



KAPREALIAN ENGINEERING  
INCORPORATED

KEI-P91-1004.P8  
November 15, 1996

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

Attention: Mr. David B. De Witt

RE: Work Plan/Proposal  
Unocal Service Station #5043  
449 Hegenberger Road  
Oakland, California

Dear Mr. De Witt:

#### INTRODUCTION

Per your request and in accordance with the letter to Unocal from the Alameda County Health Care Services (ACHCS) Agency dated October 16, 1996, Kaprealian Engineering, Inc. (KEI) submits this work plan for the installation of two additional monitoring wells and reconstruction of damaged well MW3. The purpose of the new wells is to further define the degree and extent of hydrocarbon-impacted ground water following the source removal work performed during station reconstruction. Off-site wells MW7 and MW8 were originally proposed in KEI's work plan/proposal (KEI-P91-1004.P3) dated June 22, 1993.

#### PROPOSED FIELD WORK

##### DEFINING THE EXTENT OF SUBSURFACE CONTAMINATION

1. KEI proposes the installation of 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 District, Zone 7, by KEI prior to beginning work. Unocal will be responsible for obtaining an off-site access agreement with the affected property owner.

The wells will be drilled about 10 feet into the saturated zone of the first encountered ground water. If a clay aquitard of at least 5 feet in thickness is encountered beneath the water table, drilling will be halted and the well will be constructed so as to terminate within the aquitard. Ground water is anticipated to be encountered above four feet below grade, based on historical ground water levels.

Well MW3 was observed to be plugged with soil and an unsuccessful attempt was made to repair and redevelop the well. If the well cannot be satisfactorily repaired before or on the scheduled date for installation of proposed wells MW7 and MW8, the well will be properly destroyed by overdrilling and then reconstructed within the same borehole.

2. Soil samples will be collected 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 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 lined 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 the brass liners. The liners will then be sealed with Teflon-lined plastic caps and placed in individually sealed plastic bags. They will be labeled and stored in a cooler, on crushed ice or "blue 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 well that soil materials were obtained from, and a contact phone number at KEI.
4. Finalized Boring Logs will be prepared from the field logs and submitted to the ACHCS.
5. Well Construction:

The well casing will consist of two-inch diameter schedule 40 PVC with flush threaded joints and 0.016 inch factory slot. The screen will extend from the total depth of the well to approximately 5 feet above the depth of the first encountered ground water. Monterey sand (#2/12) will fill the annular

space from total depth to 0.5 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 0.5-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. A Proposed Well Construction Diagram is attached to this proposal.

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. The elevations of the well casings will be surveyed by a licensed land surveyor to Mean Sea Level and to a vertical accuracy of 0.01 foot.

6. The wells will be developed approximately one week after well completion. Prior to development, the wells will be checked for 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). After recording the monitoring data, the wells will be developed by the use of a surge block and a subsurface pump. Effluent generated during well development will be contained in DOT-approved drums and hauled from the site by a licensed hazardous materials hauler.

7. Ground Water Sampling (Performed by MPDS Services, Inc.):

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

The wells will be purged (by the use of a pump or bailer) of a minimum of four casing volumes. Purging will be conducted prior to sampling and at least 72 hours after development. During purging operations, the field parameters pH, temperature, and electrical conductivity will be recorded and presented in a tabular form. Once the field parameters are observed to stabilize and a minimum of approximately four casing volumes have been removed from each well, water samples will then be collected by the use of a clean Teflon bailer and promptly decanted into 40 ml VOA vials and/or one-liter amber bottles, as appropriate. The vials and/or bottles 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.

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, benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA method 8020, and TPH as diesel by EPA methods 3550/modified 8015 (soil) and 3510/modified 8015 (water). HMT/BE

The analytical results will be presented in tabular form, showing the sample depths, and results. The analytical results will be used to delineate the 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. Conclusions:

Conclusions and results of this work will be described in a technical report. The technical report will be submitted to the ACHCS.

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,

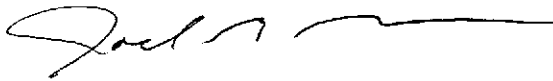
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except that our services will be performed in accordance with generally accepted professional principles and practices existing for such work.

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

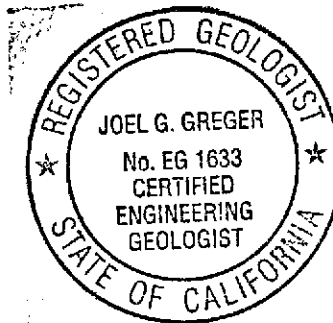
Sincerely,

Kaprealian Engineering, Inc.



