KAPREALIAN ENGINEERING
INCORPORATED

Rec 1/26/93
STID 1119

January 11, 1993

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

Attention: Mr. Tom Peacock

RE: Unocal Service Station #0746
3943 Broadway
Oakland, California 611

Dear Mr. Peacock:

Per the request of Mr. Ed Ralston of Unocal Corporation, enclosed please find our report dated December 28, 1992, 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.

Judy A. Dewey

jad\82

Enclosure

cc: Ed Ralston, Unocal Corporation

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

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P89-0805.QR7
December 28, 1992

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

Attention: Mr. Ed Ralston

RE: Quarterly Report
Unocal Service Station #0746
3943 Broadway
Oakland, California

Dear Mr. Ralston:

This report presents the results of the most recent quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per KEI's proposal (KEI-P89-0805.P6) dated April 15, 1991, and as modified in KEI's quarterly report (KEI-P89-0805.QR5) dated December 13, 1991. The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from September through November of 1992.

## BACKGROUND

The subject site contains a Unocal service station facility. Two underground fuel storage tanks, one waste oil tank, and the product piping were removed from the site in August of 1989 during tank replacement activities. The fuel tank pit was subsequently overexcavated in order to remove contaminated soil. Twelve monitoring wells (seven on-site and five off-site) and one recovery well have been installed at and in the vicinity of the site.

A site description, detailed background information including a summary of all of the soil and ground water subsurface investigation/remediation work conducted to date, site hydrogeologic conditions, and tables that summarize all of the soil and ground water sample analytical results are presented in KEI's report (KEI-P89-0805.R9) dated September 25, 1992.

## RECENT FIELD ACTIVITIES

The 12 wells (MW1 through MW12) were monitored three times and were sampled once during the quarter, except for well MW5, which was not sampled due to the presence of free product, and wells MW8 and MW9, which were inaccessible, and therefore they were neither monitored nor sampled during the November 20, 1992, monitoring and sampling

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Concord, California 94520
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event. In addition, wells MW3 and MW5 were monitored and purged three additional times during the quarter, and well MW8 was monitored and purged two additional times. A total of approximately 4.5 oz. of free product were also purged from monitoring well MW5. Prior to sampling, the wells were checked for depth to water and the presence of free product. During 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, except for free product observed in well MW5 during five of the six monitoring events, and a sheen observed in well MW3 during the November 20, 1992, sampling event. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from the wells (except MW5, MW8, and MW9) on November 20, 1992. Prior to sampling, the wells were each purged of between 3 and 8 gallons of water by the use of a surface pump. The samples were collected by the use of a clean Teflon bailer. The samples were decanted into clean VOA vials that were then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to a state-certified laboratory.

HYDROLOGY

The measured depth to ground water at the site on November 20, 1992, ranged between 8.34 and 14.25 feet below grade. The water levels in wells MW1, MW2, MW3, MW6, MW7, MW10, and MW11, have shown net decreases ranging from 0.16 to 2.21 feet, and wells MW4, MW5, and MW12 have shown net increases ranging from 0.15 to 0.51 feet since August 25, 1992. Based on the water level data gathered during the quarter, the ground water flow direction appeared to be to the south-southwest, as shown on the attached Potentiometric Surface Maps, Figures 1, 2, and 3. The flow direction reported this quarter is similar to the flow direction reported since the inception of monitoring in November 1988. The average hydraulic gradient across the site on November 20, 1992, ranged between 0.015 and 0.024.

ANALYTICAL RESULTS

The ground water samples were analyzed at Sequoia Analytical Laboratory and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by EPA method 5030/modified 8015, and benzene, toluene, xylenes, and ethylbenzene (BTX&E) by EPA method 8020.

The ground water sample analytical results are summarized in Table 2. The concentrations of TPH as gasoline and benzene detected in

the ground water samples collected this quarter are shown on the attached Figures 4 and 5, respectively. Copies of the laboratory analytical results and the Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results for the ground water samples collected and evaluated to date, KEI recommends the continuation of the current ground water monitoring and sampling program, per KEI's proposal (KEI-P89-0805.P6) dated April 15, 1991, and as modified in KEI's quarterly report (KEI-P89-0805.QR5) dated December 13, 1991. In addition, KEI recommends the continuation of the bi-weekly purging of monitoring wells MW3, MW5, and MW8 in order to reduce levels of contamination in the vicinity of these wells until a remediation system is designed and implemented at the subject site. In the interim, a continuous surface skimming free product recovery system has been installed in MW5.

KEI has reviewed a copy of a letter to Unocal from the Alameda County Health Care Services Agency (ACHCS) dated November 30, 1992. The letter requests that a Remedial Action Plan be submitted. KEI previously submitted a work plan/proposal (KEI-P89-0850.P7) dated March 9, 1992, to initiate remedial action at the site. The work plan proposed the installation of one extraction well (RW1) and conducting an aquifer test. However, after installation, the well development of RW1 resulted in a relatively slow ground water recovery rate, and the well dewatered several times. As a result, KEI did not recommend the installation of a ground water pump and treat system at that time. Rather, KEI reviewed the available data in order to evaluate alternate ground water remediation methods. Based on the fact that the original remedial action plan must now be altered, and based on the request for a remedial action plan by the ACHCS, KEI recommends that a meeting be conducted between Unocal, the ACHCS, and KEI in order to discuss alternate remedial methods.

DISTRIBUTION

A copy of this report should be sent to the ACHCS, and to Mr. Lester Feldman of the Regional Water Quality Control Board, San Francisco 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

Aram Kaloustian
Project Engineer

/bp

Attachments: Tables 1 & 2
Location Map
Potentiometric Surface Maps - Figures 1, 2 & 3
Concentrations of TPH as Gasoline - Figure 4
Concentrations of benzene - Figure 5
Laboratory Analyses
Chain of Custody documentation

