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UNOCAL 76

March 22, 1993

Northern Region
Corporate Environmental
Remediation and Technology

Alameda County
Health Care Services
Dept of Environmental Health
80 Swan Way, Rm. 210
Oakland, CA 94621

REQUEST FOR CASE CLOSURE
Former UNOCAL STATION No. 5847
2701 East Avenue
Hayward, California

Dear Sirs:

Attached please find our consultant's (Kaprealian Engineering, Inc.) report summarizing the work completed to date at this site and supporting our request for case closure. This Site Closure Report dated February 25, 1993 was formatted in accordance with the *Letter of Recommendation for UST Case Closure* provided by your agency.

Based on the results of the soil and groundwater investigations conducted to date, it does not appear that a threat to water quality exists at the site. Therefore, it is our position that no further work is warranted.

Unocal shall consider this incident closed unless we receive additional information from your office. If you agree with our assessment, a concurrence letter would be appreciated. Upon receipt of your closure letter, a work plan will be submitted for proper destruction of the monitoring wells.

We look forward to your comments. Should you have any questions, please contact me at (510) 277-2320.

Sincerely,

Penny Silzer, R. G.
Sr. Environmental Geologist
Unocal Corporation

Attachment

cc: Mr. Rich Hiett - RWQCB
R. E. Bock - w/o
T. R. Ross - KEI - w/o

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P91-1101.R2
February 25, 1993

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

Attention: Ms. Penny Silzer

RE: Site Closure Report
Former Unocal Service Station #5847
2701 East Avenue
Hayward, California

Dear Ms. Silzer:

INTRODUCTION

This report presents a comprehensive summary of all of the soil sampling, ground water monitoring, ground water sampling, and remediation activities that were conducted at the referenced site from November of 1986 through January of 1993. Based on the analytical results of all of the ground water samples collected and evaluated to date, no significant ground water contamination appears to be present at the site. Therefore, it is Kaprealian Engineering, Inc.'s (KEI) opinion that no further ground water monitoring or sampling work is warranted at the Unocal site.

I. SITE DESCRIPTION AND BACKGROUND

The subject site formerly contained a Unocal service station facility. The site is located at the southeast corner of Windfeldt Road and East Avenue in Hayward, California, and is situated approximately 700 feet east-northeast of an unnamed tributary to San Lorenzo Creek. The site is currently vacant and all improvements have been demolished and removed from the site.

According to Unocal documents, the service station was demolished in September of 1985, at which time two 10,000 gallon underground storage tanks (containing regular unleaded and super unleaded gasoline) and one 280 waste oil tank were removed from the site. There were no reported indications of any leaks or holes in the underground storage tanks.

On November 6, 1986, six exploratory borings (designated as B-1 through B-6 on the attached Figure 4) were drilled at the

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site by Applied GeoSystems, Inc. (AGS) of Fremont, California. Borings B-3 and B-5 were terminated at shallow depths due to auger refusal. Borings B-1 and B-4 were terminated at depths below grade of approximately 15 feet and 22 feet, respectively, due to auger refusal. In these four exploratory borings, AGS reported that refusal occurred after "encountering large fragments of concrete, metal objects, and other hard, discarded materials." Borings B-2 and B-6 were drilled to total depths of 37 and 41 feet below grade, respectively. Ground water was encountered in borings B-2 and B-6 at depths ranging from 21.5 to 33 feet beneath the surface during drilling. Ground water was not encountered in the other four borings prior to auger refusal. Borings B-2 and B-6 were subsequently converted into two-inch diameter monitoring wells (designated as wells MW1B and MW2B, respectively, on the attached Figure 4). The monitoring wells were developed and sampled on November 10, 1986.

Soil samples collected from borings B-2 (MW1B), B-4, and B-6 (MW2B), and water samples collected from wells MW1B and MW2B, were analyzed by AGS for total hydrocarbons (THC) as gasoline. In addition, soil samples collected from boring B-6 were analyzed for THC as diesel, and water samples collected from wells MW1B and MW2B were analyzed for benzene, toluene, xylenes, and ethylbenzene (BTX&E).

The analytical results for the soil samples collected from borings B-2, B-4, and B-6 indicated concentrations of THC as gasoline ranging from non-detectable to 3.11 ppm. THC as diesel was non-detectable in all soil samples collected from boring B-6. The analytical results of the ground water samples collected on November 11, 1986, from wells MW1B and MW2B showed THC as gasoline at concentrations of 1,378 ppb and 84 ppb, respectively. Benzene was detected at 14 ppb in well MW1B, and was non-detectable in well MW2B. The results of the soil samples are summarized in Table 5, and the results of the water samples are summarized in Table 4.

Based on the analytical results, AGS recommended the implementation of a monitoring and sampling program for both wells. Documentation of AGS's well installation procedures, sample collection techniques, and analytical results are presented in the AGS report (Job No. 86109-1) dated November 19, 1986.

The wells were monitored and sampled quarterly (April, July, and October) by AGS during 1987. No free product or sheen was noted in any of the wells during monitoring. The analytical results for the ground water samples collected on

October 27, 1987, from wells MW1B and MW2B showed non-detectable concentrations of THC as gasoline and BTX&E. The analytical results of all the ground water samples collected by AGS are summarized in Table 4.

Unocal subsequently requested closure for the site in a letter (dated December 7, 1987) to the Regional Water Quality Control Board (RWQCB). KEI understands that no response to this request was received.

Per Unocal's procedure for potential site divestment locations, between February 17, 1992, and February 28, 1992, seven additional two-inch diameter monitoring wells and four exploratory borings (designated as MW3, MW4, MW5, MW6, MW7, MW8, and MW9, and EB7, EB8, EB9, and EB10, respectively) were installed at the site at the approximate locations identified on the attached Figure 4. 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 seven wells were each drilled and completed to total depths ranging from 35 to 40.5 feet below grade. The four exploratory borings were drilled to depths ranging from 17 to 27.5 feet below grade. Ground water was encountered at depths ranging from approximately 19.5 to 33.5 feet beneath the surface during drilling. However, ground water was not encountered in borings EB7 or EB8.

The wells (except MW1B and MW2B) were developed on March 2 through 5, 1992, and all of the wells were sampled on March 14, 1992. Water samples collected from all of the wells, and selected soil samples collected from the borings of MW3 through MW9 and EB7 through EB10, were analyzed at Sequoia Analytical Laboratory in Concord, California. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline and BTX&E. In addition, the soil samples collected from MW8 and the water samples collected from MW2B and MW8 were also analyzed for TPH as diesel, total oil and grease (TOG), and for EPA method 8010 constituents.

The analytical results for the soil samples collected from all borings indicated non-detectable concentrations of TPH as gasoline and BTX&E in all analyzed samples, except for minor levels of toluene and/or xylenes (varying from 0.0075 ppm to 0.0098 ppb) in samples EB7(5), EB7(14.5), EB7(20), and EB8(15). In addition, TPH as diesel, TOG, and all EPA method 8010 constituents were all non-detectable in all samples analyzed from MW8. The analytical results for the water

samples collected from all nine wells indicated non-detectable concentrations of TPH as gasoline and BTX&E, except for 240 ppb of TPH as gasoline and minor amounts of ethylbenzene and xylenes in MW1B. In wells MW2B and MW8, TPH as diesel, TOG, and all EPA method 8010 constituents were non-detectable. The results of the soil analyses are summarized in Table 3, and the results of the water analyses are summarized in Table 2.

Based on the analytical results of the soil and ground water samples, KEI recommended the implementation of a monthly monitoring and quarterly sampling program for all of the wells. Documentation of the well installation procedures, sample collection techniques, monitoring data, and the analytical results are presented in KEI's report (KEI-P91-1101.R1) dated April 15, 1992.

RECENT FIELD ACTIVITIES

The nine monitoring wells (MW1B, MW2B, and MW3 through MW9) were monitored three times and were sampled once during the quarter. During monitoring, the wells were checked for depth to water and the presence of free product. Prior to sampling, the wells were also checked for the presence of a sheen. No free product or sheen was noted in any of the wells during the quarter. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from all of the wells on January 14, 1993. Prior to sampling, the wells were each purged of between 11 and 15 gallons of water by the use of a surface pump. Samples were collected by the use of a clean Teflon bailer. The samples were decanted into clean VOA vials and/or one-liter amber bottles, as appropriate, which were then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to a state-certified laboratory.

ANALYTICAL RESULTS

The ground water samples collected this quarter were analyzed at Sequoia Analytical Laboratory and 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. In addition, the ground water samples collected from monitoring wells MW2B and MW8 were analyzed for TPH as diesel by EPA method 3510/modified 8015, TOG by Standard Methods 5520B&F, and for EPA method 8010 constituents.

The ground water samples collected from all nine monitoring wells on January 14, 1993, showed non-detectable concentrations of TPH as gasoline and BTX&E. In addition, the ground water samples collected from wells MW2B and MW8 showed non-detectable concentrations of TPH as diesel, TOG, and all EPA method 8010 constituents. The ground water sample analytical results are summarized in Table 2. Copies of the laboratory analytical results and the Chain of Custody documentation are attached to this report.

