KAPREALIAN ENGINEERING
INCORPORATED

KEI-P88-0205.R9
April 5, 1994

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

Attention: Mr. Edward C. Ralston

RE: Continuing Ground Water Investigation at
Unocal Service Station #5366
7375 Amador Valley Boulevard
Dublin, California

Dear Mr. Ralston:

This report presents the results of Kaprealian Engineering, Inc's. (KEI) most recent soil and ground water investigation for the referenced site, in accordance with KEI's proposal (KEI-P88-0205.P1) dated July 7, 1993. The purpose of the investigation was to further define the degree and extent of soil and ground water contamination at and in the vicinity of the site. The scope of the work performed by KEI consisted of the following:

Coordination with regulatory agencies

Geologic logging of one boring for the installation of one monitoring well

Soil sampling

Ground water monitoring and purging

Laboratory analyses

Data analysis, interpretation, and report preparation

SITE DESCRIPTION AND BACKGROUND

The subject site presently contains a Unocal service station facility. The site is located near the center of the southeast end of San Ramon Valley. The site is situated at the west corner of the intersection of Village Parkway and Amador Valley Boulevard in Dublin, California. A BP service station, an Arco service station, and a former Shell station are located at the other three corners of this intersection. A Location Map is attached to this report.

KEI's initial work at the site began on February 18, 1988, and consisted of soil sampling following the removal of three under-

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ground fuel storage tanks. The tanks consisted of one 10,000 gallon unleaded gasoline tank, one 10,000 gallon super unleaded gasoline tank, and one 10,000 gallon diesel fuel tank. The tanks were made of steel and had various sized holes at the bottom of the tanks, ranging from a quarter-inch to one-inch in diameter. Ground water was encountered in the tank pit at a depth of 10.5 feet below grade, thus prohibiting the collection of soil samples from beneath the tanks. Six soil samples, labeled S1 through S4, S2D, and S4D, were collected from the sidewalls of the fuel tank pit. The soil sample collection points are shown on the attached Figure 3. The fuel tank pit was then excavated to a depth of approximately 13 feet below grade. Additional soil excavation in the vicinity of soil sample S4 was not feasible due to the proximity of the existing pump islands. After 9,000 gallons of water were pumped from the former tank pit, one ground water sample, labeled W1, was collected. In addition, a second water sample, labeled W2, was collected from a second excavation where the new tanks were installed.

Samples were analyzed at HAZCAT Mobile Organics Laboratory in San Carlos, California, a state-certified laboratory. Soil samples S2, S3, and S4, and the water samples, were analyzed for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, ethylbenzene, and xylenes (BTEX). Soil samples S1, S2D, and S4D, and the water samples, were also analyzed for TPH as diesel. The analytical results of the soil and water samples are summarized in Table 5. Based on the analytical results of the soil and water samples, KEI recommended the installation of four monitoring wells in order to define the extent of the soil and ground water contamination, and to determine the direction of ground water flow. Documentation of the tank removal procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-J88-025) dated February 25, 1988.

On April 14, 1988, four two-inch diameter monitoring wells, designated as MW1 through MW4 on the attached Figure 1, were installed at the site. The wells were drilled and completed to total depths of 20 feet below grade. Ground water was encountered at depths ranging from 14 to 16 feet beneath the surface during drilling. The wells were developed on April 26, 1988, and were initially sampled on April 29, 1988.

The samples were analyzed at HAZCAT Organics Laboratory in San Carlos, California, for TPH as gasoline and BTEX. In addition, the soil samples collected from boring MW3 (adjacent to the waste oil tank) were analyzed for TPH as diesel, total oil and grease (TOG), and EPA method 8010 compounds. The analytical results of the soil samples are summarized in Table 4, and the analytical results of

the water samples are summarized in Tables 2 and 3. Based on the analytical results, KEI recommended the implementation of a monthly monitoring and quarterly sampling program for the four wells. Documentation of the monitoring well installation protocol, sample collection techniques, and the analytical results are presented in KEI's report (KEI-J88-025A-1) dated May 11, 1988.

As previously indicated, some residual soil contamination remains at the site in the area between the old tank pit and the southwest side of the pump islands. As much contaminated soil as possible was removed during the tank replacement activities in February of 1988 without compromising the structural integrity of the pump islands.

Three of the four corners at the intersection of Village Parkway and Amador Valley Boulevard have active service stations (BP, Arco, and Unocal). The fourth corner (southwest) was previously a Shell station, and has been converted into an oil changing facility. The respective locations of the service stations are shown on the attached Figure 1. In addition, immediately adjacent to and south of the former Shell station is a facility referred to as the Dodge Property, located at 7400 Amador Valley Boulevard, which also contained underground fuel storage tanks. During a site visit by KEI in January of 1989, it was observed that several monitoring wells had been installed at the former Shell station site (located south-southeast of the subject site), and at the BP station (located east-southeast of the subject site). In addition, KEI reviewed the files of the Regional Water Quality Control Board (RWQCB) on March 5, 1991, to obtain information regarding any subsurface investigations conducted at the above mentioned sites. The following is a summary of the information contained in the RWQCB files as of March 1991:

1. Former Shell service station, located at 7194 Amador Valley Boulevard (southwest corner).

   Shell had installed 11 monitoring wells (six off-site) and one recovery well. One monitoring well was subsequently destroyed. Levels of TPH as gasoline had been detected in the ground water samples collected from the on-site wells at concentrations ranging from non-detectable to 200,000 ppb. The levels of TPH as gasoline detected in ground water samples collected from on-site wells on August 21, 1990 (the most recent data reviewed), ranged from non-detectable to 5,100 ppb. The ground water flow direction, as measured on August 20, 1990, appeared to be towards the north at the northern portion of the site, and towards the south at the southern portion of the site.

2. BP service station, located at 7197 Village Parkway (southeast corner).

   BP had installed six monitoring wells on-site. One monitoring well had consistently detected free product. The levels of TPH as gasoline detected in ground water samples collected from the six wells on September 6, 1990 (the most recent data reviewed), ranged from non-detectable to 470 ppb. The ground water flow direction was reportedly to the south-southwest.

3. Arco service station, located at the northeast corner of Amador Valley Boulevard and Village Parkway.

   As of March of 1991 (review date), there was no information in the RWQCB files indicating that subsurface investigations have been conducted at the Arco site. The site was not listed on the RWQCB's fuel leak list as of that date.

4. Former Dutch Pride Dairy facility (currently referred to as the Dodge Property), located at 7400 Amador Valley Boulevard, adjacent to and south of the former Shell station.

