



KAPREALIAN ENGINEERING  
INCORPORATED

R0408

KEI-P88-1203.R14  
June 10, 1993

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

Attention: Mr. Tim Howard

RE: Continuing Ground Water Investigation  
and Quarterly Report  
Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California

Dear Mr. Howard:

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-P88-1203.P4) dated April 22, 1991. The purpose of the investigation was to further define the degree and extent of soil and ground water contamination at the site. This report also presents the results of the most recent quarter of monitoring and sampling of the monitoring wells at the referenced site. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from March through May of 1993. 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, purging, and sampling

Laboratory analyses

Data analysis, interpretation, and report preparation

SITE DESCRIPTION AND BACKGROUND

The subject site contains a Unocal service station facility. The vicinity of the site is characterized by gently sloping, southwest trending topography. The site is located approximately 3,400 feet northeast of the present shoreline of San Leandro Bay and approximately 500 feet northwest of Lion Creek.

Available historical data indicate that the subject site has been used as a service station from sometime prior to 1967. During 1967, the station (as it probably existed for approximately 20 years) was demolished, and a more modern facility was constructed in its place. At this time, a strip of land (approximately 11 feet wide) along the northeasterly property line was dedicated to the Bay Area Rapid Transit District (BART), and a strip of land (approximately 40 feet wide) located along the southwesterly property line was added to the site. The station layout has not significantly changed since 1967, other than building modifications. The service station facilities, including the building, pump islands, and underground fuel storage tank locations, are indicated on the attached Figure 8, for both the station as it existed prior to 1967, and the station as it presently exists.

KEI's initial work at the site began on December 8, 1988, during modifications to the pump island located along San Leandro Street. Three soil samples were collected from undisturbed soil at depths ranging from 2 to 3 feet below grade. The samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California, for total petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, xylenes, and ethylbenzene (BTX&E). Analytical results of the soil samples collected from beneath the pump island indicated non-detectable levels of all constituents for all three samples. Documentation of the sample collection techniques and the analytical results are presented in KEI's report (KEI-J88-1203.R1) dated December 16, 1988.

KEI returned to the site on November 29, 1989, when two 10,000 gallon underground gasoline storage tanks and one 280 gallon waste oil tank were removed from the site. The gasoline tanks and the waste oil tank were all made of steel, and no apparent cracks or holes were observed in any of the tanks.

Water was initially encountered in the fuel tank pit at a depth of approximately 10.5 feet below grade, thus prohibiting the collection of any soil samples from immediately beneath the tanks. Six soil samples, labeled SW1 through SW6, were collected from the sidewalls of the fuel tank pit (each approximately 18 to 30-inches above the water table). One soil sample, labeled WO1, was collected from beneath the waste oil tank at a depth of 8.5 feet below grade. The soil beneath the waste oil tank was then excavated until ground water was encountered. Two sidewall soil samples, labeled SWA and SWB, were collected from the waste oil tank pit sidewalls (each approximately 12-inches above the water table). The sample point locations are as shown on the attached Figure 7.

All soil samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California. All of the fuel tank pit sidewall samples were analyzed for TPH as gasoline and BTX&E. Analytical results of the samples collected from the fuel tank pit showed TPH as gasoline levels ranging from non-detectable to 32 ppm, with benzene levels ranging from non-detectable to 1.2 ppm. The waste oil tank pit bottom and sidewall samples were analyzed for TPH as gasoline, BTX&E, TPH as diesel, total oil and grease (TOG), EPA method 8010 constituents, and the metals cadmium, chromium, lead, and zinc. Analytical results of the waste oil tank pit soil samples indicated less than 50 ppm of TOG, non-detectable levels of BTX&E, TPH as diesel, and EPA method 8010 constituents, and less than 5.0 ppm of TPH as gasoline for all three samples. Metal concentrations are summarized in Table 5.

On November 29, December 5, and December 29, 1989, KEI collected 11 pipe trench samples, labeled D1 through D6 and P1 through P5, at depths ranging from 3.5 to 6 feet below grade. Upon review of the analytical results for sample P2, KEI returned to the site on January 9, 1990, to collect additional soil samples. Following the trench excavation to a depth of 12 feet below grade, one sample [labeled P2(12)], was collected at a depth of 12 feet below grade, and two samples (labeled SWP2E and SWP2W) were collected at depths of 11 feet below grade from the easterly and westerly sidewalls of the trench adjacent to sample point location P2(12). KEI completed the pipe trench sampling on January 10, 1990, when two samples, (labeled P6 and P7), were collected at depths of 3 and 4 feet below grade, respectively. The pipe trench sample point locations are as shown on the attached Figure 6.

Analytical results of soil samples collected from the pipe trench indicated TPH as gasoline levels ranging from non-detectable to 15 ppm, with non-detectable to 0.13 ppm levels of benzene for all samples, except sample P2, which showed TPH as gasoline at 3,800 ppm and benzene at 6.1 ppm. Following the additional excavation in the area of sample point P2, analytical results of samples P2(12), SWP2E, and SWP2W indicated non-detectable levels of TPH as gasoline and benzene for samples P2(12) and SWP2W, while sample SWP2E showed TPH as gasoline at 20 ppm, with non-detectable levels of benzene. The analytical results of the soil samples are summarized in Table 5.

After the fuel tank pit soil sampling was completed, approximately 5,000 gallons of ground water were pumped from the fuel tank pit. On December 5, 1989, one water sample (labeled W1) was collected from the fuel tank pit. The water sample was analyzed for TPH as gasoline, BTX&E, and EPA method 8010 constituents. Analytical results of the water sample collected from the fuel tank pit

indicated 7,900 ppb of TPH as gasoline, 850 ppb of benzene, and non-detectable levels of EPA method 8010 constituents. Analytical results of the water sample are summarized in Table 6. Documentation of the tank and piping removal procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-J88-1203.R2) dated January 15, 1990.

Based on the analytical results, and in accordance with the guidelines established by the Regional Water Quality Control Board (RWQCB), KEI recommended the installation of three monitoring wells at the site to begin to define the extent of the soil and ground water contamination, and to determine the ground water flow direction.

On April 26 and 27, 1990, three two-inch diameter monitoring wells (designated as MW1, MW2, and MW3 on the attached Figure 10) were installed at the site. During drilling, an attempt was made to install MW2 near the pump island; however, drill bit refusal was encountered, and MW2 was installed at the modified location (as indicated on the attached Figure 10). The earlier attempts to install well MW2 resulted in the drilling of two shallow exploratory borings, designated as EB1 and EB2 and as shown on the attached Figure 10. The exploratory borings were backfilled to the surface with neat cement.

The three monitoring wells were each drilled and completed to total depths ranging from 22 to 23 feet below grade. The exploratory borings were each drilled and/or sampled to depths of 8.5 and 10.5 feet below grade. Ground water was encountered at depths ranging from 9.5 to 14.5 feet beneath the surface during drilling. The wells were developed on May 3 and 4, 1990, and were initially sampled on May 11, 1990.

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Redwood City, California, for TPH as gasoline and BTX&E. In addition, sample EB2(9), collected from boring EB2, was analyzed for TPH as diesel and TOG.

Analytical results of the soil samples collected from the borings for monitoring wells MW1 and MW3 indicated non-detectable levels of TPH as gasoline in all soil samples. Analytical results of the soil samples collected from the boring for monitoring well MW2 indicated levels of TPH as gasoline ranging from 2.2 ppm to 6.8 ppm. However, analytical results of the soil samples collected from boring EB2 indicated levels of TPH as gasoline ranging from 2,400 ppm to 12,000 ppm. In sample EB2(9), TPH as diesel was detected at 1,400 ppm, and TOG was detected at 7,000 ppm. Benzene was detected in all soil samples collected from MW1, MW2, and MW3,

[except for samples MW2(10) and MW2(12)], at levels ranging from 0.0075 ppm to 0.012 ppm. Benzene was also detected in samples EB2(7) and EB2(9) at concentrations of 5.0 ppm and 84 ppm, respectively.

Analytical results of the ground water samples collected from monitoring wells MW1 and MW2 indicated levels of TPH as gasoline at 22,000 ppb and 65,000 ppb, respectively. Benzene was detected in samples MW1 and MW2 at levels of 590 ppb and 3,300 ppb, respectively. Analytical results of the ground water sample collected from monitoring well MW3 showed non-detectable levels of all constituents analyzed. The results of the soil analyses are summarized in Table 4, and the results of the water analyses are summarized in Table 2.

Based on the analytical results, KEI recommended the implementation of a monthly monitoring and quarterly sampling program. In addition, KEI recommended the installation of three additional monitoring wells to further define the extent of ground water contamination. Also, KEI recommended that additional soil excavation be conducted in the vicinity of borings EB1 and EB2 because of the level of the soil contamination detected in these borings. Documentation of the well installation procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P88-1203.R7) dated May 31, 1990.

On August 14, 1990, three additional two-inch diameter monitoring wells (designated as MW4, MW5, and MW6 on the attached Figure 1) were installed at the site. The three wells were each drilled and completed to total depths of 26 feet below grade, except for well MW4, which was completed at a depth of 25 feet below grade. Ground water was encountered at depths ranging from 13.5 to 16.5 feet beneath the surface during drilling. The new wells were developed on August 21, 1990, and all of the wells were sampled on August 28, 1990.

Water samples from all of the wells, and selected soil samples from the borings for MW4, MW5, and MW6, were analyzed at Sequoia Analytical Laboratory in Concord, California, for TPH as gasoline and BTX&E. In addition, soil samples collected from the boring for monitoring well MW6, and water samples collected from monitoring wells MW2 and MW6, were also analyzed for TPH as diesel and TOG.

The analytical results of the soil samples collected from the borings for wells MW4, MW5, and MW6 showed non-detectable levels of TPH as gasoline and benzene in all samples analyzed, except for MW6(10), MW6(12.5), and MW6(15.5), which showed levels of TPH as gasoline at 18 ppm, 160 ppm, and 2.5 ppm, respectively, and levels

of benzene at 0.24 ppm, 3.4 ppm, and 0.43 ppm, respectively. In addition, TPH as diesel was detected only in samples MW6(10) and MW6(12.5), at levels of 5.1 ppm and 93 ppm, respectively. Also, TOG was detected in sample MW6(12.5) at a level of 200 ppm.

The analytical results of the water samples collected from monitoring wells MW3 and MW5 indicated non-detectable levels of TPH as gasoline and benzene. Levels of TPH as gasoline and benzene were detected in wells MW1, MW2, MW4, and MW6 at concentrations ranging from 1,700 ppb to 62,000 ppb for TPH as gasoline, with benzene concentrations ranging from 140 ppb to 2,600 ppb. Also, TPH as diesel was detected in wells MW2 and MW6 at levels of 3,100 ppb and 1,000 ppb, respectively. The results of the soil analyses are summarized in Table 4, and the results of the water analyses are summarized in Table 2.

Based on these results, KEI recommended that a Hydropunch study be performed at and in the vicinity of the site to aid in determining the extent of ground water contamination. Documentation of the well installation protocol, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P88-1203.R8) dated September 24, 1990.

On January 19 and 20, 1991, CHIPS Environmental Consultants, Inc. (CEC) of Sunnyvale, California, conducted a ground water sampling study under the direction of KEI. Sampling methods and the analytical results are presented in the CEC report dated February 1991 and are summarized below.

Ground water samples were collected from seven locations (designated as P1 through P7 on the attached Figure 9). The ground water samples were collected from depths of about 14 to 17 feet below grade. After sample collection, the holes were grouted with a bentonite-cement mixture.

Ground water samples collected from the probe holes were analyzed at CEC's laboratory in Sunnyvale, California. The samples were analyzed for TPH as diesel, TPH as gasoline, and BTX&E.

The analytical results of the water samples collected from the sample probes P2 through P7 showed non-detectable levels of TPH as gasoline, BTX&E, and TPH as diesel, except for sample P2, which showed 0.6 ppb of xylenes. The analytical results of the water sample collected from probe P1 indicated a level of TPH as gasoline at 92 ppb, a level of benzene at 0.8 ppb, and a non-detectable level of TPH as diesel. Analytical results of the ground water samples are summarized in Table 7.

Documentation of the sampling methods and the analytical results are presented in KEI's report (KEI-P88-1203.R9) dated April 22, 1991. Based on the analytical results of the ground water sampling study and the ground water samples collected from monitoring wells MW1 through MW6 on February 21, 1991, KEI recommended the installation of three off-site monitoring wells (MW8, MW9, and MW10) and one on-site monitoring well (MW7).

As previously recommended, a representative of KEI was present at the site on March 12, 1991, to observe the excavation of contaminated soil in the immediate vicinity of the previously drilled exploratory borings EB1 and EB2 (see Figures 5 and 10). The excavation revealed two large concrete slabs (each approximately 13 feet long by 5.5 feet wide and 1 foot thick, which were located at depths of about 8.5 feet and 10 feet below grade). Inspection of the slab surfaces showed evidence of the previous boring attempts in this area (EB1 and EB2).

KEI returned to the site on March 19, 1991, to observe the removal of the above-mentioned concrete slabs. The removal had been scheduled to permit the installation of shoring along the northeasterly side of the 66th Avenue pump islands. The shoring was necessary to avoid potential damage to the product piping, since this area had been overexcavated during the fuel tank replacement in November and December of 1989. Concrete removal and subsequent soil excavation to a depth of about 1 foot below ground water (which was encountered at a depth of approximately 11 feet below grade) confirmed the previous removal of underground fuel storage tanks from this area.