II. INVESTIGATIVE METHODS

a. Soil Sampling Methodology

The specific soil sampling methods used for each phase of work conducted to date are presented in various technical reports that have been previously submitted (see the attached report reference list). A general description of KEI's soil sampling methods are described in Appendix A.

b. Ground Water Monitoring Well Design, Installation, and Development

The specific monitoring well design, installation, and development techniques that have been used to install monitoring wells at the site are presented in various technical reports that have been previously submitted (see the attached report reference list). A general description of KEI's ground water monitoring well design, installation, and development methods are described in Appendix B.

c. Ground Water Sampling Methodology

The specific ground water sampling methods used for each phase of work conducted to date are presented in various technical reports that have been previously submitted (see the attached report reference list). A general description of KEI's ground water sampling methods are described in Appendix C.

d. Certified Laboratory, Chain of Custody Procedures, Sample Preservation, Sample Holding Times, Sample Preservation Methods, and Acceptable Detection Limits

All of the soil and ground water samples collected were analyzed by state-certified laboratories (Sequoia Analytical Laboratory, Anametrix Inc., and Applied

Geosystems), and were accompanied by properly executed Chain of Custody documentation. A KEI sample Chain of Custody form is included in Appendix C. The sample preservation, appropriate holding time, analytical method, sample container, and detection limit information is shown on Table 1 of Appendix C.

e. Soil and/or Ground Water Analysis Performed in Accordance to Table 2 of Regional Board Staff Recommendations

All of the soil and ground water samples collected were analyzed in accordance with Table 2 of the "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites." As described in the Background section of this report, two underground fuel storage tanks and one waste oil tank were removed from the site in September of 1985. The tanks consisted of one 10,000 gallon super unleaded gasoline tank, one 10,000 gallon regular unleaded gasoline tank, and one 550 gallon waste oil tank. In accordance with the Tri-Regional Board's guidelines, the following analyses have been performed on the samples collected at the site:

Tank Type	Soil Analysis	Water Analysis
Regular and Super Unleaded Gasoline	TPH as gasoline by EPA method 5030/ modified 8015	TPH as gasoline by EPA method 5030/ modified 8015
	BTX&E by EPA method 8020	BTX&E by EPA method 8020
Waste Oil	TPH as gasoline by EPA method 5030/ modified 8015	TPH as gasoline by EPA method 5030/ modified 8015
	BTX&E by EPA method 8020	BTX&E by EPA method 8020
	TPH as diesel by EPA method 3550/ modified 8015	TPH as diesel by EPA method 3510/ modified 8015
	TOG by Standard Methods 5520 E&F (Gravimetric)	TOG by Standard Methods 5520 B&F (Gravimetric)

Tank Type	Soil Analysis	Water Analysis
	Halogenated Volatile Organic Compounds (chlorinated solvents) by EPA method 8010	Halogenated Volatile Organic Compounds (chlorinated solvents) by EPA method 8010

f. Method Used to Measure Free Product Thickness

Monitoring well reference elevations are measured to the center of the protective Christy box lid. When the lid is removed and depth to free product measurements are desired, a rigid instrument, such as a ruler, is placed across the top of the now open Christy box. Free product thickness measurements are accomplished in one of several ways.

Depth measurement to the top of the free product layer may be performed using an electric petroleum hydrocarbon indicator. Alternatively, a steel or aluminum yardstick covered with product finding paste is attached to a steel tape and lowered until part of the yardstick encounters the free product layer. The measured length of the steel tape is added to the unaffected length of the yardstick as measured from the top of the yardstick to the point where discoloration of the product finding paste begins.

The total product thickness is determined by finding the difference between the measured depth to product and the measured depth to water.

In most instances, it is possible to place both water finding paste and product finding paste on the yardstick and directly measure the thickness of the discolored product finding paste from the yardstick. Depth to free product or free product thickness measurements are made to the nearest 0.01 feet. However, please note that no free product has ever been encountered at the subject site.

g. Method Used to Measure Ground Water Elevations

Monitoring well reference elevations are measured to the center of the protective Christy box lid. When the lid is removed and depth to water measurements are desired, a rigid instrument, such as a ruler, is placed across the top of the now open Christy box. Depth to water is

measured using an electric water level indicator and referenced to the middle and bottom edge of the rigid instrument spanning the top of the Christy box. Alternatively, a steel or aluminum yardstick covered with water finding paste is attached to a steel tape and lowered until part of the yardstick encounters the water layer. The measured length of the steel tape is added to the unaffected length of the yardstick as measured from the top of the yardstick to the point where the discoloration of the water finding paste begins. Depth to water level measurements are made to the nearest 0.01 feet.

Water levels are measured prior to development, purging or sampling.

III. EXTENT OF SOIL AND GROUND WATER POLLUTION:

a. Vertical and Lateral Extent of Soil Contamination

As shown in Tables 3 and 5, the analytical results of all of the soil samples collected from the exploratory borings and monitoring well borings have shown non-detectable concentrations of TPH as gasoline and benzene, except for four samples (see Table 5), which showed TPH as gasoline at concentrations ranging from 0.2 pm to 3.11 ppm. In addition, all of the soil samples collected from monitoring wells MW2B and MW8 showed non-detectable concentrations of TPH as diesel. The soil samples collected from monitoring well MW8 also showed non-detectable concentrations of all EPA method 8010 constituents and TOG, except for 120 ppm of TOG detected in sample MW8(5), which was collected at a depth of 5 feet below grade.

Based on the analytical results of all of the soil samples collected and evaluated to date, the extent of the soil contamination at the site is well defined. The majority of the soil samples collected showed non-detectable concentrations of petroleum hydrocarbons. Very low concentrations of petroleum hydrocarbon contamination were detected in a few isolated samples.

b. Vertical and Lateral Definition of Free Product and Dissolved Constituents

As shown in Table 2, the ground water samples collected from all nine monitoring wells during the past four sampling events (March 1992 through January 1993) have shown non-detectable concentrations of TPH as gasoline

and BTX&E, except for the sample collected from well MW1B on March 14, 1992. The analytical results for the ground water sample collected from well MW1B on March 14, 1992, showed concentrations of TPH as gasoline at 240 ppb, xylenes at 4.4 ppb, and ethylbenzene at 20 ppb. However, the ground water samples collected from well MW1B during the past three quarters of sampling have shown non-detectable concentrations of TPH as gasoline and BTX&E.

In summary, based on the analytical results of all of the soil samples collected at the subject site, there does not appear to be a source of contamination at the site which presents a threat, or a potential threat, to water quality. In addition, the analytical results of the ground water samples collected during the past four quarters indicate that the ground water meets the State of California drinking water standards. Therefore, it is KEI's opinion that no further soil or ground water monitoring or sampling is warranted at the Unocal site. KEI will prepare a work plan to destroy all nine existing monitoring wells once site closure is granted from the regulatory agencies.

IV. LOCAL AND REGIONAL HYDROGEOLOGY

The measured depth to ground water at the site on January 14, 1993, ranged between 15.22 and 24.65 feet below grade. The water levels in all of the wells have shown net increases ranging from 1.64 to 6.98 feet since October 15, 1992. Based on the water level data gathered during the quarter, the ground water flow direction appeared to vary from the north-northwest to the north-northeast, as shown on the attached Potentiometric Surface Maps, Figures 1, 2, and 3. The flow direction has varied from the northwest to the northeast since April of 1992 (3 consecutive quarters). The average hydraulic gradient across the site on January 14, 1993, was approximately 0.15, and was approximately 0.07 on December 8, 1992, and November 6, 1992.

Based on a review of regional geologic maps (U.S. Geological Survey Open File Report 80-540 "Preliminary Geologic Map of the Hayward Quadrangle, Alameda and Contra Costa Counties, California" by Thomas W. Dibblee, Jr. 1980) the subject site is underlain by bedrock materials of the upper Cretaceous Panoche Formation (Kp). The Panoche Formation in the vicinity of the site is described as consisting of gray, micaceous, argillaceous to silty clay shale that strikes to the northwest and dips to the northeast at 65 to 80 degrees (where measured). The site is also located approximately

2,000 feet northeast of the East Chabot Fault, 3,600 feet northeast of the West Chabot Fault, and approximately 6,600 feet northeast of the mapped trace of the active Hayward fault.

The results of our subsurface investigation indicate that the site is underlain directly by shale (claystone to siltstone) bedrock materials, except at the vicinity of the former fuel tank pit, where fill materials extend to depths of about 13.5 feet below grade. The particle size analysis (sieve only) conducted on the sample was classified as claystone/siltstone bedrock. Analysis on the sample collected from MW8 at a depth of 29 feet below grade indicates that the material is composed of 5% sand, with the remainder being silt and clay size materials. Analysis on the sample collected from MW4 at a depth of 35 feet below grade indicates 40% sand, approximately 35% silt and approximately 25% clay.

V. BENEFICIAL USES

a. Existing and Potential Beneficial Uses

The former Unocal service station site is located approximately 700 feet east-northeast of an unnamed tributary to San Lorenzo Creek. Based on the December 1986 Water Quality Control Plan for the RWQCB, San Francisco Bay Basin (Basin Plan), the existing and potential beneficial uses of San Lorenzo Creek are as follows:

- Municipal and Domestic Supply
- Ground Water Recharge
- Fresh Water Replenishment
- Water Contact Recreation
- Non-contact Water Recreation
- Warm Fresh Water Habitat
- Cold Fresh Water Habitat
- Wildlife Habitat
- Fish Migration
- Fish Spawning

There are no known discharges (past and present) to surface waters (San Lorenzo Creek and/or its tributaries, including storm drains) at the subject Unocal site.

