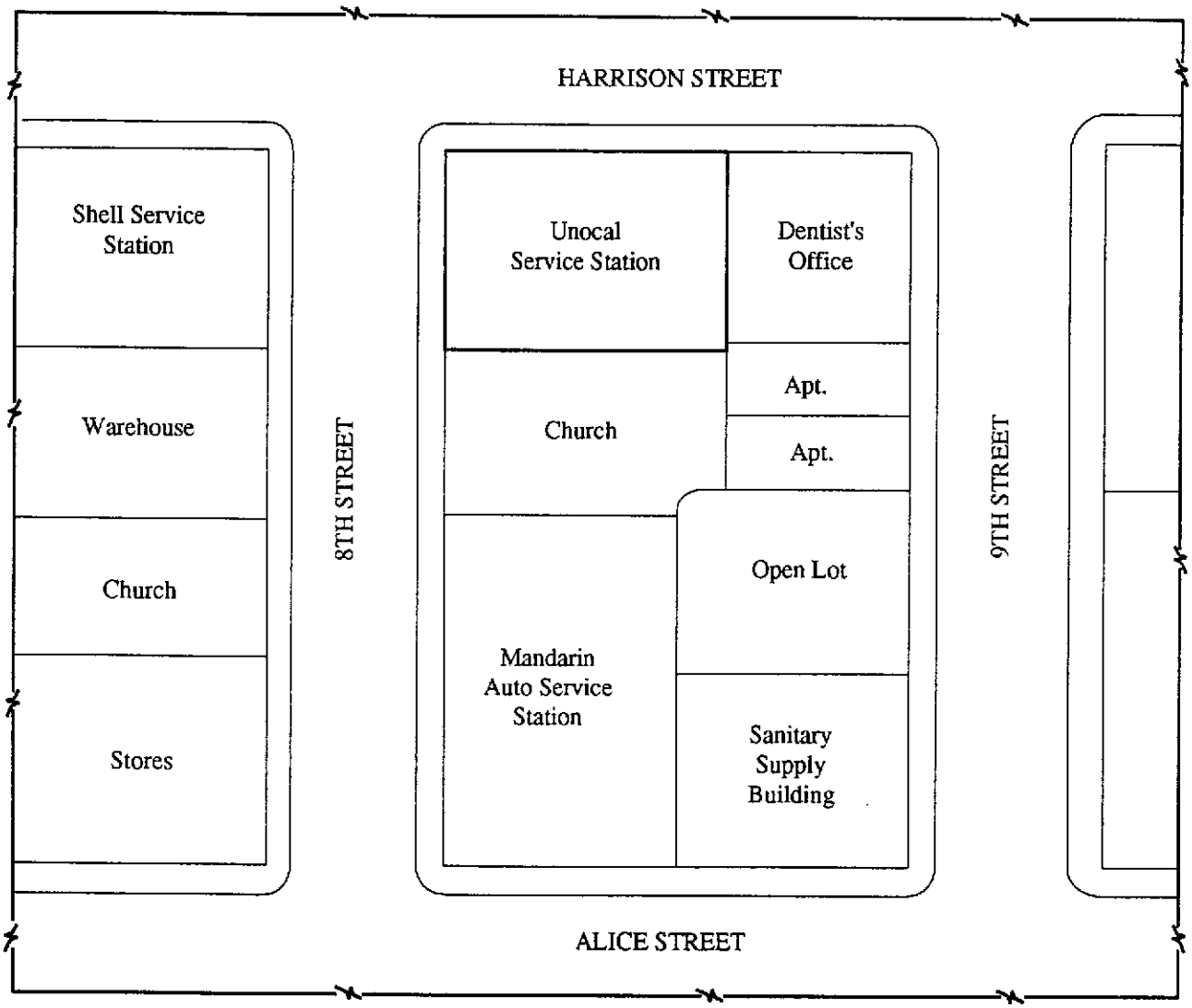
Approx. scale feet

UNDERGROUND TANK AND PIPING SOIL SAMPLE POINT LOCATIONS

KAPREALIAN ENGINEERING INCORPORATED

UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE **3**



SITE VICINITY MAP

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE
4

KAPREALIAN ENGINEERING
INCORPORATED

MAJOR DIVISIONS	SYMBOLS		TYPICAL SOIL DESCRIPTIONS
GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size)	GW		Well graded gravels or gravel - sand mixtures, little or no fines
	GP		Poorly graded gravels or gravel - sand mixtures, little or no fines
	GM		Silty gravels, gravel - sand - silt mixtures
	GC		Clayey gravels, gravel - sand - clay mixtures
SANDS (More than 1/2 of coarse fraction < No. 4 sieve size)	SW		Well graded sands or gravelly sands, little or no fines
	SP		Poorly graded sands or gravelly sands, little or no fines
	SM		Silty sands, sand - silt mixtures
	SC		Clayey sands, sand - clay mixtures
SILTS & CLAYS LL < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL		Organic silts and organic silty clays of low plasticity
SILTS & CLAYS LL > 50	MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH		Inorganic clays of high plasticity, fat clays
	OH		Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS	Pt		Peat and other highly organic soils
DUAL (TRANSITION) SOILS	Soil characterisitics are transitional between the soil classifications listed above		

CLASSIFICATION CHART (Unified Soil Classification System)

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" **Casing Diameter** 2"	**Logged By** JGG W.W. CEG 1633
Project Name Unocal S/S #0752 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 9/30/92
Boring No. MW4	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		3 inches of asphalt over gravel base.
			CL	Clay, stiff, moist, very dark gray (10YR 3/1).
				Sand, estimated at 5-10% silt, moist, brown (10YR 4/3).
12/17/23		5		Sand, estimated at 5-10% silt, trace clay, sand is fine-grained, dense, moist, light yellowish brown (10YR 6/4).