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

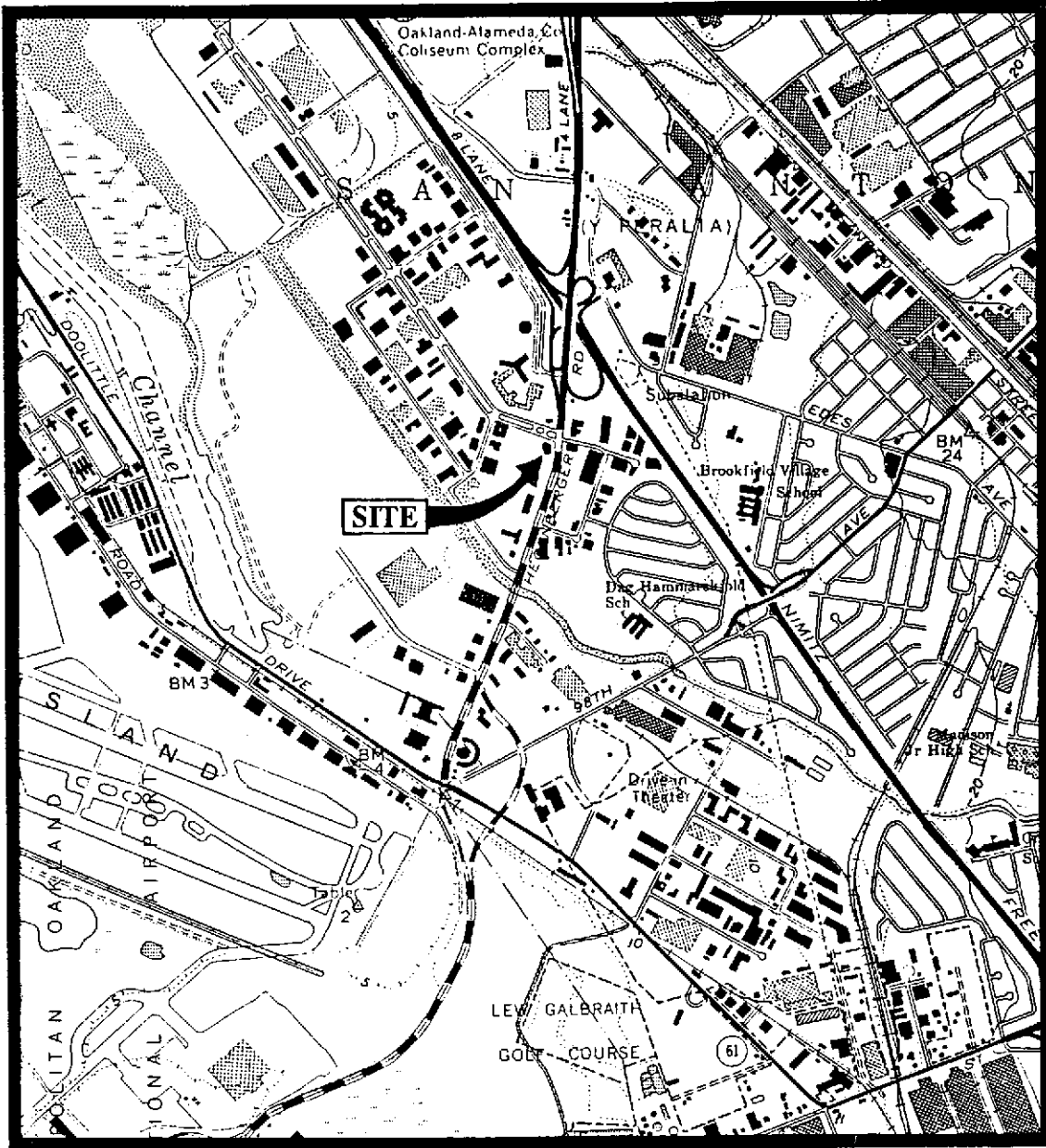
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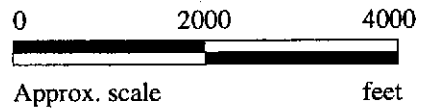
Robert H. Kezerian  
Project Manager

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Attachments: Location Map  
Figure 1  
Proposed Well Construction Diagram