KEI-P89-0805.QR7
December 28, 1992

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) | Product Purged (ounces) |
|---|---|---|---|---|---|---|
| **(Monitored and Sampled on November 20, 1992)** | | | | | | |
| MW1 | 72.38 | 8.69 | 0 | No | 8 | 0 |
| MW2 | 71.57 | 10.05 | 0 | No | 7 | 0 |
| MW3 | 71.25 | 10.76 | 0 | Yes | 8 | 0 |
| MW4 | 71.40 | 10.08 | 0 | No | 7 | 0 |
| MW5 | 71.08* | 10.52 | 0.01 | N/A | 0 | <1 |
| MW6 | 72.13 | 8.34 | 0 | No | 8 | 0 |
| MW7 | 72.55 | 9.28 | 0 | No | 6 | 0 |
| MW8 | WELL WAS INACCESSIBLE | | | | | |
| MW9 | WELL WAS INACCESSIBLE | | | | | |
| MW10 | 67.65 | 14.25 | 0 | No | 6 | 0 |
| MW11 | 65.07 | 13.36 | 0 | No | 4 | 0 |
| MW12 | 66.88 | 13.01 | 0 | No | 3 | 0 |
| **(Monitored on November 4, 1992)** | | | | | | |
| MW3 | 71.74 | 10.27 | 0 | -- | 50 | 0 |
| MW5 | 71.58* | 10.02 | 0.01 | N/A | 50 | 2.5 |
| MW8 | WELL WAS INACCESSIBLE | | | | | |
| **(Monitored and Developed on October 27, 1992)** | | | | | | |
| RW1 | 70.83 | 10.37 | 0 | -- | 20 | 0 |
| **(Monitored on October 19, 1992)** | | | | | | |
| MW1 | 72.12 | 8.95 | 0 | -- | 0 | 0 |
| MW2 | 71.22 | 10.40 | 0 | -- | 0 | 0 |
| MW3 | 71.03 | 10.98 | 0 | -- | 50 | 0 |
| MW4 | 71.00 | 10.48 | 0 | -- | 0 | 0 |
| MW5 | 70.83* | 10.77 | 0.01 | N/A | 50 | <1 |
| MW6 | 71.86 | 8.61 | 0 | -- | 0 | 0 |
| MW7 | 72.30 | 9.53 | 0 | -- | 0 | 0 |
| MW8 | 69.73 | 11.98 | 0 | -- | 50 | 0 |
| MW9 | 69.16 | 11.97 | 0 | -- | 0 | 0 |
| MW10 | 67.88 | 14.02 | 0 | -- | 0 | 0 |
| MW11 | 64.55 | 13.88 | 0 | -- | 0 | 0 |
| MW12 | 66.72 | 13.17 | 0 | -- | 0 | 0 |

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December 28, 1992

TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

| Well # | Ground Water Elevation (feet) | Depth to Water (feet) | Product Thickness (feet) | Sheen | Water Purged (Gallons) | Product Purged (ounces) |
|---|---|---|---|---|---|---|
| | | **(Monitored on October 7, 1992)** | | | | |
| MW3 | 70.95 | 11.06 | 0 | -- | 20 | 0 |
| MW5 | 70.79 | 10.80 | 0 | -- | 20 | 0 |
| MW8 | 70.15 | 11.56 | 0 | -- | 20 | 0 |
| | | **(Monitored on September 23, 1992)** | | | | |
| MW1 | 72.24 | 8.83 | 0 | -- | 0 | 0 |
| MW2 | 71.37 | 10.25 | 0 | -- | 0 | 0 |
| MW3 | 71.17 | 10.84 | 0 | -- | 50 | 0 |
| MW4 | 71.07 | 10.41 | 0 | -- | 0 | 0 |
| MW5 | 70.98 | 10.61 | Trace | N/A | 50 | <1 |
| MW6 | 72.00 | 8.47 | 0 | -- | 0 | 0 |
| MW7 | 72.41 | 9.42 | 0 | -- | 0 | 0 |
| MW8 | 69.86 | 11.85 | 0 | -- | 50 | 0 |
| MW9 | 69.32 | 11.81 | 0 | -- | 0 | 0 |
| MW10 | 67.80 | 14.10 | 0 | -- | 0 | 0 |
| MW11 | 63.87 | 14.56 | 0 | -- | 0 | 0 |
| MW12 | 66.51 | 13.38 | 0 | -- | 0 | 0 |
| | | **(Monitored on September 8, 1992)** | | | | |
| MW3 | 71.27 | 10.74 | 0 | -- | 50 | 0 |
| MW5 | 71.07 | 10.52 | Trace | N/A | 50 | <1 |
| MW8 | 69.94 | 11.77 | 0 | -- | 28 | 0 |

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TABLE 1 (Continued)

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

| Well # | Surface Elevation** (feet) |
|---|---|
| MW1 | 81.07 |
| MW2 | 81.62 |
| MW3 | 82.01 |
| MW4 | 81.48 |
| MW5 | 81.59 |
| MW6 | 80.47 |
| MW7 | 81.83 |
| MW8 | 81.71 |
| MW9 | 81.13 |
| MW10 | 81.90 |
| MW11 | 78.43 |
| MW12 | 79.89 |
| RW1 | 81.20 |

-- Sheen determination was not performed.

* The elevation of ground water was corrected due to the presence of free product by the use of a specific gravity of 0.75.

** The elevations of the tops of the well covers have been surveyed relative to MSL, per City of Oakland Benchmark #1336.

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December 28, 1992

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

| Date | Well # | TPH as Gasoline | Benzene | Toluene | Xylenes | Ethyl-benzene |
|---|---|---|---|---|---|---|
| 11/20/92 | MW1 | ND | 0.75 | ND | ND | ND |
| | MW2 | 510♦ | ND | ND | ND | ND |
| | MW3 | 1,100,000♦♦ | 1,800 | 6,400 | 15,000 | 3,000 |
| | MW4 | ND | 6.2 | ND | 0.52 | 1.2 |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | ND |
| | MW8 | WELL WAS INACCESSIBLE | | | | |
| | MW9 | WELL WAS INACCESSIBLE | | | | |
| | MW10 | ND | ND | ND | ND | ND |
| | MW11 | ND | ND | ND | ND | ND |
| | MW12 | ND | ND | ND | ND | ND |
| 8/26/92 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 20,000 | 690 | 1,900 | 5,700 | 1,300 |
| | MW4 | 120 | 86 | 0.52 | 1.6 | 0.57 |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | 0.73 |
| | MW8 | 1,800 | 12 | 8.0 | 13 | 4.0 |
| | MW9 | 250 | 13 | ND | 3.8 | 8.6 |
| | MW10 | ND | ND | ND | ND | ND |
| | MW11 | ND | ND | ND | ND | ND |
| | MW12 | ND | ND | ND | ND | ND |
| 5/23/92 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 25,000 | 300 | 130 | 4,900 | 880 |
| | MW4 | ND | ND | ND | ND | ND |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | ND |
| | MW8 | 2,100 | 8.6 | 1.6 | 28 | 1.7 |
| | MW9 | 460 | 18 | 0.66 | 3.2 | 1.4 |
| | MW10 | ND | ND | ND | ND | ND |
| | MW11 | ND | ND | ND | ND | ND |