The RWQCB's Basin Plan also contains beneficial uses applicable to ground water underlying the site. The existing and potential beneficial uses of ground water at and in the vicinity of the Unocal site are as follows:

- Municipal Supply
- Industrial Service Supply
- Industrial Process Water Supply
- Agricultural Supply

b. Well Surveys (Municipal, Agricultural, and Domestic)

In February of 1993, KEI completed a survey of water wells located within a 1/2-mile radius of the subject site. The survey indicated that there are no water wells within the study area. The survey was conducted by a review of the California Department of Water Resources (CDWR) records.

c. Summary of Factors Affecting Long-Term Fate of Contaminants

- The ground water flow direction at the subject site has historically varied from the northwest to the northeast.

- As shown in Table 2, the highest concentration of TPH as gasoline detected in any Unocal well during the past four quarters of sampling was 240 ppb detected in well MW1B on March 14, 1992. The ground water samples collected from all nine monitoring wells during the past four quarters of sampling have shown non-detectable concentrations of benzene. In addition, the three most recent sampling events conducted at the site (July 1992 through January 1993) have shown non-detectable concentrations of TPH as gasoline and BTX&E in all nine of the wells, and non-detectable concentrations of TPH as diesel in wells MW2B and MW8. Assuming the highest concentration of benzene detected in the ground water monitoring wells at the site to date (14 ppb in well MW1B on November 11, 1986) were to migrate off site, it is unlikely that detectable concentrations of benzene would reach the unnamed tributary to San Lorenzo Creek (located over 700 feet from the former Unocal site) due to natural attenuation (dispersion, adsorption, biodegradation, aeration, etc). Similarly, other gasoline constituents would likely be greatly attenuated within the shallow aquifer by dispersion, adsorption, biodegradation, and

aeration, and therefore it does not appear that these constituents would significantly impact San Lorenzo Creek or its tributaries.

VI. REMEDIATION ACTIVITIES

a. Rationale for Selected Remediation Option

Based on the analytical results of all of the soil and ground water samples collected and evaluated to date (see Sections III.a. and III.b. and Tables 2 through 5), it is KEI's opinion that soil and ground water remediation is not warranted for the subject Unocal site.

b. Soil Remediation Method and Effectiveness

Not applicable.

c. Ground Water Remediation Method(s)

Not applicable.

d. Interim Remediation Actions Undertaken

Not applicable.

e. Impact of Remedial Actions on Beneficial Uses

Not applicable.

VII. REMEDIATION EFFECTIVENESS

a. Final Cleanup Levels Consistent with State Water Resources Control Board (SWRCB) Resolution 68-16.

As stated previously in Sections III.b. and V.c. of this report, the ground water samples collected from all nine monitoring wells during the past four sampling events (March 1992 through January 1993) have shown non-detectable concentrations of benzene. In addition, the maximum concentrations of xylenes (4.4 ppb) and ethylbenzene (20 ppb) that have been detected in any well during the past four quarters of sampling have been well below the Federal and State primary and secondary drinking water standards for these contaminants. Furthermore, the ground water samples collected from all nine of the wells during the past three quarters of sampling have shown no detectable concentrations of TPH as gasoline and BTX&E. Based on the above discussion, it appears that the

current concentrations (non-detectable for all contaminants) detected in ground water beneath the site are consistent with SRWCB Resolution 68-16.

b. Verification Monitoring Program and Criteria, Rationale, Sampling Number, Frequency, and Duration

The verification monitoring program by KEI has consisted of monthly monitoring (water level measurements and presence of free product) of all nine wells for ten consecutive months (March 1992 through January 1993). Monitoring of wells MW1B and MW2B was also conducted by AGS during five months in 1987. The verification monitoring program by KEI has also consisted of a quarterly ground water sampling program of all nine wells for four consecutive quarters (March 1992 through January 1993). Monitoring wells MW1B and MW2B were sampled by AGS for four consecutive quarters (November 1986 through October 1987). A summary of all the ground water sample analytical results are presented in Tables 2 and 4.

c. Impact (Potential and/or Existing) of Residual Pollutants on Beneficial Uses

Based on the current non-detectable concentrations of petroleum hydrocarbons in ground water (see Sections III.b. and VII.a.) beneath the site, the impact of any residual pollutants on beneficial uses appears to be minimal.

DISTRIBUTION

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

LIMITATIONS

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

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

The results of this study are based on the data obtained from the field and laboratory analyses obtained from a state-certified laboratory. We have analyzed these data using what we believe to

be currently applicable engineering techniques and principles in the Northern California region. We make no warranty, either expressed or implied, regarding the above, including laboratory analyses, except that our services have been performed in accordance with generally accepted professional principles and practices existing for such work.

If you have any questions regarding this report, please do not hesitate to call 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 5
Report Reference List
Location Map
Potentiometric Surface Maps - Figures 1, 2 & 3
Exploratory Boring and Monitoring Well Location Map - Figure 4
Laboratory Analyses
Chain of Custody documentation
Appendices A, B & C

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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 (feet)	Sheen	Water Purged (gallons)
(Monitored and Sampled on January 14, 1993)					
MW1B	430.35	15.45	0	No	15
MW2B	429.64	18.97	0	No	15
MW3	430.45	16.55	0	No	14
MW4	430.30	16.72	0	No	14
MW5	431.61	15.22	0	No	14
MW6	426.01	24.65	0	No	11
MW7	432.27	15.47	0	No	14
MW8	428.11	23.60	0	No	11
MW9	429.68	21.30	0	No	14
(Monitored on December 8, 1992)					
MW1B	423.32	22.48	0	--	0
MW2B	423.30	25.31	0	--	0
MW3	423.23	23.77	0	--	0
MW4	423.31	23.71	0	--	0
MW5	425.68	21.15	0	--	0
MW6	423.33	27.33	0	--	0
MW7	426.29	21.45	0	--	0
MW8	425.16	26.55	0	--	0
MW9	427.16	23.82	0	--	0
(Monitored on November 6, 1992)					
MW1B	423.40	22.40	0	--	0
MW2B	423.47	25.14	0	--	0
MW3	423.36	23.64	0	--	0
MW4	423.42	23.60	0	--	0
MW5	425.33	21.50	0	--	0
MW6	423.70	26.96	0	--	0
MW7	425.82	21.92	0	--	0
MW8	425.47	26.24	0	--	0
MW9	427.44	23.54	0	--	0

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TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well	Well Cover Elevation* (feet)
MW1B	445.80
MW2B	448.61
MW3	447.00
MW4	447.02
MW5	446.83
MW6	450.66
MW7	447.74
MW8	451.71
MW9	450.98

* The elevations of the tops of the well covers have been surveyed relative to mean sea level per the County of Alameda Benchmark "HAN-E 1980".

-- Sheen determination was not performed.

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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
1/14/93	MW1B	--	ND	ND	ND	ND	ND
	MW2B*	ND	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
	MW5	--	ND	ND	ND	ND	ND
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
	MW8*	ND	ND	ND	ND	ND	ND
	MW9	--	ND	ND	ND	ND	ND
10/15/92	MW1B	--	ND	ND	ND	ND	ND
	MW2B*	ND	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
	MW5	--	ND	ND	ND	ND	ND
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
	MW8*	ND	ND	ND	ND	ND	ND
	MW9	--	ND	ND	ND	ND	ND
7/15/92	MW1B	--	ND	ND	ND	ND	ND
	MW2B*	ND	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
	MW5	--	ND	ND	ND	ND	ND
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
	MW8*	ND	ND	ND	ND	ND	ND
	MW9	--	ND	ND	ND	ND	ND
3/14/92	MW1B	--	240	ND	ND	4.4	20
	MW2B*	ND	ND	ND	ND	ND	ND
	MW3	--	ND	ND	ND	ND	ND
	MW4	--	ND	ND	ND	ND	ND
	MW5	--	ND	ND	ND	ND	ND
	MW6	--	ND	ND	ND	ND	ND
	MW7	--	ND	ND	ND	ND	ND
	MW8*	ND	ND	ND	ND	ND	ND
	MW9	--	ND	ND	ND	ND	ND

KEI-P91-1101.R2
February 25, 1993

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

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

ND = Non-detectable.

-- Indicates analysis was not performed.