13/15/18		10	SP	Sand, estimated at 5-10% silt, trace clay and gravel to 3/8 inches in diameter, dense, moist, pale brown (10YR 6/3) mottled with yellowish brown (10YR 5/4).
11/21/38		15		Sand, estimated at 5-10% silt and trace clay, dense, moist, pale brown (10YR 6/3) mottled with yellowish brown (10YR 5/4).
10/16/24		20		Sand, estimated at 5-10% silt, dense, moist to very moist, light brownish gray (10YR 6/2).

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" **Casing Diameter** 2"	**Logged By** JGG W.W. CEG 1633
Project Name Unocal S/S #0752 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 9/30/92
Boring No. MW4	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
16/19/25	▼	23 24 25	SP	Color change Sand, estimated at 5% silt, sand is fine-grained, dense, saturated, greenish gray (5GY 5/1).
				Color change
17/19/26		30		Sand, estimated at 5% silt, sand is fine-grained, dense, saturated, grayish brown (10YR 5/2).
14/28/31			SC-CL	Clayey sand/sandy clay, estimated at 10% silt, trace gravel to 3/8 inches in diameter, sand is fine-grained, very dense/hard, very moist, light brownish gray (2.5Y 6/2).
		35		TOTAL DEPTH: 33'
		40		

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" **Casing Diameter** 2"	**Logged By** JGG W.W. CEG 1633
Project Name Unocal S/S #0752 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 10/1/92
Boring No. MW5	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		9 inches of concrete pavement over sand base.
				Sand, estimated at 5% silt, sand is fine-grained, medium dense, moist, brown (10YR 4/3).
13/19/31		5		Sand, estimated at 10% silt and 5% clay, sand is fine-grained, dense, moist, greenish gray (5GY 5/1) with olive (5Y 5/3) and yellowish brown (10YR 5/6), mottled.
10/16/25		10	SP	Sand, estimated at 10-15% silt, trace clay, sand is fine-grained, , dense, moist, light olive gray (5Y 6/2).
13/24/35		15		Sand, estimated at 10% silt, trace clay, sand is fine-grained, very dense, moist, greenish gray (5GY 5/1).
13/25/31 23		20		Sand, estimated at 5% silt, very dense, moist to very moist, greenish gray (5GY 5/1).

