KAPREALIAN ENGINEERING
INCORPORATED

March 4, 1993

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

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

Gentlemen:

Per the request of Mr. Ed Ralston of Unocal Corporation, enclosed please find our work plan/proposal dated February 15, 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.

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

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KEI-P89-0805.P7R
February 15, 1993

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

4/19,1169

Attention: Mr. Edward C. Ralston

RE: Revised Work Plan/Proposal
Unocal Service Station #0746
3943 Broadway
Oakland, California 94611

Dear Mr. Ralston:

This revised work plan/proposal describes the plan for a pilot vapor extraction test. The purpose of the test is to determine whether vapor extraction is a feasible and practical means of remediation at the subject site.

Previous work conducted at the site includes the removal of two underground fuel storage tanks and one waste oil tank, the overexcavation of contaminated soil in the vicinity of the tank pit, the installation of twelve monitoring wells (seven on-site and five off-site), and the installation of one aquifer testing well (on-site). Analytical results of ground water samples collected to date indicate that ground water has been most significantly impacted in the southern portion of the Unocal site. Analytical results of soil samples previously collected indicated that hydrocarbon contaminated soil existed in the vicinity of the tank pit located to the northeast of the station building. However, it appears that the majority of the contaminated soil was removed during the tank replacement excavation activities.

A site description, detailed background information including a summary of all the soil and ground water subsurface investigation/remediation work conducted to date, site hydrogeological 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.

PROPOSED FIELD WORK-PILOT VAPOR EXTRACTION TEST

1. KEI proposes conducting a pilot vapor extraction test in order to assess the feasibility of vapor extraction as an in situ remediation technique for the subject site. The pilot test is anticipated to be conducted over a period of four days. The pilot test system will consist of a vapor extraction well head

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connected to the vapor extraction test well (recovery well RW1), flexible tubing, an internal combustion engine (ICE), and a propane tank. The location of the vapor extraction test well (RW1) is shown on Figure 1, and the pilot test system is shown on the attached Figure 2.

The ICE will be used to apply a vacuum to the vapor extraction test well. The propane tank will be used as a supplemental fuel source for the ICE. The applied vacuum and extraction air flow rate will be monitored throughout the test.

Five monitoring wells (MW3, MW4, MW5, MW7, and MW9), as shown on the attached Well Location Map, Figure 1, will be used as observation wells for the purpose of this test. The observation wells will be specially fitted with well caps and quick disconnect fittings so that differential pressures can be monitored by the use of magnehelic gauges. The differential pressures will be monitored throughout the test in order to determine the influence of the applied vacuum through the vadose zone.

Influent and effluent air samples will be collected in Tedlar bags by the use of a vacuum pump. Influent samples will be collected in order to determine the concentration of contaminants in the extracted air stream. Effluent air samples will be collected in order to verify that sufficient destruction efficiency is established and maintained during the test as required by local air quality standards. In addition, a photoionization detector will be used to monitor the effluent air stream to ensure that allowable emission rates are maintained.

The air samples collected in Tedlar bags will be analyzed by Sequoia Analytical Laboratory in Concord, California, and will be accompanied by properly executed Chain of Custody documentation. The air samples will be analyzed for total petroleum hydrocarbons as gasoline, and for benzene, toluene, xylenes, and ethylbenzene constituents, by the use of modified EPA methods 8015 and 8020, respectively.

The analytical and differential pressure data collected during the pilot test will be used to determine if vapor extraction is an appropriate remedial technique for the subject site.

2. Conclusions

Conclusions and results will be described in a technical report. The technical report will be submitted to the Alameda County Health Care Services Agency and the Regional Water Quality Control Board, 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 generated will be reasonably representative of the site as a whole, and assume that subsurface conditions are reasonably conducive to interpolation and extrapolation.

The results of this proposed study will be based on the data obtained from the field and laboratory analyses obtained from a state certified laboratory. We will analyze all data generated 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 will be performed in accordance with generally accepted professional principles and practices existing for such work.

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

Sincerely,
Kaprealian Engineering Inc.