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

KEI-P91-1101.R2
February 25, 1993

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
2/28/92	EB7(5)	5.0	--	ND	ND	ND	0.0075	ND
	EB7(10)	10.0	--	ND	ND	ND	ND	ND
	EB7(14.5)	14.5	--	ND	ND	0.0079	0.0098	ND
	EB7(20)	20.0	--	ND	ND	ND	0.0090	ND
	EB7(24.5)	24.5	--	ND	ND	ND	ND	ND
2/28/92	EB8(4.5)	4.5	--	ND	ND	ND	ND	ND
	EB8(10)	10.0	--	ND	ND	ND	ND	ND
	EB8(15)	15.0	--	ND	ND	ND	0.0087	ND
2/28/92	EB9(5)	5.0	--	ND	ND	ND	ND	ND
	EB9(10)	10.0	--	ND	ND	ND	ND	ND
	EB9(15)	15.0	--	ND	ND	ND	ND	ND
	EB9(19.5)	19.5	--	ND	ND	ND	ND	ND
	EB9(25.5)	25.5	--	ND	ND	ND	ND	ND
2/28/92	EB10(5)	5.0	--	ND	ND	ND	ND	ND
	EB10(10)	10.0	--	ND	ND	ND	ND	ND
	EB10(15)	15.0	--	ND	ND	ND	ND	ND
	EB10(20)	20.0	--	ND	ND	ND	ND	ND
	EB10(25.5)	25.5	--	ND	ND	ND	ND	ND
	EB10(27)	27.0	--	ND	ND	ND	ND	ND
2/19/92	MW3(5.5)	5.0	--	ND	ND	ND	ND	ND
	MW3(15)	15.0	--	ND	ND	ND	ND	ND
	MW3(19.5)	19.5	--	ND	ND	ND	ND	ND
	MW3(24.5)	24.5	--	ND	ND	ND	ND	ND
2/19/92	MW4(5)	5.0	--	ND	ND	ND	ND	ND
	MW4(10)	10.0	--	ND	ND	ND	ND	ND
	MW4(15)	15.0	--	ND	ND	ND	ND	ND
	MW4(20)	20.0	--	ND	ND	ND	ND	ND
	MW4(24.5)	24.5	--	ND	ND	ND	ND	ND
2/24/92	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(19)	19.0	--	ND	ND	ND	ND	ND
	MW5(24.5)	24.5	--	ND	ND	ND	ND	ND

KEI-P91-1101.R2
February 25, 1993

TABLE 3 (Continued)

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
2/18/92	MW6(10)	10.0	--	ND	ND	ND	ND	ND
	MW6(20)	20.0	--	ND	ND	ND	ND	ND
	MW6(30.5)	30.5	--	ND	ND	ND	ND	ND
2/24/92	MW7(5)	5.0	--	ND	ND	ND	ND	ND
	MW7(10)	10.0	--	ND	ND	ND	ND	ND
	MW7(15)	15.0	--	ND	ND	ND	ND	ND
	MW7(19)	19.0	--	ND	ND	ND	ND	ND
2/18/92	MW8(5)*	5.0	ND	ND	ND	ND	ND	ND
	MW8(10)**	10.0	ND	ND	ND	ND	ND	ND
	MW8(15)**	15.0	ND	ND	ND	ND	ND	ND
	MW8(19.5)**	19.5	ND	ND	ND	ND	ND	ND
	MW8(25)**	25.0	ND	ND	ND	ND	ND	ND
	MW8(30)**	30.0	ND	ND	ND	ND	ND	ND
2/17/92	MW9(5)	5.0	--	ND	ND	ND	ND	ND
	MW9(14.5)	14.5	--	ND	ND	ND	ND	ND
	MW9(25)	25.0	--	ND	ND	ND	ND	ND

* TOG was detected at 120 ppm. EPA method 8010 constituents were non-detectable.

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

ND = Non-detectable.

-- Indicates analysis was not performed.

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

KEI-P91-1101.R2
February 25, 1993

TABLE 4

SUMMARY OF LABORATORY ANALYSES
WATER

(Collected by AGS)

Date	Well #	THC as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/27/87	MW1B	ND	ND	ND	ND	ND
	MW2B	ND	ND	ND	ND	ND
7/24/87	MW1B	367.7	5.1	1.4	26.7	24.3
	MW2B	5.7	ND	1.3	0.9	ND
4/28/87	MW1B	1,263	9.1	3.8	141.2	82.4
	MW2B	12.5	ND	2.7	3.4	0.8
11/11/86	MW1B	1,378	14	7	352	102
	MW2B	84	ND	3	13	2

ND = Non-detectable.

NOTE: Designation MW1B and MW2B have been adopted by KEI, formerly referred to as MW1 and MW2 by AGS.

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

KEI-P91-1101.R2
February 25, 1993

TABLE 5

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected by AGS on November 6 & 7, 1987)

Sample Number	Well or Boring #	Depth (feet)	THC as Gasoline	THC as Diesel
S-15-B2	MW1B	15	0.4	--
S-20-B2	MW1B	20	ND	--
S-10-B4	B4	10	3.11	--
S-20-B4	B4	20	ND	--
S-15-B6	MW2B	15	0.2	ND
S-25-B6	MW2B	25	0.2	ND
S-30-B6	MW2B	30	ND	ND

ND = Non-detectable.

-- Indicates analysis was not performed.

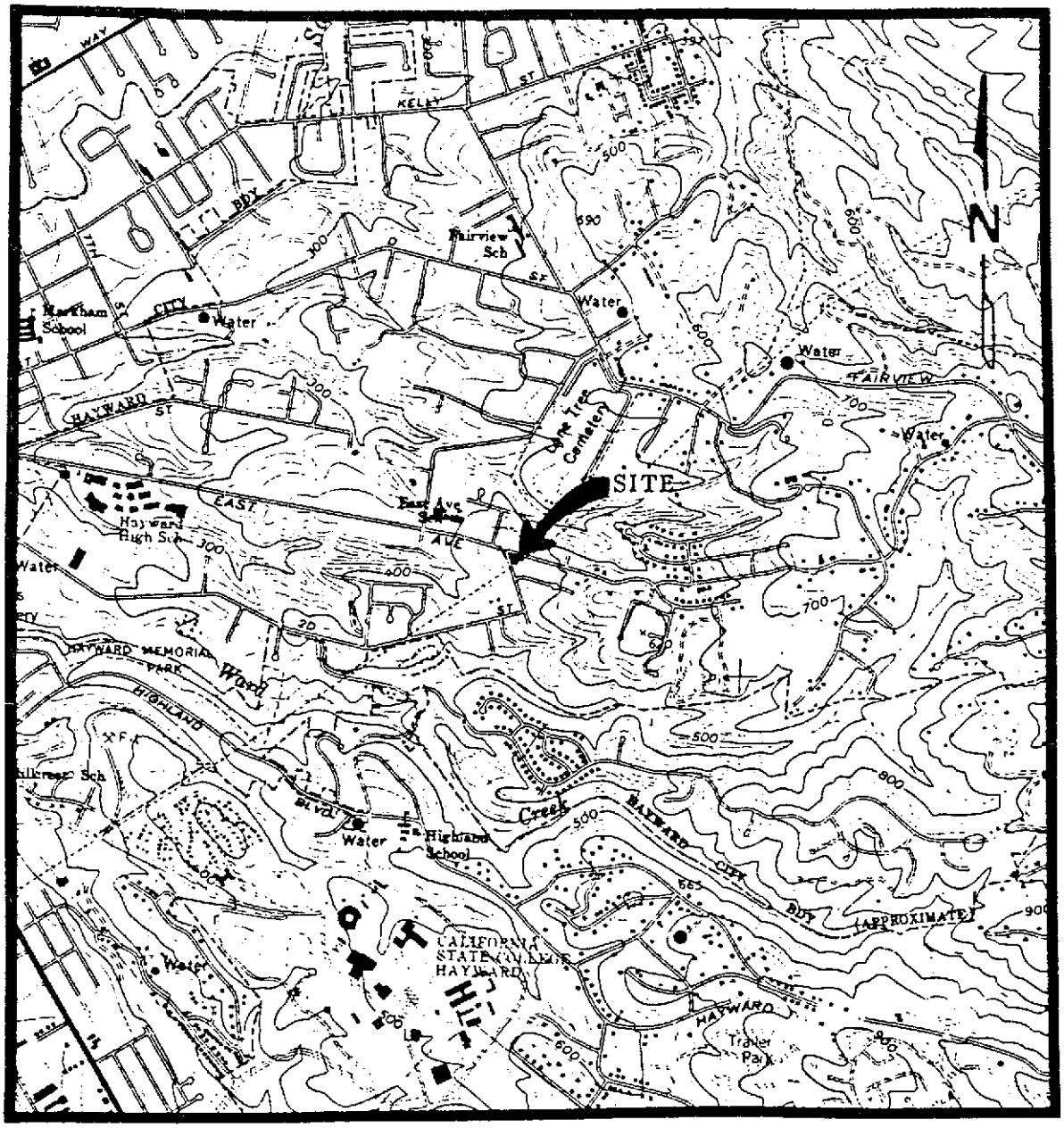
NOTE: Designation MW1B and MW2B have been adopted by KEI; formerly referred to as MW1 and MW2 by AGS.