   Two 10,000 gallon gasoline storage tanks were removed from the site in January of 1990. The analytical results of soil samples collected from the gasoline tank pit indicated TPH as gasoline at concentrations ranging from non-detectable to 6,000 ppm. It was unknown to KEI whether any monitoring wells were installed by the property owner or any tenants. A monitoring well installed by Shell (later destroyed) at the site showed levels of TPH as gasoline at concentrations ranging from non-detectable to 3,300 ppb within the ground water.

Based on the analytical results collected and evaluated through May of 1992, and no evidence of free product or sheen in any of the wells, KEI recommended reducing the frequency of monitoring of the existing wells from monthly to quarterly.

In KEI's quarterly report (KEI-P88-0205.QR19) dated March 29, 1993, KEI recommended the continuation of the joint monitoring program with the respective consultants for the BP and former Shell service stations. In addition, the Arco site located at 7249 Village Parkway (across the street and to the east of the Unocal site) was found to be on the RWQCB's list of fuel leak sites. Therefore, KEI proposed to review the file for that site during the following quarter, and to attempt to include Arco in future joint monitoring events.

On April 20, 1993, a representative of KEI reviewed the file for the Arco service station located at 7249 Village Parkway (across Village Parkway and east of Unocal, as shown on the attached Figure 1). The file review was conducted at the offices of the Alameda County Health Care Services (ACHCS) Agency. Based on a Quarterly Groundwater Monitoring report dated April 2, 1993, the direction of ground water flow at the Arco site varied from the south-southeast to the east-northeast during the last quarter of 1992. On the November 10, 1992, sampling event, the maximum concentration of TPH as gasoline in ground water was detected in MW1 at a concentration of 2,800 ppb. Based on a report by RESNA (the consultant for the Arco site) titled "Additional Onsite Subsurface Investigation and Vapor Extraction Test" dated January 29, 1993, there were six monitoring wells and four vapor extraction wells on-site for that date. Vapor extraction tests were performed at the Arco site on November 10, 1992. Based on the results of the test, RESNA concluded that vapor extraction appeared to be a viable soil remediation alternative for the Arco site.

In KEI's report (KEI-P88-0205.QR20) dated June 30, 1990, KEI recommended the installation of one additional monitoring well in the downgradient direction of MW1 in order to comply with the requirements of the ACHCS, and in order to further delineate the extent of soil and ground water contamination at and in the vicinity of the site. Due to space limitations in the vicinity of MW1, a site reconnaissance was proposed in order to determine a feasible location for the proposed additional monitoring well.

On August 16, 1993, a representative of KEI visited the Oakland office of the RWQCB and reviewed the file for the nearby Arco site. This file review was performed to determine the status and effectiveness of any remedial measures that have been performed at the Arco site. However, no new information was contained in the file.

RECENT FIELD ACTIVITIES

On January 11, 1994, one additional two-inch diameter monitoring well (designated as MW5 on the attached Figure 2) was installed at the site. The well was 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 new well are described in the attached Boring Log and Well Construction Diagram, respectively.

Monitoring well MW5 was drilled and completed to a total depth of 20 feet below grade. Ground water was encountered at a depth of 13

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 4 feet below grade and continuing until ground water was encountered. Other soil sampling conducted below the 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 sealed with aluminum foil, plastic caps and tape, labeled, and stored in a cooler, on ice, until delivery to a state-certified laboratory.

The well casing of MW5 was installed with a watertight cap and padlock. A round, watertight, flush-mounted well cover was cemented in place over the well casing. The surface of each well cover and the top of each well casing of all five wells at the site were surveyed by Kier & Wright of Pleasanton, California, to Mean Sea Level (MSL) and to a vertical accuracy of 0.01 foot.

Monitoring well MW5 was developed on January 17, 1994. Prior to development, the well was 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 the new well. After recording the monitoring data, well MW5 was purged (by the use of a surface pump) of 13.5 gallons of water, until the evacuated water was clear and free of visible suspended sediment.

All of the wells, including newly installed well MW5, were monitored and sampled on February 11, 1994, by MPDS Services, Inc., of Concord, California. The monitoring and well development data are summarized in Table 1.

ANALYTICAL RESULTS

Selected soil samples collected from the boring of monitoring well MW5 were analyzed at Sequoia Analytical Laboratory in Concord, California. 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 BTEX by EPA method 8020. The analytical results of the soil samples are summarized in Table 4. Copies of the laboratory analyses and the Chain of Custody documentation for the soil samples are attached to this report.

The analytical results of the ground water samples collected from all of the monitoring wells (MW1 through MW5) on February 11, 1994, are summarized in Tables 2 and 3. The concentrations of TPH as gasoline and benzene detected in ground water samples collected on February 11, 1994, are shown on the attached Figure 2. Copies of the laboratory analyses and the Chain of Custody documentation for the water samples are attached to MPDS Services, Inc. Quarterly Data Report (MPDS-UN5366-01) dated March 21, 1994.

FILE REVIEW

On December 29, 1993, a KEI representative visited the Oakland office of the RWQCB and reviewed the file for the nearby Arco site located at 7249 Village Parkway. No new information was contained in the file.

On January 6, 1994, a KEI representative conducted a second file review for the Arco site at the office of the ACHCS in Oakland. This file review was performed to obtain and evaluate information on recent remediation work being conducted at the Arco site. A number of reports by RESNA (the consultant for the Arco site) were reviewed. The following is a summary of information obtained from a RESNA work plan dated September 3, 1993.

In June of 1990, one 550 gallon waste oil tank was removed from the site, and ten soil samples were collected from the tank excavation. The analytical results of the soil samples indicated non-detectable concentrations of TPH as gasoline, TPH as diesel, BTEX, TOG, and halogenated volatile organic compounds (HVOCs).

In September of 1990, an estimated 10 gallons of fuel was spilled on the ground near one of the dispenser pumps in the southeastern portion of the site.

In September of 1991, three monitoring wells (MW1 through MW3) were installed in an effort to investigate the spill noted above. The analytical results of the soil samples indicated TPH as gasoline concentrations of less than 100 ppm, except in one soil sample where TPH as gasoline was detected at 150 ppm. Ground water stabilized in the three wells at depths of approximately 9 to 11 feet below grade. Ground water flow was interpreted to be toward the southwest. The analytical results of the first encountered ground water samples indicated concentrations of TPH as gasoline at 990 ppb and benzene at 50 ppb.