Also on March 19, 1991, KEI collected two soil samples, labeled SW1 and SW2, from the sidewalls of the former fuel tank pit excavation (at depths of 6 to 12 inches above ground water). The sample point locations are as shown on the attached Figure 5.

KEI returned to the site on March 21 and 22, 1991, to observe the continuing excavation of contaminated soil from the former fuel tank pit. On March 21, 1991, two soil samples, labeled SW3 and SW4, were collected from the sidewalls of the excavation, each approximately 6 to 12 inches above the ground water level. On March 22, 1991, three soil samples, labeled SW5, SW6, and SW2(12), were collected from the sidewalls of the excavation (each approximately 6 to 12 inches above the level of the ground water). The sample point locations are as shown on the attached Figure 5.

KEI again returned to the site on April 3, 4, and 5, 1991. One soil sample, labeled SW5(7), was collected on April 3, one soil sample, labeled SW7, was collected on April 4, and three soil

samples, labeled SW4(6), SW3(2), and SW10, were collected on April 5, 1991. All samples were collected from the excavation sidewalls (approximately 6 to 12 inches above the level of the ground water). The sample point locations are as indicated on the attached Figure 5.

On April 11, 1991, KEI collected four soil samples, labeled SW2(30), SW6(5), SW8, and SW9, from the sidewalls of the excavation (each approximately 6 to 12 inches above the level of the ground water). The sample point locations are as shown on the attached Figure 5.

On March 27, 1991, approximately 10,000 gallons of ground water were pumped prior to backfilling a portion of the excavation along the northeasterly side of 66th Avenue pump islands. An additional 10,000 gallons of ground water were pumped from the excavation after completion of the soil sampling activities on April 11, 1991.

All samples were analyzed by Sequoia Analytical Laboratory in Concord, California. All soil samples were analyzed for TPH as gasoline and BTX&E. In addition, all soil samples, except samples SW2(30) and SW6(5), were also analyzed for TOG.

Analytical results of the soil samples (SW1 and SW9) collected from the former fuel tank pit excavation indicated non-detectable levels of TPH as gasoline. Analytical results of soil samples SW2, SW2(12), SW3, SW4, SW5, and SW6, indicated levels of TPH as gasoline at 1,000 ppm, 2,400 ppm, 310 ppm, 1,400 ppm, 2,200 ppm, and 260 ppm, respectively. Analytical results of the final soil samples {SW1, SW2(30), SW3(2), SW4(6), SW5(7), SW6(5), SW7, SW8, SW9, and SW10} collected from the boundaries of the excavation (see the attached Figure 5) indicated levels of TPH as gasoline ranging from non-detectable to 53 ppm, except for samples SW2(30), SW8, and SW10, which indicated levels of TPH as gasoline at 340 ppm, 310 ppm, and 1,400 ppm, respectively. However, KEI was unable to further excavate laterally in the vicinity of sample point SW10 due to limited access (the product piping).

Analytical results of sidewall soil samples SW1, SW3, and SW6 through SW9, which were collected after the initial excavation, indicated non-detectable levels of TOG for all samples. Analytical results of sidewall soil samples SW2, SW4, SW5, and SW10, also collected after the initial excavation, indicated levels of TOG at concentrations of 58 ppm, 160 ppm, 85 ppm, and 60 ppm, respectively. However, the analytical results of soil samples collected after additional excavation at sample point locations SW2, SW4, and SW5 indicated non-detectable levels of TOG for all three samples. The results of the soil analyses are summarized in Table 9. The



results of the excavation and soil sampling activities are presented in KEI's report (KEI-J88-1203.R10) dated April 26, 1991.

The review of site historical data indicated that borings EB1 and EB2 had been drilled in the area of the former underground fuel storage tank pit as it existed prior to 1967. The previous work at the site had shown that the site is underlain by artificial fill materials to a depth of about 7.5 feet below grade. This layer of fill, coupled with the drill bit refusal experienced at depths of about 8.5 and 10.5 feet below grade for borings EB1 and EB2, respectively, suggested that this area may have been filled with assorted refuse from the pre-1967 version of the station.

In all, approximately 2,000 cubic yards of contaminated soil have been removed from the area in the vicinity of the pre-1967 tank pit. All soil in the pre-1967 tank pit was excavated laterally until the sidewall soil samples indicated less than 100 ppm of both TPH as gasoline and TOG, except at sample point locations SW2(30), SW8, and SW10, where the excavation was terminated because the existing product piping prevented further excavation. In addition, soil was not excavated from the southwesterly end of the pre-1967 tank pit, due to its location between the existing pump islands located along 66th Avenue.

On September 28 and 29, 1992, three additional two-inch diameter monitoring wells (designated as MW8, MW9, and MW10 on the attached Figure 1) were installed in the vicinity of the site. The three new wells were each drilled and completed to total depths of 23 feet below grade. Ground water was encountered in each well at a depth of 13.5 feet beneath the surface during drilling.

KEI initially recommended the installation of an additional on-site monitoring well (designated as MW7 on the attached Figure 1). KEI attempted to install the proposed well on September 28, 1992, but encountered difficulties with the service station dealer; therefore, the well was not installed at that time. Subsequently, Unocal entered into negotiations with the service station dealer to allow the well to be installed.

Wells MW8, MW9, and MW10 were developed on October 16, 1992, and were initially sampled on November 3, 1992. Water samples from all of the wells, and selected soil samples from the borings for MW8, MW9, and MW10, were analyzed at Sequoia Analytical Laboratory. The samples were analyzed for TPH as gasoline, TPH as diesel, and BTX&E. In addition, water samples collected from wells MW2 and MW6 were analyzed for TOG. The results of the soil analyses are summarized in Table 4, and the results of the water analyses are summarized in Table 2.

Based on the analytical results of the samples collected and evaluated through November of 1992, KEI concluded that the extent of ground water contamination had been predominantly defined at and in the vicinity of the site. The ground water samples collected from the new wells (MW8 and MW9) installed to the east of the site showed non-detectable concentrations of TPH as gasoline, BTX&E, and TPH as diesel. However, petroleum hydrocarbon contamination was detected in the new well (MW10) installed to the southeast of the site. In order to verify the analytical results of the ground water samples collected from the three recently installed wells, KEI recommended the continuation of the ground water monitoring and sampling program. Documentation of the well installation procedures, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P88-1203.R13) dated December 10, 1992.

#### RECENT FIELD ACTIVITIES - WELL INSTALLATION

On April 28, 1993, one additional two-inch diameter monitoring well (designated as MW7 on the attached Figure 1) 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 well are described in the attached Boring Log and Well Construction Diagram, respectively.

The new well was drilled and completed to a total depth of 20 feet below grade. Ground water was encountered at a depth of 5.5 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 4.0 feet below grade and continuing until ground water was encountered. 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 then 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 was installed with a watertight cap and a padlock. A round, watertight, flush-mounted well cover was cemented in place over the well casing. The surface of the well cover was surveyed by Kier & Wright of Pleasanton, California, to Mean Sea Level (MSL) and to a vertical accuracy of 0.01 foot.

The new well was developed on May 11, 1993. Prior to development, the new 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 well. After recording the monitoring data, the new well was purged (by the use of a surface pump) of 165 gallons of water, until the evacuated water was clear and free of visible suspended sediment. Monitoring and well development data are summarized in Table 1.

#### RECENT FIELD ACTIVITIES - MONITORING AND SAMPLING

The nine previously existing monitoring wells (MW1 through MW6, and MW8 through MW10) 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 sheen. No free product or sheen was noted in any of the wells during the quarter. Monitoring data are summarized in Table 1.

Water samples were collected from the previously existing wells (MW1 through MW6, and MW8 through MW10) on May 17, 1993. Prior to sampling, the wells were each purged of between 10 and 13 gallons of water by the use of a surface pump. The water samples were then 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, labeled, and stored in a cooler, on ice, until delivery to a state-certified laboratory.

The new well (MW7) was also sampled on May 17, 1993. Prior to sampling, the well was checked for the depth to the water table and the presence of free product or a sheen. No free product or sheen was noted in the new well. After recording the monitoring data, the well was purged of 9 gallons of water. The water samples were collected, handled, and delivered to a state-certified laboratory as previously described.

### ANALYTICAL RESULTS

Water samples from all of the wells, and selected soil samples from the boring for well MW7, were analyzed at Sequoia Analytical Laboratory. All samples analyzed were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for TPH as gasoline by EPA method 5030/modified 8015, TPH as diesel by EPA methods 3550/modified 8015 (soil) and 3510/modified 8015 (water), and BTX&E by EPA method 8020. The water samples collected from monitoring wells MW1 and MW10 were also analyzed for methyl tert butyl ether (MTBE) by EPA method 8020/modified.

The concentrations of TPH as gasoline, benzene, and TPH as diesel detected in the ground water samples collected on May 17, 1993, are shown on the attached Figure 4. The results of the soil analyses are summarized in Table 4, and the results of the water analyses are summarized in Tables 2 and 3. Copies of the laboratory analyses and the Chain of Custody documentation are attached to this report.

### HYDROLOGY AND GEOLOGY

The measured depth to ground water at the site on May 17, 1993, ranged between 5.47 and 8.46 feet below grade. The water levels in all of the previously existing wells have shown net decreases ranging from 0.39 to 1.61 feet since February 3, 1993. Based on the water level data gathered on May 17, 1993, the ground water flow direction appeared to be predominantly to the northeast, with a east-southeasterly component present in the southern part of the site, as shown on the attached Potentiometric Surface Map, Figure 1. On April 1 and March 1, 1993, the ground water flow direction appeared to be complex, varying from the west-southwest at the eastern part of the site and vicinity, to the southeast at the southern part of the site and vicinity, and between north-northwest and north-northeast at the northern part of the site, as shown on the attached Potentiometric Surface Maps, Figures 2 and 3. On May 17, 1993, the hydraulic gradient at the site varied from approximately 0.007 to 0.01.

In response to a letter (dated August 1, 1990) from the Alameda County Health Care Services (ACHCS) Agency, KEI evaluated the effects of possible tidal action on ground water levels at the subject site. On January 18, 1991, a representative of KEI was at the site for an approximate seven-hour period to monitor any changes in the ground water table elevation that might have been related to tidal effects. All six monitoring wells were monitored 13 times for depth to water. All monitoring data is presented as Table 8. Water levels continuously rose in each well during the

seven-hour monitoring period (from 0.09 foot to 0.11 foot; a 0.02 foot differential only). The constant rise in water levels at the site may be related to tidal action; however, this near uniform rise of water levels in the monitoring wells indicates that the ground water flow direction does not change appreciably in response to any tidal action. Therefore, KEI recommended that no further study be conducted at the site in relation to possible effects of tidal action.

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," 1979), the subject site is underlain by relatively unconsolidated alluvial deposits that are described as fine-grained alluvium (Qhaf) and that typically consist of clay and silt materials. In addition, the site is closely adjacent to a mapped geologic contact with Bay Mud (Qhbm) to the west.

Based on the results of our subsurface studies, the site is underlain by fill materials to a depth of about 1.5 to 8 feet below grade. The fill is in turn underlain by alluvium to the maximum depth explored (26 feet below grade). The alluvium underlying the site consists predominantly of clayey gravel, with interbeds of clay, silty/clayey sand, and clayey silt. This material is coarser-grained than the fine-grained alluvium shown on the above-referenced regional map.

As of May 1993, the unsaturated zone beneath the site is approximately 5.5 to 8.5 feet thick and consists predominantly of clayey or sandy gravel, clay, silty to clayey sand, and clayey silt, in order of decreasing abundance.

The first water bearing unit underlying the site (first aquifer) consists largely of clayey gravel, with subordinate amounts of silty to clayey sand, clayey silt, and clay.

#### DISCUSSION AND RECOMMENDATIONS

Based on the analytical results of the ground water samples collected and evaluated to date, KEI recommends the continuation of the existing ground water monitoring and sampling program, per KEI's proposal (KEI-P88-1203.P4) dated April 22, 1991, and as modified in KEI's report (KEI-P88-1203.QR8) dated February 25, 1993. The wells are currently monitored monthly and sampled quarterly. The results of the monitoring and sampling program will be documented and evaluated after each monitoring and sampling event. Recommendations for altering or terminating the program will be made as warranted.

DISTRIBUTION

A copy of this report should be sent to Ms. Cynthia Chapman of the ACHCS, and to the RWQCB, San Francisco Bay Region.

LIMITATIONS

Soil deposits and rock formations may vary in thickness, lithology, saturation, strength and other properties across any site. In addition, environmental changes, either naturally-occurring or artificially-induced, may cause changes in the extent and concentration of any contaminants. Our studies assume that the field and laboratory data are reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

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



KAPREALIAN ENGINEERING  
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93 AUG -3 PM 4: 04

August 2, 1993

Alameda County Health Care Services  
80 Swan Way, Room 200  
Oakland, CA 94621

Attention: Ms. Cynthia Chapman

RE: Unocal Service Station #3135  
845 - 66th Avenue  
Oakland, California

Dear Ms. Chapman:

Per the request of Mr. Tim Howard of Unocal Corporation, enclosed please find our report dated June 10, 1993, for the above referenced site.