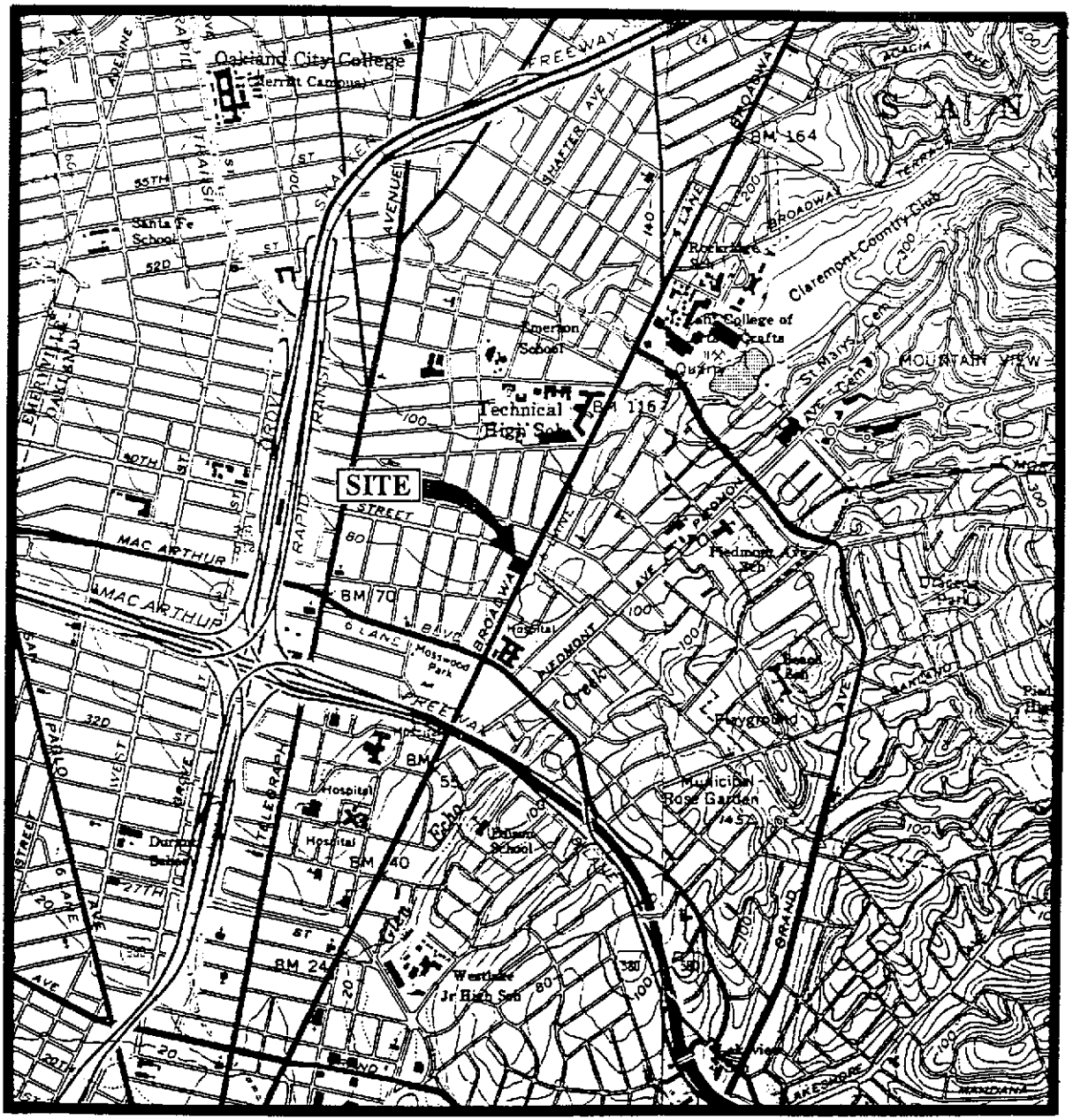
Joel G. Greger, C.E.G.
Senior Engineering Geologist

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

Aram Kaloustian
Project Engineer

/bp

Attachments: Location Map
Figure 1 - Well Location Map
Figure 2 - Pilot Vapor Extraction Test System Schematic