In October of 1992, three additional monitoring wells (MW4 through MW6) and four vapor extraction wells (VW-1 through VW-4) were installed at the Arco site. The analytical results of the soil

samples collected from the borings of the wells installed in the northwestern and southeastern portions of the site indicated non-detectable concentrations of TPH as gasoline and BTEX. The analytical results of the soil samples collected from the borings for the wells installed in the southern portion of the site indicated TPH as gasoline concentrations ranging from non-detectable to 32,000 ppm, and BTEX concentrations ranging from non-detectable to 390 ppm. The analytical results of the ground water samples collected from monitoring wells MW4 through MW6 indicated non-detectable concentrations of TPH as gasoline and BTEX.

The analytical results of the air samples collected during a vapor extraction test (VET) from wells VW-1 through VW-4 indicated concentrations of TPH as gasoline ranging from 6,600 mg/m^3 to 110,000 mg/m^3, with the highest concentrations present in the vicinity of VW-4. The results of the VET indicated that vapor extraction was a viable soil remediation method for the site.

A review of ground water monitoring and sampling activities at the Arco site indicates that monthly ground water monitoring began in October of 1991, and quarterly sampling was initiated in December 1992. TPH as gasoline has been detected in ground water samples collected from wells MW1 through MW3 at concentrations of up to 6,400 ppb. However, TPH as gasoline has been non-detectable in ground water samples collected from wells MW4 through MW6 since the wells were installed in November of 1992. The interpreted ground water flow direction appeared to be variable with a flat gradient. In a quarterly ground water monitoring and sampling report by RESNA (dated September 8, 1993), ground water flow direction at the Arco site appeared to be to the to the northeast in April of 1993, and to the west-southwest in May and June of 1993. The average gradient for the same period was reportedly less than 0.004 ft/ft.

Lastly, the RESNA work plan referenced above contains a proposal for the installation of two air-sparging wells and one additional vapor extraction well, for the purpose of conducting an air-sparging test and a combined air-sparging and vapor extraction test at the Arco site. At present, it is not known to KEI if these tests have been carried out.

HYDROLOGY AND GEOLOGY

On February 11, 1994, the measured depth to ground water in the monitoring wells ranged from 9.72 to 10.10 feet. Based on the water level data gathered during the joint monitoring event conducted with the adjacent former Shell station and the existing Arco and BP stations on February 11, 1994, the direction of ground water flow appears to be complex, but predominantly to the east-

northeast at the Unocal site, as shown on the attached Figure 1. The ground water flow direction in the vicinity of the Unocal site has been complex in the past, but generally toward the east-northeast at the Unocal site. The hydraulic gradient at the Unocal site on February 11, 1994, was approximately 0.013.

The site is situated within the Dublin Subbasin of the Livermore Valley Ground Water Basin, as defined by the Alameda County Flood Control and Water Conservation District (Zone 7), and by the California Department of Water Resources Bulletin 118-2. Regionally, the ground water flow direction is toward the southeast, based on ground water contours presented in the Zone 7 Fall 1993 Ground Water Contour Map Report.

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 situated at a mapped geologic contact separating Holocene-age Fine-grained Alluvium (Qhaf) and Late-Pleistocene Alluvium (Qpa). The Fine-grained Alluvium is described as typically consisting of unconsolidated silt and clay materials that are rich in organic material and that are generally less than 10 feet thick. The Late-Pleistocene Alluvium is described as typically consisting of irregularly interbedded clay, silt, sand, and gravel that has a maximum thickness of up to 150 feet.

The results of our subsurface studies indicate that the site is underlain predominantly by clay and silty clay soil materials to the maximum depth explored (20 feet below grade).

As of February of 1994, the unsaturated zone at the site is between 9 and 10 feet thick. Both the unsaturated zone and the first water bearing zone penetrated by the five existing wells at the site consist of clay or silty clay with minor amounts of clayey silt.

DISCUSSION AND RECOMMENDATIONS

The analytical results of the soil samples collected from the boring of monitoring well MW5 indicated elevated concentrations of petroleum hydrocarbons (see Table 4) at depths of 10 to 12.5 feet below grade (capillary fringe zone). The petroleum hydrocarbon contamination detected in the initial ground water sample collected from well MW5 is most likely due to the capillary fringe zone soil contamination encountered in this well.

Based on the analytical results of the ground water samples collected from the monitoring wells to date, the extent of the

ground water contamination at and in the vicinity of the Unocal site has not been completely defined (see Figure 2). However, in order to verify the initial ground water sample analytical results for well MW5, KEI recommends the continuation of the current ground water monitoring and sampling program. All of the wells are currently monitored on a quarterly basis. Monitoring wells MW1 and MW5 are sampled on a quarterly basis, and monitoring wells MW2, MW3, and MW4 are sampled on an annual basis. The results of the monitoring and sampling program will be documented and evaluated after each monitoring and sampling event, and recommendations for altering or terminating the program will be made as warranted.

DISTRIBUTION

Copies of this report should be sent to 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 me at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

Haig (Gary) Tejirian
Project Geologist

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

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

REGISTERED GEOLOGIST
JOEL G. GREGER
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Thomas J. Berkins
Project Manager

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Attachments: Tables 1 through 5
Location Map
Figures 1 through 3
Boring Log
Well Construction Diagram
Laboratory Analyses
Chain of Custody documentation

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TABLE 1

SUMMARY OF MONITORING DATA
UNOCAL MONITORING WELLS

Well #	Ground Water Elevation (feet)	Depth to Water (feet)♦	Product Thickness (feet)	Sheen	Water Purged (gallons)	Total Well Depth (feet)♦
(Monitored and Sampled on February 11, 1994)						
MW1	326.35	9.72	0	No	7	19.46
MW2	326.93	9.85	0	No	6.5	19.23
MW3	326.97	10.01	0	No	6.5	18.90
MW4	326.33	10.10	0	No	6.5	19.40
MW5	325.88	10.08	0	No	7	19.96
(Monitored and Developed on January 17, 1994)						
MW5	319.12	16.84	0	--	13.5	19.95
(Monitored and Sampled on November 11, 1993)						
MW1	325.91	10.17	0	No	7	
MW2*	326.27	10.51	0	--	0	
MW3*	326.34	10.64	0	--	0	
MW4*	325.94	10.48	0	--	0	
(Monitored and Sampled on August 12, 1993)						
MW1	326.17	9.91	0	No	6.5	
MW2*	326.67	10.11	0	--	0	
MW3*	326.64	10.34	0	--	0	
MW4*	326.10	10.32	0	--	0	
(Monitored and Sampled on May 10, 1993)						
MW1	327.15	9.57	0	No	10	
MW2*	327.61	9.75	0	--	0	
MW3*	327.62	9.91	0	--	0	
MW4*	327.10	9.90	0	--	0	

TABLE 1 (Continued)

SUMMARY OF MONITORING DATA
UNOCAL MONITORING WELLS

Well #	Well Cover Elevation (feet)**	Well Casing Elevation (feet)**
MW1	336.72	336.07
MW2	337.36	336.78
MW3	337.53	336.98
MW4	337.00	336.43
MW5	336.32	335.96

♦ The depth to water level and total well depth measurements were taken from the top of the well casings. Prior to August 12, 1993, the depth to water level and total well depth measurements were taken from the top of the well covers.

