KAPREALIAN ENGINEERING
INCORPORATED

KEI-P90-1103.P3
January 21, 1993

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

Attention: Mr. Edward C. Ralston

RE: Work Plan/Proposal
Unocal Service Station #0752
800 Harrison Street
Oakland, California

INTRODUCTION

In Kaprealian Engineering, Inc's. (KEI) report (KEI-P90-1103.QR6) dated January 21, 1993, KEI recommended the installation of two additional monitoring wells. The purpose of these wells is to further define the extent of the ground water contamination at and in the vicinity of the site. The locations of the proposed wells are shown on the attached Figure 1. This work plan/proposal for the installation of these wells is presented for your review and consideration. The site background information, recent field activities, and a discussion of our recommendations are included in the referenced report.

PROPOSED FIELD WORK

PHASE II - DEFINING THE EXTENT OF SUBSURFACE CONTAMINATION

1. KEI proposes to install two additional two-inch diameter monitoring wells, designated as MW7 and MW8 on the attached Figure 1, by the use of hollow-stem auger equipment. Permits will be obtained from the Alameda County Flood Control and Water Conservation District (ACWD), the Alameda County Health Care Services (ACHCS) Agency, and the City of Oakland, as necessary, prior to beginning work.

   The wells will be drilled about 10 to 15 feet into the saturated zone of the first encountered ground water, unless a clay aquitard of at least 5 feet in thickness is encountered first, at which time drilling will be terminated. Ground water is anticipated at approximately 19 feet below grade, based on the ground water level in the existing monitoring wells during the December 21, 1992, monitoring event.

2. Soil samples will be collected at a ~~maximum~~ minimum spacing of 5 foot intervals, at significant changes in lithology, at obvious

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areas of contamination, and at/or within the soil/ground water interface, beginning at a depth of about 4 to 5 feet below grade. Sample intervals will be chosen so that an accurate profile of the subsurface soil conditions can be determined. Sampling for laboratory analyses and lithologic logging purposes will continue until the first water table is encountered. Sampling for lithologic logging purposes only will continue below the water table to the total depth drilled. Classification of soil will be done using the Unified Soils Classification System (USCS) by KEI's field geologist. Samples will be collected in a California-modified split-spoon sampler with two-inch diameter brass liners. The sampler will be advanced ahead of the drilling augers at designated depths by dropping a 140 pound hammer 30 inches. Blow counts will be recorded. Samples will be removed from the sampler and retained in brass liners. A 5-foot long continuous coring device may be used for sampling purposes in addition to the California-modified split-spoon sampler. The liners will be sealed with aluminum foil, plastic caps, and tape. They will be labeled and stored, on ice, for delivery to a state-certified laboratory. Properly executed Chain of Custody documentation will accompany all soil samples.

3. During drilling operations, all soil materials will be stored on-site in DOT-approved, 55-gallon drums, or else covered by visqueen. Each drum (if used) will be properly labeled and will include (at a minimum) the date, the interval that soil materials were obtained from, a contact individual, and the phone number at KEI.

4. Finalized Boring Logs will be prepared from field logs and submitted to the ACWD, the ACHCS, and to the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region.

5. Well Construction:

Casing Type: Schedule 40 PVC, flush threaded joints, 0.02 inch factory slot, two-inch diameter. Screen to run from total depth of the well to approximately 5 feet above the depth of the first encountered ground water. Monterey sand (#3) will fill the annular space from total depth to 2 feet above the perforated casing interval. The choice of screen slot size and sand filter pack material is based on soils encountered in previous borings and particle size analysis. A 2-foot thick bentonite seal will be placed in the annular space on top of the sand pack. Neat cement grout will be placed on top of the bentonite seal to the surface.

The well casings will be secured with a waterproof cap and a padlock. A round, watertight, flush-mounted well cover will be concreted in place over the top of each casing.

6. Water levels will be measured by the use of an electronic sounder. The wells will be developed by the use of a surface pump approximately one week after well completion. The wells will be pumped until expelled water is clear and free of turbidity. Effluent generated during well development will be contained in DOT-approved drums and hauled from the site by a licensed hazardous materials hauler. follow up IDW

The elevations of the well covers will be surveyed by a licensed land surveyor to Mean Sea Level and to a vertical accuracy of 0.01 feet. The well covers will also be surveyed to a horizontal x-y coordinate grid.

7. Ground Water Sampling:

The wells will be purged (by the use of a surface pump or bailer) of a minimum of four casing volumes prior to sampling and at least 72 hours after development. After recovery, samples will be collected by the use of a clean Teflon bailer and promptly decanted into 40 ml VOA vials. The vials will then be sealed with Teflon-lined screw caps, labeled, and stored, on ice, for delivery to a state-certified laboratory. The sampling bailer will be cleaned with non-phosphate soap and clean water rinses between uses.