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

REPORT REFERENCE LIST

The following is a chronological listing of all the technical reports and proposals that have been prepared by KEI and AGS and submitted to Unocal Corporation and the regulatory agencies:

REPORT TITLE	REPORT DESCRIPTION	REPORT NUMBER	REPORT DATE
Quarterly Report	August - October 1992 Monitoring and Sampling results	KEI-P91-1101.QR2	11/05/92
Quarterly Report	May - July 1992 Monitoring and Sampling results	KEI-P91-1101.QR1	08/10/92
Ground Water Investigation	Installation of seven monitoring wells and four exploratory borings	KEI-P91-1101.R1	04/15/92
Work Plan/Proposal	Proposal for the installation of seven monitoring wells and four exploratory borings	KEI-P91-1101.P1	12/06/91
Quarterly Report	October 1987 Monitoring and Sampling results	AGS Letter Report No. 86109-2	11/13/87
Quarterly Report	July 1987 Monitoring and Sampling results	AGS Letter Report No. 86109-2	08/18/87
Quarterly Report	April 1987 Monitoring and Sampling results	AGS Letter Report No. 86109-2	05/19/87
Monthly Report	March 1987 Monitoring results	AGS Letter Report No. 86109-2	03/23/87
Monthly Report	February 1987 Monitoring results	AGS Letter Report No. 86109-2	02/24/87
Subsurface Environmental Investigation	Installation of two monitoring wells and two exploratory borings	AGS Job No. 86109-1	11/19/86

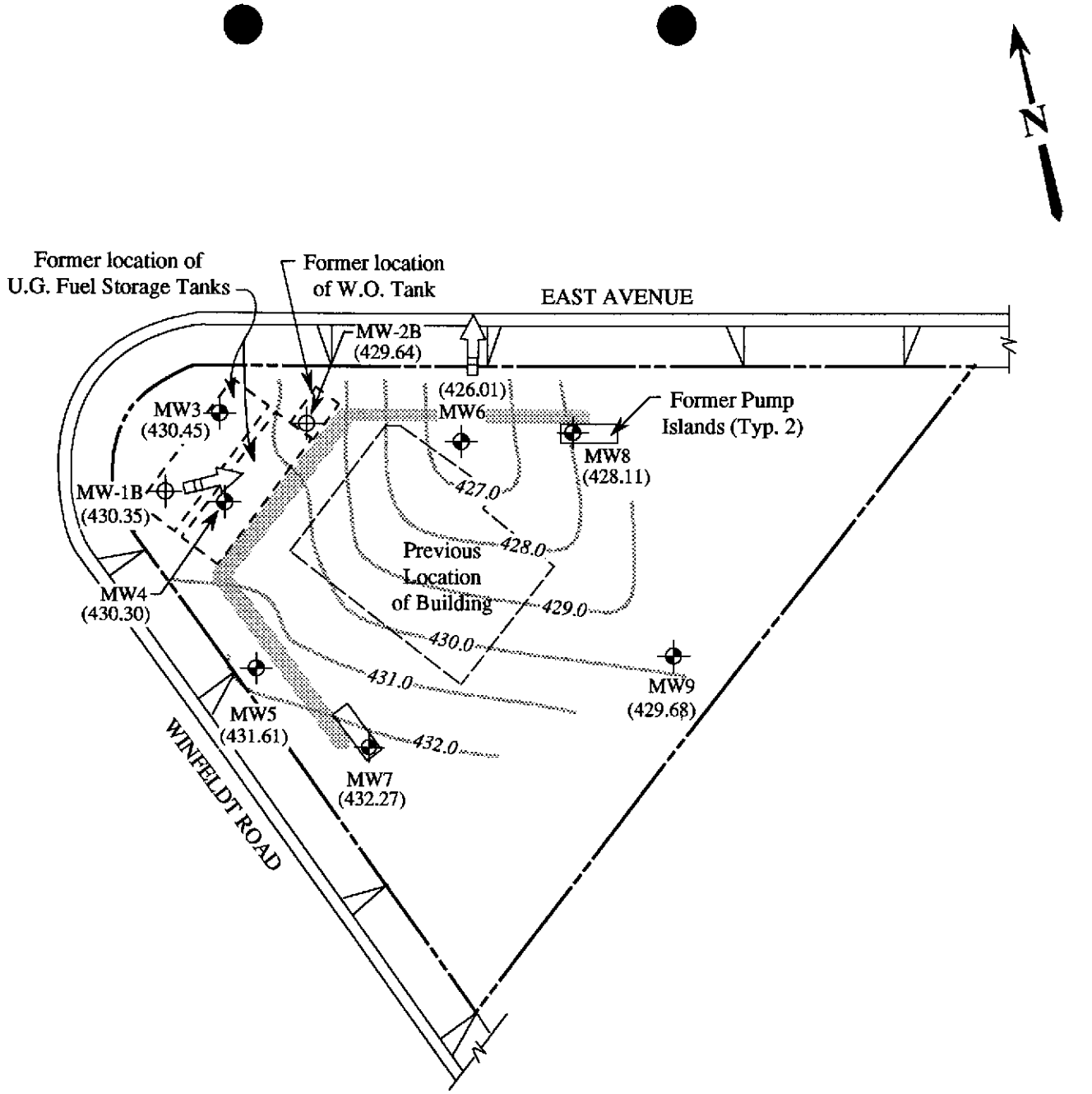


Base modified from 7.5 minute U.S.G.S. Hayward Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	FORMER UNOCAL S/S #5847 2701 EAST AVENUE HAYWARD, CA	LOCATION MAP



LEGEND

- Monitoring well (by KEI)
- Monitoring well (by AGS, 1986)
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

0 30 60

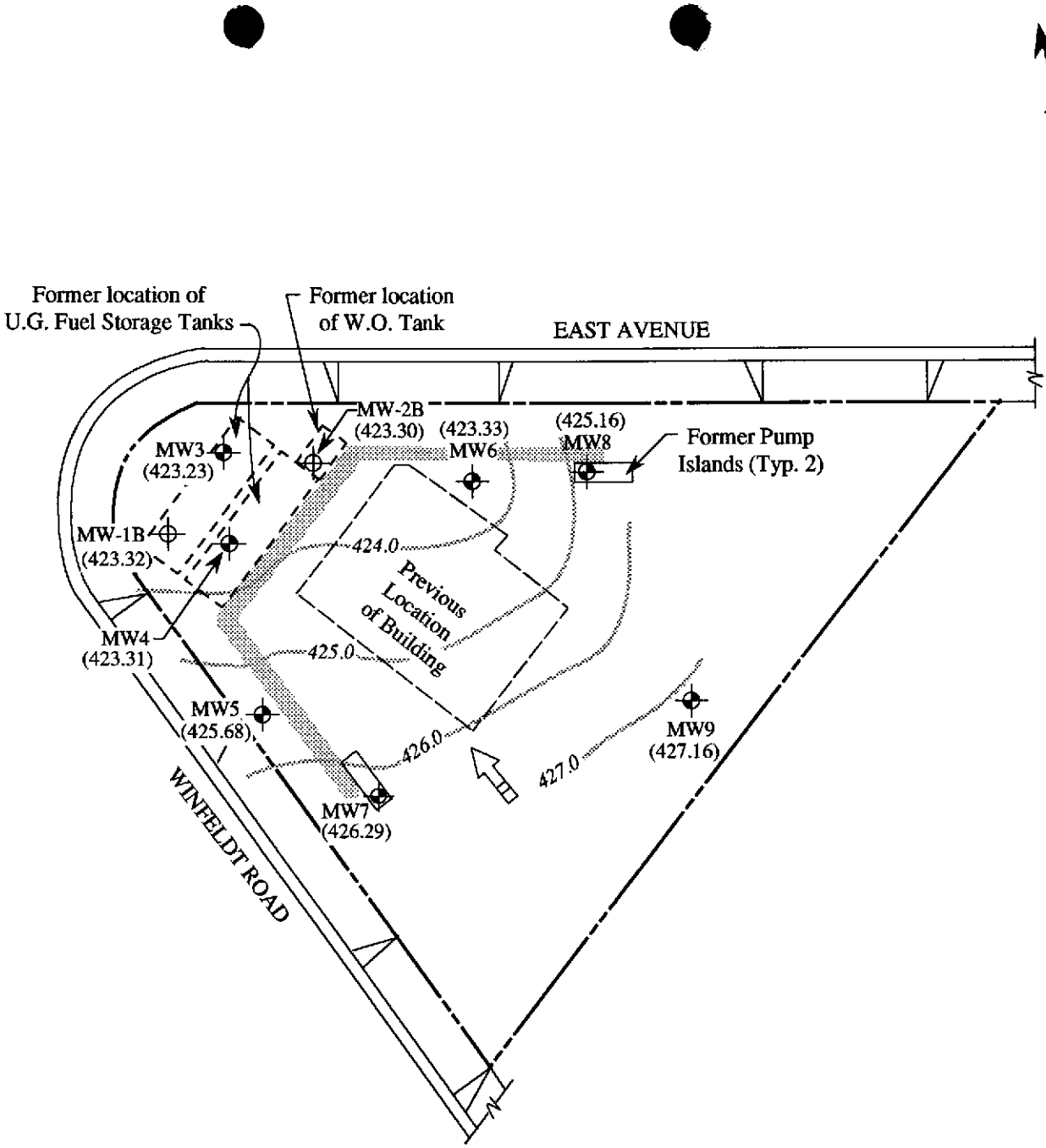
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE JANUARY 14, 1993 MONITORING EVENT

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION # 5847
2701 EAST AVENUE
HAYWARD, CA

FIGURE
1



LEGEND

- Monitoring well (by KEI)
- Monitoring well (by AGS, 1986)
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