* Monitored only.

** The elevations of the top of the well covers and well casings have been surveyed relative to Mean Sea Level (MSL), per the County of Alameda Benchmark, standard brass disk in the westerly center island of Amador Valley Boulevard at Village Parkway, 15 feet from the nose and 0.8 feet from the northerly curb, stamped "VL PK AM VY, 1977" (elevation = 337.40 MSL).

-- Sheen determination was not performed.

NOTE: The monitoring data on February 11, 1994, were provided by MPDS Services, Inc.

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TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
2/11/94	MW1	970	40	3.2	2.8	15
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
	MW5	18,000	2,400	140	920	3,100
11/11/93	MW1	350	19	2.5	2.7	3.4
8/12/93	MW1	1,000	46	ND	29	6.3
5/10/93	MW1	1,600	39	0.40	25	3.3
2/10/93	MW1	3,000	230	ND	340	200
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
11/10/92	MW1	1,100	49	ND	71	21
8/12/92	MW1	1,700	51	ND	93	21
5/22/92	MW1	2,500	120	ND	230	37
	MW2	ND	ND	ND	ND	ND
2/25/92	MW1	3,900	500	ND	450	400
11/13/91	MW1	860	40	ND	11	2.5
8/12/91	MW1	1,100	68	2.6	210	9.3
5/15/91	MW1	2,100	220	ND	360	27
2/14/91	MW1	1,900	150	2.9	340	43
11/14/90	MW1	2,000	110	0.52	410	16
8/15/90	MW1	2,200	160	ND	570	45

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
5/18/90	MW1	2,000	140	1.8	460	19
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
2/06/90	MW1	2,700	170	ND	350	29
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
10/20/89	MW1	ND	ND	ND	ND	ND
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	0.38	ND
	MW4	ND	ND	ND	ND	ND
7/27/89	MW1	1,900	130	6.3	ND	68
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	0.34	ND	ND	ND
5/22/89	MW3	ND	ND	ND	ND	ND
4/28/89	MW1	1,000	97	0.8	170	24
	MW2	ND	ND	ND	ND	ND
	MW3	880	9.6	9.7	19	12.7
	MW4	ND	0.3	ND	ND	ND
1/26/89	MW1	1,900	240	1.8	81	30
	MW2	ND	ND	ND	ND	ND
	MW3	ND	ND	ND	ND	ND
	MW4	ND	0.67	ND	ND	ND
10/28/88	MW1	5,200	150	ND	250	12
	MW2	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND
7/25/88	MW1	6,100	170	2.1	94	94
	MW2	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
4/29/88	MW1	10,000	960	17	870	1,500
	MW2	170	2.7	0.6	ND	13
	MW3	ND	ND	ND	ND	ND
	MW4	ND	ND	ND	ND	ND

ND = Non-detectable.

-- Indicates analysis was not performed.

Results are in micrograms per liter (µg/L), unless otherwise indicated.

NOTE: Laboratory analyses data on February 11, 1994, were provided by MPDS Services, Inc.

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TABLE 3

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Well #	TPH as Diesel	TOG (mg/L)	EPA Method 8010 Constituents
2/11/94	MW3	ND	ND	--
	MW5	2,300*	--	--
5/10/93	MW1	730*	--	--
2/10/93	MW3	200	ND	--
5/18/90	MW3	ND	ND	ND
2/06/90	MW3	ND	ND	ND
10/20/89	MW3	ND	2.5	ND
7/27/89	MW3	ND	1.6	ND
5/22/89	MW3	--	--	--
4/28/89	MW3	72	ND	ND
1/26/89	MW3	ND	--	ND
10/28/88	MW3	ND	--	ND
7/25/88	MW3	ND	--	ND
4/29/88	MW3	ND	--	ND

* Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be a diesel and non-diesel mixture.

ND = Non-detectable.

-- Indicates analysis was not performed.

mg/L = milligrams per liter.

Results are in micrograms per liter (µg/L), unless otherwise indicated.

NOTE: Laboratory analyses data on February 11, 1994, were provided by MPDS Services, Inc.

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TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes
4/14/88	MW1(10)	340	ND	ND	ND	ND
	MW1(15)	11	ND	ND	ND	ND
	MW2(10)	ND	ND	ND	ND	ND
	MW3(5)*	ND	ND	ND	ND	ND
	MW3(10)*	--	--	--	--	--
	MW4(10)	4.9	ND	ND	ND	ND
1/11/94	MW5(5)	ND	ND	ND	0.012	0.017
	MW5(10)	1,100	7.1	1.2	39	140
	MW5(12.5)	950	7.0	2.7	24	87

* TOG and TPH as diesel were non-detectable; MW3(10) had non-detectable levels of EPA methods 8010 and 8020 priority pollutants.

-- Indicates analysis was not performed.

Results are in milligrams per kilogram (mg/kg), unless otherwise indicated.

NOTE: The soil samples were collected at the depths below grade indicated in the ( ) of the respective sample number.

KEI-P88-0205.R9
April 5, 1994

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample #	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes
2/18/88	S1	ND	--	--	--	--	--
	S2	--	14	0.8	ND	4.6	2.7
	S2D	ND	--	--	--	--	--
	S3	--	14	1.1	ND	7.1	0.7
	S4	--	1,700	8.0	22	62	340
	S4D	83	--	--	--	--	--

ND = Non-detectable.

-- Indicates analysis was not performed.

Results are in milligrams per kilogram (mg/kg), unless otherwise indicated.

