KAPREALIAN ENGINEERING
INCORPORATED

STID
521

July 21, 1992

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

RE: Unocal Service Station #5043
449 Hegenberger Road
Oakland, California

Gentlemen:

Per the request of Mr. Tim Howard of Unocal Corporation, enclosed please find our report and work plan/proposal, both dated July 7, 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: Tim Howard, Unocal Corporation

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

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P91-1004.QR1
July 7, 1992

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

Attention: Mr. Tim Howard

RE: Quarterly Report
Unocal Service Station #5043
449 Hegenberger Road
Oakland, California

Dear Mr. Howard:

This report presents the results of the first quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per KEI's proposal KEI-P91-1004.P1 dated December 17, 1991. **The wells are currently monitored monthly and sampled on a quarterly basis. This report covers the work performed by KEI from March through May of 1992.**

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a service station. The site is characterized by gently sloping, west to west-southwest trending topography, and is located approximately 1,250 feet northeast of the existing drainage channel of San Leandro Creek.

KEI's initial field work was conducted on October 25, 1991, when four soil samples, labeled P1 through P4, were collected from the product pipe trenches (at depths of approximately 3 feet below grade) during an island modification project at the site. Sample point locations are as shown on the attached Site Plan, Figure 2. In addition, two shallow borings were drilled to ground water (which was encountered at a depth of approximately 4 to 4.5 feet below grade) by the use of a hand auger. The product pipe trenches were subsequently excavated to the ground water depth.

All samples were analyzed by Sequoia Analytical Laboratory in Concord, California. All soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline, benzene, toluene, xylenes, and ethylbenzene (BTX&E), and TPH as diesel.

The analytical results of the soil samples indicated a level of TPH as gasoline at 370 ppm for sample P4, while samples P1, P2, and P3 showed levels of TPH as gasoline at 3,200 ppm, 9,000 ppm, and 7,100 ppm, respectively. The analytical results further indicated levels

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

of TPH as diesel at 420 ppm and 460 ppm for samples P1 and P4, respectively. Samples P2 and P3 indicated levels of TPH as diesel at 8,400 ppm and 1,100 ppm, respectively. The results of the soil analyses are summarized in Table 4.

To comply with the requirements of the regulatory agencies and based on the analytical results, KEI proposed the installation of three monitoring wells. Documentation of the sample collection techniques and the analytical results of the soil samples collected from the product pipe trenches are summarized in KEI's report (KEI-J91-1004.R1) dated December 17, 1991.

On February 5, 1992, three two-inch diameter monitoring wells (designated as MW1, MW2, and MW3 on the attached Site Plan, Figure 1) were installed at the site. The monitoring wells were drilled and completed to total depths ranging from 13.5 to 15 feet below grade. Ground water was encountered at depths ranging from approximately 3 to 5 feet beneath the surface during drilling. The surface of each well cover was surveyed by Kier & Wright of Pleasanton, California, to Mean Sea Level (MSL) and to a vertical accuracy of 0.01 feet. The wells were developed on February 10, 1992, and were initially sampled on February 18, 1992.

Water and selected soil samples were analyzed at Sequoia Analytical Laboratory in Concord, California. The soil and water samples were analyzed for TPH as gasoline, BTX&E, and TPH as diesel.

The analytical results of the soil samples collected from the boring for monitoring well MW3 indicated non-detectable levels of TPH as gasoline and BTX&E, except for 0.011 ppb of xylenes in sample MW3(3). Also in MW3, both soil samples showed non-detectable levels of TPH as diesel, except for sample MW3(3), which showed a level of 49 ppm. All soil samples analyzed from MW1 and MW2 showed levels of TPH as gasoline ranging from 31 ppm to 14,000 ppm, levels of benzene ranging from 2.4 ppm to 160 ppm, and levels of TPH as diesel ranging from 29 ppm to 2,400 ppm.

The analytical results of the ground water samples collected from monitoring wells MW1, MW2, and MW3 indicated levels of TPH as gasoline ranging from 230 ppb to 150,000 ppb, benzene levels ranging from 4.8 ppb to 17,000 ppb, and levels of TPH as diesel ranging from 4,300 ppb to 13,000 ppb, except for MW3, which showed a non-detectable level of TPH as diesel. The results of the soil analyses are summarized in Table 3, and the results of the water analyses are summarized in Table 2.

