KAPREALIAN ENGINEERING
INCORPORATED

KEI-P90-1003.P3
March 23, 1992

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

Attention: Mr. Robert A. Boust

RE: **Work Plan/Proposal**
Unocal Service Station #7004
15399 Hesperian Boulevard
San Leandro, California

Dear Mr. Boust:

This work plan has been prepared in order to gather information about the aquifer characteristics at the subject site, for use in the design and implementation of a ground water remediation system.

Additional background information, recent field activities, and a discussion of previous recommendations are contained in our quarterly report (KEI-P90-1003.QR2) dated March 23, 1992.

PROPOSED FIELD WORK

PHASE III - INSTALLATION OF AN INITIAL RECOVERY WELL FOR GROUND WATER REMEDIATION

1. **KEI proposes to install one six-inch diameter well for the purpose of ground water remediation** (designated as RW1 on the attached Site Plan), by the use of hollow-stem auger equipment. Permits will be obtained from the Alameda County Health Care Services Agency prior to beginning work.

   The well will be drilled about 20 feet into the saturated zone of the first encountered ground water, unless a 5 foot thick clay aquitard is encountered first, at which time drilling will be terminated and the well constructed. Based on our present knowledge of the site, the well is anticipated to be drilled to a depth of about 38 feet below grade.

2. Soil samples will be collected for lithologic logging purposes only, corresponding to a maximum spacing of 5 foot intervals and significant changes in lithology, beginning at a depth of about 5 feet below grade, and continuing below the water table to the total depth drilled. Sampling below the water table will be conducted at near continuous intervals to define aquifer characteristics and to verify that a significant clay

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aquitard was not encountered. Classification of soil will be done using the Unified Soils Classification System (USCS) by KEI's field engineer or 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.

3. Finalized Boring Logs will be prepared from field logs and submitted to the Alameda County Health Care Services Agency and the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region.

4. Ground water is anticipated at approximately 16 to 18 feet below grade, based on the ground water level found in the existing adjacent monitoring wells.

5. Well Construction:

   Casing Type: Schedule 40 PVC, flush threaded joints, 0.0100 inch factory slot, six-inch diameter. Screened portions of the well casing to run from total depth of the well to approximately 5 feet above the depth of the first encountered ground water. It is anticipated that the screened interval of the well casing will extend from approximately 13 feet to approximately 38 feet below grade. Monterey sand (#2/12) will fill the annular space from total depth to 2 feet above the perforated casing interval. 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 casing will be secured with a waterproof cap and a padlock. A round, watertight, flush-mounted well cover of up to approximately 36-inches in diameter will be concreted in place over the top of the casing.

6. The water level will be measured with an electronic sounder. The well will be developed using a surface pump, approximately one week after well completion. The well 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.

7. Pump Test

   A pump test is proposed to be performed on well RW1 (once this well is installed). A submersible pump will be lowered into

the recovery well and suspended approximately 1 foot from the bottom of the well. Ground water will be initially pumped from the well at a rate of approximately 1.5 gallons per minute (gpm). The water will be pumped through a flow meter, and stored in a temporary holding tank on-site. Ground water in the holding tank will be pumped and hauled from the site by a licensed hazardous materials hauler. Water level data loggers will be used on nearby existing monitoring wells to determine the radius of influence of pumping from the recovery well (at the equilibrium pumping rate). This aquifer information will be used to determine the location and number of additional recovery wells which may be necessary to achieve hydraulic control of the contaminated ground water plume, and for the design of a ground water remediation system for the site.

8. Conclusions:

Conclusions and results of Phase III will be described in a technical report. The recovery well is anticipated to be incorporated into an active ground water remediation system.

The technical report will be submitted to the Alameda County Health Care Services Agency, to Mr. Michael Bakaldin of the City of San Leandro Fire Department, 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 me at (510) 602-5100.

Approved by:

Aram B. Kaloustian
Project Engineer (C.E.)