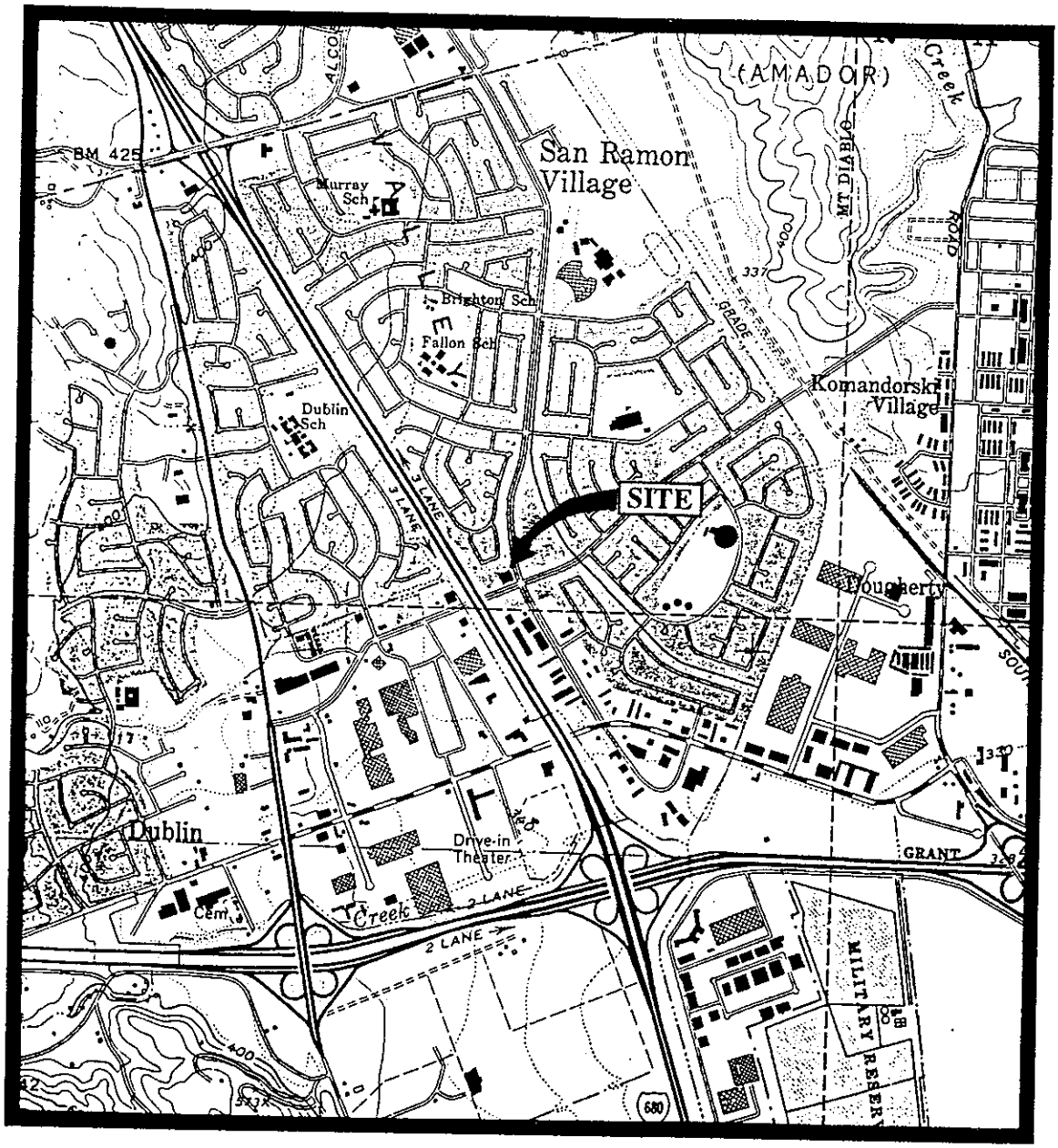
SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample #	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes
2/19/88	W1	91,000	8,200	1,200	4,300	5,300
	W2	120	ND	5.0	2.4	12

ND = Non-detectable.

-- Indicates analysis was not performed.

Results are in micrograms per liter (μg/L), unless otherwise indicated.