If you should have any questions, please feel free to call our office at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.

A handwritten signature in cursive script, appearing to read 'Judy A. Dewey'.

Judy A. Dewey

jad\82

Enclosure

cc: Tim Howard, Unocal Corporation

KEI-P88-1203.R14  
June 10, 1993  
Page 15

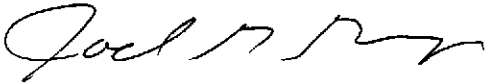
Should you have any questions regarding this report, please do not hesitate to call at (510) 602-5100.

Sincerely,

Kaprealian Engineering, Inc.



Thomas J. Berkins  
Senior Environmental Engineer



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

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Attachments: Tables 1 through 9  
Location Map  
Figures 1 through 10  
Boring Log  
Well Construction Diagram  
Laboratory Analyses  
Chain of Custody documentation



KEI-P88-1203.R14  
 June 10, 1993

TABLE 1

SUMMARY OF MONITORING DATA

<u>Well No.</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Product Thickness (feet)</u>	<u>Sheen</u>	<u>Water Purged (gallons)</u>
(Monitored and Sampled on May 17, 1993)					
MW1	-3.07	8.25	0	No	10
MW2	-3.25	7.08	0	No	12
MW3	-2.17	5.47	0	No	12
MW4	-3.19	8.46	0	No	12
MW5	-3.14	7.75	0	No	13
MW6	-3.19	7.50	0	No	13
MW7	-2.16	7.00	0	No	9
MW8	-3.13	8.25	0	No	11
MW9	-3.11	7.95	0	No	11
MW10	-3.70	7.04	0	No	12
(Monitored and Developed on May 11, 1993)					
MW7	0.32	4.52	0	--	165
(Monitored on April 1, 1993)					
MW1	-1.94	7.12	0	--	0
MW2	-1.93	5.76	0	--	0
MW3	-1.30	4.60	0	--	0
MW4	-1.98	7.25	0	--	0
MW5	-1.90	6.51	0	--	0
MW6	-1.73	6.04	0	--	0
MW8	-1.43	6.55	0	--	0
MW9	-1.33	6.17	0	--	0
MW10	-2.35	5.69	0	--	0
(Monitored on March 1, 1993)					
MW1	-2.12	7.30	0	--	0
MW2	-2.09	5.92	0	--	0
MW3	-1.54	4.84	0	--	0
MW4	-2.36	7.63	0	--	0
MW5	-2.07	6.68	0	--	0
MW6	-1.89	6.20	0	--	0
MW8	-1.52	6.64	0	--	0
MW9	-1.38	6.22	0	--	0
MW10	-2.48	5.82	0	--	0

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TABLE 2

SUMMARY OF LABORATORY ANALYSES  
 WATER

<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethylbenzene</u>	<u>TOG</u>
(Collected on May 17, 1993)							
MW1	490♦♦	960**	39	ND	60	57	--
MW2	5,500♦♦	46,000	4,400	510	9,900	2,900	--
MW3	53	ND	ND	ND	ND	ND	--
MW4	3,100♦	2,500	ND	ND	410	170	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	1,400♦	4,900	890	46	530	210	--
MW7	ND	ND	ND	ND	ND	ND	--
MW8	ND	ND	ND	ND	ND	ND	--
MW9	ND	ND	ND	ND	ND	ND	--
MW10	ND	1,200*	ND	ND	ND	ND	--
(Collected on February 3, 1993)							
MW1	ND	94**	ND	ND	1.6	1.4	--
MW2	3,900♦	9,300	780	68	1,200	830	ND
MW3	ND	ND	ND	ND	ND	ND	--
MW4	720♦♦	370	2.6	ND	53	1.2	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	ND	ND	1.2	ND	ND	ND	ND
MW8	ND	ND	ND	ND	ND	ND	--
MW9	ND	ND	ND	ND	ND	ND	--
MW10	ND	1,200*	ND	ND	ND	ND	--
(Collected on November 3, 1992)							
MW1	400♦	1,100	28	ND	78	80	--
MW2	9,600♦	40,000	5,600	130	6,100	3,000	ND
MW3	52♦	ND	ND	ND	ND	ND	--
MW4	8,300♦	36,000	69	ND	7,400	3,000	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	220♦	920	45	0.76	110	12	ND
MW8	ND	ND	ND	ND	ND	ND	--
MW9	ND	ND	ND	ND	ND	ND	--
MW10	160♦	740	11	2.1	56	32	--

KEI-P88-1203.R14  
 June 10, 1993

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES  
 WATER

<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethylbenzene</u>	<u>TOG</u>
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(Collected on August 3, 1992)

MW1	220♦	980	22	0.69	82	77	--
MW2	3,300♦♦	37,000	4,500	480	9,700	3,300	ND
MW3	58	ND	ND	ND	ND	ND	--
MW4	2,400♦	24,000	61	ND	5,400	2,100	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	170♦	1,100	180	1.1	78	62	ND

(Collected on May 5, 1992)

MW1	120	310	5.7	ND	15	7.1	--
MW2	4,600	26,000	2,300	110	6,900	2,700	ND
MW3	56	ND	ND	ND	1.8	0.43	--
MW4	3,200	15,000	82	12	5,600	2,000	--
MW5	72	ND	ND	ND	1.4	0.42	--
MW6	47	ND	ND	ND	1.3	ND	ND

(Collected on February 7, 1992)

MW1	ND	220	2.1	ND	16	10	--
MW2	2,300	11,000	1,400	30	1,400	1,900	ND
MW3	ND	ND	ND	ND	ND	ND	--
MW4	2,300	8,100	24	4.9	3,200	1,800	--
MW5	ND	ND	ND	ND	0.94	0.36	--
MW6	ND	180	22	0.68	20	22	ND

(Collected on November 5, 1991)

MW1	260	4,900	80	ND	160	150	--
MW2	3,900	110,000	4,200	200	8,600	3,400	78
MW3	ND	31	ND	ND	0.65	ND	--
MW4	7,700	140,000	320	ND	13,000	4,800	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	300	7,100	200	ND	580	190	ND

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TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES  
 WATER

<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	<u>TOG</u>
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(Collected on August 5, 1991)

MW1	200	1,200	95	6.2	80	230	--
MW2	4,200	33,000	2,900	190	7,900	3,400	ND
MW3	63	ND	ND	ND	ND	ND	--
MW4	6,200	37,000	310	70	9,700	3,600	--
MW5	ND	ND	ND	ND	ND	ND	--
MW6	130	860	130	11	150	92	ND

(Collected on February 21, 1991)

MW1	690	26,000	280	39	1,900	1,200	--
MW2	7,000	3,400	160	61	490	200	ND
MW3	--	ND	ND	ND	0.64	ND	--
MW4	4,100	33,000	210	21	12,000	3,800	--
MW5	--	56	ND	ND	4.7	ND	--
MW6	160	750	77	14	140	23	ND
MWD	--	740	74	12	140	33	--

(MW6 duplicate)

(Collected on November 26, 1990)

MW1	--	2,900	160	2.3	320	330	--
MW2	3,800	15,000	1,600	450	2,100	1,100	ND
MW3	--	ND	ND	ND	ND	ND	--
MW4	--	49,000	360	36	11,000	3,800	--
MW5	--	ND	ND	ND	ND	ND	--
MW6	320	4,800	1,000	200	650	340	ND
MW7	--	4,000	800	120	440	250	--

(MW6 duplicate)

(Collected on August 28, 1990)

MW1	--	1,700	140	1.4	150	180	--
MW2	3,100	27,000	2,600	1,300	3,000	1,900	ND
MW3	--	ND	ND	ND	0.70	ND	--
MW4	--	62,000	810	72	4,600	4,400	--
MW5	--	ND	ND	ND	1.2	ND	--
MW6	1,000	12,000	1,700	1,400	2,100	230	16
MW7	--	2,600	180	3.0	270	810	--

(MW1 duplicate)

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TABLE 2 (Continued)SUMMARY OF LABORATORY ANALYSES  
WATER

<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	<u>TOG</u>
(Collected on May 11, 1990)							
MW1	--	22,000	590	42	3,600	1,200	--
MW2	--	65,000	3,300	3,300	12,000	4,100	--
MW3	--	ND	ND	ND	ND	ND	--

- \* Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be gasoline.
- \*\* Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be a gasoline and non-gasoline mixture.
- ◆ Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be diesel.
- ◆◆ 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.

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

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TABLE 3  
SUMMARY OF LABORATORY ANALYSES  
WATER

<u>Date</u>	<u>Sample Number</u>	<u>(MTBE)</u>
5/17/93	MW1	250
	MW10	2,100

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

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TABLE 4

SUMMARY OF LABORATORY ANALYSES  
 SOIL

<u>Date</u>	<u>Sample Number</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-benzene</u>	<u>TOG</u>
4/26/90	MW1(5)	--	ND	0.012	0.16	ND	ND	--
&	MW1(10)	--	ND	0.0094	0.024	ND	ND	--
4/27/90	MW1(14)	--	ND	0.0075	0.031	ND	ND	--
	MW2(5)	--	2.4	0.075	0.0071	ND	ND	--
	MW2(10)	--	2.2	ND	0.017	0.018	0.0088	--
	MW2(12)	--	6.8	ND	0.028	0.015	0.10	--
	MW3(5)	--	ND	0.0094	0.048	ND	ND	--
	MW3(10)	--	ND	0.0088	0.015	ND	ND	--
	EB2(7)	--	2,400	5.0	16	230	62	--
	EB2(9)	1,400	12,000	84	12	860	360	7,000
8/14/90	MW4(14.5)	--	ND	ND	ND	ND	ND	--
	MW5(13)	--	ND	ND	0.010	ND	ND	--
	MW6(5)	ND	ND	ND	0.042	ND	ND	ND
	MW6(10)	5.1	18	0.26	0.22	1.2	0.34	ND
	MW6(12.5)	93	160	3.4	12	3.6	20	200
	MW6(15.5)	ND	2.5	0.43	0.41	0.12	0.50	ND
4/28/93	MW7(5)	ND	ND	ND	ND	ND	ND	--
9/28/92	MW8(5)	ND	ND	ND	ND	ND	ND	--
&	MW8(10)	ND	ND	ND	ND	ND	ND	--
9/29/92	MW8(13)	ND	ND	ND	ND	ND	ND	--
	MW9(5.5)	ND	ND	ND	ND	ND	ND	--
	MW9(10)	ND	ND	ND	ND	ND	ND	--
	MW9(13)	ND	ND	ND	ND	ND	ND	--
	MW10(5)	ND	ND	ND	ND	ND	ND	--
	MW10(10.5)39*		210	0.58	0.38	10	4.4	--
	MW10(13)	ND	ND	ND	ND	0.0063	0.0090	--

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TABLE 4 (Continued)

SUMMARY OF LABORATORY ANALYSES  
SOIL

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

\* Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be diesel.

-- Indicates analysis was not performed.

ND = Non-detectable.

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



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TABLE 5

SUMMARY OF LABORATORY ANALYSES  
 SOIL

(Collected on November 29, and  
 December 5 & 29, 1989)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
SW1	9.0	--	1.6	ND	ND	ND	ND
SW2	9.0	--	3.8	ND	ND	ND	ND
SW3	9.0	--	5.6	ND	ND	2.3	0.42
SW4	9.0	--	32	1.2	ND	1.0	2.1
SW5	9.0	--	4.8	0.20	ND	0.11	ND
SW6	8.0	--	ND	ND	ND	ND	ND
D1	3.5	--	ND	ND	ND	ND	ND
D2	3.5	--	1.5	0.08	ND	ND	ND
D3	3.5	--	6.6	0.14	ND	0.31	ND
D4	3.5	--	7.4	0.11	ND	0.1	ND
D5	3.5	--	1.9	ND	ND	ND	ND
D6	3.5	--	2.0	ND	0.17	0.25	ND
P1	6.0	--	15	0.086	ND	8.5	0.18
P2	5.5	--	3,800	6.1	290	750	140
P2 (12)	12.0	--	ND	ND	ND	ND	ND
P3	5.0	--	11	0.13	ND	1.3	0.18
P4	4.5	--	1.4	ND	ND	0.23	ND
P5	4.5	--	ND	ND	ND	ND	ND
P6	3.0	--	ND	ND	ND	ND	ND
P7	4.0	--	ND	ND	ND	ND	ND
SWP2E	11.0	--	20	ND	0.16	3.1	0.50
SWP2W	11.0	--	ND	ND	ND	ND	ND
WO1*	8.5	ND	1.6	ND	ND	ND	ND

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TABLE 5 (Continued)

SUMMARY OF LABORATORY ANALYSES  
SOIL

(Collected on November 29, and  
December 5 & 29, 1989)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
SWA**	9.5	ND	2.1	ND	ND	ND	ND
SWB***	9.5	ND	3.9	ND	ND	ND	ND

\* TOG was <50 ppm, and all EPA method 8010 constituents were non-detectable. Metal concentrations were as follows: cadmium was non-detectable, chromium was 20 ppm, lead was 75 ppm, and zinc was 65 ppm.