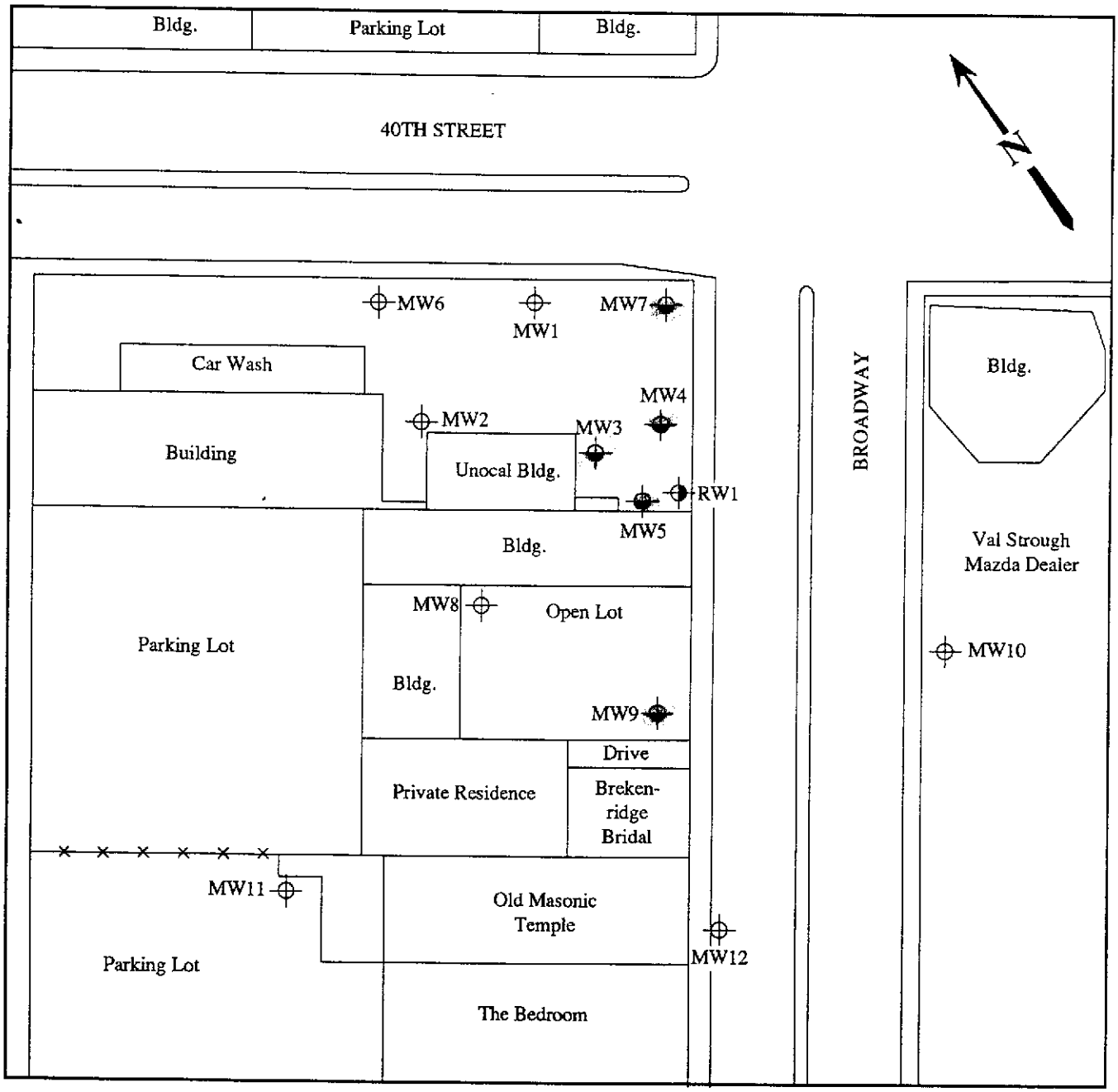


Base modified from 7.5 minute U.S.G.S. Oakland East and West Quadrangles (both photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #0746 3943 BROADWAY OAKLAND, CA	LOCATION MAP



MWs to be used as observation wells when vacuum applied to RW-1

LEGEND

- Monitoring well
- 6-inch diameter well to be used for vapor extraction pilot test
- Monitoring well to be used as observation well during vapor extraction test