0 30 60

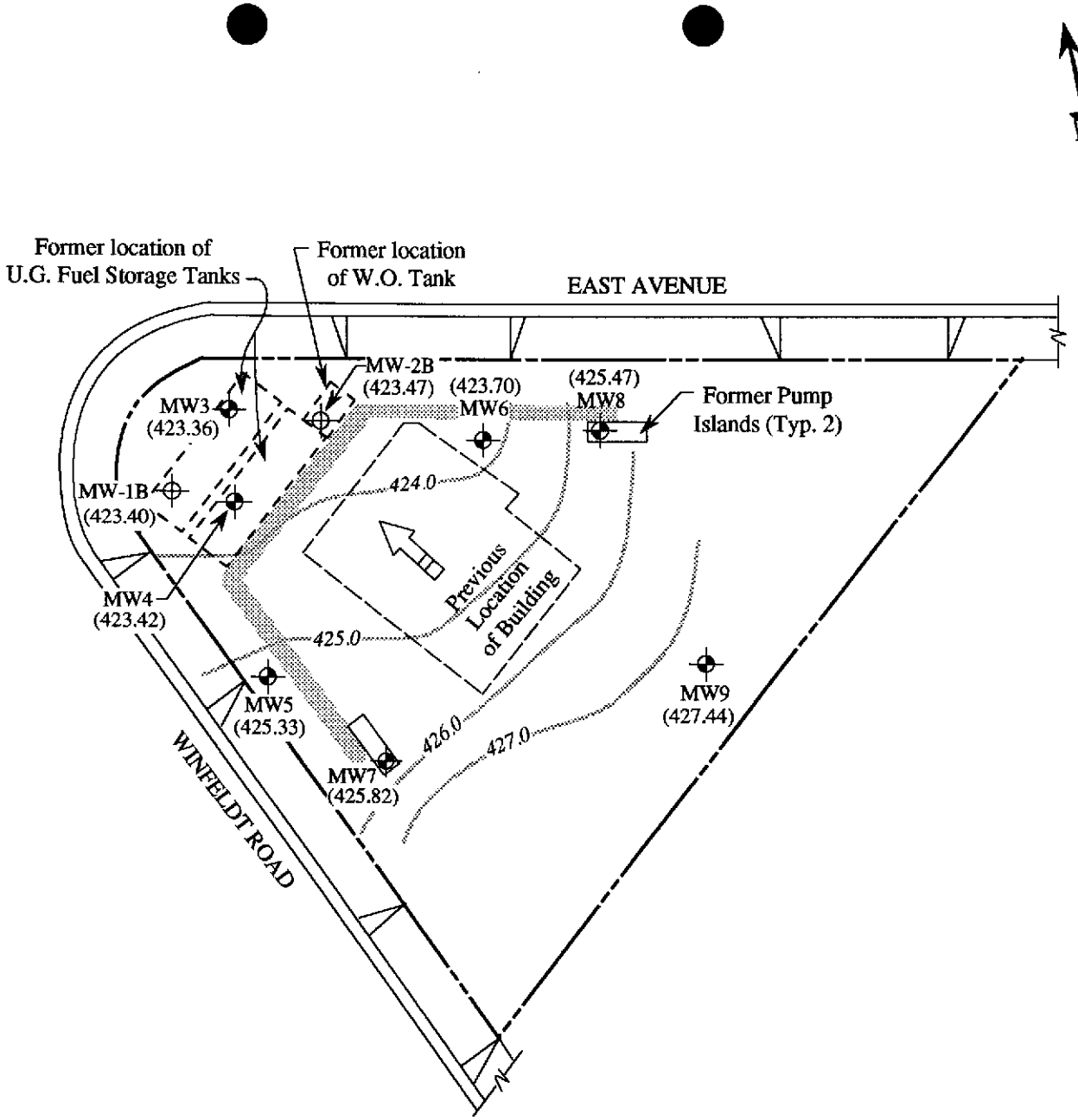
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE DECEMBER 8, 1992 MONITORING EVENT

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION # 5847
2701 EAST AVENUE
HAYWARD, CA

FIGURE
2



LEGEND

- Monitoring well (by KEI)
- Monitoring well (by AGS, 1986)
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

0 30 60

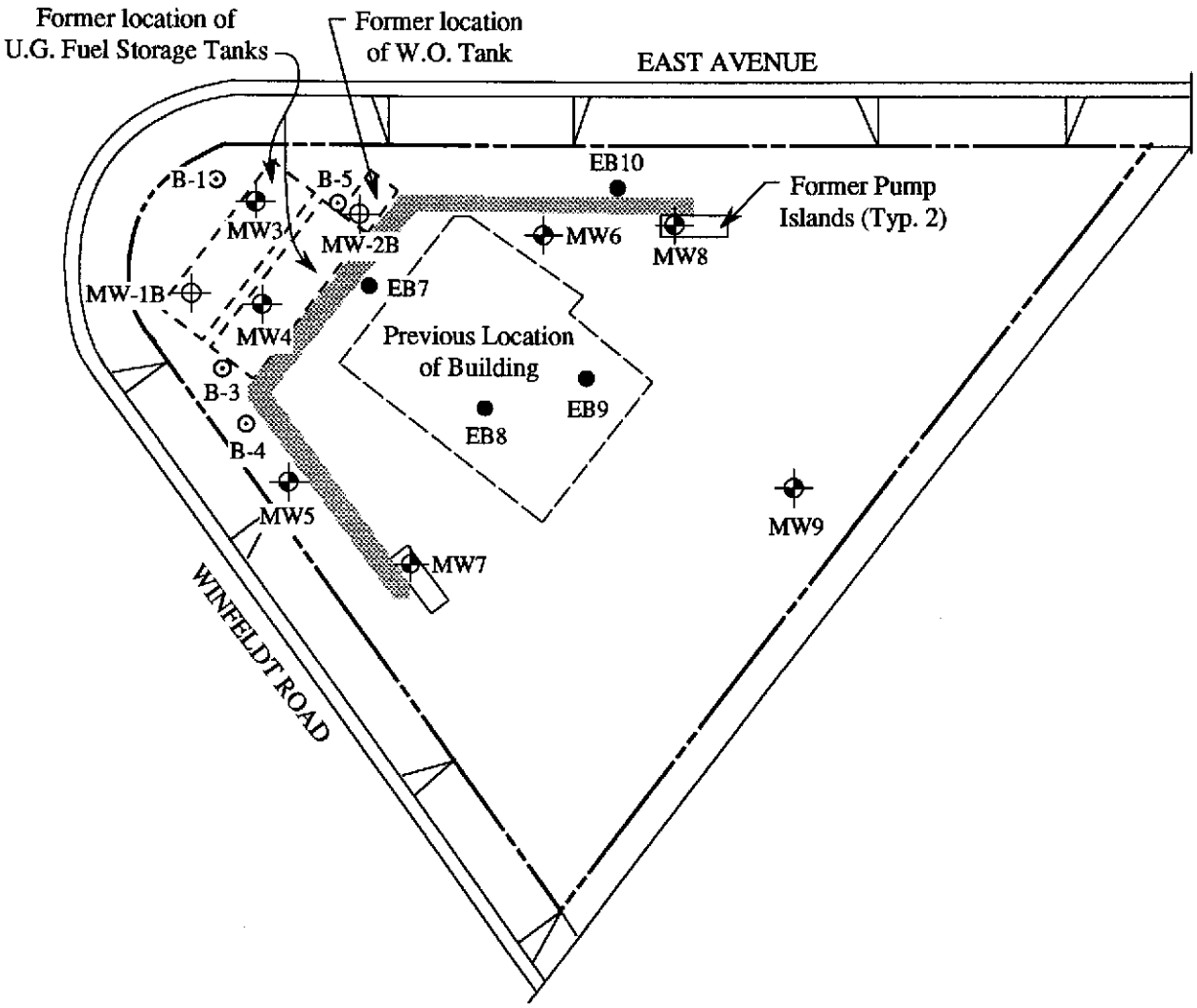
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE NOVEMBER 6, 1992 MONITORING EVENT

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION # 5847
2701 EAST AVENUE
HAYWARD, CA

FIGURE
3



LEGEND

- Monitoring well (by KEI)
- Monitoring well (by AGS, 1986)
- Exploratory boring (by KEI)
- Exploratory boring (by AGS, 1986)

0 30 60

Approx. scale feet

EXPLORATORY BORING AND MONITORING WELL LOCATION MAP

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION # 5847
2701 EAST AVENUE
HAYWARD, CA

FIGURE
4

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Jan 26, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	301-0350		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 301-0350 MW1B	Sample I.D. 301-0351 MW2B	Sample I.D. 301-0352 MW3	Sample I.D. 301-0353 MW4	Sample I.D. 301-0354 MW5	Sample I.D. 301-0355 MW6
Purgeable Hydrocarbons	50	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzene	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Total Xylenes	0.5	N.D.	N.D.	N.D.	N.D.	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:	1/20/93	1/20/93	1/20/93	1/20/93	1/20/93	1/20/93
Instrument Identification:	HP-4	HP-4	HP-4	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	103	105	104	105	105	106

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
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Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Jan 26, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	301-0356		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 301-0356 MW7	Sample I.D. 301-0357 MW8	Sample I.D. 301-0358 MW9	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	N.D.	N.D.	N.D.	
Benzene	0.5	N.D.	N.D.	N.D.	
Toluene	0.5	N.D.	N.D.	N.D.	
Ethyl Benzene	0.5	N.D.	N.D.	N.D.	
Total Xylenes	0.5	N.D.	N.D.	N.D.	
Chromatogram Pattern:		--	--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0
Date Analyzed:	1/20/93	1/20/93	1/20/93	1/20/93
Instrument Identification:	HP-4	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	106	103	104	103

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
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Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	EPA 3510/3520/8015	Reported:	Jan 26, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	301-0351		

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 301-0351 MW2B	Sample I.D. 301-0357 MW8	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	N.D.	N.D.	
Chromatogram Pattern:		--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Extracted:	1/21/93	1/21/93
Date Analyzed:	1/25/93	1/25/93
Instrument Identification:	HP-3A	HP-3A

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

SEQUOIA ANALYTICAL

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Matrix Descript:	Water	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	Jan 21, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	301-0351	Analyzed:	Jan 22, 1993
			Reported:	Jan 26, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
301-0351	MW2B	N.D.
301-0357	MW8	N.D.