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" **Casing Diameter** 2"	**Logged By** JGG W.W. CEG 1633
Project Name Unocal S/S #0752 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 10/1/92
Boring No. MW5	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
31/55	▼	25	SP	Sand, estimated at 5% silt, sand is fine-grained, very dense, saturated, dark greenish gray (5GY 4/1).
21/29/30		30	CL-SC	Sand, trace silt, sand is fine-grained, dense to very dense, saturated, grayish brown (10YR 5/2). Sandy clay/clayey sand, estimated 5-10% silt, sand is fine-grained, hard to very dense, moist, light brownish gray (2.5Y)
		35		TOTAL DEPTH: 32'
		40		

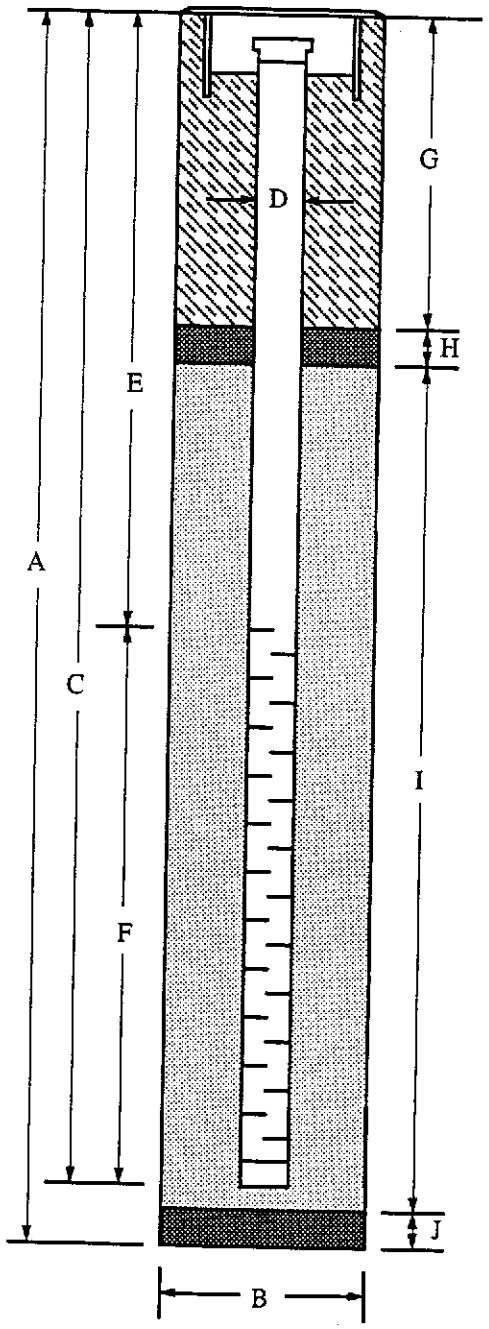
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal S/S #0752, 800 Harrison St., Oakland WELL NO. MW5

PROJECT NUMBER: KEI-P90-1103

WELL PERMIT NO.: 92543

Flush-mounted Well Cover



A. Total Depth : 32'

B. Boring Diameter: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 32'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375"

ID = 2.067"

E. Depth to Perforations: 15' screened

F. Perforated Length: 17'

Perforation Type: Machined Slot

Perforation Size: 0.020"

G. Surface Seal: 11'

Seal Material: Neat Cement

H. Seal: 2'

Seal Material: Bentonite

I. Filter Pack: 19'

Pack Material: RMC Lonestar Sand

Size: #3

J. Bottom Seal: None

Seal Material: N/A

15' to 32' bgs ok gw at 23' bgs

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" **Casing Diameter** 2"	**Logged By** JGG W.W. CEG 1633
Project Name Unocal S/S #0752 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 9/30/92
Boring No. MW6	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		9 inches of concrete over sand and gravel base.
				Sand, estimated at 5% silt, sand is fine-grained, medium dense, moist, brown (10YR 4/3).
17/26/30		5	SP	Sand, estimated at 10% silt, trace clay, sand is fine-grained, dense, moist to very moist, yellowish brown (10YR 5/4) mottled with olive gray (5Y 5/2).
8/11/19		10	SM	Silty sand, estimated at 15% silt and 5% clay, sand is fine-grained, dense, moist to very moist, yellowish brown (10YR 5/4) mottled with light brownish gray (10YR 6/2).
10/26/55		15	SP	Sand, estimated at 10% silt, trace clay, very dense, moist to very moist, olive gray (5Y 5/2) mottled with greenish gray (5GY 5/1).
13/30/40		20		Sand, very dense, very moist, gray (5Y 6/1), mottled with light olive brown (2.5Y 5/3).
23	▽	21 24.5		Sand, trace silt, sand is fine-grained, very dense, saturated, greenish gray (5GY 5/1).