0 60 120

Approx. scale feet

WELL LOCATION MAP

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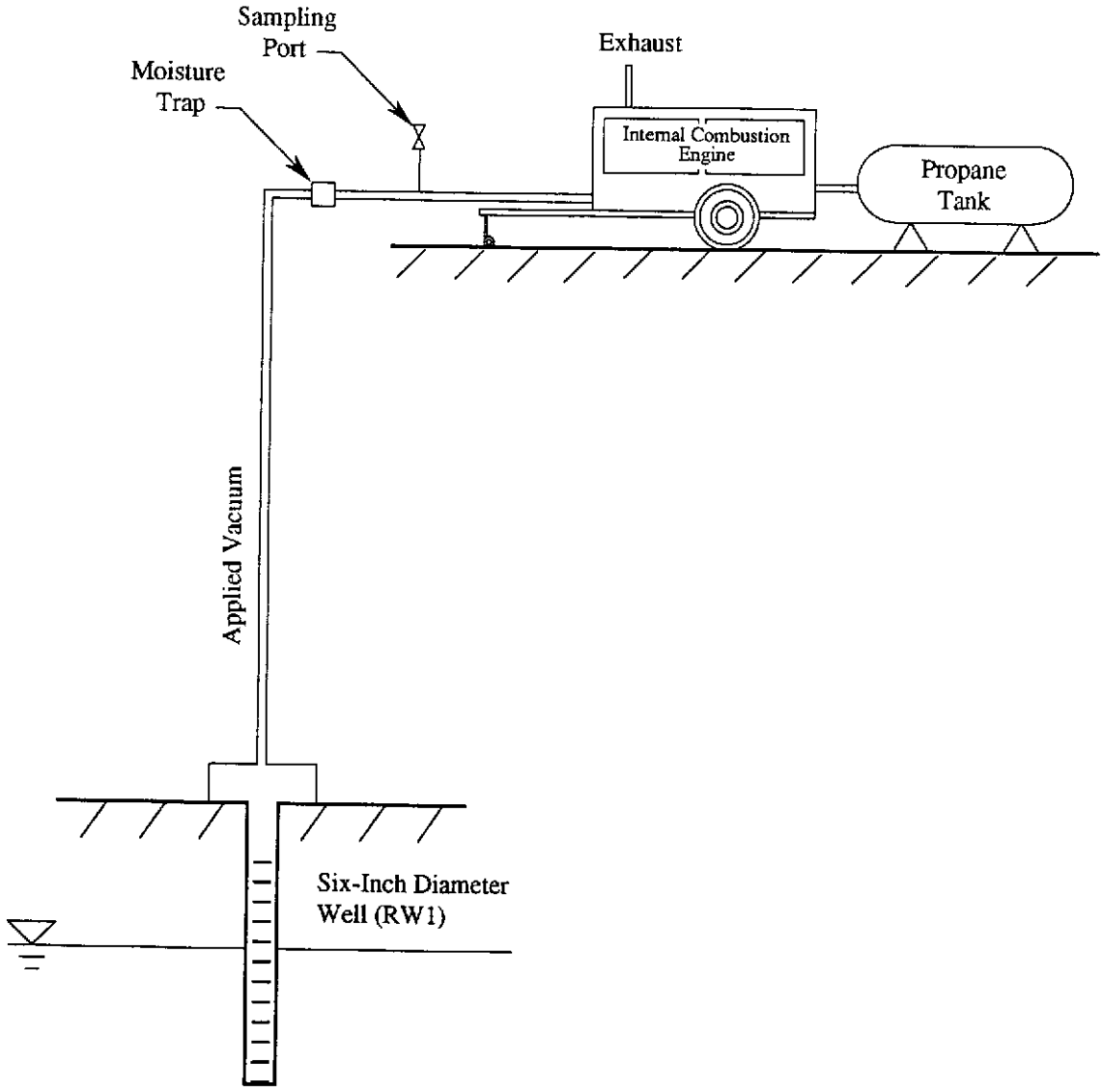
UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CA

FIGURE
1



NOT TO SCALE

PILOT VAPOR EXTRACTION TEST SYSTEM

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OAKLAND, CA

FIGURE
2