\*\* TOG was <50 ppm, and all EPA method 8010 constituents were non-detectable. Metals concentrations were as follows: cadmium was non-detectable, chromium was 20 ppm, lead was 5.9 ppm, and zinc was 44 ppm.

\*\*\* TOG was <50 ppm, and all EPA method 8010 constituents were non-detectable. Metals concentrations were as follows: cadmium was non-detectable, chromium was 15 ppm, lead was 5.0 ppm, an zinc was 39 ppm.

-- Indicates analysis was not performed.

ND = Non-detectable.

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

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TABLE 6

SUMMARY OF LABORATORY ANALYSES  
WATER

(Collected on December 5, 1989)

<u>Sample #</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethylbenzene</u>
W1*	7,900	850	150	720	ND

\* All EPA method 8010 constituents were non-detectable.

ND = Non-detectable.

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

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TABLE 7

SUMMARY OF LABORATORY ANALYSES  
WATER

(Collected on January 9 through 11, 1991 by CEC)

<u>Sample</u>	<u>Depth (feet)</u>	<u>TPH as Diesel</u>	<u>TPH as Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl- benzene</u>
P1	15	ND	90.0	0.8	0.6	2.4	0.5
P2	15	ND	ND	ND	ND	0.6	ND
P3	16	ND	ND	ND	ND	ND	ND
P4	17	ND	ND	ND	ND	ND	ND
P5	14	ND	ND	ND	ND	ND	ND
P6	15	ND	ND	ND	ND	ND	ND
P7	14	ND	ND	ND	ND	ND	ND

ND = Non-detectable.

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

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TABLE 8  
SUMMARY OF MONITORING DATA  
(Conducted on January 18, 1991)

<u>Well #</u>	<u>Time</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	
MW1	9:55 a.m.	-7.27	12.45	
	10:22	-7.27	12.45	
	10:34	-7.27	12.45	
	10:55	-7.25	12.43	
	11:29	-7.24	12.42	
	11:57	-7.23	12.41	
	12:29 p.m.	-7.21	12.39	
	1:04	-7.21	12.39	
	1:27	-7.21	12.39	
	1:58	-7.20	12.38	
	2:29	-7.18	12.36	
	4:36	-7.19	12.37	
	5:01	-7.19	12.37	
	MW2	9:37 a.m.	-7.21	11.04
		10:08	-7.20	11.03
10:25		-7.20	11.03	
10:46		-7.18	11.01	
11:20		-7.17	11.00	
11:49		-7.15	10.98	
12:23 p.m.		-7.14	10.97	
12:55		-7.13	10.96	
1:18		-7.14	10.97	
1:50		-7.12	10.95	
2:22		-7.11	10.94	
4:24		-7.10	10.93	
4:53		-7.10	10.93	
MW3	9:34 a.m.	-6.13	9.43	
	10:04	-6.12	9.42	
	10:23	-6.11	9.41	
	10:43	-6.11	9.41	
	11:18	-6.09	9.39	
	11:47	-6.08	9.38	
	12:21 p.m.	-6.07	9.37	
	12:53	-6.06	9.36	
	1:16	-6.06	9.36	
	1:48	-6.05	9.35	
	2:20	-6.04	9.34	
	4:21	-6.02	9.32	
4:51	-6.02	9.32		

TABLE 8 (Continued)

SUMMARY OF MONITORING DATA  
 (Conducted on January 18, 1991)

<u>Well #</u>	<u>Time</u>	<u>Ground Water Elevation (feet)</u>	<u>Depth to Water (feet)</u>	
MW4	9:51	-7.31	12.58	
	10:17	-7.31	12.58	
	10:31	-7.31	12.58	
	10:53	-7.30	12.57	
	11:27	-7.28	12.55	
	11:55	-7.27	12.54	
	12:27 p.m.	-7.24	12.51	
	1:01	-7.24	12.51	
	1:25	-7.25	12.52	
	1:56	-7.23	12.50	
	2:28	-7.22	12.49	
	4:34	-7.22	12.49	
	4:59	-7.22	12.49	
	MW5	9:47 a.m.	-7.27	11.88
		10:14	-7.27	11.88
10:29		-7.26	11.87	
10:50		-7.25	11.86	
11:25		-7.23	11.84	
11:53		-7.22	11.83	
12:25 p.m.		-7.20	11.81	
1:00		-7.20	11.81	
1:23		-7.20	11.81	
1:54		-7.19	11.80	
2:26		-7.17	11.78	
4:30		-7.17	11.78	
4:57		-7.17	11.78	
MW6	9:42 a.m.	-7.24	11.55	
	10:11	-7.23	11.54	
	10:27	-7.22	11.53	
	10:48	-7.21	11.52	
	11:23	-7.19	11.50	
	11:50	-7.18	11.49	
	12:24 p.m.	-7.17	11.48	
	12:57	-7.17	11.48	
	1:21	-7.17	11.48	
	1:53	-7.14	11.45	
	2:23	-7.14	11.45	
	4:26	-7.14	11.45	
4:55	-7.14	11.45		

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TABLE 9

SUMMARY OF LABORATORY ANALYSES  
SOIL - PRE-1967 FUEL TANK PIT

<u>Date</u>	<u>Sample</u>	<u>Depth</u> <u>(feet)</u>	<u>TPH as</u> <u>Gasoline</u>	<u>Benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Ethyl-</u> <u>benzene</u>	<u>TOG</u>
3/19/91	SW1	10.5	ND	ND	ND	ND	ND	ND
3/19/91	SW2	11.0	1,000	14	65	98	19	58
3/22/91	SW2 (12)	11.0	2,400	38	180	280	54	ND
4/11/91	SW2 (30)	11.0	340	1.6	1.2	21	9.9	--
3/21/91	SW3	10.5	310	3.3	4.8	26	6.5	ND
4/05/91	SW3 (2)	10.5	5.3	ND	ND	0.14	0.13	ND
3/21/91	SW4	10.5	1,400	14	41	110	30	160
4/05/91	SW4 (6)	10.5	53	0.023	1.4	4.1	0.85	ND
3/22/91	SW5	10.5	2,200	28	140	260	52	85
4/03/91	SW5 (7)	10.5	29	0.44	0.052	2.8	0.89	ND
3/22/91	SW6	10.5	260	3.6	7.5	29	7.2	ND
4/11/91	SW6 (5)	10.5	44	0.34	0.32	2.5	1.1	--
4/04/91	SW7	11.0	2.5	0.41	0.0070	0.018	0.15	ND
4/11/91	SW8	11.0	310	1.9	2.9	8.1	2.8	ND
4/11/91	SW9	11.0	ND	0.17	ND	0.0052	0.0062	ND
4/05/91	SW10	11.0	1,400	18	130	200	36	60

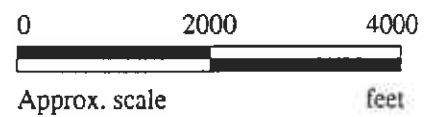
-- Indicates analysis not performed.

ND = Non-detectable.

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



Base modified from 7.5 minute U.S.G.S. Oakland East and San Leandro Quadrangles  
 (both photorevised 1980)

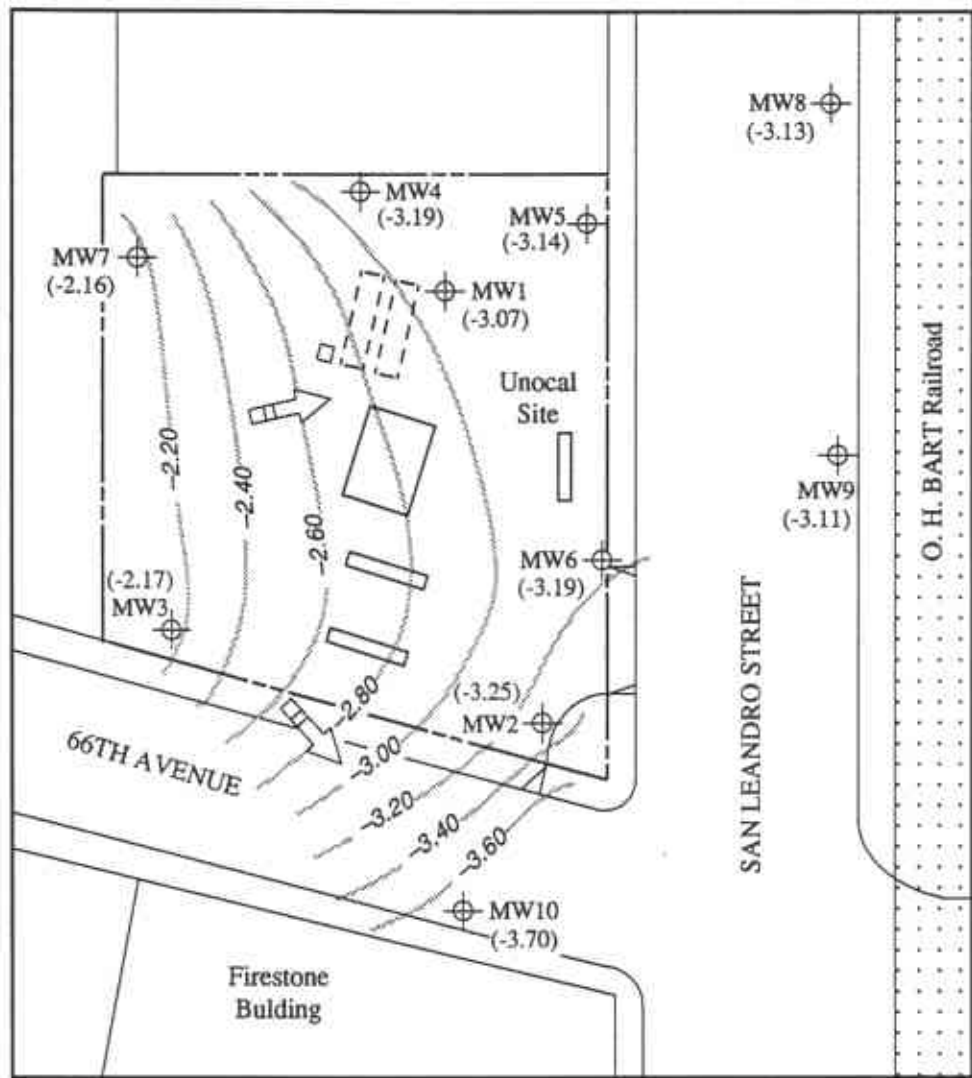


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 INCORPORATED



UNOCAL SERVICE STATION #3135  
 845 - 66TH AVENUE  
 OAKLAND, CA

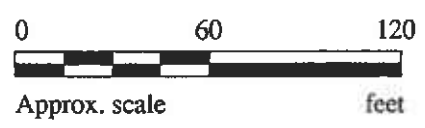
LOCATION  
 MAP





**LEGEND**

-  Monitoring well
-  Direction of ground water flow
- ( ) Ground water elevation in feet relative to Mean Sea Level
- ..... Contours of ground water elevation

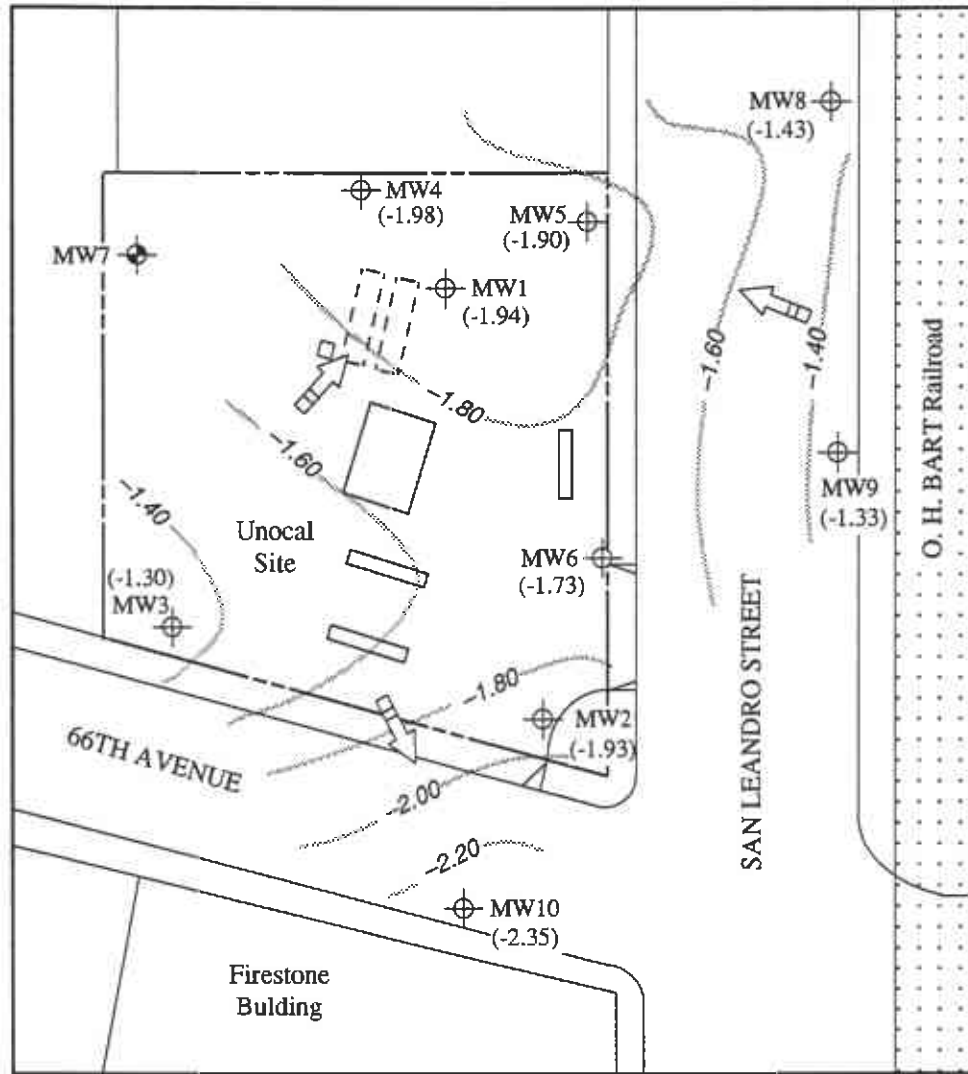


**POTENTIOMETRIC SURFACE MAP FOR THE MAY 17, 1993 MONITORING EVENT**

  
**KAPREALIAN ENGINEERING  
INCORPORATED**

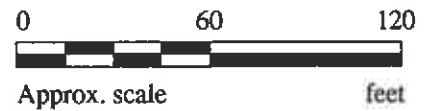
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
1**