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December 28, 1992

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

| Date | Well # | TPH as Gasoline | Benzene | Toluene | Xylenes | Ethyl-benzene |
|---|---|---|---|---|---|---|
| 2/06/92 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | 0.36 | 0.66 | 0.62 | ND |
| | MW3 | 24,000 | 600 | 1,800 | 5,800 | 1,200 |
| | MW4 | 5,700 | 2,200 | 140 | 980 | 57 |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | ND |
| | MW8 | 2,600 | 4.1 | 7.0 | 93 | 31 |
| | MW9 | 660 | 41 | 1.0 | 15 | 33 |
| | MW10 | ND | ND | ND | ND | ND |
| | MW11 | ND | ND | ND | ND | ND |
| 11/19/91 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 22,000 | 250 | 440 | 3,000 | 660 |
| | MW4 | 55 | 9.2 | 4.5 | 6.7 | 1.4 |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | 32 | ND | ND | ND | ND |
| | MW8 | 1,600 | 8.1 | 1.8 | 52 | 19 |
| | MW9 | 360 | 17 | 0.45 | 11 | 15 |
| 8/28/91 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 16,000 | 650 | 2,200 | 5,400 | 1,100 |
| | MW4 | 2,000 | 1,500 | 20 | 300 | 120 |
| | MW5 | NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT | | | | |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | ND |
| | MW8 | 1,800 | 3.2 | 1.9 | 74 | 19 |
| | MW9 | 450 | 17 | 0.9 | 14 | 13 |
| 5/28/91 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 24,000 | 570 | 1,100 | 4,200 | 810 |
| | MW4 | 38 | ND | ND | 1.9 | ND |
| | MW5 | 24,000 | 2,300 | 3,400 | 6,000 | 1,300 |
| | MW6 | ND | ND | ND | 0.42 | ND |
| | MW7 | 39 | ND | ND | 0.73 | ND |
| | MW8 | 4,800 | 4.2 | 1.3 | 170 | 5.1 |
| | MW9 | 590 | 6.0 | 0.43 | 1.4 | 6.8 |

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

| Date | Well # | TPH as Gasoline | Benzene | Toluene | Xylenes | Ethyl-benzene |
|---|---|---|---|---|---|---|
| 2/25/91 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | 0.68 | 0.42 | 0.86 | ND |
| | MW3 | 37,000 | 730 | 2,900 | 7,300 | 1,300 |
| | MW4 | 22,000 | 600 | 1,300 | 2,800 | 780 |
| | MW5 | 25,000 | 950 | 1,300 | 3,500 | 900 |
| | MW6 | ND | 0.37 | 0.40 | 1.5 | 0.35 |
| | MW7 | 70 | ND | ND | 0.52 | ND |
| | MW8 | 5,300 | 17 | 6.1 | 300 | 53 |
| | MW9 | 390 | 13 | 1.1 | 14 | 2.8 |
| 11/07/90 | MW1 | 45 | ND | ND | ND | ND |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 42,000 | 1,400 | 5,000 | 7,500 | 1,800 |
| | MW4 | 180 | 1.5 | 0.37 | 26 | 6.3 |
| | MW5 | 20,000 | 640 | 1,100 | 3,000 | 670 |
| | MW6 | ND | ND | ND | ND | ND |
| | MW7 | ND | ND | ND | ND | ND |
| | MW8 | 4,700 | 28 | 38 | 7,200 | 86 |
| | MW9 | 480 | 7.8 | 1.2 | 47 | 13 |
| 8/16/90 | MW1 | ND | ND | ND | ND | ND |
| | MW2 | ND | ND | 6.7 | ND | ND |
| | MW3 | 6,800 | 600 | 660 | 160 | 760 |
| | MW4 | 3,600 | 480 | 17 | 260 | 230 |
| | MW5 | 16,000 | 1,400 | 1,900 | 660 | 2,800 |
| 2/15/90 | MW1 | 170 | 7.9 | ND | 2.8 | 2.2 |
| | MW2 | ND | ND | ND | ND | ND |
| | MW3 | 20,000 | 1,700 | 2,100 | 3,100 | 750 |
| | MW4 | 150 | 8.0 | 8.0 | 45 | 10 |
| | MW5 | 24,000 | 1,500 | 1,700 | 3,600 | 260 |
| 11/01/89 | MW1 | ND | ND | ND | 0.30 | ND |
| | MW2 | 200 | ND | ND | 1.2 | 3.0 |
| | MW3 | 13,000 | 57 | 48 | 120 | 1.7 |