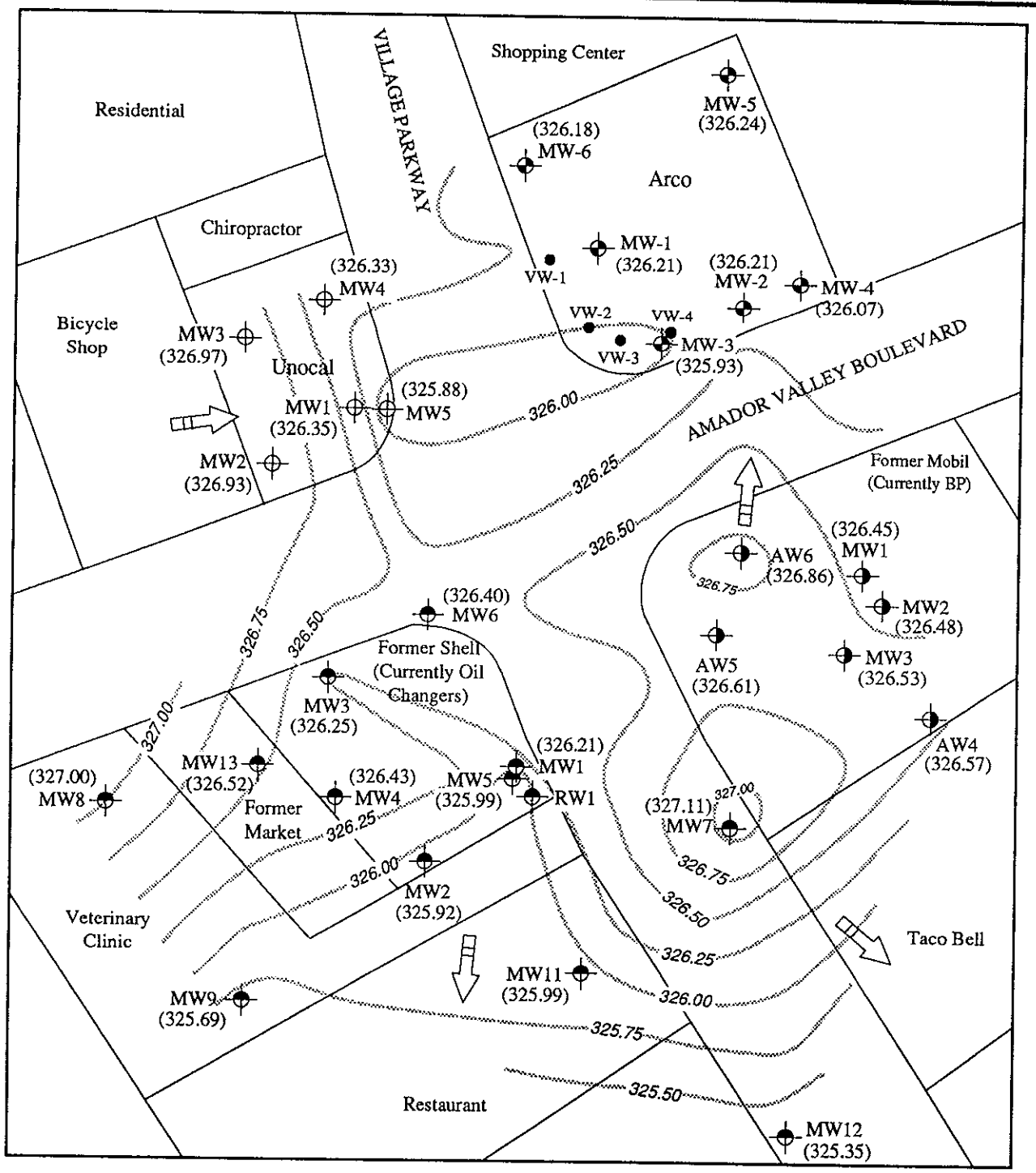


Base modified from 7.5 minute U.S.G.S. Dublin Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #5366 7375 AMADOR VALLEY BLVD. DUBLIN, CALIFORNIA	LOCATION MAP



LEGEND

- Monitoring well (Unocal)
- Monitoring well (BP)
- Monitoring well (Shell)
- Monitoring well (Arco)
- Vapor extraction well (Arco)
- ( ) Ground water elevation in feet above Mean Sea Level
- Contours of ground water elevation
- Direction of ground water flow

Note: The ground water elevations and contours were obtained from MPDS Services, Inc.'s report (MPDS-UN5366-01) dated March 21, 1994.

0 100 200

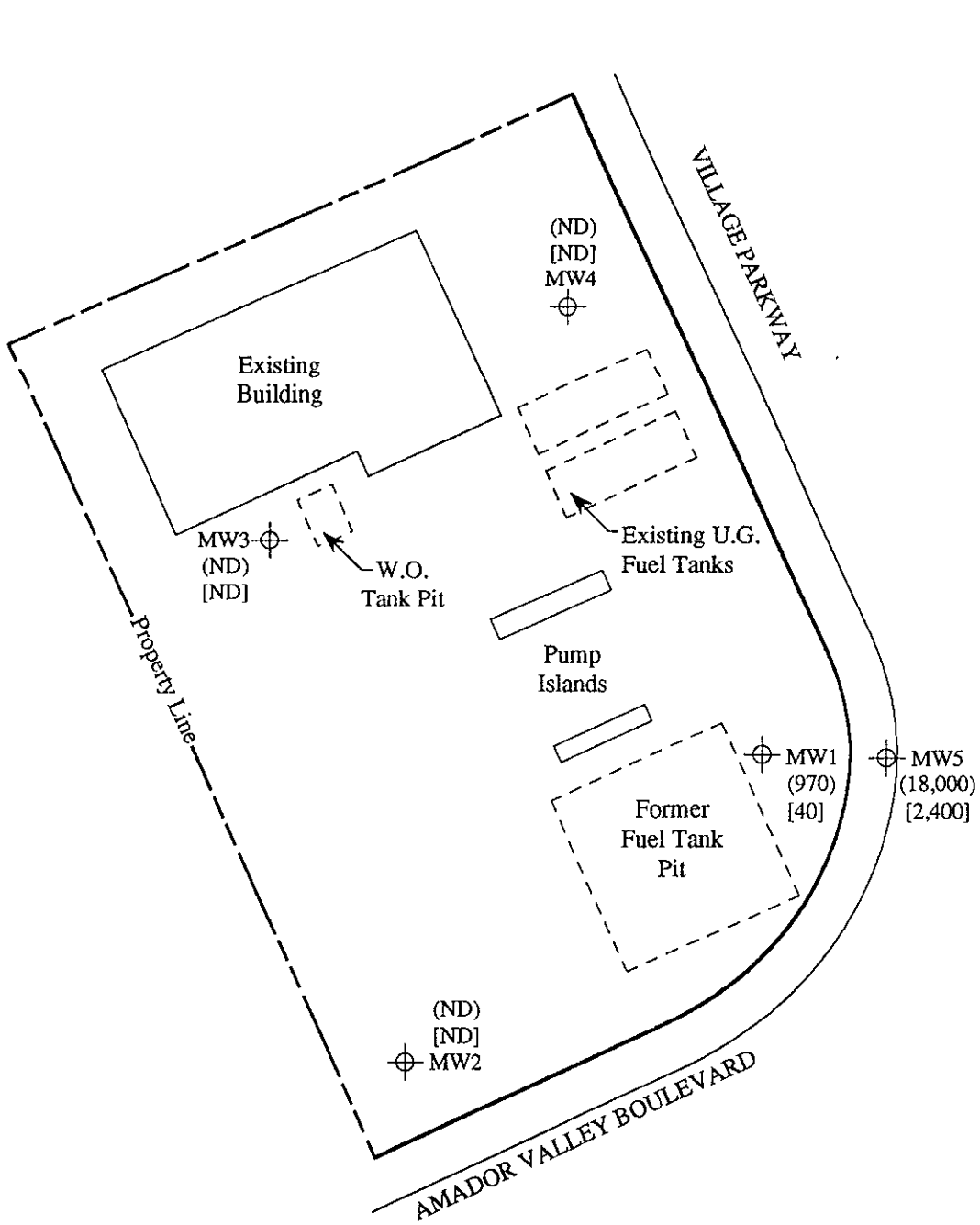
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE FEBRUARY 11, 1994 JOINT MONITORING EVENT

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5366
7375 AMADOR VALLEY BLVD.
DUBLIN, CALIFORNIA

FIGURE
1



LEGEND

- ⊕ Monitoring well
- ( ) Concentration of TPH as gasoline in µg/L
- [ ] Concentration of benzene in µg/L