**LEGEND**

- Monitoring well (existing)
- Monitoring well (drilled April 28, 1993)
- Direction of ground water flow
- ( ) Ground water elevation in feet relative to Mean Sea Level
- Contours of ground water elevation

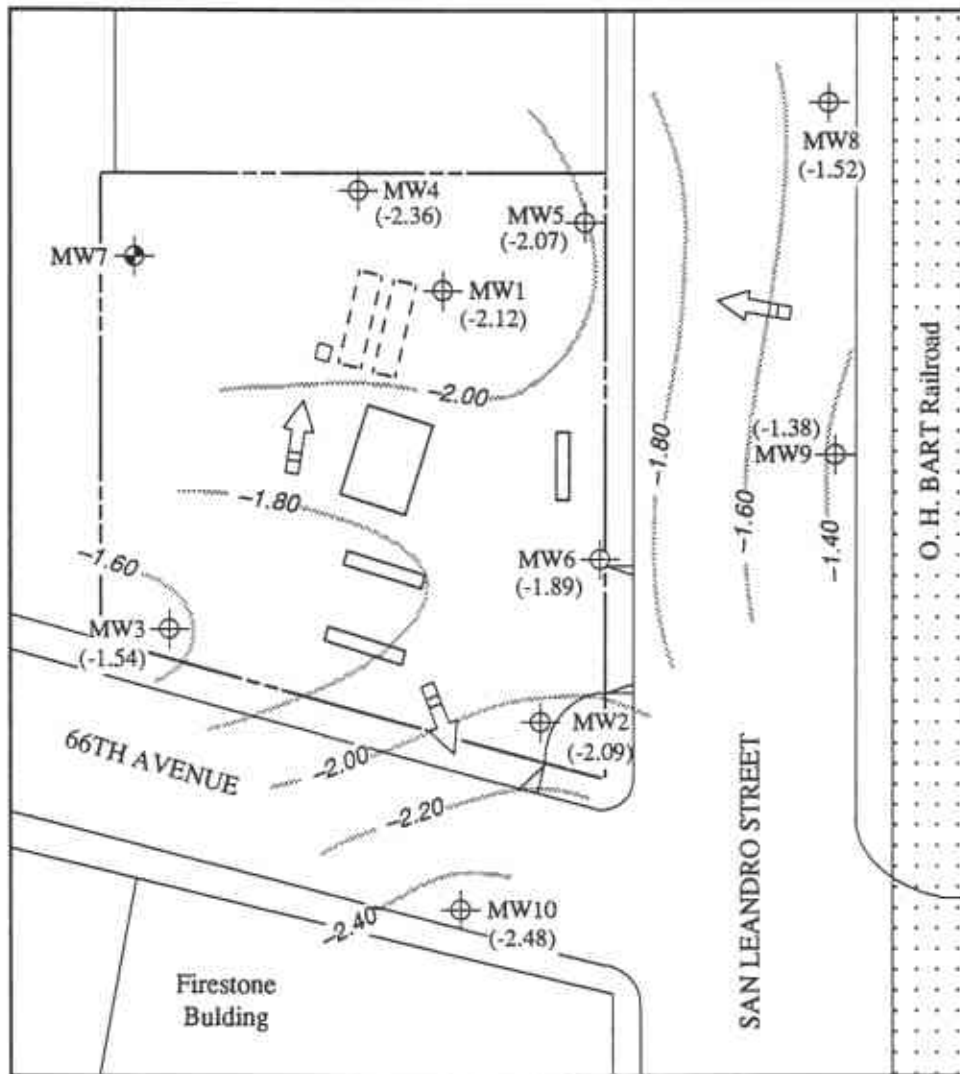


**POTENTIOMETRIC SURFACE MAP FOR THE APRIL 1, 1993 MONITORING EVENT**



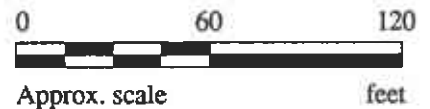
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
2**



**LEGEND**

- ⊕ Monitoring well (existing)
- ⊙ Monitoring well (drilled April 28, 1993)
- ➔ Direction of ground water flow
- ( ) Ground water elevation in feet relative to Mean Sea Level
- ..... Contours of ground water elevation

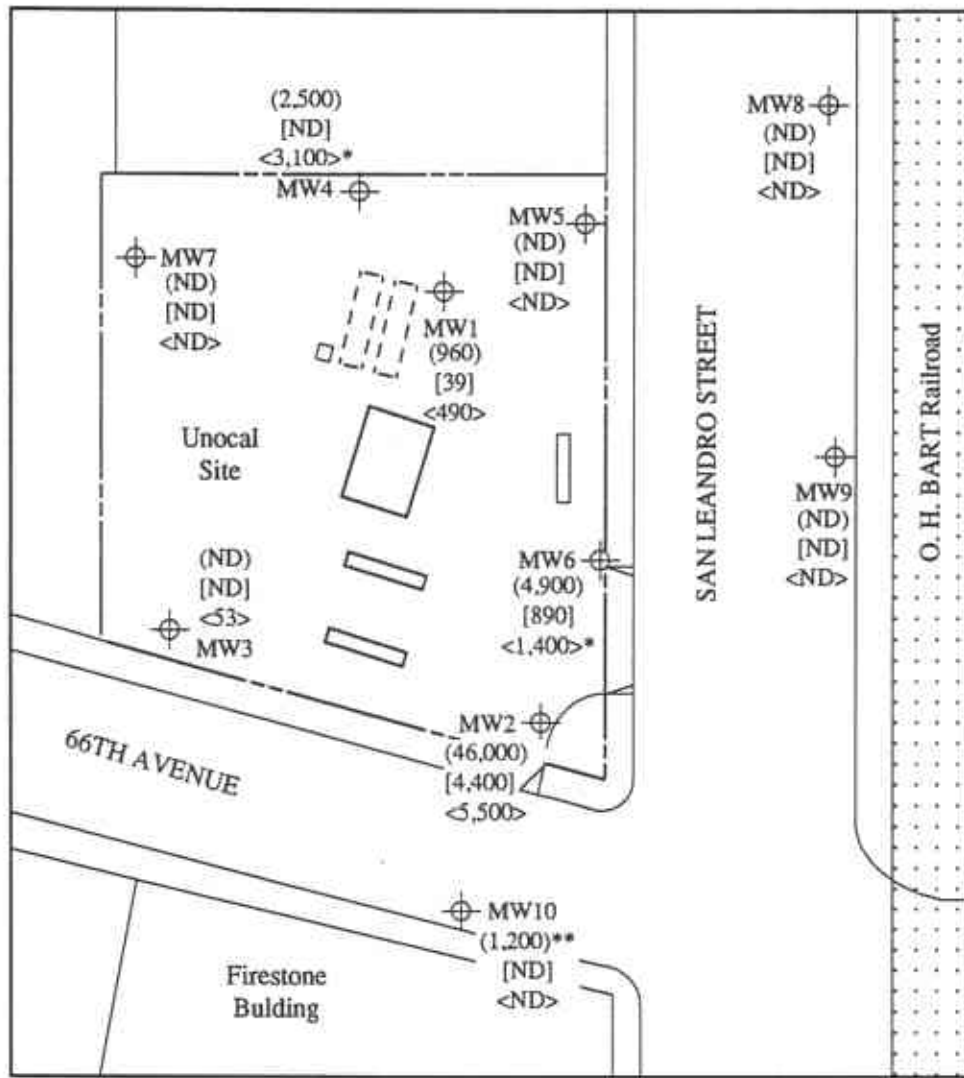


**POTENTIOMETRIC SURFACE MAP FOR THE MARCH 1, 1993 MONITORING EVENT**

**KAPREALIAN ENGINEERING  
INCORPORATED**

**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
3**

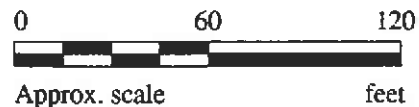


**LEGEND**

- ⊕ Monitoring well
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- < > Concentration of TPH as diesel in ppb
- ND= Non-detectable

\* The lab reported that the hydrocarbons detected do not appear to be diesel.

\*\* The lab reported that the hydrocarbons detected do not appear to be gasoline.

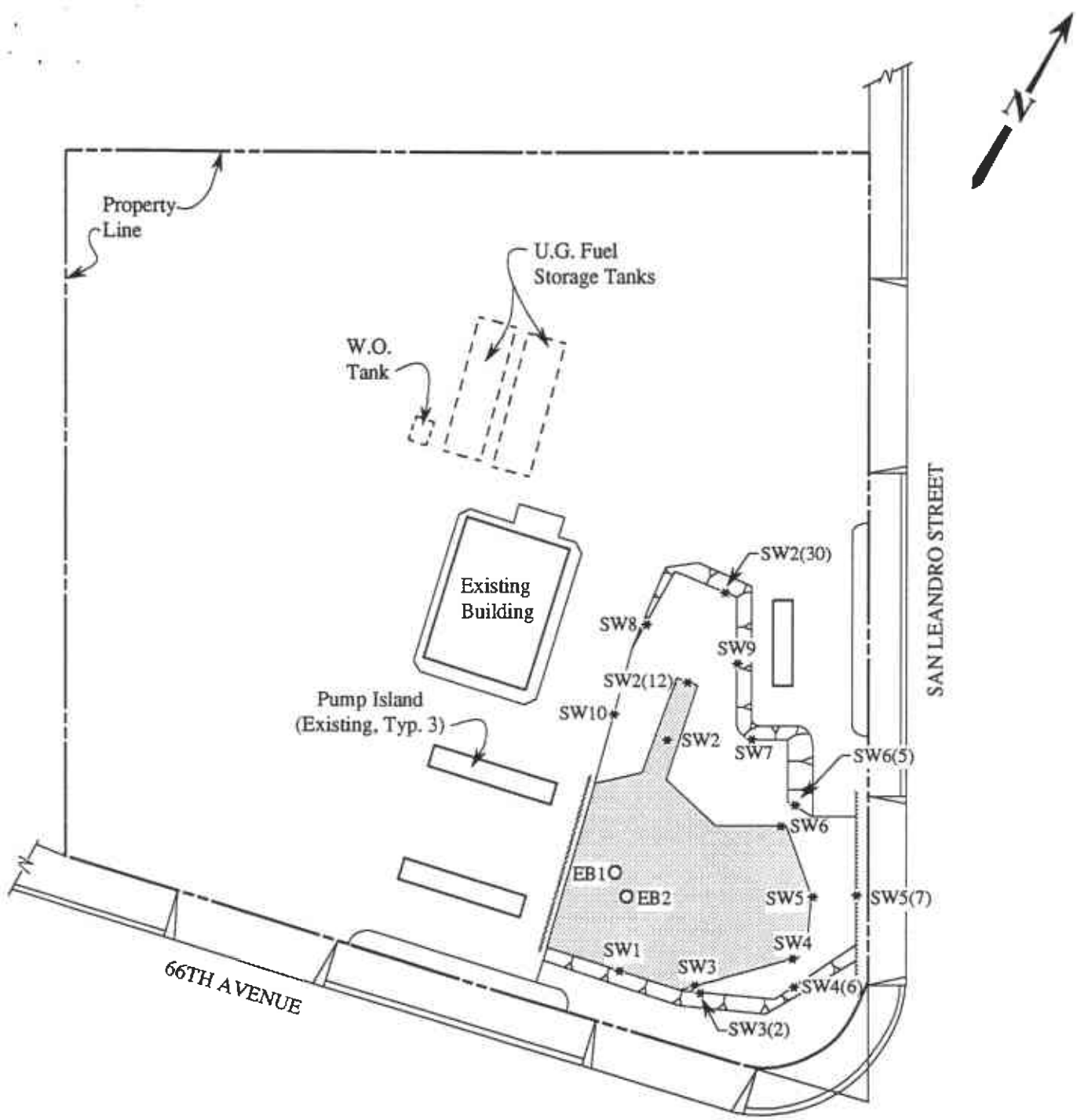


**PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON MAY 17, 1993**



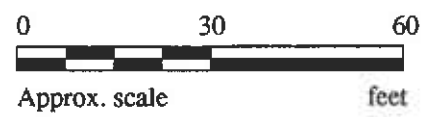
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
4**