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

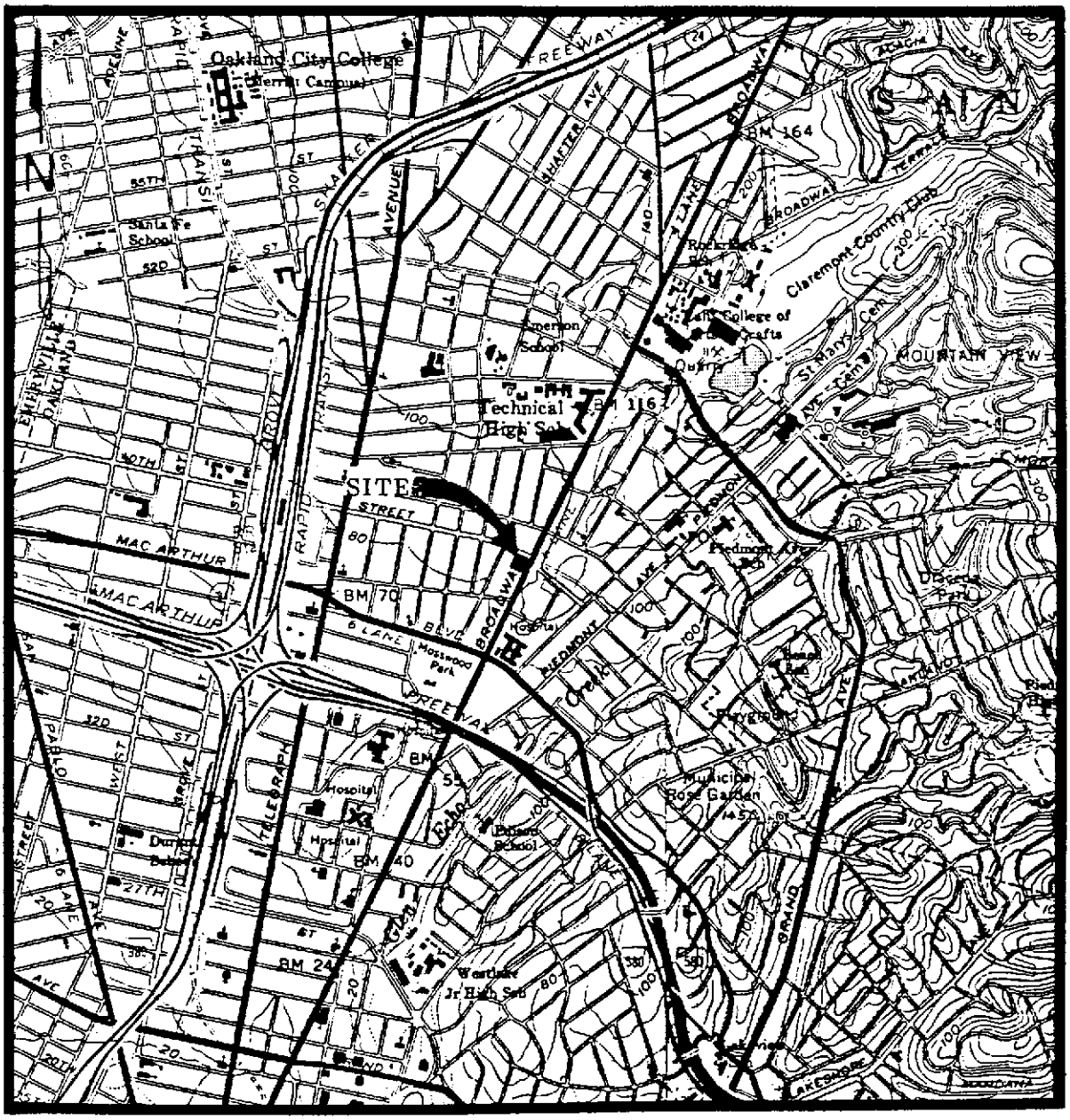
♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected did not appear to be gasoline.

♦♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be gasoline and non-gasoline mixture.

ND = Non-detectable.

-- Indicates analysis was not performed.

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

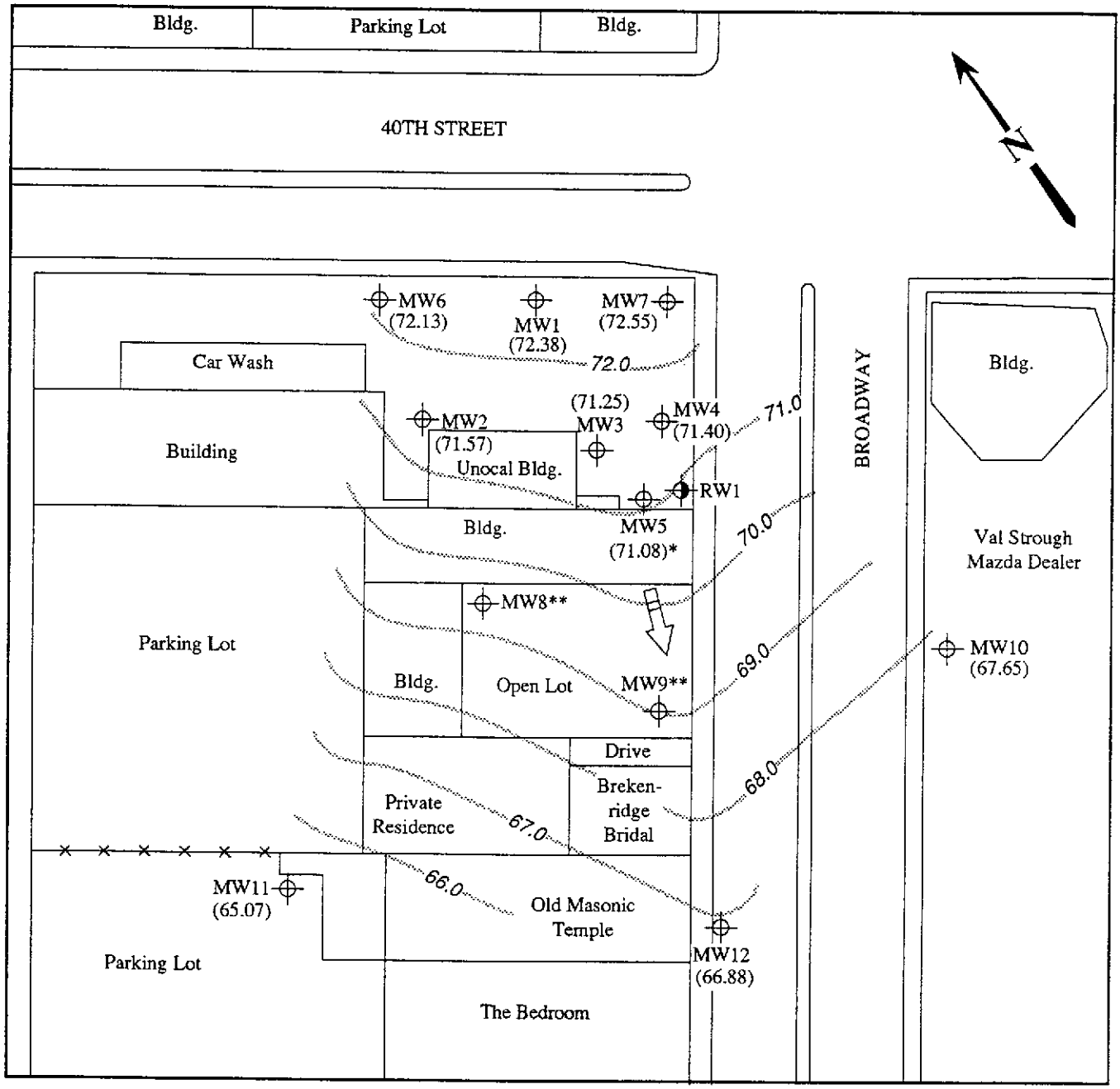



Base modified from 7.5 minute U.S.G.S. Oakland East and West Quadrangles (both photorevised 1980)

0 2000 4000

Approx. scale feet

| | | |
|---|---|---|
| KAPREALIAN ENGINEERING INCORPORATED | UNOCAL SERVICE STATION #0746<br>3943 BROADWAY<br>OAKLAND, CA | LOCATION MAP |




## LEGEND

- Monitoring well
- 6-inch diameter recovery well
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation
- * Ground water elevation corrected due to the presence of free product
- ** Well was inaccessible.