Based on the analytical results, KEI recommended the implementation of a monthly monitoring and quarterly sampling program. Documenta-

tion of the well installation protocol, sample collection techniques, and the analytical results are presented in KEI's report (KEI-P91-1004.R3) dated March 26, 1992.

RECENT FIELD ACTIVITIES

The three wells (MW1, MW2, and MW3) were monitored three times (except for well MW3), and well MW2 was sampled once during the quarter. Well MW3 was inaccessible on May 20, 1992, and therefore was neither sampled nor monitored. Well MW1 was not sampled due to the presence of free product. During monitoring, the wells were checked for depth to water and the presence of free product. During sampling, well MW2 was also checked for the presence of sheen. No free product or sheen was noted in any of the wells during the quarter, except for well MW1, in which free product was detected during the last two monitoring events of the quarter. Monitoring data are summarized in Table 1.

asphalted over

A water sample was collected from well MW2 on May 20, 1992. Prior to sampling, well MW2 was purged of 8 gallons by the use of a surface pump. The water sample was then collected by the use of a clean Teflon bailer. The sample was decanted into clean VOA vials and/or one-liter amber bottles, as appropriate, which were then sealed with Teflon-lined screw caps and stored in a cooler, on ice, until delivery to the state-certified laboratory.

HYDROLOGY AND GEOLOGY

Based on the water level data gathered on April 22, 1992, and March 20, 1992, the ground water flow direction appeared to be toward the west, as shown on the attached Site Plans, Figures 1a and 1b. This flow direction is similar to the flow direction reported last quarter. Well MW3 was inaccessible on May 20, 1992; therefore, the flow direction could not be determined based on data from only two wells. Water levels have decreased during the quarter, showing a net decrease of 0.15 and 0.30 feet in wells MW1 and MW2 since February 18, 1992. The measured depth to ground water at the site on May 20, 1992 ranged between 2.76 and 2.90 feet below grade.

Based on review of regional geologic maps (U.S. Geological Survey Professional Paper 943 "Flatland Deposits - Their Geology and Engineering Properties and their Importance to Comprehensive Planning" by E.J. Helley and K.R. Lajoie, 1979), the subject site is underlain by Holocene-age Bay Mud (Qhbm). The Bay Mud typically consists of unconsolidated, saturated clay and silty clay that is rich in organic material. The Bay Mud locally contains lenses and stringers of well-sorted silt, sand, and beds of peat.

The subsurface soils exposed in the pipe trench excavations consisted primarily of sandy silt (to a depth of about 4 feet below grade) that was underlain with "Bay Mud" to the full depth explored (approximately 5 feet below grade). Ground water was encountered at a depth of approximately 4 to 4.5 feet below grade.

The results of our recent subsurface study (the boring logs for MW1, MW2, and MW3) indicate that the site is underlain by artificial fill materials that extend to depths below grade of approximately 2 to 4 feet. The fill materials are underlain by a highly organic zone that is locally lensed with peat and that extends to depths of about 8 to 9 feet below grade. This highly organic layer is in turn underlain by silty clay soil materials to the maximum depths explored (13.5 to 15 feet below grade).

ANALYTICAL RESULTS

The ground water sample from MW2 was analyzed at Sequoia Analytical Laboratory in Concord, California, and was accompanied by properly executed Chain of Custody documentation. The sample was analyzed for TPH as gasoline by EPA method 5030 in conjunction with modified 8015, BTX&E by EPA method 8020, and for TPH as diesel by EPA method 3510 in conjunction with modified 8015.

The concentrations of TPH as gasoline, benzene, and TPH as diesel detected in the ground water sample collected on May 20, 1992 are shown on the attached Site Plan, Figure 1c. The results of the analyses are summarized in Table 2. Copies of the analytical results and Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results collected and evaluated to date, KEI recommends the continuation of the current monthly monitoring and quarterly sampling program of the existing monitoring wells, per KEI's proposal (KEI-P91-1004.P1) dated December 17, 1991. The results of the monitoring program will be documented and evaluated after each monitoring and sampling event. Recommendations for altering or terminating the program will be made as warranted.