Joel G. Greger
Certified Engineering Geologist

License No. 1633
Exp. Date 6/30/92

Timothy R. Ross
Project Manager

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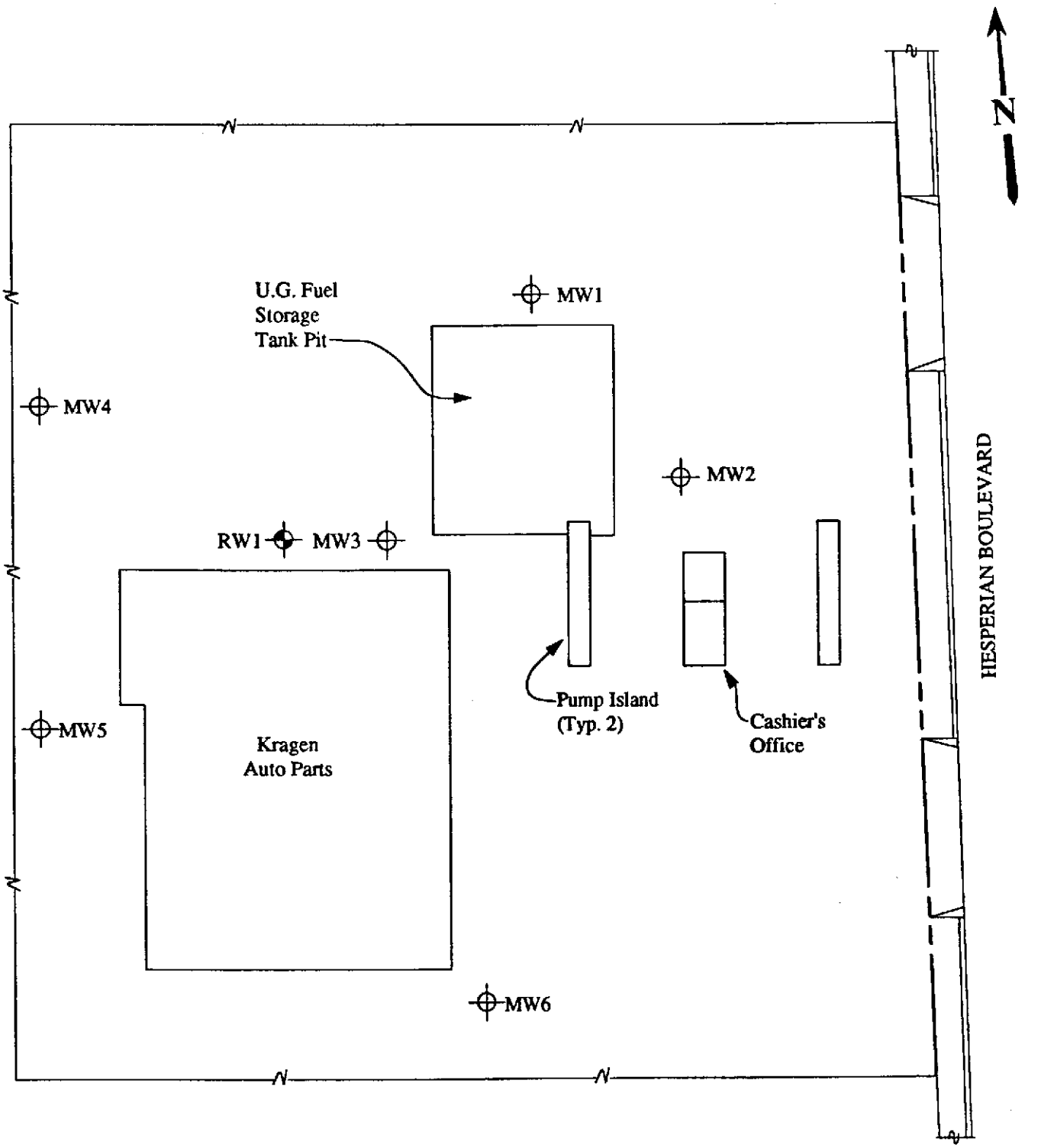
Attachments: Location Map
Site Plan
Cross Section A-A
Typical Well Completion Diagram

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

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #7004 15599 HESPERIAN BOULEVARD SAN LEANDRO, CA	LOCATION MAP



LEGEND

- Monitoring Well
- Six inch diameter recovery well (proposed)