ND = Non-detectable

0 30 60

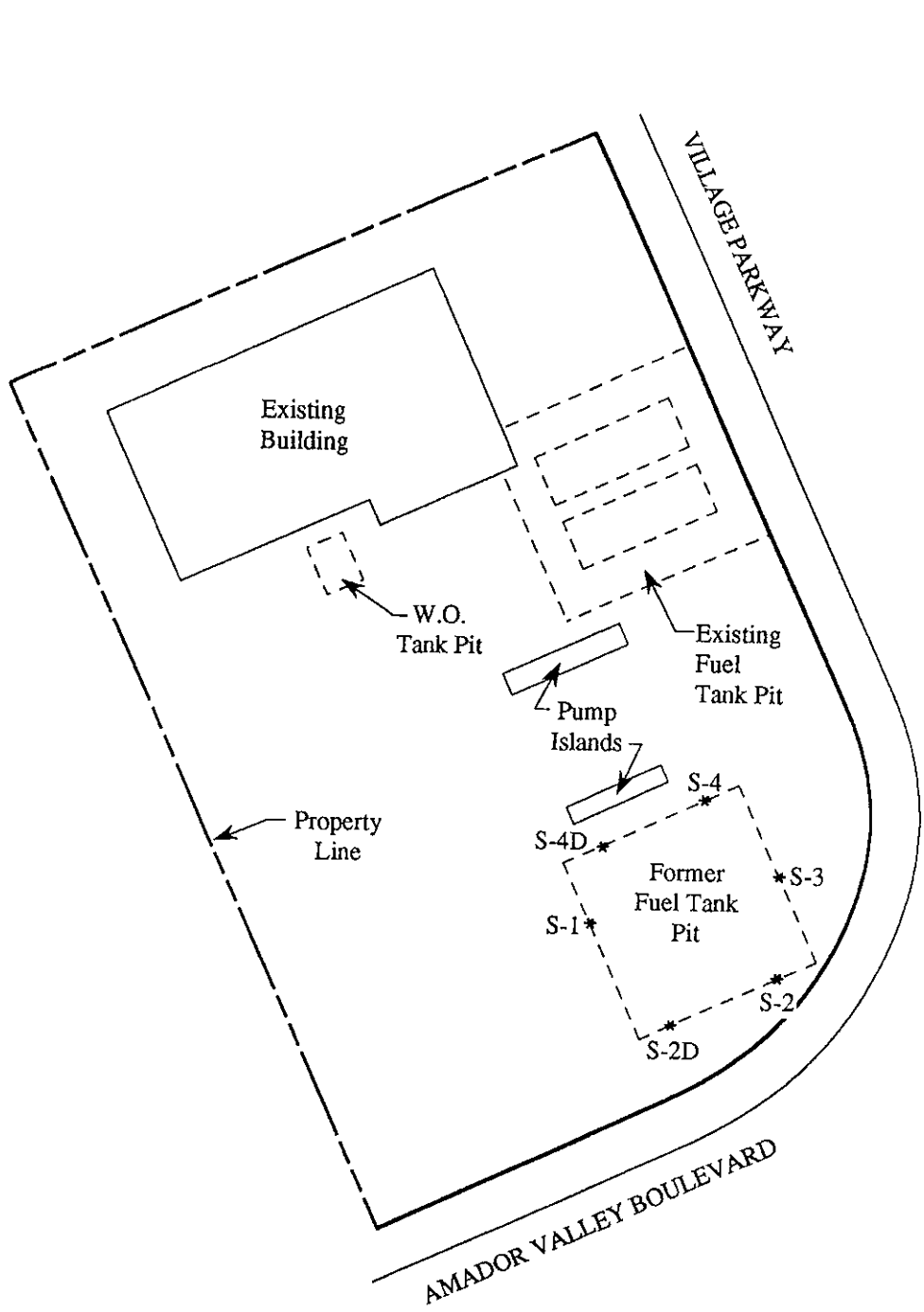
Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON FEBRUARY 11, 1994

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5366
7375 AMADOR VALLEY BLVD.
DUBLIN, CALIFORNIA

FIGURE
2



LEGEND

* Soil sample point location (collected on 2/18/88)

0 30 60

Approx. scale feet

SOIL SAMPLE POINT LOCATION MAP

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5366
7375 AMADOR VALLEY BLVD.
DUBLIN, CA

FIGURE
3

BORING LOG

Project No. KEI-P88-0205	**Boring Diameter** 8.5" / **Casing Diameter** 2"	**Logged By** D.L. JGG CEG 1633
Project Name Unocal S/S #5366, 7375 Amador Valley Blvd., Dublin	**Well Cover Elevation** N/A	**Date Drilled** 1/11/94
Boring No. MW5	**Drilling Method** Hollow-stem Auger	**Drilling Company** Woodward Drilling

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati-graphy USCS	Description
		0		Concrete Slab
				Silt, sand and gravel, very moist, brown (fill).
			ML	Clayey silt, estimated at 10-15% sand, stiff, moist, very dark gray.
				Sandy silt, stiff, moist, very dark gray, with thin lenses of silt, sand is fine grained.
5/6/6		5	SW	Well graded sand, trace silt, medium dense, moist, very dark gray.
6/11/13			CL	Silty clay, stiff to very stiff, moist, black, with roots and root holes, caliche fills root holes, grades to very dark gray below 10 feet.
4/6/7		10		
3/4/6	▽			Silty clay, firm to stiff, moist, wet inside voids, very dark gray, with caliche nodules to 3/4 inch diameter, locally grades to very clayey silt.
		15		
4/6/8				Silty clay, stiff, moist, olive brown and very dark gray, mottled, with root holes and caliche nodules to 1-1/4 inches diameter.
3/5/6		20		
				TOTAL DEPTH: 20'

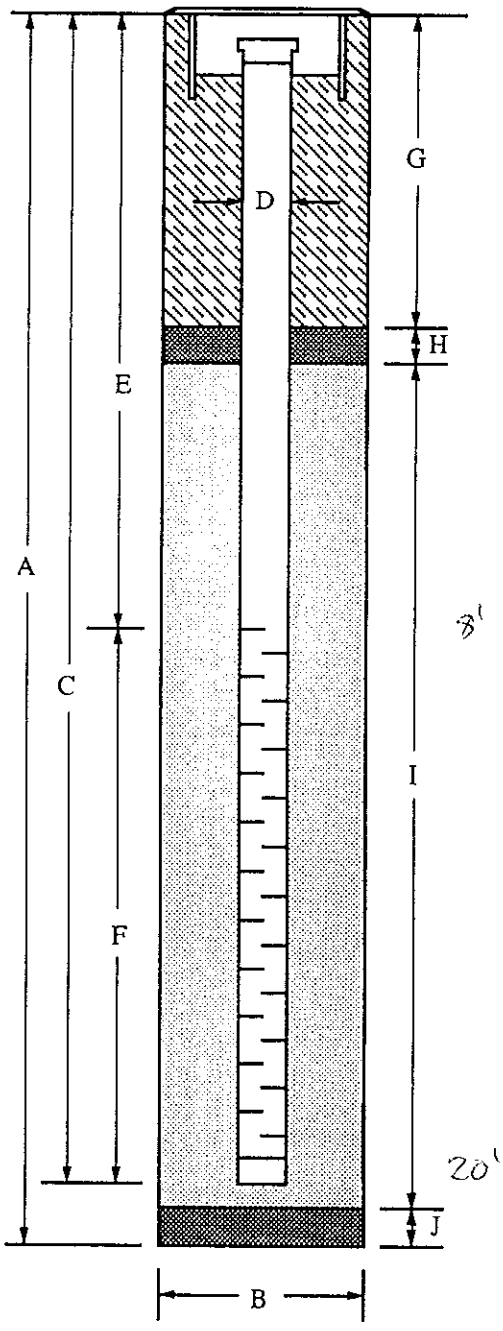
WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Unocal S/S #5366, 7375 Amador Valley Blvd, Dublin **WELL NO.:** MW5