**LEGEND**

- \* Sample point location
- Exploratory boring
- ▨ Intermediate excavation boundary
- Shoring

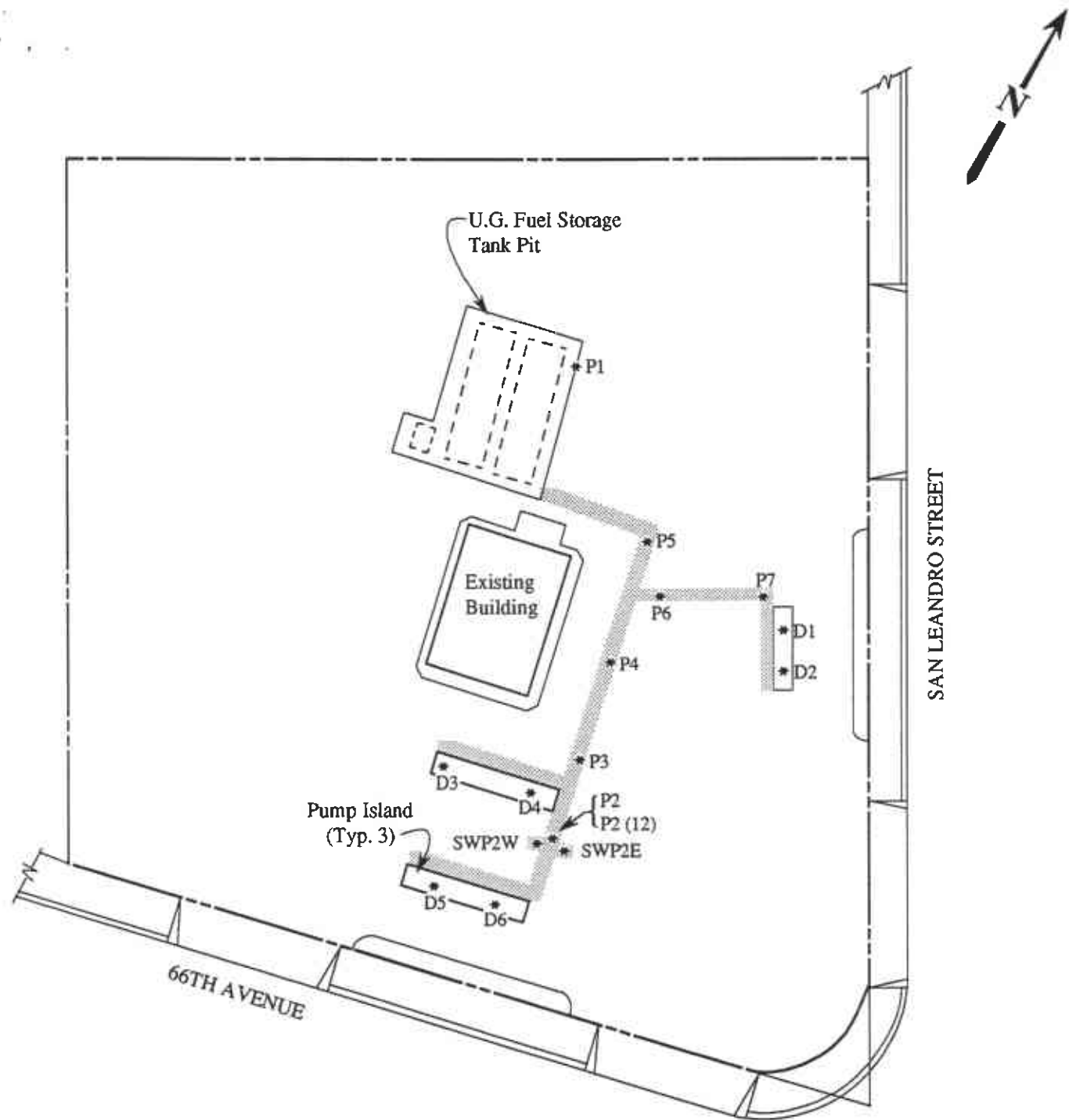


**SAMPLE POINT LOCATIONS MAP**



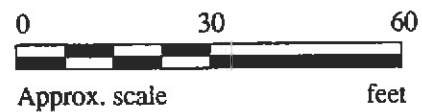
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
5**



**LEGEND**

\* Sample point location

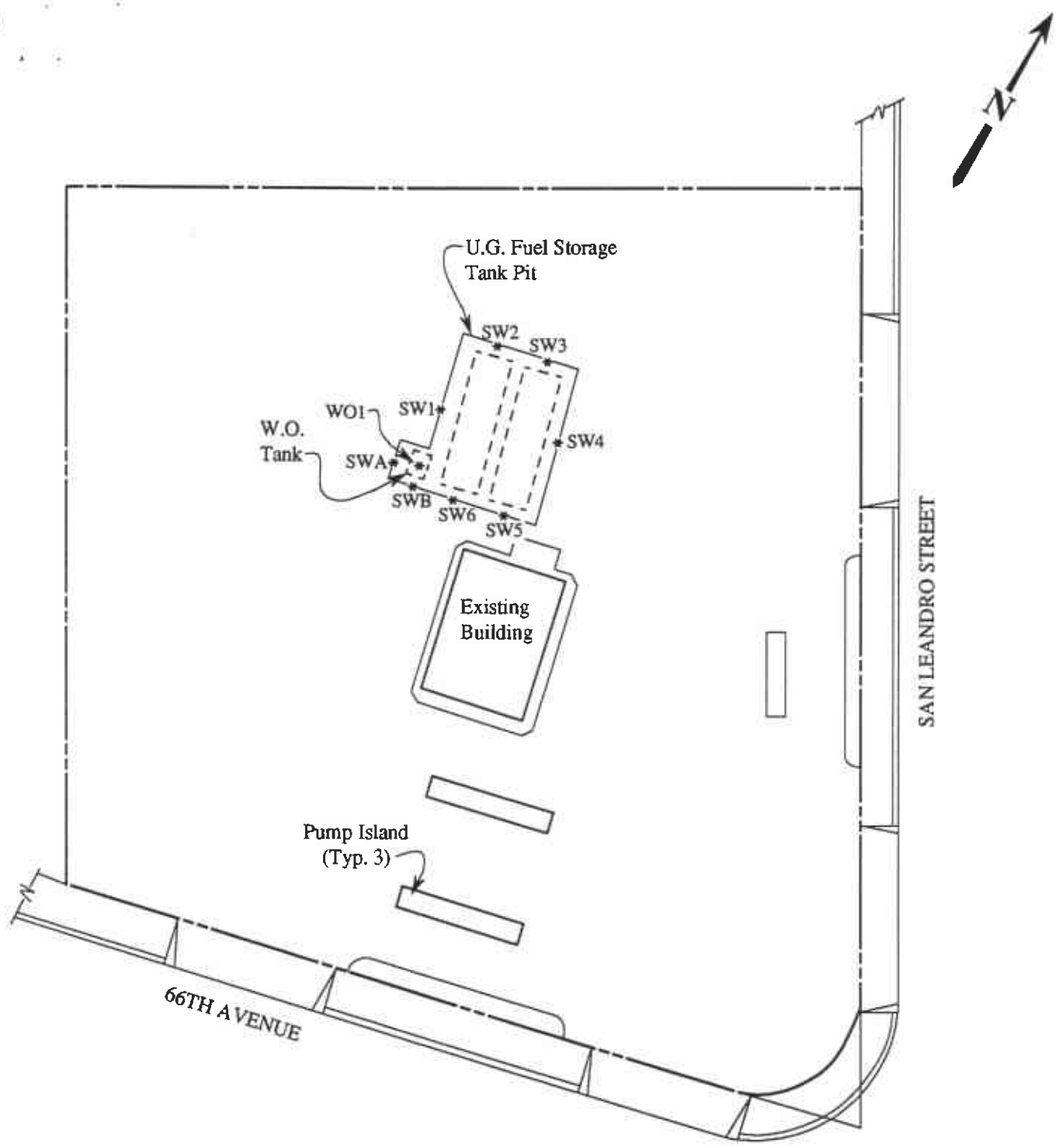


**SAMPLE POINT LOCATIONS MAP**



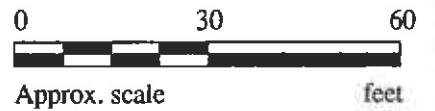
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
6**