BORING LOG

Project No. KEI-P90-1103	**Boring Diameter** 9" / **Casing Diameter** 2"	**Logged By** JGG / W.W. CEG 1633
Project Name Unocal S/S #0752, 800 Harrison St., Oakland	**Well Cover Elevation**	**Date Drilled** 9/30/92
Boring No. MW6	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling Co.

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
47/50-5"		25	SP	Sand, trace silt, sand is fine-grained, very dense, saturated, greenish gray (5GY 5/1).
21/29/30		30		Sand, estimated at 5% silt, very dense, saturated, dark yellowish brown (10YR 4/4).
			SM-ML	Silty sand/sandy silt, trace clay, sand is fine-grained, very dense to hard, moist, pale brown (10YR 6/3).
		35		TOTAL DEPTH: 32'
		40		

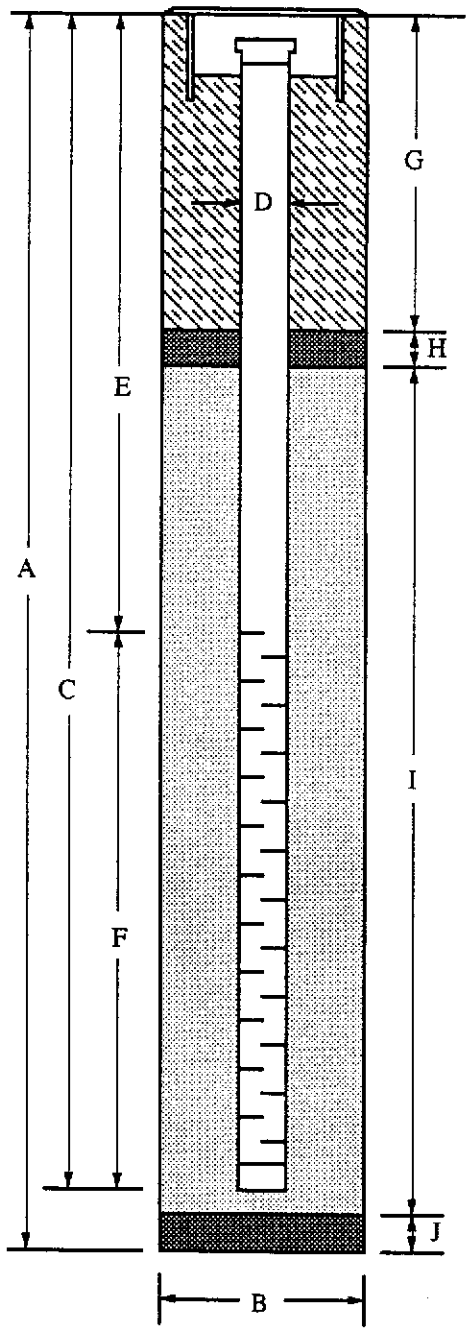
WELL COMPLETION DIAGRAM

PROJECT NAME: Unocal S/S #0752, 800 Harrison St., Oakland WELL NO: MW6

PROJECT NUMBER: KEI-P90-1103

WELL PERMIT NO.: 92543

Flush-mounted Well Cover



A. Total Depth : 32'

B. Boring Diameter: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: 32'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375"

ID = 2.067"

E. Depth to Perforations: 15' Screened 15' to 32' bgs ok

F. Perforated Length: 17' not at 21.5'

Perforation Type: Machined Slot

Perforation Size: 0.020"