PROJECT NUMBER: KEI-P88-0205

WELL PERMIT NO.: ACFC & WCD #94002

Flush-mounted Well Cover



A. Total Depth : 20'

B. Boring Diameter: 8.5"

Drilling Method: Hollow Stem Auger

C. Casing Length: 20'

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375"

ID = 2.067"

E. Depth to Perforations: 8'

F. Perforated Length: 12'

Perforation Type: Machined Slot

Perforation Size: 0.010"

G. Surface Seal: 4'

Seal Material: Neat Cement

H. Seal: 2'

Seal Material: Bentonite

I. Filter Pack: 14'

Pack Material: RMC Lonestar Sand

Size: #2/12

J. Bottom Seal: None

Seal Material: N/A

SEQUOIA ANALYTICAL

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

Kapreallian Engineering, Inc.	Client Project ID:	Unocal #5366, 7375 Amador Valley Blvd., Dublin		Sampled:	Jan 11, 1994
2401 Stanwell Dr., Ste. 400	Sample Matrix:	Soil		Received:	Jan 11, 1994
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020		Reported:	Jan 24, 1994
Attention: Avo Avedissian	First Sample #:	401-0438			

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 401-0438 MW5(5)	Sample I.D. 401-0439 MW5(10)	Sample I.D. 401-0440 MW5(12.5)	Sample I.D. Method Blank
Purgeable Hydrocarbons	1.0	N.D.	1,100	950	
Benzene	0.005	N.D.	7.1	7.0	
Toluene	0.005	N.D.	1.2	2.7	
Ethyl Benzene	0.005	0.012	39	24	
Total Xylenes	0.005	0.017	140	87	
Chromatogram Pattern:		--	Gasoline	Gasoline	

Quality Control Data

Report Limit Multiplication Factor:	1.0	100	100	1.0
Date Analyzed:	1/19/94	1/19/94	1/19/94	1/19/94
Instrument Identification:	HP-4	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	97	92	92	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

Alan B. Kemp
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 #5366, 7375 Amador Valley Blvd., Dublin
2401 Stanwell Dr., Ste. 400	Matrix:	Solid
Concord, CA 94520		
Attention: Avo Avedissian	QC Sample Group:	4010438-440

Reported: Jan 24, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Tuzon	A. Tuzon	A. Tuzon	A. Tuzon
MS/MSD Batch#:	4010376	4010376	4010376	4010376
Date Prepared:	1/19/94	1/19/94	1/19/94	1/19/94
Date Analyzed:	1/19/94	1/19/94	1/19/94	1/19/94
Instrument I.D.#:	HP-4	HP-4	HP-4	HP-4
Conc. Spiked:	0.40 mg/kg	0.40 mg/kg	0.40 mg/kg	1.2 mg/kg
Matrix Spike % Recovery:	88	88	90	89
Matrix Spike Duplicate % Recovery:	88	88	90	88
Relative % Difference:	0.0	0.0	0.0	1.1
LCS Batch#:	2LCS011994	2LCS011994	2LCS011994	2LCS011994
Date Prepared:	1/19/94	1/19/94	1/19/94	1/19/94
Date Analyzed:	1/19/94	1/19/94	1/19/94	1/19/94
Instrument I.D.#:	HP-4	HP-4	HP-4	HP-4
LCS % Recovery:	93	91	91	91
% Recovery Control Limits:	55-145	47-149	47-155	56-140

SEQUOIA ANALYTICAL

Alan B. Kemp
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

UNOCAL 76

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☐ 819 Striker Ave., Suite 8 • Sacramento, CA 95834 • (916) 921-9600
☒ 1900 Bates Ave., Suite LM • Concord, CA 94520 • (510) 686-9600
☐ 18939 120th Ave., N.E., Suite 101 • Bothell, WA 98011 • (206) 481-9200
☐ East 11115 Montgomery, Suite B • Spokane, WA 99206 • (509) 924-9200
☐ 15055 S.W. Sequoia Pkwy, Suite 110 • Portland, OR 97222 • (503) 624-9800

Company Name: **Kaprealian Engineering, Inc.**	Project Name: **7375 Amador Valley Boulevard, Dublin**
Address: **2401 Stanwell Drive, Suite 400**	UNOCAL Project Manager: **Mr. Ed Ralston**
City: **Concord** State: **CA** Zip Code: **94520**	
Telephone: **(510) 602-5100** FAX #: **(510) 687-0602**	Site #: **Unocal Service Station #5366**
Report To: **Avo** Sampler: **Doug Lee**	QC Data: ☒ Level A (Standard) ☐ Level B ☐ Level C ☐ Level D

Turnaround Time: ☒ 10 Working Days ☐ 5 Working Days ☐ 3 Working Days ☐ 2 Working Days ☐ 24 Hours ☐ 2 - 8 Hours

☐ Drinking Water ☐ Waste Water ☒ Other

Analyses Requested: TPH G, BTEX

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Laboratory Sample #	TPH G	BTEX	Comments
1. MW5(5)	1-11-94	Soil	1	Tube		X	X	40 10438
2. MW5(10)	↓	↓	↓	↓		↓	↓	0439
3. MW5(12.5)	↓	↓	↓	↓		↓	↓	↓ 0440
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Relinquished By: [signature]	Date: 1/11/94	Time: 1645	Received By: [signature]	Date: 1/11/94 Time: 1645
Relinquished By:	Date:	Time:	Received By:	Date: Time:
Relinquished By:	Date:	Time:	Received By Lab:	Date: Time:

Were Samples Received in Good Condition? ☒ Yes ☐ No Samples on Ice? ☒ Yes ☐ No Method of Shipment: Courier Page __ of __

To be completed upon receipt of report:

1) Were the analyses requested on the Chain of Custody reported? ☐ Yes ☐ No If no, what analyses are still needed? _____

2) Was the report issued within the requested turnaround time? ☐ Yes ☐ No If no, what was the turnaround time? _____

Approved by: _____ Signature: _____ Company: _____ Date: _____

Pink - Client
Yellow - Sequoia
White - Sequoia