0 60 120

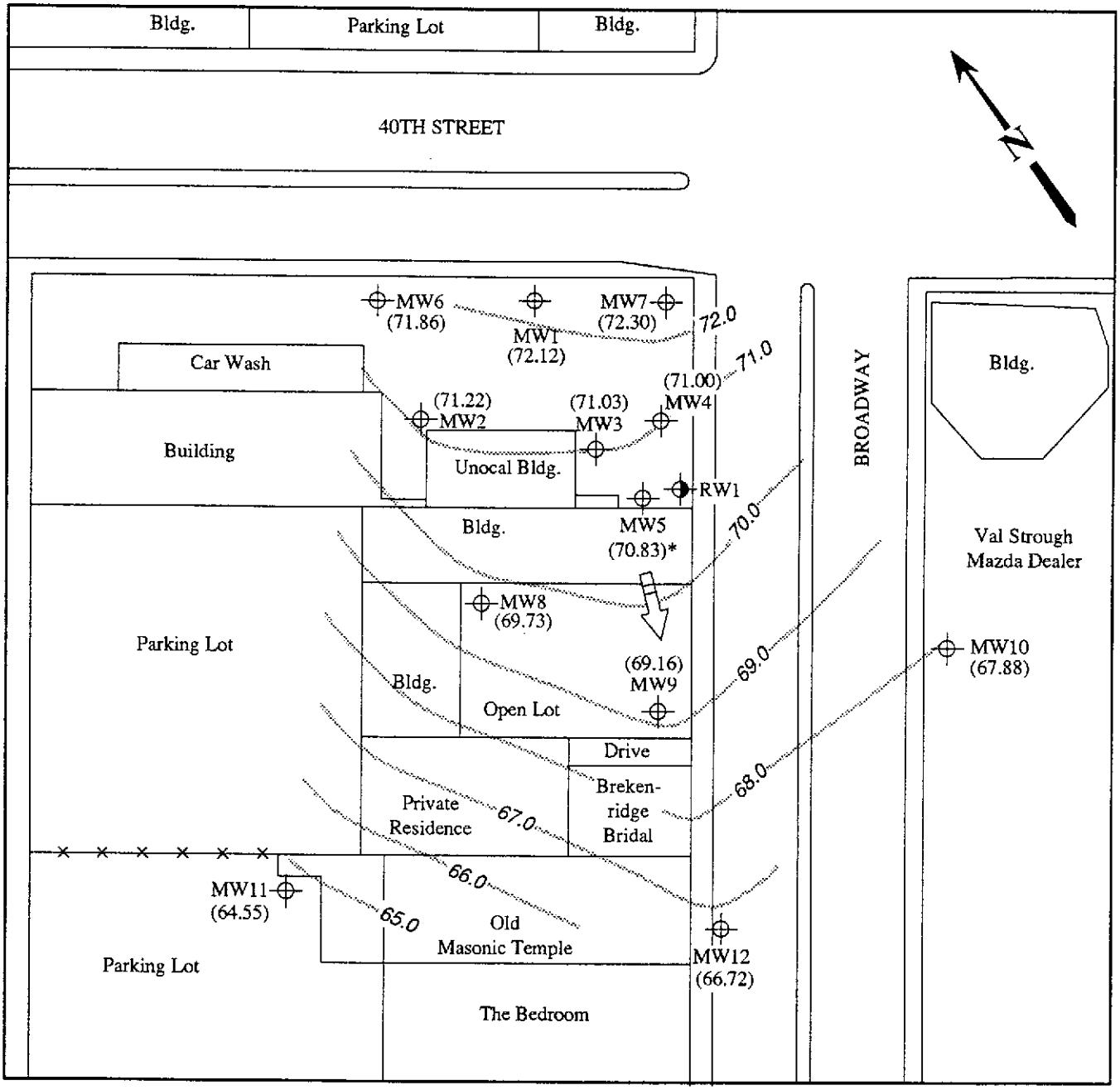
Approx. scale feet

**POTENTIOMETRIC SURFACE MAP FOR THE NOVEMBER 20, 1992 MONITORING EVENT**

KAPREALIAN ENGINEERING
INCORPORATED

**UNOCAL SERVICE STATION #0746**
**3943 BROADWAY**
**OAKLAND, CA**

FIGURE
**1**




LEGEND

- Monitoring well
- 6-inch diameter recovery well
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