G. Surface Seal: 11'

Seal Material: Neat Cement

H. Seal: 2'

Seal Material: Bentonite

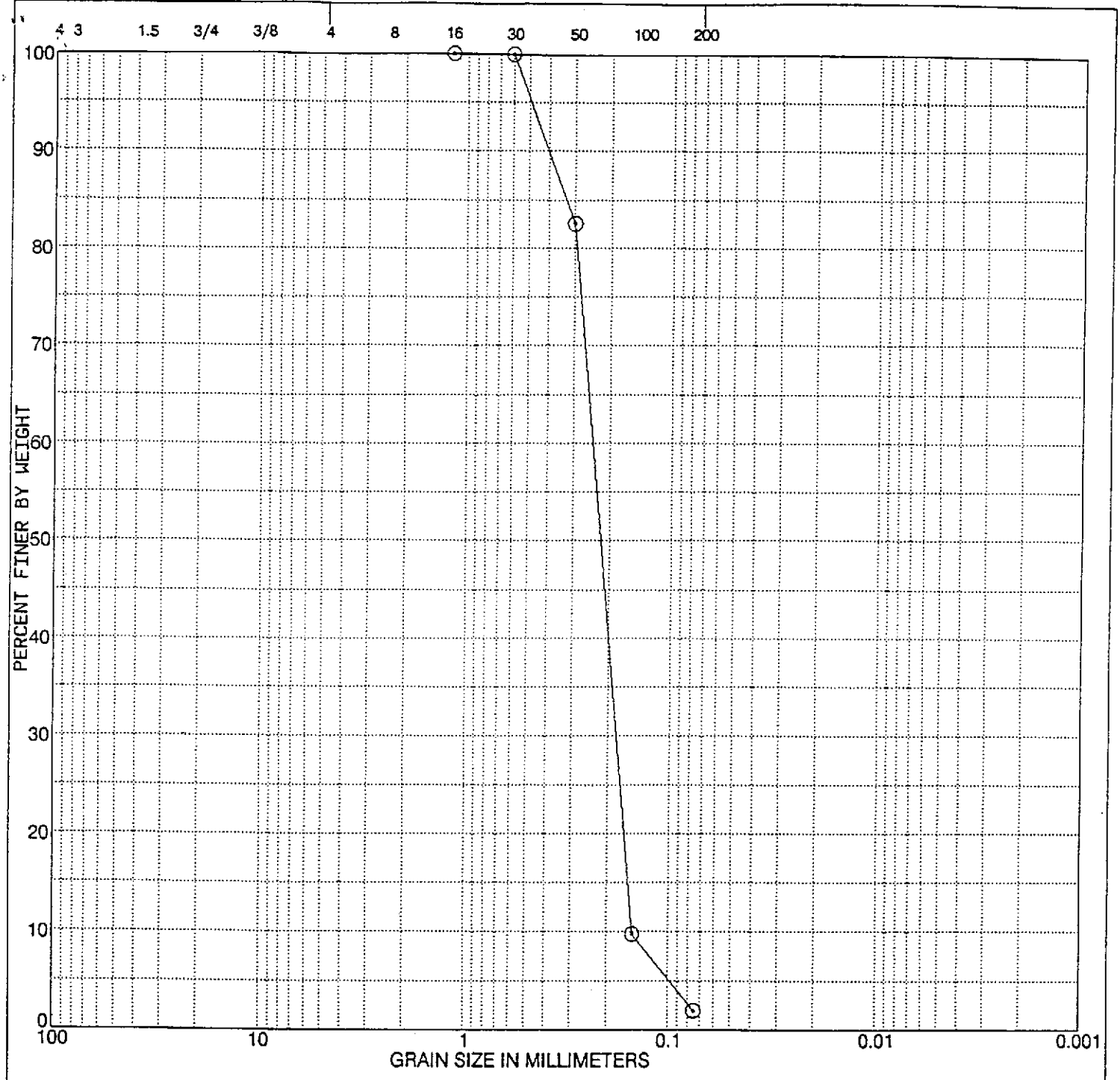
I. Filter Pack: 19'

Pack Material: RMC Lonestar Sand

Size: #3

J. Bottom Seal: None

Seal Material: N/A



Cobbles	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SYMBOL	SAMPLE SOURCE	CLASSIFICATION
⊙	MW-2 @ 30.0'	Brown Sand (SP)