Detection Limits:	**5.0**

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

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Sample Descript:	Water MW2B	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8010	Analyzed:	Jan 21, 1993
Attention: Mardo Kaprealian, P.E.	Lab Number:	301-0351	Reported:	Jan 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	0.50	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	0.50	N.D.
trans-1,3-Dichloropropene	0.50	N.D.
Methylene chloride	5.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	N.D.
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	0.50	N.D.
Vinyl chloride	1.0	N.D.

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

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Project Manager

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Kaprealian Engineering, Inc.	Client Project ID:	Unocal / Hayward, 2701 East Ave.	Sampled:	Jan 14, 1993
2401 Stanwell Drive, Suite 400	Sample Descript:	Water MW8	Received:	Jan 14, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8010	Analyzed:	Jan 21, 1993
Attention: Mardo Kaprealian, P.E.	Lab Number:	301-0357	Reported:	Jan 26, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	0.50	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	0.50	N.D.
trans-1,3-Dichloropropene	0.50	N.D.
Methylene chloride	5.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	N.D.
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	0.50	N.D.
Vinyl chloride	1.0	N.D.

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

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL
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(510) 686-9600 • FAX (510) 686-9689

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

Client Project ID: Unocal / Hayward, 2701 East Ave.
QC Sample Group: 3010350-358
Reported: Jan 28, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel	Oil and Grease
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015	SM 5520
Analyst:	A.T.	A.T.	A.T.	A.T.	K.Wimer	D. Newcomb
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Date Analyzed:	Jan 20, 1993	Jan 20, 1993	Jan 20, 1993	Jan 20, 1993	Jan 25, 1993	Jan 23, 1993
QC Sample #:	301-0295	301-0295	301-0295	301-0295	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60	300	100
Conc. Matrix Spike:	20	20	20	71	212	85
Matrix Spike % Recovery:	100	100	100	118	71	85
Conc. Matrix Spike Dup.:	21	21	21	72	176	86
Matrix Spike Duplicate % Recovery:	105	105	105	120	59	86
Relative % Difference:	4.9	4.9	4.9	1.4	18	1.0

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

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

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

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

Client Project ID: Unocal / Hayward, 2701 East Ave.
QC Sample Group: 3010350-358
Reported: Jan 26, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloroethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	K.Nill	K.Nill	K.Nill
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Jan 21, 1993	Jan 21, 1993	Jan 21, 1993
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10
Conc. Matrix Spike:	8.4	10	10
Matrix Spike % Recovery:	84	100	100
Conc. Matrix Spike Dup.:	9.1	11	10
Matrix Spike Duplicate % Recovery:	91	110	100
Relative % Difference:	8.0	9.5	0.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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

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QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015	EPA 8015
Analyst:	K.Wimer	K.Wimer	K.Wimer
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Jan 25, 1993	Jan 25, 1993	Jan 25, 1993
Sample #:	301-0351	301-0357	Blank
Surrogate % Recovery:	80	81	66

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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Reported: Jan 26, 1993

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	K.Nill	K.Nill	K.Nill
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Jan 21, 1993	Jan 21, 1993	Jan 21, 1993
Sample #:	301-0351	301-0357	Blank
Surrogate #1 % Recovery:	94	90	86
Surrogate #2 % Recovery:	114	113	115

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Vartkes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Hayward, 2701 East Ave.

ANALYSES REQUESTED: TPHG & BTXE; TPHD; TOG (5520 B&F); 8010

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG & BTXE	TPHD	TOG (5520 B&F)	8010	REMARKS
MW 1B	1/14/93	10:45 am.		X	X		2	Monitoring Well	X				3010350AB
MW 2B	"			X	X		6	" "	X	X	X	X	351AF
MW 3	"			X	X		2	" "	X				352AB
MW 4	"			X	X		2	" "	X				353AB
MW 5	"			X	X		2	" "	X				354AB
MW 6	"			X	X		2	" "	X				355AB
MW 7	"			X	X		2	" "	X				356AB
MW 8	"			X	X		6	" "	X	X	X	X	357AF
MW 9	"	3:35 pm.		X	X		2	" "	X				358AB

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Vartkes	1/14/93 4:55	
Jim Colt	1/15/93 1510	
	1-15-93 1640	
	Date/Time	Received by: (Signature)

The following MUST BE completed by the laboratory accepting samples for analysis:

1. Have all samples received for analysis been stored in ice? YES
2. Will samples remain refrigerated until analyzed? YES
3. Did any samples received for analysis have head space? NO
4. Were samples in appropriate containers and properly packaged? YES

Signature: [signature] Title: Analyst Date: 1-14-93

APPENDIX A
SOIL SAMPLING METHODOLOGY

KEI-J91-1101.R2
February 25, 1993

SOIL SAMPLING METHODS:

I. For Exploratory Borings

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 the soil-bedrock/water table interface, beginning at a depth of approximately 4.5 feet below grade in each of the borings. Sampling continued until the first water table was encountered. Classification of soil was done using the Unified Soil Classification System (USCS) by KEI's field engineer or geologist. Undisturbed soil samples were collected in a California-modified split-spoon sampler (lined with two-inch diameter brass liners). The sampler was advanced ahead of the drilling augers at designated depths by dropping a 140 pound hammer 30 inches. Blow counts were recorded. The samples were removed from the sampler, retained in the brass liners, and sealed with aluminum foil, plastic caps and tape. They were then labeled and stored in a cooler, on ice, for delivery to a state-certified laboratory. Properly executed Chain of Custody documentation accompanied all samples.

California-modified split-spoon samplers and brass tubes were decontaminated prior to each use with a trisodium phosphate solution wash followed by a water rinse. Hollow-stem augers were steam cleaned prior to each use. Water from the steam cleaning was contained and placed in DOT-approved 55-gallon drums, pending appropriate disposal.

II. For Well Installations

Soil samples were collected for laboratory analysis and for lithologic logging purposes in each of the borings 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 4.5 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 sealed with aluminum foil, plastic caps and tape, labeled, and stored in a cooler, on ice, until delivery to a state-certified laboratory.

APPENDIX B
MONITORING WELL DESIGN, INSTALLATION, DEVELOPMENT

KEI-J91-1101.R2
February 25, 1993

WELL INSTALLATION AND DEVELOPMENT

Monitoring wells were drilled by using truck mounted eight-inch outside diameter hollow-stem auger drilling equipment. Permits were obtained from the Alameda County Department of Environmental Management prior to beginning work. The wells were 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 the depths at which soil samples were collected were shown on the Boring Logs attached to the well installation report.

The wells were drilled 10 to 15 feet into the saturated zone of the first encountered ground water, unless a 5 foot thick clay aquitard was encountered first, at which time drilling was terminated. 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 wells were developed by the use of a surface pump approximately one week after well completion. The wells were pumped until expelled water was clear and free of turbidity. Effluent generated during well development was contained in DOT-approved drums and hauled from the site by a licensed hazardous materials hauler.

The elevations of the well covers were surveyed by a licensed land surveyor to Mean Sea Level and to a vertical accuracy of 0.01 feet.

Prior to development, the wells were checked for 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).

WELL DESIGN

Casing Type: Schedule 40 PVC, flush threaded joints, 0.02 inch factory slot, two-inch diameter. Screen ran from total depth of the well to approximately 5 feet above the depth of the first encountered ground water. Monterey sand (#3) fills the annular space from total depth to 2 feet above the perforated casing interval. A 2-foot thick bentonite seal was placed in the annular space on top of the sand pack. Neat cement grout was placed on top of the bentonite seal to the surface. A typical well completion diagram is attached to this Appendix.

Drilled cuttings were stored on-site in DOT-approved, 55-gallon drums, or under visqueen, until appropriate disposal could be determined.