* Ground water elevation corrected due to the presence of free product

0 60 120

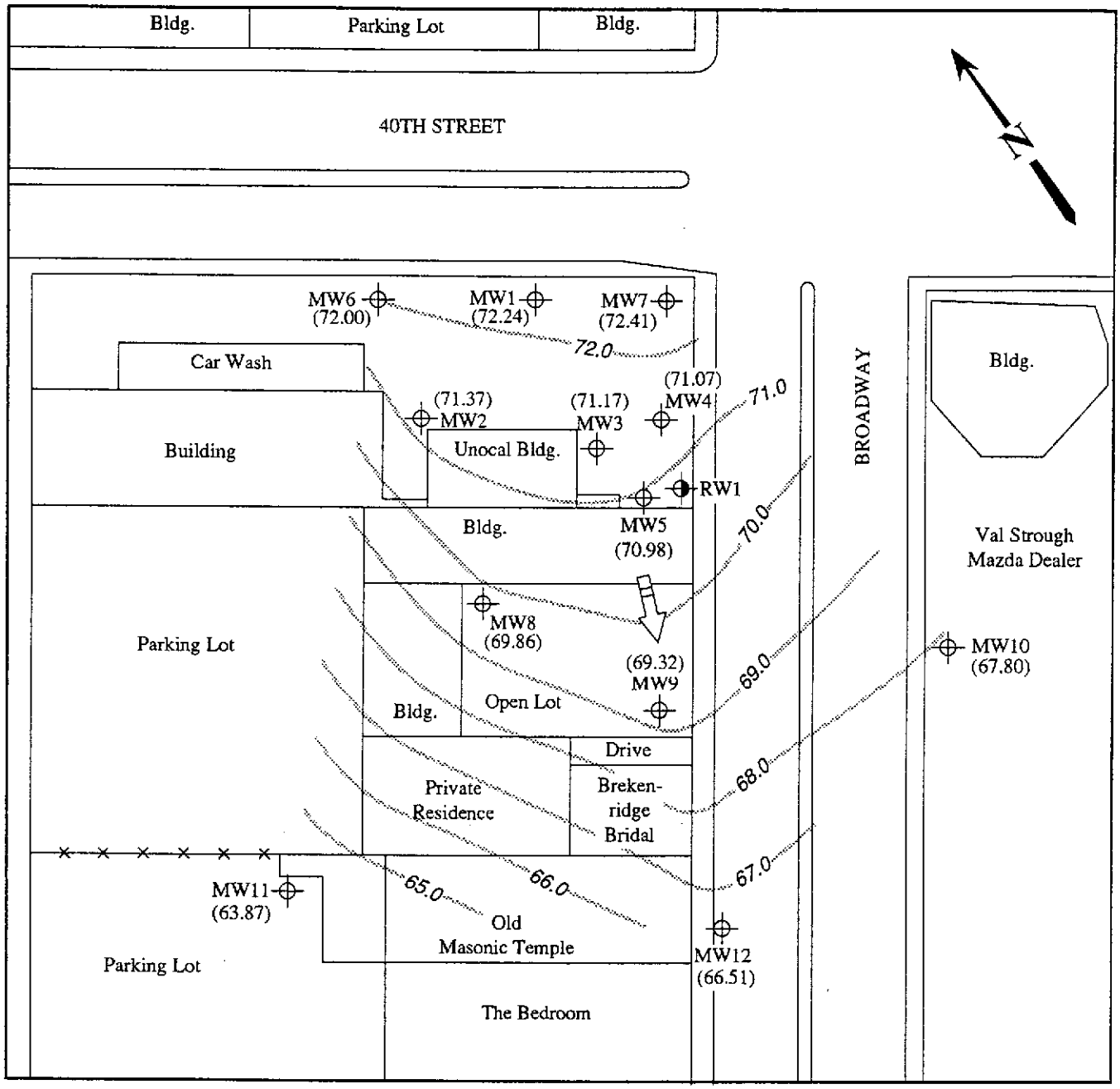
Approx. scale feet

**POTENTIOMETRIC SURFACE MAP FOR THE OCTOBER 19, 1992 MONITORING EVENT**

KAPREALIAN ENGINEERING
INCORPORATED

**UNOCAL SERVICE STATION #0746**
**3943 BROADWAY**
**OAKLAND, CA**

FIGURE
**2**




LEGEND

- Monitoring well
- 6-inch diameter recovery well
- ( ) Ground water elevation in feet above Mean Sea Level
- Direction of ground water flow
- Contours of ground water elevation