0 30 60

Approx. scale feet

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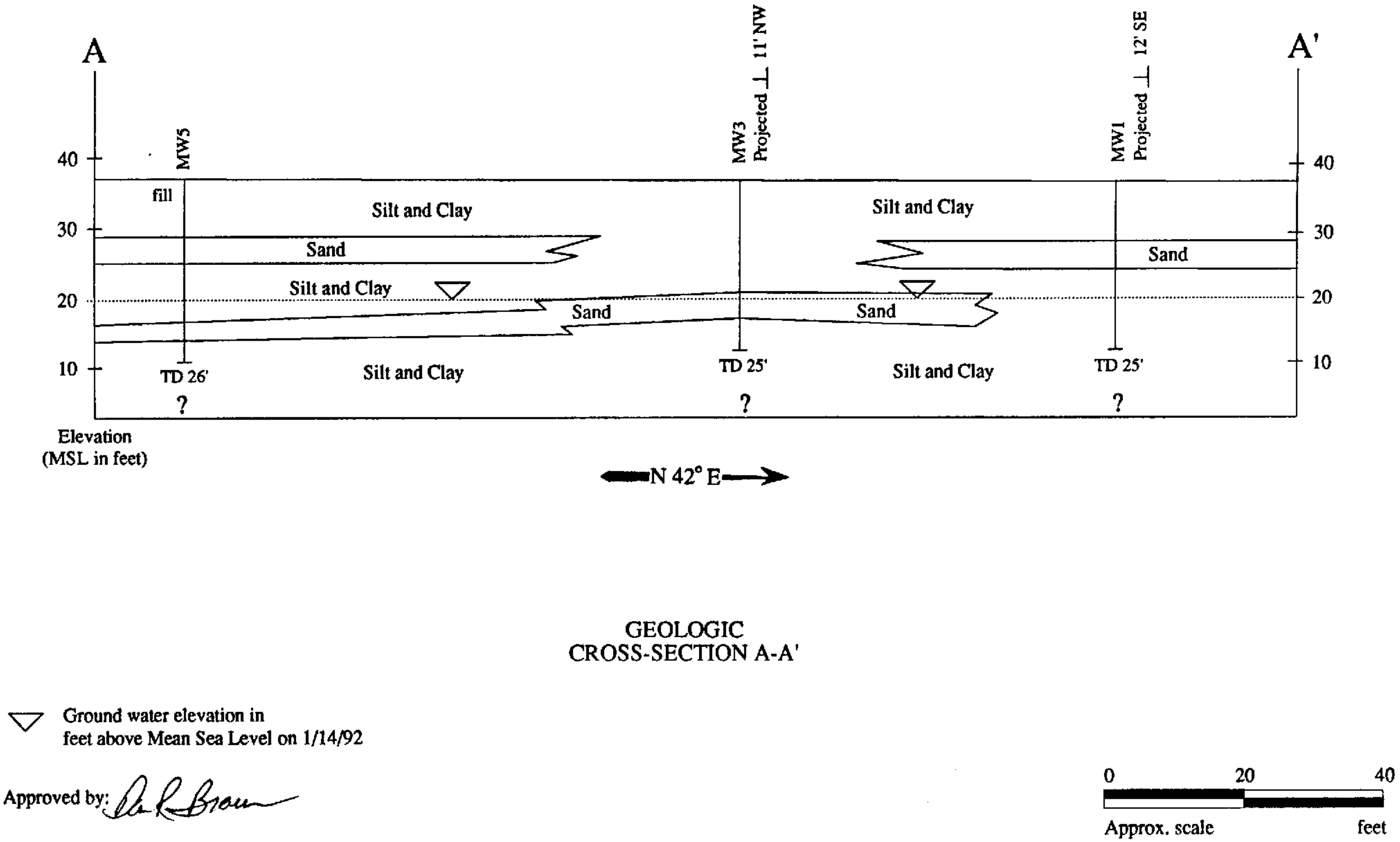
UNOCAL SERVICE STATION #7004
15599 HESPERIAN BOULEVARD
SAN LEANDRO, CA

SITE
PLAN



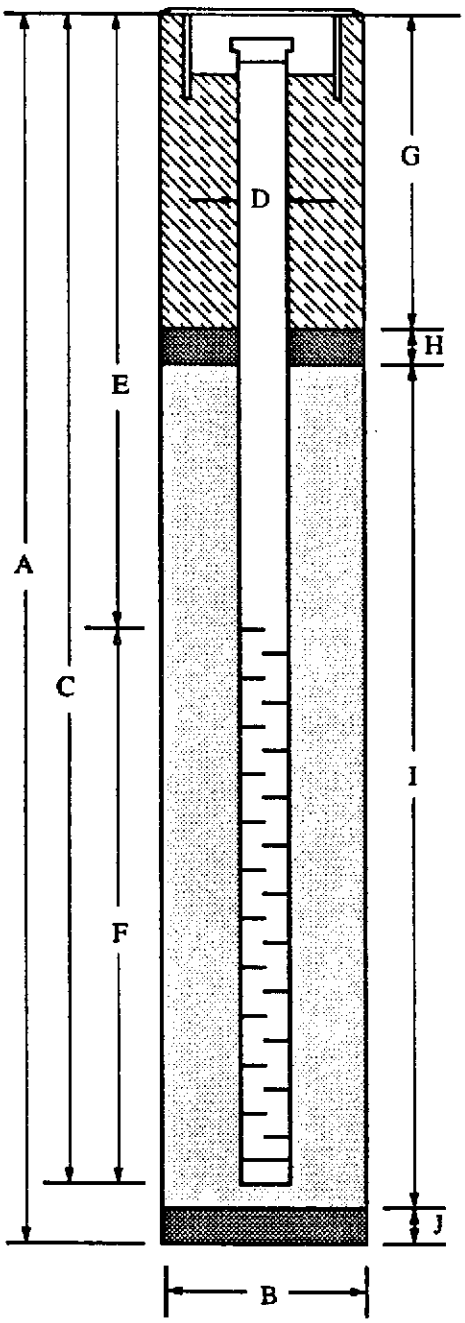
GEOLOGIC
CROSS-SECTION A-A'

Approved by: [signature]

KAPREALIAN ENGINEERING INCORPORATED	**UNOCAL SERVICE STATION #7004** **15599 HESPERIAN BLVD.** **SAN LEANDRO, CALIFORNIA**	**PLATE**

WELL COMPLETION DIAGRAM
(SCHEMATIC)

Flush-mounted Well Cover



WELL DETAILS*

1. Well will be terminated 20 feet into first ground water unless a five foot thick aquitard is encountered below the water table, in which case the aquitard 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 first ground water table (unless water <5 feet deep).

4. Schedule 40, PVC casing, 6 inch in diameter [D], will be used. Screen is 0.010 inch factory machined slots.

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.) 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.