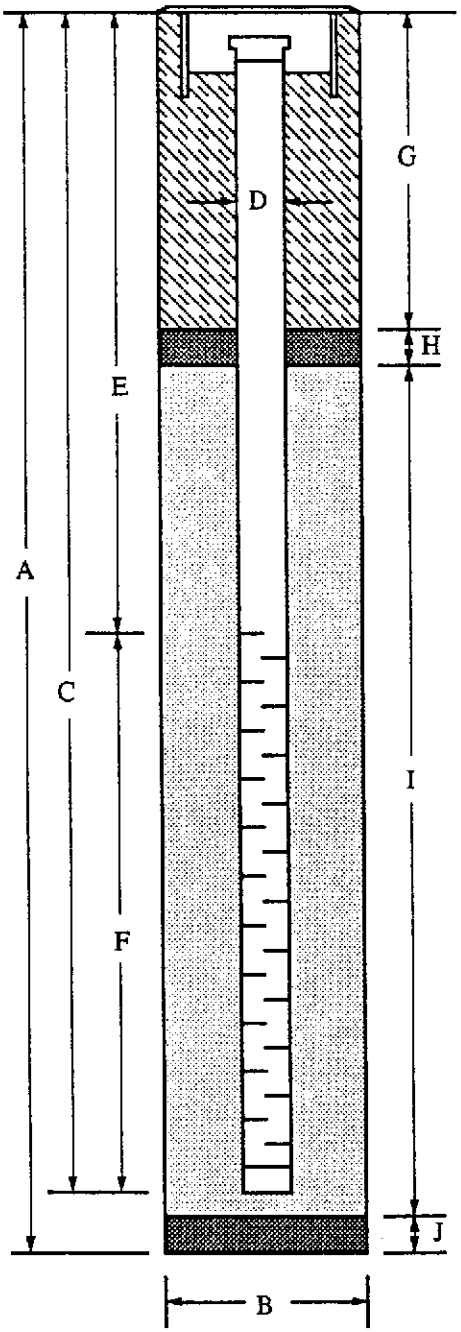
WELL COMPLETION DIAGRAM

PROJECT NAME: _____ BORING/WELL NO. _____

PROJECT NUMBER: _____

WELL PERMIT NO.: _____

Flush-mounted Well Cover



A. Total Depth : _____

B. Boring Diameter*: 9"

Drilling Method: Hollow Stem Auger

C. Casing Length: _____

Material: Schedule 40 PVC

D. Casing Diameter: OD = 2.375"

ID = 2.067"

E. Depth to Perforations: _____

F. Perforated Length: _____

Perforation Type: Machined Slot

Perforation Size: 0.020"

G. Surface Seal: _____

Seal Material: Neat Cement

H. Seal: _____

Seal Material: Bentonite

I. Filter Pack: _____

Pack Material: RMC Lonestar Sand

Size: #3

J. Bottom Seal: none

Seal Material: N/A

* Boring diameter can vary from 8-1/4" to 9" depending on bit wear.

APPENDIX C
GROUND WATER SAMPLING METHODOLOGY

KEI-J91-1101.R2
February 25, 1993

GROUND WATER MONITORING CONDUCTED PRIOR TO SAMPLING

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 and/or paste tape) prior to sampling. After depth to water and free product measurements were performed, a test for the presence of sheen was conducted. A transparent bailer was lowered into the well in such a manner that only part of the bailer was submerged. Water was withdrawn from the well and then transferred into a clean glass container, and the surface of the water in the container was then observed for the presence of "sheen" as determined by the presence of iridescence (rainbow effect) on the top of the water. A copy of the well monitoring/sampling form used in the field is attached.

Well Purging

In order to obtain a representative sample of the water in the aquifer being sampled, stagnant water in the well casing must be removed to permit well recharge with non-stagnant aquifer water. The removal of stagnant water is accomplished by the removal of the water to the surface where it is either disposed of or stored for future disposal.

The purging rate used at a particular monitoring well depends on the expected or known hydraulic yield of the well.

In moderate to high yield formation wells the purging device is placed near the top of the screened interval of the well, to ensure that non-stagnant formation water will move upward in the screened interval. When purging low yield formation wells, water is removed from the bottom of the screened interval.

When purging low-yield wells (wells which yield less than 3 casing volumes), the wells are purged to dryness once. As soon as the well has recovered to a volume sufficient for sampling, samples are collected. At no time are wells purged to dryness if the rate of recharge is such that formation water will cascade down the sides of the casing.

GROUND WATER SAMPLING METHODOLOGY

The wells were purged (by the use of a surface pump or bailer) of a minimum of four casing volumes prior to sampling, at least 72 hours after development. A well monitoring/sampling field log is attached to this appendix. Samples were collected by the use of a clean Teflon bailer and were promptly decanted into 40 ml VOA vials and/or one-liter amber bottles (as appropriate). Vials and/or bottles were sealed with Teflon-lined screw caps, labeled, and

stored in a cooler, on ice, for delivery to a state-certified laboratory. Properly executed Chain of Custody documentation accompanied all samples. A typical Chain of Custody documentation form is attached to this Appendix. The sampling bailer was cleaned with a non-phosphate soap and a clean water rinse prior to each use.

Standardization of field equipment is done at the beginning of each use, according to manufactures' specifications and consistent with methods described in EPA SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods.

All samples are collected in an order such that those parameters most sensitive to volatilization will be sampled first. A general order of collection for some common ground water parameters follows:

- Volatile Organics Compounds (VOC's)
- Total Organic Halogens (TOX)
- Total Organic Carbon (TOC)
- Total Metals
- Dissolved Metals
- Phenols
- Sulfate and Chloride
- Turbidity
- Nitrate and Ammonia

All samples are collected in such a manner as to minimize the volatilization or oxidation of a sample due to agitation during transference from pump or bailer to sample container. When a bladder pump is used for the collection of volatile compounds, the flow rate are adjusted to provide a constant flow stream of approximately 100 milliliters/minute. After samples for volatile compounds have been collected, higher flow rates may be used, particularly if large volumes are necessary. The sampling flow rates never exceeds the flow rate during the purging process.

The sample preservation, holding time, analytical method, sample container, and detection limits for the various soil and ground water analyses conducted are shown on the attached Table 1.

APPENDIX C
TABLE 1

SAMPLE ANALYSIS METHODS, DETECTION LIMITS, CONTAINERS, HOLDING TIMES, AND PRESERVATION

PARAMETER	ANALYTICAL METHOD	DETECTION LIMITS	SAMPLE CONTAINER	HOLDING TIME	PRESERVATION
Total Petroleum Hydrocarbons (TPH) as gasoline	EPA method 5030/ modified 8015 (soil and water)	1.0 ppm (soil)	2-inch diameter brass liners	14 days	4°C
		30 ppb (water)	40 ml glass vial, Teflon-lined screw cap	14 days	4°C + HCL
TPH as diesel	EPA method 3550/ modified 8015 (soil)	1.0 ppm	2-inch diameter brass liners	7 days BE 40 days AE	4°C
	EPA method 3510/ modified 8015 (water)	50 ppb	1 liter amber bottle, Teflon-lined screw cap	14 days BE 40 days AE	4°C
Benzene, Toluene, Xylenes, and Ethyl-benzene (BTX&E)	EPA method 8020 (soil and water)	0.005 ppm (soil)	2-inch diameter brass liners	14 days	4°C
		0.30 ppb (water)	40 ml glass vial, Teflon-lined screw cap	14 days	4°C + HCL
Total Oil and Grease (TOG)	Standard Methods 5520 E&F (soil)	30 ppm	2-inch diameter brass liners	28 days	4°C
	Standard Methods 5520 B&F (water)	5 ppm	1 liter amber bottle, Teflon-lined screw cap	28 days	4°C

APPENDIX C
TABLE 1 (Continued)

SAMPLE ANALYSIS METHODS, DETECTION LIMITS, CONTAINERS, HOLDING TIMES, AND PRESERVATION

PARAMETER	ANALYTICAL METHOD	DETECTION LIMITS	SAMPLE CONTAINER	HOLDING TIME	PRESERVATION
Halogenated Volatile Organics (chlorinated solvents)	EPA method 8010 (soil and water)	5-10 ppb (soil)	2-inch diameter brass liners	14 days	4°C
		0.5 ppb (water)	40 ml glass vial, Teflon-lined screw cap	14 days	4°C
Semi-Volatile Organics by GC/MS	EPA method 8270 (soil)	100-500 ppb (soil)	2-inch diameter brass liners	14 days BE 40 days AE	4°C
Metals (cadmium, chromium, lead, nickel, and zinc)	ICP by EPA method 6010 (soil)	0.05-0.5 ppm (soil)	2-inch diameter brass liners	6 months	N/A

BE = Before extraction
AE = After extraction

KAPREALIAN ENGINEERING
INCORPORATED

WELL MONITORING/SAMPLING

NAME: _____ DATE: _____

FACILITY NAME AND ADDRESS: _____

_____

FIELD ACTIVITIES

DEVELOPING MONITORING PURGING (PUMP/BAIL) SAMPLING

WELL NO.	DEPTH TO WATER			WELL DEPTH	PRODUCT THICKNESS	SHEEN		VOLUME PURGED	
	BEFORE PURGING		AFTER PURGING			YES	NO	WATER	PRODUCT
	TIME	READING							

REMARKS:

WMS1

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KAPREALIAN ENGINEERING
INCORPORATED

CHAIN OF CUSTODY

SAMPLER	SITE NAME & ADDRESS	ANALYSES REQUESTED	TURN AROUND TIME:
WITNESSING AGENCY			REMARKS

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION							

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)

The following MUST BE completed by the laboratory accepting samples for analysis:

1. Have all samples received for analysis been stored in ice?
2. Will samples remain refrigerated until analyzed?
3. Did any samples received for analysis have head space?
4. Were samples in appropriate containers and properly packaged?

Signature _____ Title _____ Date _____

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