**LEGEND**

\* Sample point location

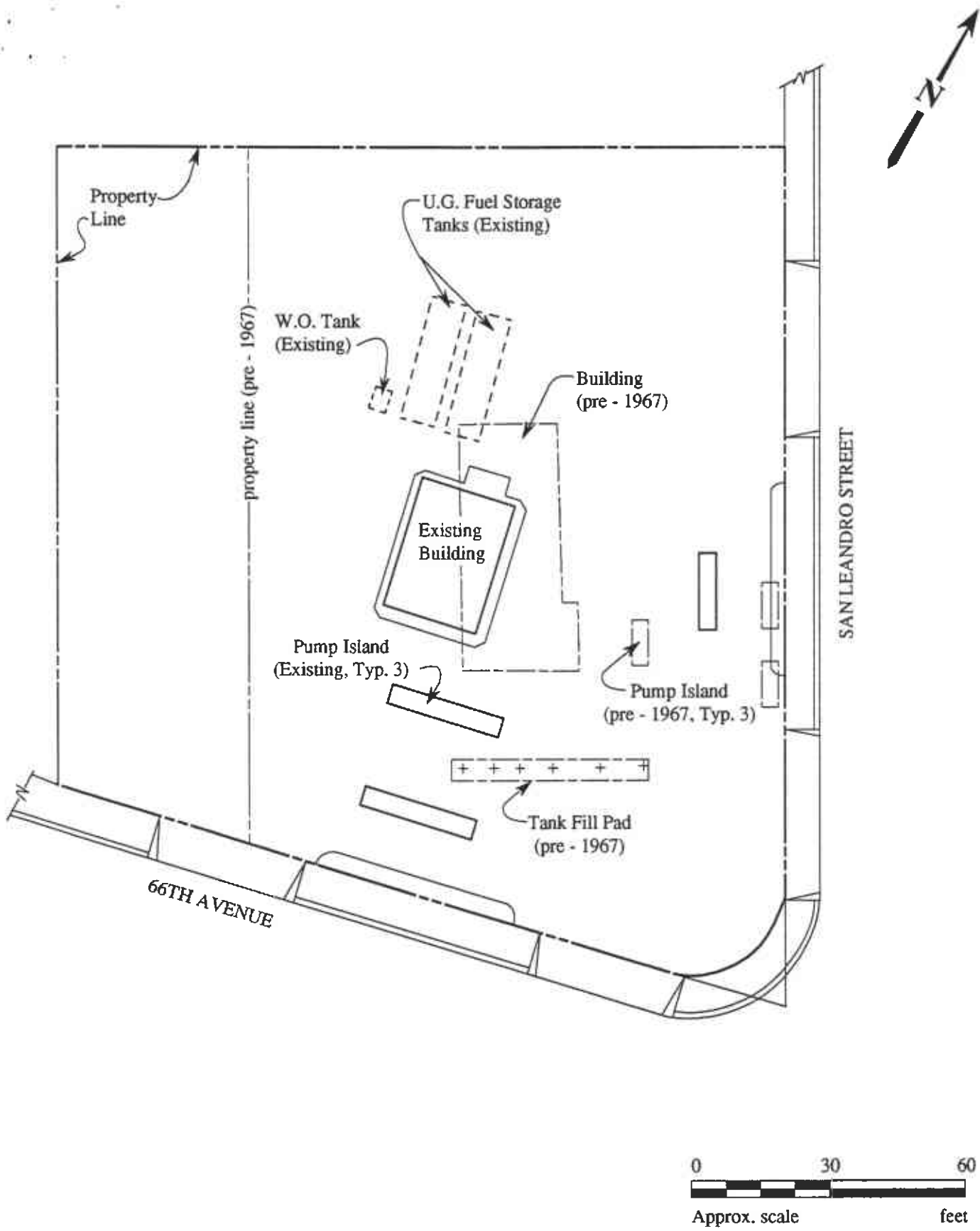


**SAMPLE POINT LOCATIONS MAP**

**KAPREALIAN ENGINEERING  
INCORPORATED**

**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
7**



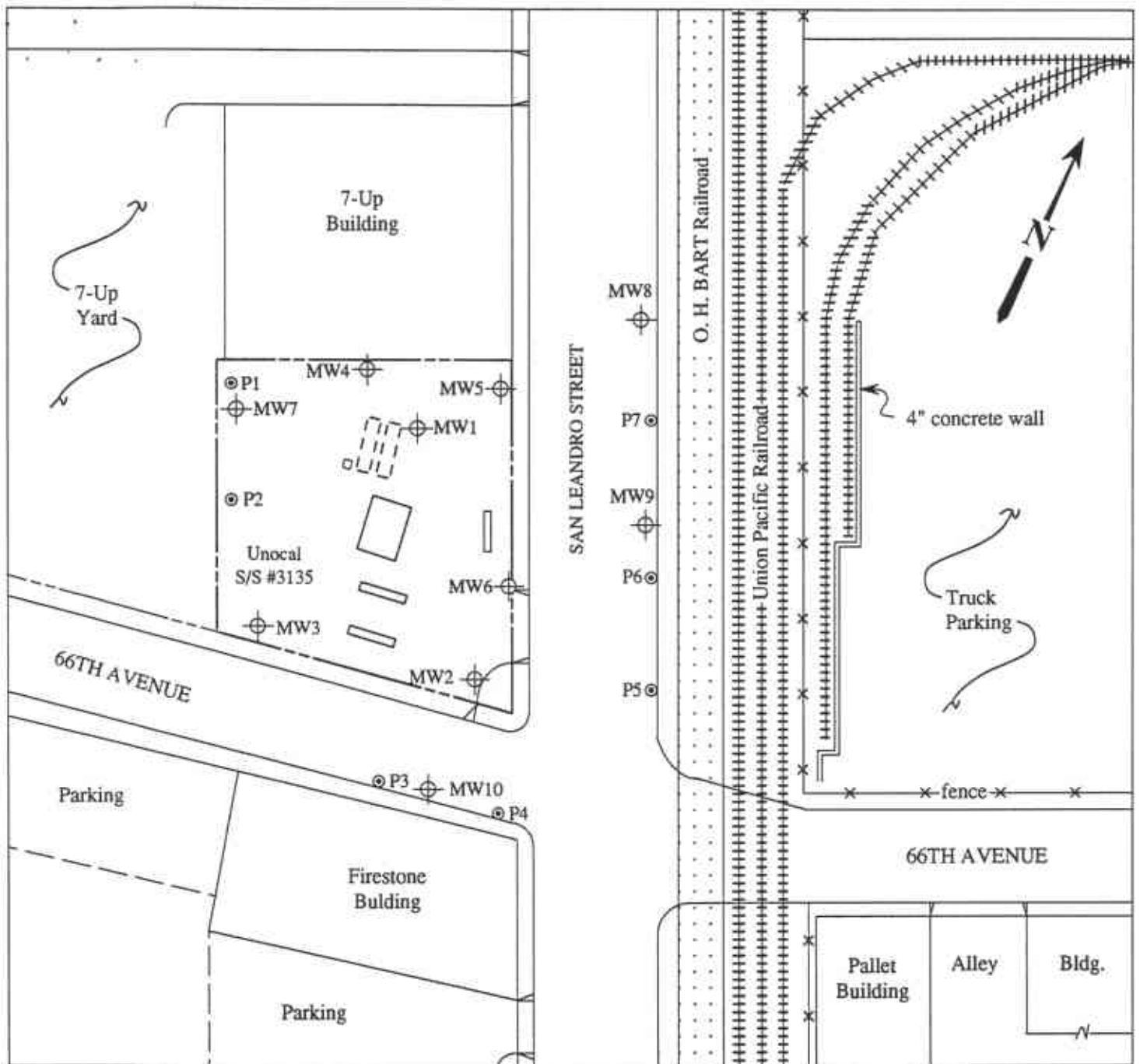
STATION LAYOUT MAP



UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA

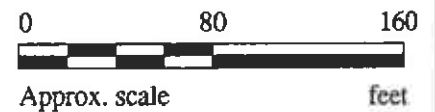
FIGURE  
8





**LEGEND**

- ⊕ Monitoring well (existing)
- ⊙ Ground water sample point location

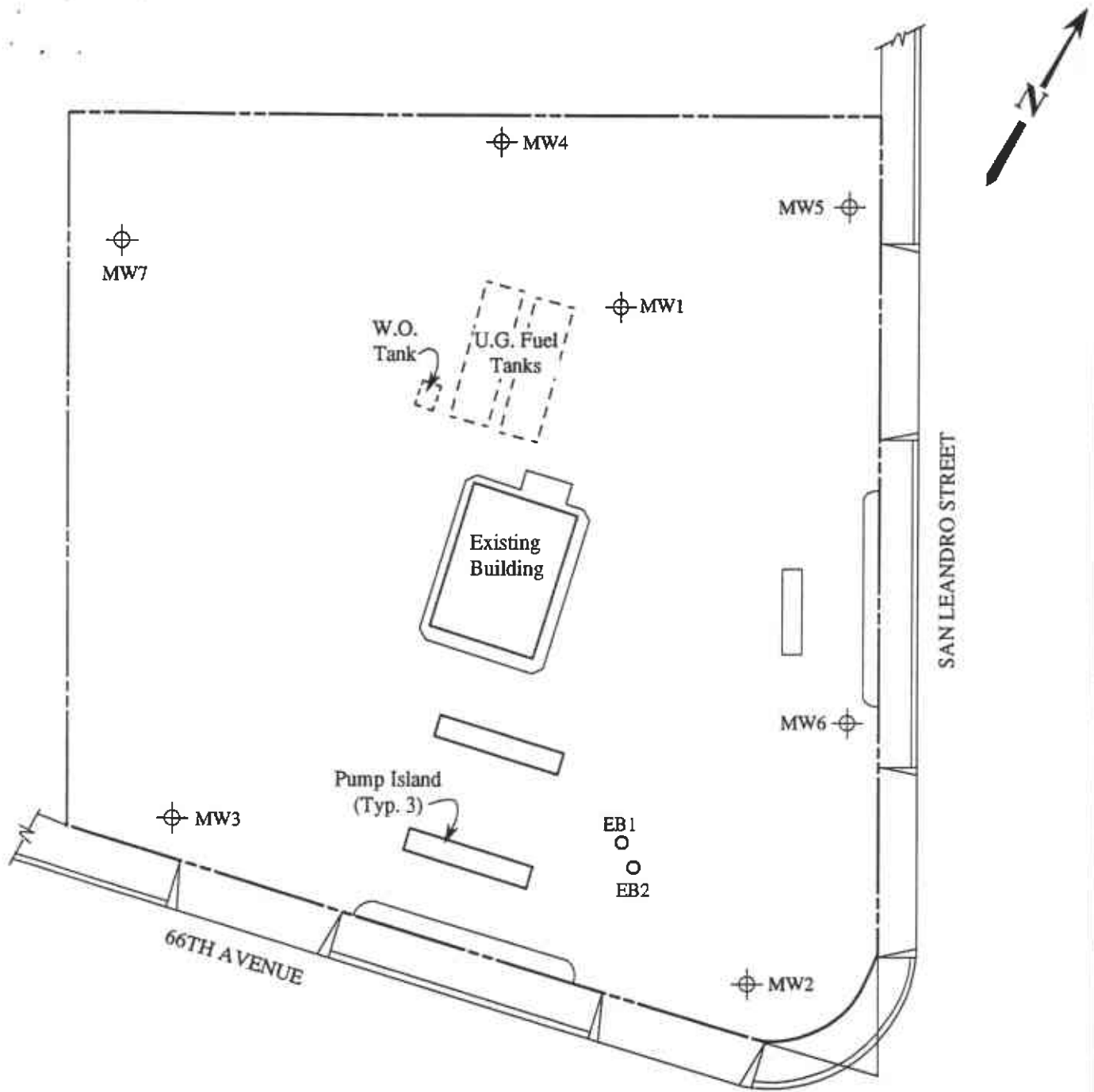


**MONITORING WELLS AND SAMPLE POINTS LOCATION MAP**

**KAPREALIAN ENGINEERING  
INCORPORATED**

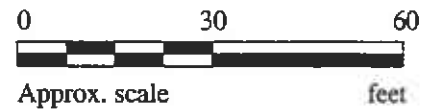
**UNOCAL SERVICE STATION #3135  
845 - 66TH AVENUE  
OAKLAND, CA**

**FIGURE  
9**



**LEGEND**

- ⊕ Monitoring well
- Exploratory boring



**MONITORING WELL AND EXPLORATORY BORING LOCATION MAP**

**KAPREALIAN ENGINEERING  
 INCORPORATED**

**UNOCAL SERVICE STATION #3135  
 845 - 66TH AVENUE  
 OAKLAND, CA**

**FIGURE  
 10**

## BORING LOG

<b>Project No.</b> KEI-P90-0209	<b>Boring Diameter</b> 8.5"	<b>Logged By</b> D.L.
	<b>Casing Diameter</b> 2"	
<b>Project Name</b> Unocal S/S #3135 845 - 66th Ave., Oakland	<b>Well Cover Elevation</b>	<b>Date Drilled</b> 4/28/93
<b>Boring No.</b> MW7	<b>Drilling Method</b> Hollow-stem Auger	<b>Drilling Company</b> Woodward Drilling

Penetration blows/6"	G. W. level	Depth (feet) Samples	Strati- graphy USCS	Description
		0		Asphalt pavement over silt, sand, and gravel base.
			CL	Sandy clay, estimated 10-15% gravel, stiff, moist, light olive brown (fill).
3/6/8/11	▼		ML	Gravelly silt with sand, trace clay, stiff, moist to wet, very dark grayish brown, grades to black (fill?).
		5	GM	Silty gravel with sand, trace clay, very stiff, moist to wet, black (fill?).
3/4/5/9			CL	Silty clay, estimated at 5-10% fine-grained sand, firm to stiff, moist, olive brown and dark greenish gray, mottled.
7/16/28/45			SM	Silty sand, fine-grained, estimated at 30-40% silt, dense, very moist, cohesive, dark olive brown and dark greenish gray, mottled.
		15	GM	Silty gravel with sand, estimated at 15-20% silt, trace clay, dense to very dense, wet, dark olive gray.
22/30/50			GM	Silty gravel with sand, estimated at 15% silt, angular to subrounded gravel, very dense, saturated, dark yellowish brown.
		20		TOTAL DEPTH: 20'

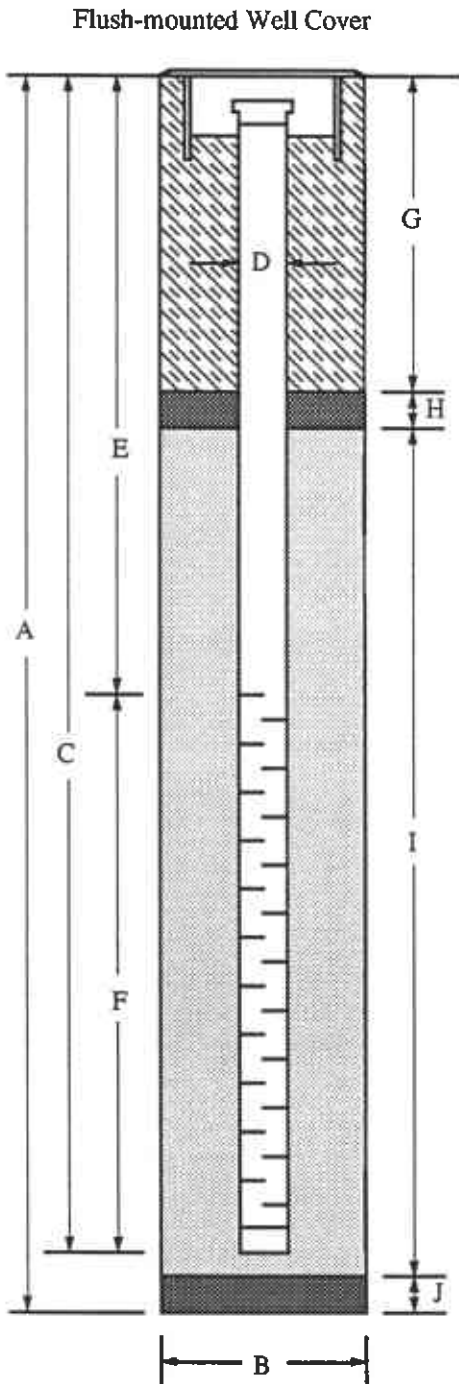
## WELL CONSTRUCTION DIAGRAM

**PROJECT NAME:** Unocal #3135, 845 - 66th Ave., Oakland

**WELL NO.:** MW7

**PROJECT NUMBER:** KEI-P88-1203

**WELL PERMIT NO.:** ACFC & WCD #93158



- 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: 3.5'
- F. Perforated Length: 16.5'  
Perforation Type: Machined Slot  
Perforation Size: 0.010"
- G. Surface Seal: 2'  
Seal Material: Neat Cement
- H. Seal: 1'  
Seal Material: Bentonite
- I. Filter Pack: 17'  
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

Kaprealian Engineering, Inc. 2401 Stanwell Dr., Ste. 400 Concord, CA 94520 Attention: Mardo Kaprealian, P.E.	Client Project ID: Unocal, 845 66th Ave., Oakland Sample Matrix: Water Analysis Method: EPA 5030/8015/8020 First Sample #: 305-0928	Sampled: May 17, 1993 Received: May 18, 1993 Reported: May 26, 1993
---	--	---

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 305-0928 MW 1*	Sample I.D. 305-0929 MW 2	Sample I.D. 305-0930 MW 3	Sample I.D. 305-0931 MW 4	Sample I.D. 305-0932 MW 5	Sample I.D. 305-0933 MW 6
Purgeable Hydrocarbons	50	960	46,000	N.D.	2,500	N.D.	4,900
Benzene	0.5	39	4,400	N.D.	N.D.	N.D.	890
Toluene	0.5	N.D.	510	N.D.	N.D.	N.D.	46
Ethyl Benzene	0.5	57	2,900	N.D.	170	N.D.	210
Total Xylenes	0.5	60	9,900	N.D.	410	N.D.	530
Chromatogram Pattern:		Gasoline and Discrete Peak	Gasoline	--	Gasoline	--	Gasoline

### Quality Control Data

Report Limit Multiplication Factor:	5.0	200	1.0	20	1.0	20
Date Analyzed:	5/22/93	5/23/93	5/22/93	5/23/93	5/22/93	5/23/93
Instrument Identification:	HP-4	HP-2	HP-4	HP-2	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	90	100	102	96	102	89

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

Please Note: \* "Discrete Peak" refers to MTBE peak.