The wells will be checked for free product (by the use of an interface probe and/or paste tape) prior to development and sampling. The wells will also be checked for the presence of a sheen prior to sampling.

Properly executed Chain of Custody documentation will accompany all water samples.

8. Laboratory Analyses:

Water and selected soil samples will be analyzed by Sequoia Analytical Laboratory, a state-certified laboratory, for total petroleum hydrocarbons (TPH) as gasoline by EPA method 5030/modified 8015, and benzene, toluene, xylenes, and ethylbenzene (BTX&E) constituents.

The analytical results will be presented in tabular form, showing the sample depths and results. The analytical results will be used to further delineate the vertical and lateral extent of the contaminants in soil and ground water.

9. Hydrology:

The ground water flow direction and ground water gradient will be determined from the water level elevations measured in both the new and existing monitoring wells. The flow direction will be shown on the Site Plan.

10. Ongoing Pumping, Monitoring, and Sampling:

10.1 All of the existing monitoring wells will be monitored on a monthly basis. The water level in each well and any abnormal conditions noted during inspection will be recorded, including the presence of free product.

10.2 Ground water from all of the existing monitoring wells will be purged, sampled, and analyzed for TPH as gasoline and BTX&E on a quarterly basis. In addition, ground water from MW1 (adjacent to the waste oil tank), will be analyzed for TPH as diesel and EPA method 8010 constituents. Prior to sampling, the water level in each well will be recorded as well as the presence of any free product or sheen.

10.3 Quarterly technical reports will be prepared that summarize the field activities (including water sampling and analyses), and that include discussion and recommendations.

11. Conclusions:

Conclusions and results of Phase II will be described in a technical report. The technical report will be submitted to the ACWD, 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 will be based on the data obtained from the field and laboratory analyses obtained from a state-certified laboratory. We will analyze 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 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.

Approved by:

Kaprealian Engineering, Inc.

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

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

Timothy R. Ross
Project Manager

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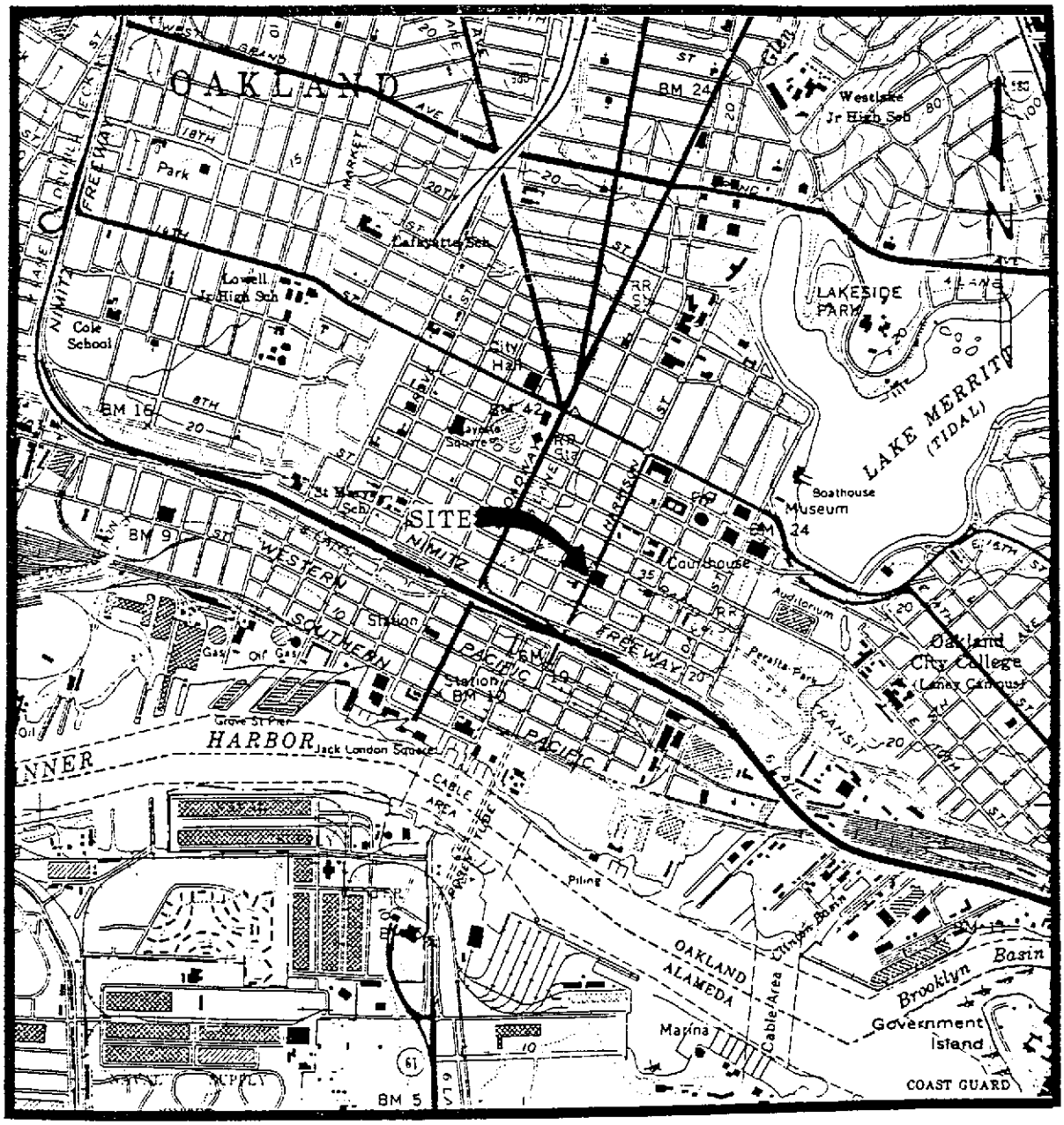
Attachments: Location Map
Existing and Proposed Monitoring Well Location Map - Figure 1
Typical Well Completion Diagram