0 60 120

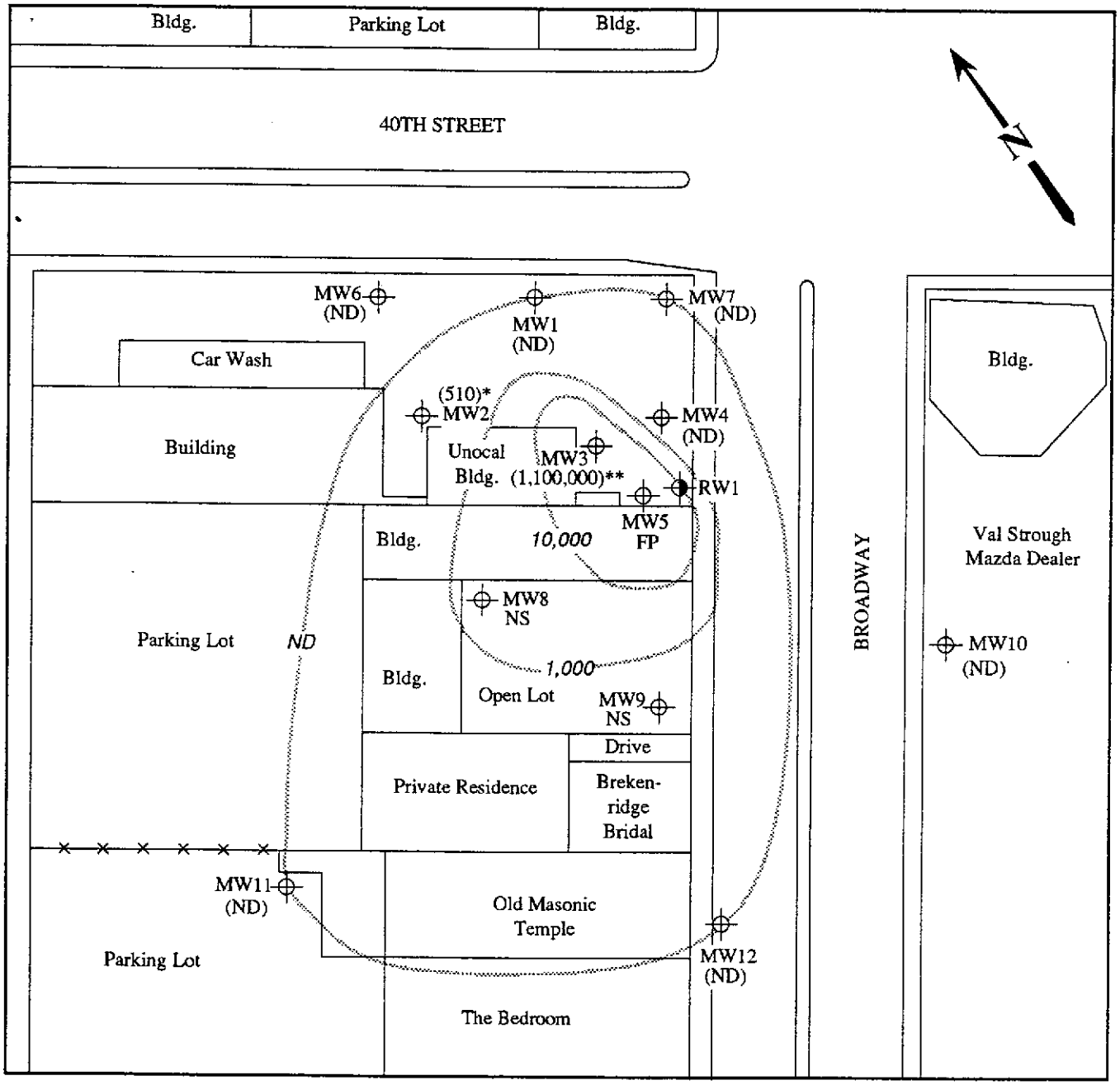
Approx. scale feet

**POTENTIOMETRIC SURFACE MAP FOR THE SEPTEMBER 23, 1992 MONITORING EVENT**

KAPREALIAN ENGINEERING
INCORPORATED

**UNOCAL SERVICE STATION #0746**
**3943 BROADWAY**
**OAKLAND, CA**

FIGURE
**3**




LEGEND

- Monitoring well
- 6-inch diameter recovery well
- [ ] Concentration of TPH as gasoline in ppb
- Direction of ground water flow
- Approximate iso-concentration contours of TPH as gasoline contamination in ground water

0 60 120

Approx. scale feet

ND = Non-detectable, FP = Free product, NS = Not sampled

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

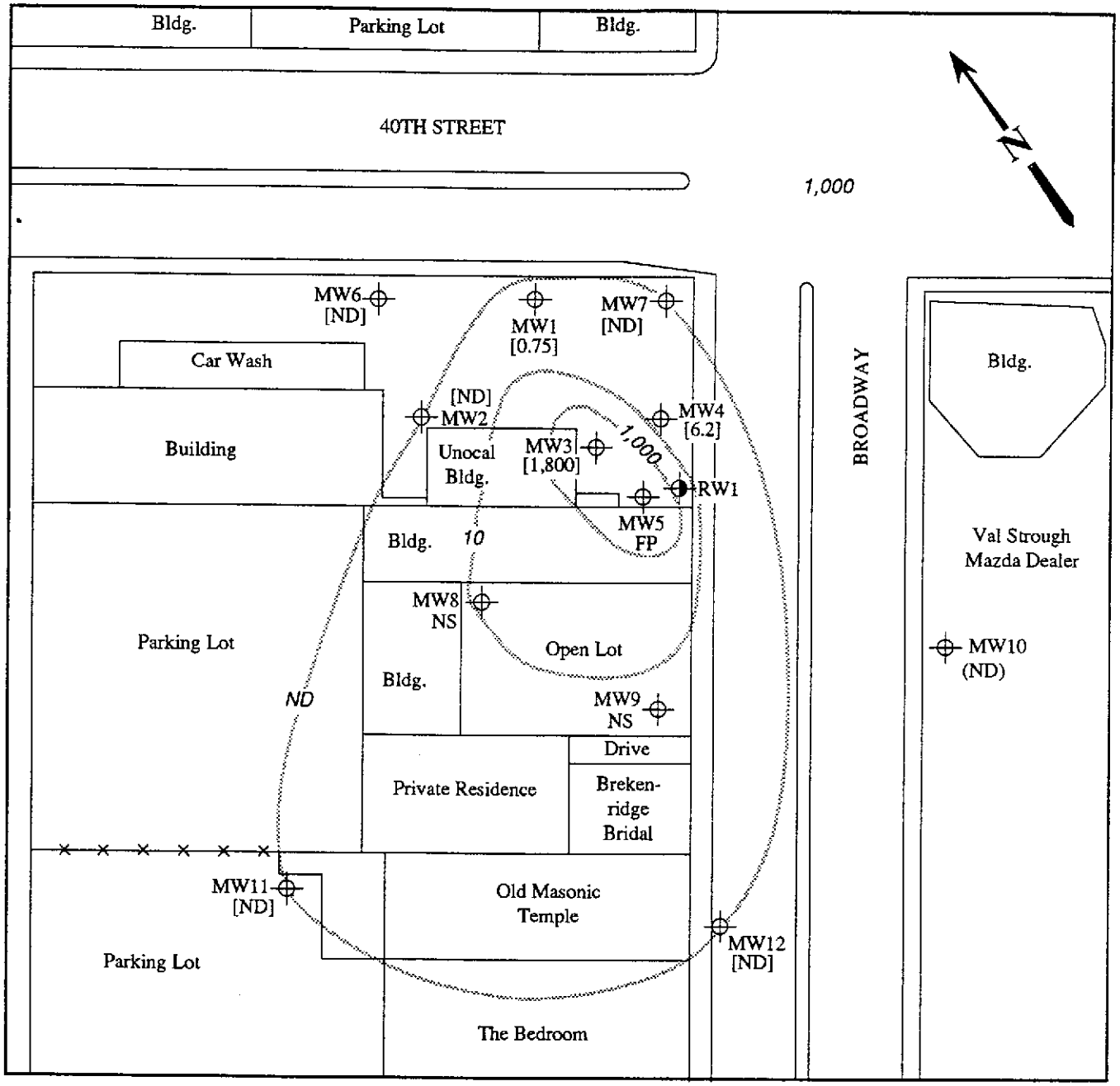
* The lab reported that the hydrocarbons detected are a gasoline and non-gasoline mixture.

**CONCENTRATIONS OF TPH AS GASOLINE IN GROUND WATER ON NOVEMBER 20, 1992**

KAPREALIAN ENGINEERING
INCORPORATED

**UNOCAL SERVICE STATION #0746**
**3943 BROADWAY**
**OAKLAND, CA**

FIGURE
**4**




## LEGEND

- Monitoring well
- 6-inch diameter recovery well
- [ ] Concentration of benzene in ppb
- Direction of ground water flow
- Approximate iso-concentration contours of benzene contamination in ground water