Herzog Associates
Laboratory Testing Services

Job No: 6232.1-0-8
Job Id: KA005
Appr:
Drwn: LTS
Date: JUN 1991

PARTICLE SIZE ANALYSIS

UNOCAL-OAKLAND

HARRISON STREET

PLATE 1

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 800 Harrison St., Oakland	Sampled:	Oct 19, 1992
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Oct 19, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Oct 22, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	210-0566		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 210-0566 MW 4	Sample I.D. 210-0567 MW 5	Sample I.D. 210-0568 MW 6	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	480	2700	3900	
Benzene	0.5	0.51	61	420	
Toluene	0.5	2.1	5.0	12	
Ethyl Benzene	0.5	2.8	100	60	
Total Xylenes	0.5	6.8	61	28	
Chromatogram Pattern:		Gasoline	Gasoline	Gasoline	

Quality Control Data

Report Limit Multiplication Factor:	1.0	10	10	1.0
Date Analyzed:	10/21/92	10/21/92	10/21/92	10/21/92
Instrument Identification:	HP-2	HP-2	HP-2	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	102	100	110	100

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc. Client Project ID: Unocal, 800 Harrison St., Oakland
2401 Stanwell Drive, Suite 400
Concord, CA 94520
Attention: Mardo Kaprealian, P.E. QC Sample Group: 2100566-568 Reported: Oct 22, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	J.F.	J.F.	J.F.	J.F.
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Oct 21, 1992	Oct 21, 1992	Oct 21, 1992	Oct 21, 1992
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	18	20	21	65
Matrix Spike % Recovery:	90	100	105	108
Conc. Matrix Spike Dup.:	18	20	21	65
Matrix Spike Duplicate % Recovery:	90	100	105	108
Relative % Difference:	0.0	0.0	0.0	0.0

Laboratory Blank contained the following analytes: None detected.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% 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: Vartkes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
800 Harrison str.

ANALYSES REQUESTED: TPH6 : BTXE

TURN AROUND TIME: Regular.

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPH6 : BTXE	REMARKS
MW 4	10/19/92	10:45 am.		X	X		2	Monitoring Well	X	210056 AB 10/21/92
MW 5	"	9:35 am.		X	X		2	" "	X	0567 AB
MW 6	"	10:10 am.		X	X		2	" "	X	0568 AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Tekhojian	10/19/92 6:45	10/19/92 1845
Jim Gatta	10-20-92 1340	
	Date/Time 10-20-92 1512	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? /

Signature: [illegible] Title: analyst Date: 10/19/92

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal #0752, 800 Harrison St., Oakland	Sampled: 9/30 & 10/1/92
2401 Stanwell Drive, Suite 400	Sample Matrix:	Soil	Received: Oct 2, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported: Oct 8, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	210-0050	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 210-0050 MW4-(5)	Sample I.D. 210-0051 MW4-(10)	Sample I.D. 210-0052 MW4-(15)	Sample I.D. 210-0053 MW4-(20)	Sample I.D. 210-0054 MW4-(22.5)	Sample I.D. 210-0055 MW5-(5)
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.	27	N.D.
Benzene	0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Total Xylenes	0.005	N.D.	N.D.	N.D.	N.D.	0.45	N.D.
Chromatogram Pattern:		--	--	--	--	Non-Gasoline Mixture (>C9)	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	20	1.0
Date Analyzed:	10/2/92	10/2/92	10/2/92	10/2/92	10/2/92	10/2/92
Instrument Identification:	HP-4	HP-4	HP-4	HP-4	HP-2	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	102	102	100	102	99	98

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal #0752, 800 Harrison St., Oakland	Sampled: 9/30 & 10/1/92
2401 Stanwell Drive, Suite 400	Sample Matrix:	Soil	Received: Oct 2, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported: Oct 8, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	210-0056	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 210-0056 MW5-(10)	Sample I.D. 210-0057 MW5-(15)	Sample I.D. 210-0058 MW5-(20)	Sample I.D. 210-0059 MW5-(22)	Sample I.D. 210-0060 MW6-(5)	Sample I.D. 210-0061 MW6-(10)
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	1.1	N.D.	N.D.
Benzene	0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.005	N.D.	N.D.	N.D.	0.0060	N.D.	N.D.
Ethyl Benzene	0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Total Xylenes	0.005	N.D.	N.D.	N.D.	0.014	N.D.	N.D.
Chromatogram Pattern:		--	--	--	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	10/2/92	10/2/92	10/2/92	10/5/92	10/2/92	10/2/92
Instrument Identification:	HP-2	HP-2	HP-2	HP-4	HP-2	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	100	102	101	97	98	101