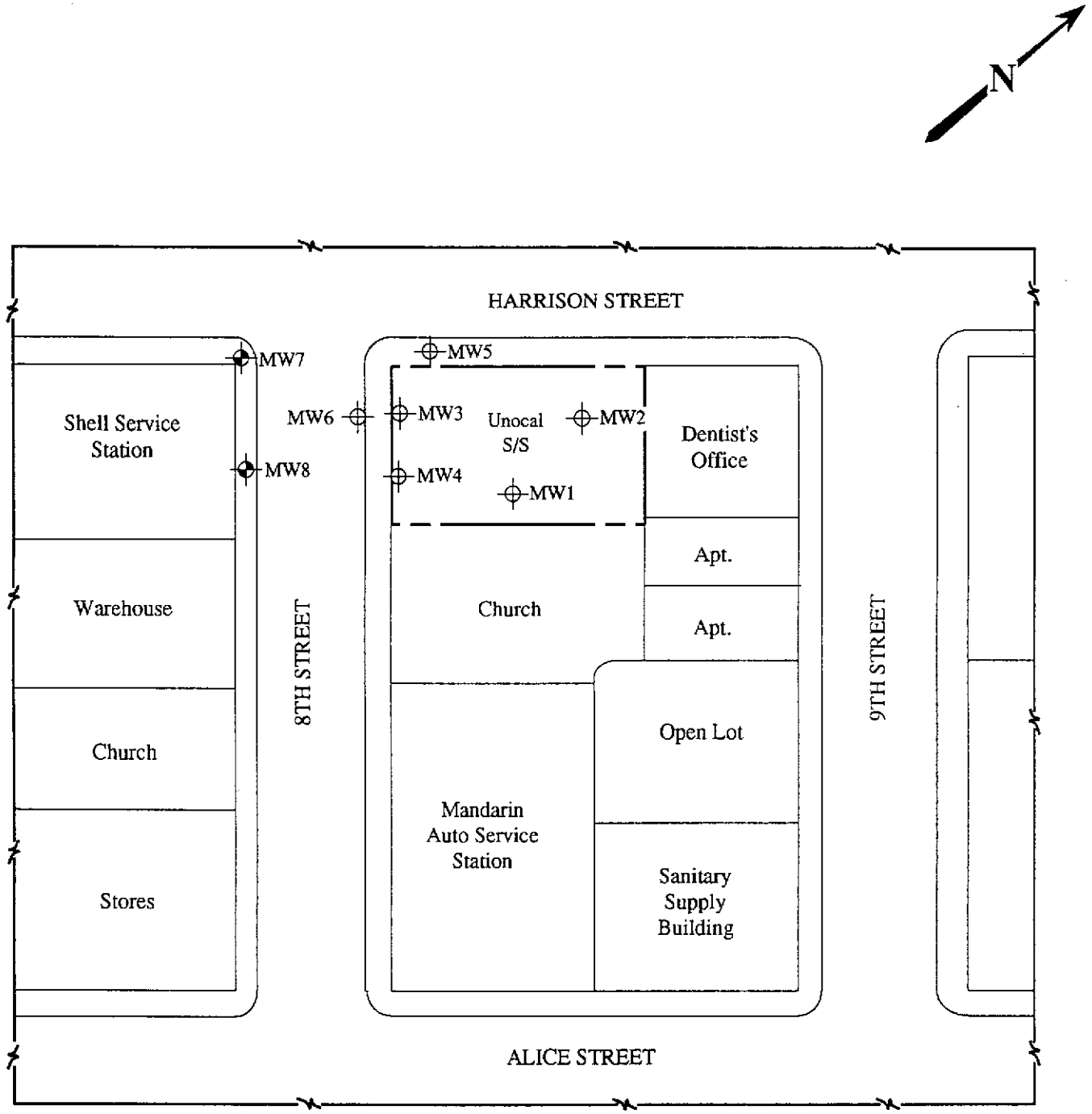


Base modified from 7.5 minute U.S.G.S. Oakland West Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	**UNOCAL SERVICE STATION #0752** **800 HARRISON STREET** **OAKLAND, CA**	**LOCATION MAP**



LEGEND

- Monitoring well (existing)
- Monitoring well (proposed)

0 75 150

Approx. scale feet

EXISTING AND PROPOSED MONITORING WELL LOCATION MAP

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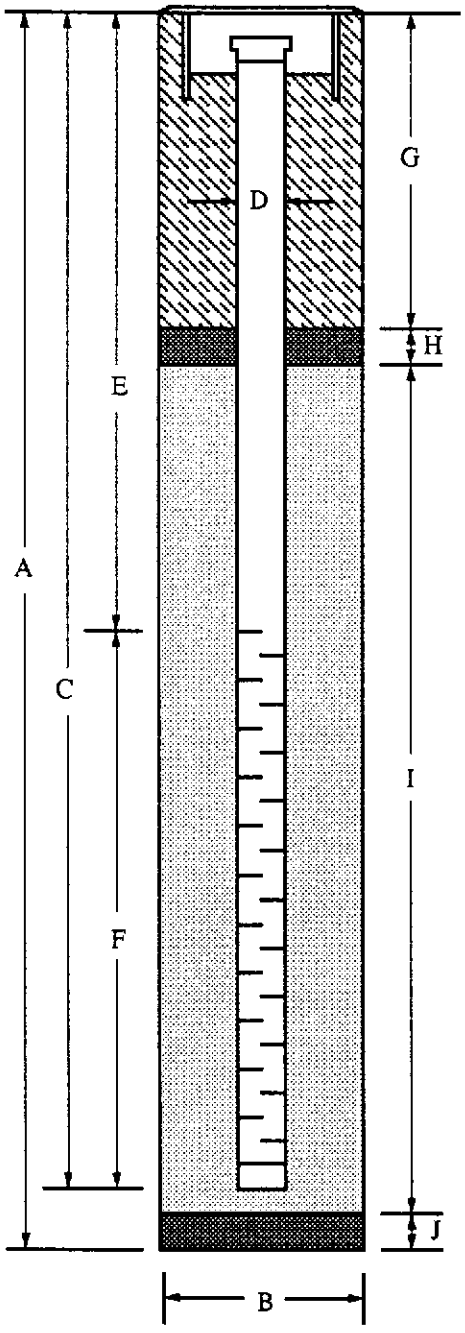
UNOCAL SERVICE STATION #0752
800 HARRISON STREET
OAKLAND, CA

FIGURE
1

WELL COMPLETION DIAGRAM
(SCHEMATIC)

Flush-mounted Well Cover



WELL DETAILS*

1. Well will be terminated 10 to 15 feet into the first encountered ground water, unless an aquitard five feet or greater in thickness is encountered below the water table, in which case the bottom of the boring will be backfilled with bentonite pellets and the well terminated at the top of this aquitard [A].

2. Boring diameter [B] is 8 inches for 2 inch wells, 10 inches for 4 inch wells, and 12 inches for 6 inch wells.

3. Perforated interval [F] will extend from bottom of casing to five feet above the first encountered ground water table (unless water <5 feet deep).

4. Schedule 40 PVC casing, 2 inch in diameter [D], will be used. Screen is 0.020 or 0.010 inch factory machined slots, depending on filter pack grain size.

5. Filter pack will be placed from bottom of casing to two feet above perforated interval [I]. (Bottom seal [J] is not installed unless required.) One to two feet of bentonite [H] will be placed above the filter pack. Concrete grout [G] will be placed from top of bentonite seal to the surface (unless modified due to shallow water). Blank casing [E] will extend from the top of the perforated casing to the top of the hole.

6. The well will be installed with a waterproof cap, padlock and a flush-mounted well cover.

* See text for additional information.