ND = Non-detectable, FP = Free product, NS = Not sampled

0 60 120

Approx. scale feet

**CONCENTRATIONS OF BENZENE IN GROUND WATER ON NOVEMBER 20, 1992**

KAPREALIAN ENGINEERING
INCORPORATED

**UNOCAL SERVICE STATION #0746**
**3943 BROADWAY**
**OAKLAND, CA**

FIGURE
**5**

# SEQUOIA ANALYTICAL

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


| | | | | |
|---|---|---|---|---|
| Kaprealian Engineering, Inc. | Client Project ID: | Unocal, 3943 Broadway, Oakland | Sampled: | Nov 20, 1992 |
| 2401 Stanwell Drive, Suite 400 | Sample Matrix: | Water | Received: | Nov 23, 1992 |
| Concord, CA 94520 | Analysis Method: | EPA 5030/8015/8020 | Reported: | Dec 3, 1992 |
| Attention: Mardo Kaprealian, P.E. | First Sample #: | 211-1131 | | |

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

| Analyte | Reporting Limit µg/L | Sample I.D. 211-1131 MW 1 | Sample I.D. 211-1132 MW 2* | Sample I.D. 211-1133 MW 3 | Sample I.D. 211-1134 MW 4 | Sample I.D. 211-1135 MW 6 | Sample I.D. 211-1136 MW 7 |
|---|---|---|---|---|---|---|---|
| Purgeable Hydrocarbons | 50 | N.D. | 510 | 1,100,000 | N.D. | N.D. | N.D. |
| Benzene | 0.5 | 0.75 | N.D. | 1,800 | 6.2 | N.D. | N.D. |
| Toluene | 0.5 | N.D. | N.D. | 6,400 | N.D. | N.D. | N.D. |
| Ethyl Benzene | 0.5 | N.D. | N.D. | 3,000 | 1.2 | N.D. | N.D. |
| Total Xylenes | 0.5 | N.D. | N.D. | 15,000 | 0.52 | N.D. | N.D. |
| Chromatogram Pattern: | | -- | Discrete Peak | Gasoline and Non-Gasoline Mixture (>C9) | -- | -- | -- |

**Quality Control Data**

| | | | | | | |
|---|---|---|---|---|---|---|
| Report Limit Multiplication Factor: | 1.0 | 1.0 | 1,000 | 1.0 | 1.0 | 1.0 |
| Date Analyzed: | 11/25/92 | 11/30/92 | 11/25/92 | 11/25/92 | 11/25/92 | 11/25/92 |
| Instrument Identification: | HP-4 | HP-2 | HP-4 | HP-4 | HP-4 | HP-4 |
| Surrogate Recovery, %: (QC Limits = 70-130%) | 95 | 98 | 91 | 95 | 94 | 95 |

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

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Scott A. Chieffo
Project Manager

Please Note: * The above sample does not appear to contain gasoline. Purgeable Hydrocarbons are due to a single unidentified peak in the MTBE range.

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|---|---|---|---|---|
| Kaprealian Engineering, Inc. | Client Project ID: | Unocal, 3943 Broadway, Oakland | Sampled: | Nov 20, 1992 |
| 2401 Stanwell Drive, Suite 400 | Sample Matrix: | Water | Received: | Nov 23, 1992 |
| Concord, CA 94520 | Analysis Method: | EPA 5030/8015/8020 | Reported: | Dec 3, 1992 |
| Attention: Mardo Kapreallan, P.E. | First Sample #: | 211-1137 | | |

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

| Analyte | Reporting Limit µg/L | Sample I.D. 211-1137 MW 10 | Sample I.D. 211-1138 MW 11 | Sample I.D. 211-1139 MW 12 | 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: | 11/25/92 | 11/25/92 | 11/25/92 | 11/25/92 |
| Instrument Identification: | HP-4 | HP-4 | HP-4 | HP-4 |
| Surrogate Recovery, %: (QC Limits = 70-130%) | 98 | 97 | 98 | 107 |

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

# KAPREALIAN ENGINEERING, INC.

## CHAIN OF CUSTODY

SAMPLER: Vartkes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland, 3943 Broadway

ANALYSES REQUESTED: TPHG & BTXE

TURN AROUND TIME: Regular

| SAMPLE ID NO. | DATE | TIME | SOIL | WATER | GRAB | COMP | NO. OF CONT. | SAMPLING LOCATION | TPHG & BTXE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| MW 1 | 11/20/92 | 11:15 am | | X | X | | 2 | Monitoring Well | X | 211131 AB |
| MW 2 | " | | | X | X | | 2 | " " | X | 32 AB |
| MW 3 | " | | | X | X | | 2 | " " | X | 33 AB |
| MW 4 | " | | | X | X | | 2 | " " | X | 34 AB |
| MW 6 | " | | | X | X | | 2 | " " | X | 35 AB |
| MW 7 | " | | | X | X | | 2 | " " | X | 36 AB |
| MW 10 | " | | | X | X | | 2 | " " | X | 37 AB |
| MW 11 | " | | | X | X | | 2 | " " | X | 38 AB |
| MW 12 | " | 3:05 pm. | | X | X | | 2 | " " | X | 39 AB |

| Relinquished by: (Signature) | Date/Time | Received by: (Signature) |
|---|---|---|
| W. Vartkes | 11/23/92 0825 | [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? Y
2. Will samples remain refrigerated until analyzed? Y
3. Did any samples received for analysis have head space? NO
4. Were samples in appropriate containers and properly packaged? Y

[signature] — Signature; F.S. — Title; 11/23/92 — Date

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

Client Project ID: Unocal, 3943 Broadway, Oakland
QC Sample Group: 2111131-39
Reported: Dec 3, 1992

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes |
|---|---|---|---|---|
| Method: | EPA 8015/8020 | EPA 8015/8020 | EPA 8015/8020 | EPA 8015/8020 |
| Analyst: | A.T. | A.T. | A.T. | A.T. |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L |
| Date Analyzed: | Nov 25, 1992 | Nov 25, 1992 | Nov 25, 1992 | Nov 25, 1992 |
| QC Sample #: | 211-1053 | 211-1053 | 211-1053 | 211-1053 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. |
| **Spike Conc. Added:** | 20 | 20 | 20 | 60 |
| **Conc. Matrix Spike:** | 21 | 21 | 21 | 66 |
| **Matrix Spike % Recovery:** | 105 | 105 | 105 | 110 |
| **Conc. Matrix Spike Dup.:** | 21 | 21 | 21 | 66 |
| **Matrix Spike Duplicate % Recovery:** | 105 | 105 | 105 | 110 |
| **Relative % Difference:** | 0.0 | 0.0 | 0.0 | 0.0 |

Laboratory blank contained the following analytes: None Detected

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Scott A. Chieffo
Project Manager

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