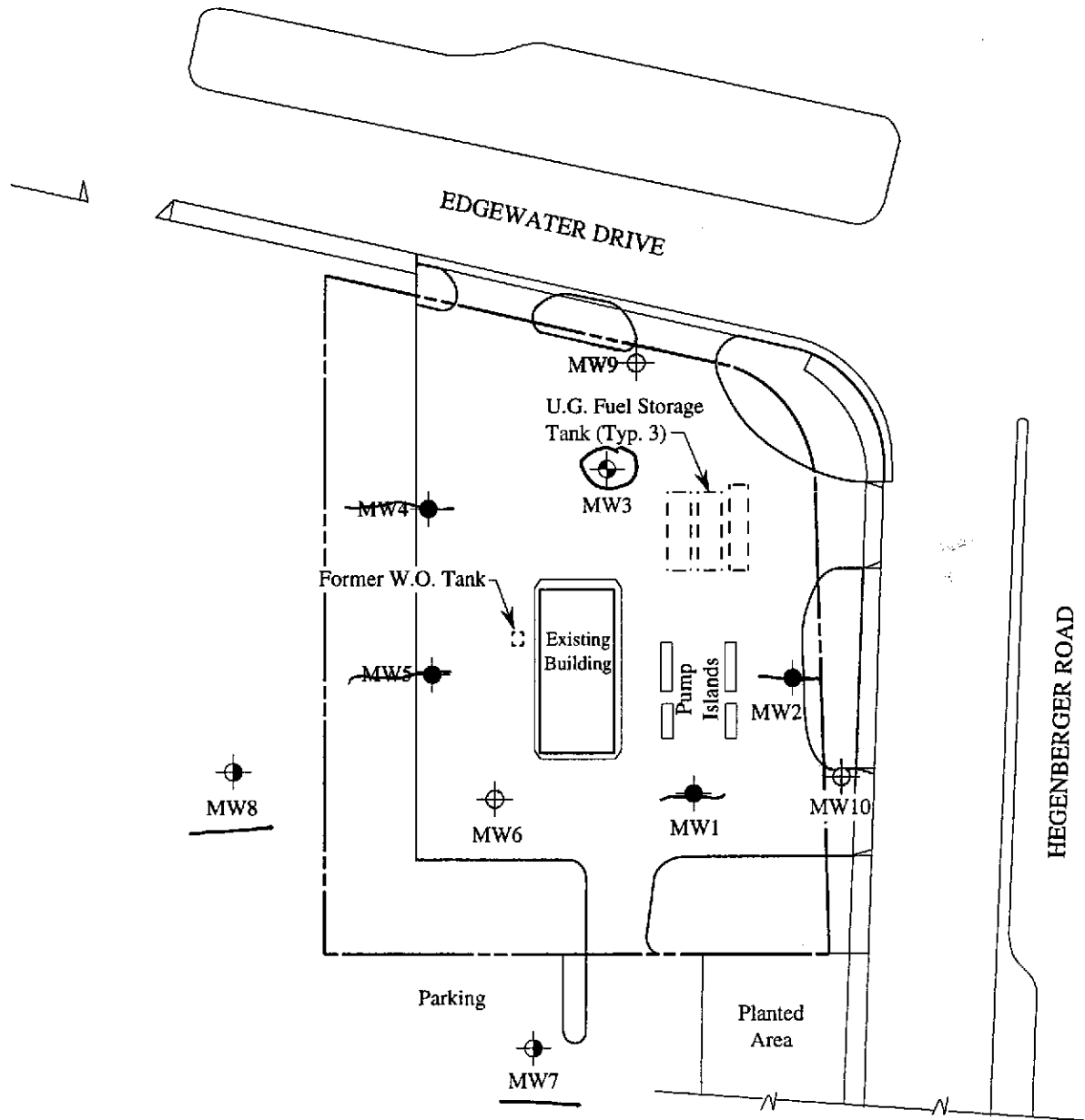
Base modified from 7.5 minute U.S.G.S. San Leandro Quadrangle  
(photorevised 1980)



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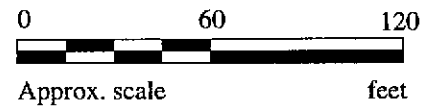
**UNOCAL SERVICE STATION #5043  
449 HEGENBERGER ROAD  
OAKLAND, CALIFORNIA**

**LOCATION  
MAP**



**LEGEND**

- ⊕ Monitoring well (existing)
- Monitoring well (destroyed)
- ⊕ Monitoring well (to be reinstalled / reconstructed)
- ⊕ Monitoring well (proposed)



**EXISTING AND PROPOSED MONITORING WELL LOCATION MAP**



**UNOCAL SERVICE STATION #5043  
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OAKLAND, CALIFORNIA**

**FIGURE  
1**