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

Client Project ID: Unocal, 845 66th Ave., Oakland  
Sample Matrix: Water  
Analysis Method: EPA 5030/8015/8020  
First Sample #: 305-0934

Sampled: May 17, 1993  
Received: May 18, 1993  
Reported: May 26, 1993

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 305-0934 MW 7	Sample I.D. 305-0935 MW 8	Sample I.D. 305-0936 MW 9	Sample I.D. 305-0937 MW 10*	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	N.D.	N.D.	N.D.	1,200	
Benzene	0.5	N.D.	N.D.	N.D.	N.D.	
Toluene	0.5	N.D.	N.D.	N.D.	N.D.	
Ethyl Benzene	0.5	N.D.	N.D.	N.D.	N.D.	
Total Xylenes	0.5	N.D.	N.D.	N.D.	N.D.	
Chromatogram Pattern:		..	..	..	Discrete Peak	

### Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	20	1.0
Date Analyzed:	5/22/93	5/22/93	5/22/93	5/23/93	5/22/93
Instrument Identification:	HP-2	HP-2	HP-2	HP-4	HP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	104	102	105	101	105

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. Chierfo  
Project Manager

Please Note: \*\*Discrete Peak\*\* refers to MTBE peak.



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

Client Project ID: Unocal, 845 66th Ave., Oakland  
Sample Descript: Water  
Analysis for: MTBE (EPA 8020 - Modified)  
First Sample #: 305-0928

Sampled: May 17, 1993  
Received: May 18, 1993  
Analyzed: 5/22 & 5/23/93  
Reported: May 26, 1993

## LABORATORY ANALYSIS FOR: MTBE (EPA 8020 - Modified)

Sample Number	Sample Description	Detection Limit $\mu\text{g/L}$	Sample Result $\mu\text{g/L}$
305-0928	MW 1	3.0	250
305-0937	MW 10	12	2,100

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

SEQUOIA ANALYTICAL

  
Scott A. Chieffo  
Project Manager



# SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520  
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Kaprealian Engineering, Inc. 2401 Stanwell Dr., Ste. 400 Concord, CA 94520 Attention: Mardo Kaprealian, P.E.	Client Project ID: Unocal, 845 66th Ave., Oakland Sample Matrix: Water Analysis Method: EPA 3510/3520/8015 First Sample #: 305-0928	Sampled: May 17, 1993 Received: May 18, 1993 Reported: May 26, 1993
---	--	---

## TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 305-0928 MW 1	Sample I.D. 305-0929 MW 2	Sample I.D. 305-0930 MW 3	Sample I.D. 305-0931 MW 4	Sample I.D. 305-0932 MW 5	Sample I.D. 305-0933 MW 6
Extractable Hydrocarbons	50	490	5,500	53	3,100	N.D.	1,400
Chromatogram Pattern:		Diesel and Non-Diesel Mixture (<C14)	Diesel and Non-Diesel Mixture (<C14)	Diesel	Non-Diesel Mixture (<C14)	---	Non-Diesel Mixture (<C14)

### Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	10	1.0	1.0
Date Extracted:	5/21/93	5/21/93	5/21/93	5/21/93	5/21/93	5/21/93
Date Analyzed:	5/25/93	5/25/93	5/25/93	5/25/93	5/25/93	5/25/93
Instrument Identification:	HP-3A	HP-3A	HP-3A	HP-3A	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

  
Scott A. Chieffo  
Project Manager





# SEQUOIA ANALYTICAL

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Kapreallan Engineering, Inc.  
2401 Stanwell Dr., Ste. 400  
Concord, CA 94520  
Attention: Mardo Kapreallan, P.E.

Client Project ID: Unocal, 845 66th Ave., Oakland  
Sample Matrix: Water  
Analysis Method: EPA 3510/3520/8015  
First Sample #: 305-0934

Sampled: May 17, 1993  
Received: May 18, 1993  
Reported: May 26, 1993

## TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 305-0934 MW 7	Sample I.D. 305-0935 MW 8	Sample I.D. 305-0936 MW 9	Sample I.D. 305-0937 MW 10	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	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
Date Extracted:	5/21/93	5/21/93	5/21/93	5/21/93	5/21/93
Date Analyzed:	5/25/93	5/25/93	5/25/93	5/25/93	5/25/93
Instrument Identification:	HP-3A	HP-3A	HP-3A	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

Scott A. Chierfo  
Project Manager



# SEQUOIA ANALYTICAL

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

Client Project ID: Unocal, 845 66th Ave., Oakland  
Matrix: Water

QC Sample Group 3050928-937

Reported: May 26, 1993

## QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel
<b>Method:</b>	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015
<b>Analyst:</b>	J.F.	J.F.	J.F.	J.F.	K.Wimer
<b>Conc. Spiked:</b>	20	20	20	60	300
<b>Units:</b>	µg/L	µg/L	µg/L	µg/L	µg/L
<b>LCS Batch#:</b>	2LCS052293	2LCS052293	2LCS052293	2LCS052293	BLK052193
<b>Date Prepared:</b>	5/22/93	5/22/93	5/22/93	5/22/93	5/21/93
<b>Date Analyzed:</b>	5/22/93	5/22/93	5/22/93	5/22/93	5/25/93
<b>Instrument I.D.#:</b>	HP-4	HP-4	HP-4	HP-4	HP-3A
<b>LCS % Recovery:</b>	72	90	102	103	108
<b>Control Limits:</b>	70-130%	70-130%	70-130%	70-130%	80-120

MS/MSD					
<b>Batch #:</b>	3050887	3050887	3050887	3050887	052193
<b>Date Prepared:</b>	5/22/93	5/22/93	5/22/93	5/22/93	5/21/93
<b>Date Analyzed:</b>	5/22/93	5/22/93	5/22/93	5/22/93	5/25/93
<b>Instrument I.D.#:</b>	HP-4	HP-4	HP-4	HP-4	HP-3A
<b>Matrix Spike % Recovery:</b>	95	100	100	113	108
<b>Matrix Spike Duplicate % Recovery:</b>	90	95	100	110	110
<b>Relative % Difference:</b>	5.4	5.1	0.0	2.6	1.8

SEQUOIA ANALYTICAL

  
Scott A. Chieffo  
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 LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

CHAIN OF CUSTODY

SAMPLER <i>Ray NEI</i>		SITE NAME & ADDRESS <i>UNOCH OAKLAND 845 60TH AVE</i>							ANALYSES REQUESTED				TURN AROUND TIME: <i>5 days</i>	
WITNESSING AGENCY									TPHG	BTXE	TPHD	MTBE		REMARKS
SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION						
<i>MW1</i>	<i>5.17</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>VOR 1 AMB</i>	<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>		<i>3050 PEARL ST'S PRESERVED</i>
<i>MW2</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>2</i>	<i>VOR 1 AMB</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>929AC</i>
<i>MW3</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>930AC</i>
<i>MW4</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>931AC</i>
<i>MW5</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>932AC</i>
<i>MW6</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>933AC</i>
<i>MW7</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>934AC</i>
<i>MW8</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>935AC</i>
<i>MW9</i>	<i>4</i>			<i>X</i>	<i>X</i>		<i>4</i>	<i>4</i>	<i>X</i>	<i>X</i>	<i>X</i>			<i>936AC</i>
Relinquished by: (Signature) <i>Ray (NEI)</i>	Date/Time <i>5-17-93</i>	Received by: (Signature) <i>Channawit + 51893</i>		Date/Time <i>09:50 AM</i>		The following MUST BE completed by the laboratory accepting samples for analysis:								
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		Date/Time		1. <input checked="" type="checkbox"/> Have all samples received for analysis been stored in ice?								
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		Date/Time		2. <input checked="" type="checkbox"/> Will samples remain refrigerated until analyzed?								
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		Date/Time		3. <input checked="" type="checkbox"/> Did any samples received for analysis have head space?								
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		Date/Time		4. <input checked="" type="checkbox"/> Were samples in appropriate containers and properly packaged?								
						<i>CLW</i>			<i>SECTY</i>			<i>5/18/93</i>		
						Signature			Title			Date		

CHAIN OF CUSTODY

SAMPLER <i>Ray (KE)</i>		SITE NAME & ADDRESS UNOCAL OAKLAND 845 66TH Ave							ANALYSES REQUESTED					TURN AROUND TIME: <u>5 Days</u>			
WITNESSING AGENCY									TPMG	PBTXE	TPHD	MTBE					
SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION					REMARKS				
MW10	5-17			X	X		4 1	VOA AMB	X	X	X	X	3050937A	EVOA's PRESERVED			
Relinquished by: (Signature)		Date/Time		Received by: (Signature) <i>Channawut 5/18/93 0950</i>							The following MUST BE completed by the laboratory accepting samples for analysis: 1. Have all samples received for analysis been stored in ice? <u>y</u> 2. Will samples remain refrigerated until analyzed? <u>y</u> 3. Did any samples received for analysis have head space? <u>N</u> 4. Were samples in appropriate containers and properly packaged? <u>y</u> <i>Chw</i> Signature <i>Seely</i> Title <u>5/18/93</u> Date						
Relinquished by: (Signature)		Date/Time		Received by: (Signature)													
Relinquished by: (Signature)		Date/Time		Received by: (Signature)													
Relinquished by: (Signature)		Date/Time		Received by: (Signature)													



# SEQUOIA ANALYTICAL

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

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

Client Project ID: Unocal #3135, 845 66th Ave., Oakland  
Sample Matrix: Soil  
Analysis Method: EPA 5030/8015/8020  
First Sample #: 304-1237

Sampled: Apr 28, 1993  
Received: Apr 28, 1993  
Reported: May 5, 1993

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 304-1237 MW7 (5)	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	1.0	N.D.	
Benzene	0.005	N.D.	
Toluene	0.005	N.D.	
Ethyl Benzene	0.005	N.D.	
Total Xylenes	0.005	N.D.	

Chromatogram Pattern: --

### Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Analyzed:	4/30/93	4/30/93
Instrument Identification:	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	100	100

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

### SEQUOIA ANALYTICAL

  
Scott A. Chieffo  
Project Manager



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

Client Project ID: Unocal #3135, 845 66th Ave., Oakland  
Sample Matrix: Soil  
Analysis Method: EPA 3550/8015  
First Sample #: 304-1237

Sampled: Apr 28, 1993  
Received: Apr 28, 1993  
Reported: May 5, 1993

## TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit mg/kg	Sample I.D. 304-1237 MW7 (5)	Sample I.D. Matrix Blank
Extractable Hydrocarbons	1.0	N.D.	

Chromatogram Pattern: --

### Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Extracted:	5/3/93	5/3/93
Date Analyzed:	5/4/93	5/4/93
Instrument Identification:	HP-3B	HP-3B

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

SEQUOIA ANALYTICAL

  
Scott A. Chieffo  
Project Manager

CHAIN OF CUSTODY

SAMPLER <i>[Signature]</i>		SITE NAME & ADDRESS UNOCAL #3135 / OAKLAND 845 66TH AVE.							ANALYSES REQUESTED				TURN AROUND TIME: REGULAR	
WITNESSING AGENCY									TOX-C	TOX-E	TOX-D			
SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION					REMARKS	
M07(S)	4/28/93		X		X		1	SEE SAMPLE ID NO.	X	X	X		3041237	
Relinquished by: (Signature) <i>[Signature]</i>	Date/Time 4/28/93 1830	Received by: (Signature) <i>[Signature]</i>		The following MUST BE completed by the laboratory accepting samples for analysis:										
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		1. Have all samples received for analysis been stored in ice? <i>Y</i>										
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		2. Will samples remain refrigerated until analyzed? <i>Y</i>										
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		3. Did any samples received for analysis have head space? <i>N</i>										
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		4. Were samples in appropriate containers and properly packaged? <i>Y</i>										
				<i>[Signature]</i> Signature		<i>FS</i> Title		<i>4/28/93</i> Date						



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Kaprealian Engineering, Inc.  
2401 Stanwell Dr., Ste. 400  
Concord, CA 94520

Client Project ID: Unocal #3135, 845 66th Ave., Oakland

Attention: Mardo Kaprealian, P.E. QC Sample Group: 304-1237

Reported: May 5, 1993

## QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015
Analyst:	K. Wimer	K. Wimer
Reporting Units:	mg/kg	mg/kg
Date Analyzed:	May 4, 1993	May 4, 1993
Sample #:	304-1237	Matrix Blank

Surrogate		
% Recovery:	90	88

SEQUOIA ANALYTICAL

  
Scott A. Chieffo  
Project Manager

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