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal #0752, 800 Harrison St., Oakland	Sampled:	Sep 30, 1992
2401 Stanwell Drive, Suite 400	Sample Matrix:	Soil	Received:	Oct 2, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Oct 8, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	210-0062		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 210-0062 MW6-(15)	Sample I.D. 210-0063 MW6-(20)	Sample I.D. 210-0064 MW6-(21.5)	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	1.0	N.D.	N.D.	170	
Benzene	0.005	N.D.	N.D.	N.D.	
Toluene	0.005	N.D.	N.D.	0.38	
Ethyl Benzene	0.005	N.D.	N.D.	1.8	
Total Xylenes	0.005	N.D.	N.D.	4.5	
Chromatogram Pattern:		--	--	Gasoline	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	25	1.0
Date Analyzed:	10/2/92	10/2/92	10/2/92	10/2/92
Instrument Identification:	HP-2	HP-2	HP-2	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	102	101	97	103

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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Project Manager

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Kaprealian Engineering, Inc.
2401 Stanwell Drive, Suite 400
Concord, CA 94520
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal #0752, 800 Harrison St., Oakland
QC Sample Group: 2100050-64
Reported: Oct 8, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020
Analyst:	A.P.	A.P.	A.P.	A.P.
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Oct 2, 1992	Oct 2, 1992	Oct 2, 1992	Oct 2, 1992
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.40	0.40	0.40	1.2
Conc. Matrix Spike:	0.42	0.42	0.43	1.3
Matrix Spike % Recovery:	105	105	108	108
Conc. Matrix Spike Dup.:	0.43	0.43	0.43	1.3
Matrix Spike Duplicate % Recovery:	108	108	108	108
Relative % Difference:	2.3	2.3	0.0	0.0

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

for Scott A. Chieffo
Project Manager

$$\%\ \text{Recovery:} = \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} = \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$$

KAPREALIAN ENGINEERING
INCORPORATED

CHAIN OF CUSTODY

SAMPLER: Wade Weston
WITNESSING AGENCY:
SITE NAME & ADDRESS: Unocal #0752, 800 Harrison St. Oakland
TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	ANALYSES REQUESTED: TPH-G/BTXE	REMARKS
MW4-(5)	9/30/92		✓		✓		1	See Sample ID #	✓	2100050
MW4-(10)	"		✓		✓		1		✓	051
MW4-(15)	"		✓		✓		1		✓	052
MW4-(20)	"		✓		✓		1		✓	053
MW4-(22.5)	"		✓		✓		1		✓	054
MW5-(5)	10/1/92		✓		✓		1		✓	055
MW5-(10)	"		✓		✓		1		✓	056
MW5-(15)	"		✓		✓		1		✓	057
MW5-(20)	"		✓		✓		1		✓	058

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Wade Weston	10/2/92 11:20 AM	
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? Y
2. Will samples remain refrigerated until analyzed? Y
3. Did any samples received for analysis have head space? N/A
4. Were samples in appropriate containers and properly packaged? Y

SP (Signature) — P.S. (Title) — 10/2/92 (Date)

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510 602.5100 Fax: 510 687.0602

KAPREALIAN ENGINEERING
INCORPORATED

CHAIN OF CUSTODY

SAMPLER: Wade Weston
WITNESSING AGENCY:
SITE NAME & ADDRESS: Unocal #0752, 800 Harrison St. Oakland

ANALYSES REQUESTED: TPH-G/BTXE
TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPH-G/BTXE	REMARKS
MW5-(22)	10/1/92		✓		✓		1	See Sample ID#	✓	2100059
MW6-(5)	9/30/92		✓		✓		1		✓	060
MW6-(10)	"		✓		✓		1		✓	061
MW6-(15)	"		✓		✓		1		✓	062
MW6-(20)	"		✓		✓		1		✓	063
MW6-(21.5)	"		✓		✓		1		✓	064

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Wade Weston	10/2/92 11:00Am	[redacted]
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? Y
2. Will samples remain refrigerated until analyzed? Y
3. Did any samples received for analysis have head space? N/A
4. Were samples in appropriate containers and properly packaged? Y

Signature: [redacted] Title: F.S. Date: 10/2/92

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