The lateral extent of soil and ground water contamination at and in the vicinity of the site has not been defined. Elevated levels of soil and ground water contamination exist in the vicinity of the pump island. Prior to recommending the installation of additional on-site monitoring wells, KEI previously recommended performing a quarter of monitoring and sampling of the existing wells, in order to establish a consistent ground water flow direction at the site

and also to attempt to establish reasonably consistent levels of contamination within the existing wells.

Based on the water level data gathered this quarter and last quarter, the ground water flow direction has been consistently to the west. In addition, the elevated levels of contamination detected in wells MW1 and MW2 this quarter are similar to last quarter. Therefore, KEI recommends the installation of three additional monitoring wells at the site in order to further define the extent of contamination. Our work plan/proposal for this work is attached for your review and consideration.

KEI recently conducted a site reconnaissance in order to identify any potential sources of ground water contamination that may be contributing to the contamination at the Unocal site. A Chevron service station is located due north of the Unocal site; however, it appears that no monitoring wells have been installed at the Chevron site. Based on the current westerly flow direction at the Unocal site, it appears unlikely that any contamination from the Chevron site would have contributed to the contamination detected in Unocal's wells MW1 and MW2. There do not appear to be any obvious sources of contamination located directly upgradient (to the east) of the Unocal site.

DISTRIBUTION

A copy of this report should be sent to Alameda County Health Care Services Agency, and to the Regional Water Quality Control Board, San Francisco Bay 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 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 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 me 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 6/30/93

Timothy R. Ross
Project Manager

\bp

Attachments: Tables 1 through 4
Location Map
Site Plans - Figures 1, 1a, 1b, 1c & 2
Laboratory Analyses
Chain of Custody documentation
Work Plan/Proposal

KEI-P91-1004.QR1
July 7, 1992

TABLE 1

SUMMARY OF GROUND WATER MONITORING AND PURGING DATA

Well #	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness	Sheen	Gallons Pumped
	(Monitored and Sampled on May 20, 1992)				
MW1*	5.12	2.76	0.13	N/A	0
MW2	6.06	2.90	0	No	8
MW3	WELL WAS INACCESSIBLE				
	(Monitored on April 22, 1992)				
MW1*	5.40	2.49	0.14	N/A	0
MW2	6.38	2.58	0	--	0
MW3	3.90	3.77	0	--	0
	(Monitored on March 20, 1992)				
MW1	5.48	2.30	0	--	0
MW2	6.54	2.42	0	--	0
MW3	4.53	3.14	0	--	0

Well #	Surface Elevation** (feet)
MW1	7.78
MW2	8.96
MW3	7.67

-- Sheen determination was not performed.

* The ground water elevation was modified for the free product thickness by using an assumed specific gravity of 0.77.

** The elevations of the tops of the well covers have been surveyed relative to MSL, per the City of Oakland Benchmark #3880.

KEI-P91-1004.QR1
July 7, 1992

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
5/20/92	MW1	NOT SAMPLED DUE TO THE PRESENCE OF FREE PRODUCT					
	MW2	4,300♦	24,000	2,200	7,600	11,000	630
	MW3	WELL WAS INACCESSIBLE FOR SAMPLING					
2/18/92	MW1	13,000	150,000	17,000	26,000	26,000	5,200
	MW2	4,300	29,000	1,000	5,300	7,900	260
	MW3	ND	230	4.8	22	33	1.8
Detection Limits		50	30	0.30	0.30	0.30	0.30

♦ The laboratory reported that the sample "does not appear to contain diesel. HBP is due to LMBP fuel."

ND = Non-detectable.

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

KEI-P91-1004.QR1
July 7, 1992

TABLE 3

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample Number	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
2/05/92	MW1(2.5)	2.5	1,200	14,000	160	680	2,400	470
	MW2(3.5)	3.5	2,400	9,000	74	440	1,400	280
	MW2(4.5)	4.5	29	31	2.4	0.14	9.0	3.0
	MW3(3)	3.0	49	ND	ND	ND	0.011	ND
	MW3(4.5)	4.5	ND	ND	ND	ND	ND	ND
Detection Limits			1.0	1.0	0.0050	0.0050	0.0050	0.0050

ND = Non-detectable.

Results in parts per million (ppm), unless otherwise indicated.

KEI-P91-1004.QR1
July 7, 1992

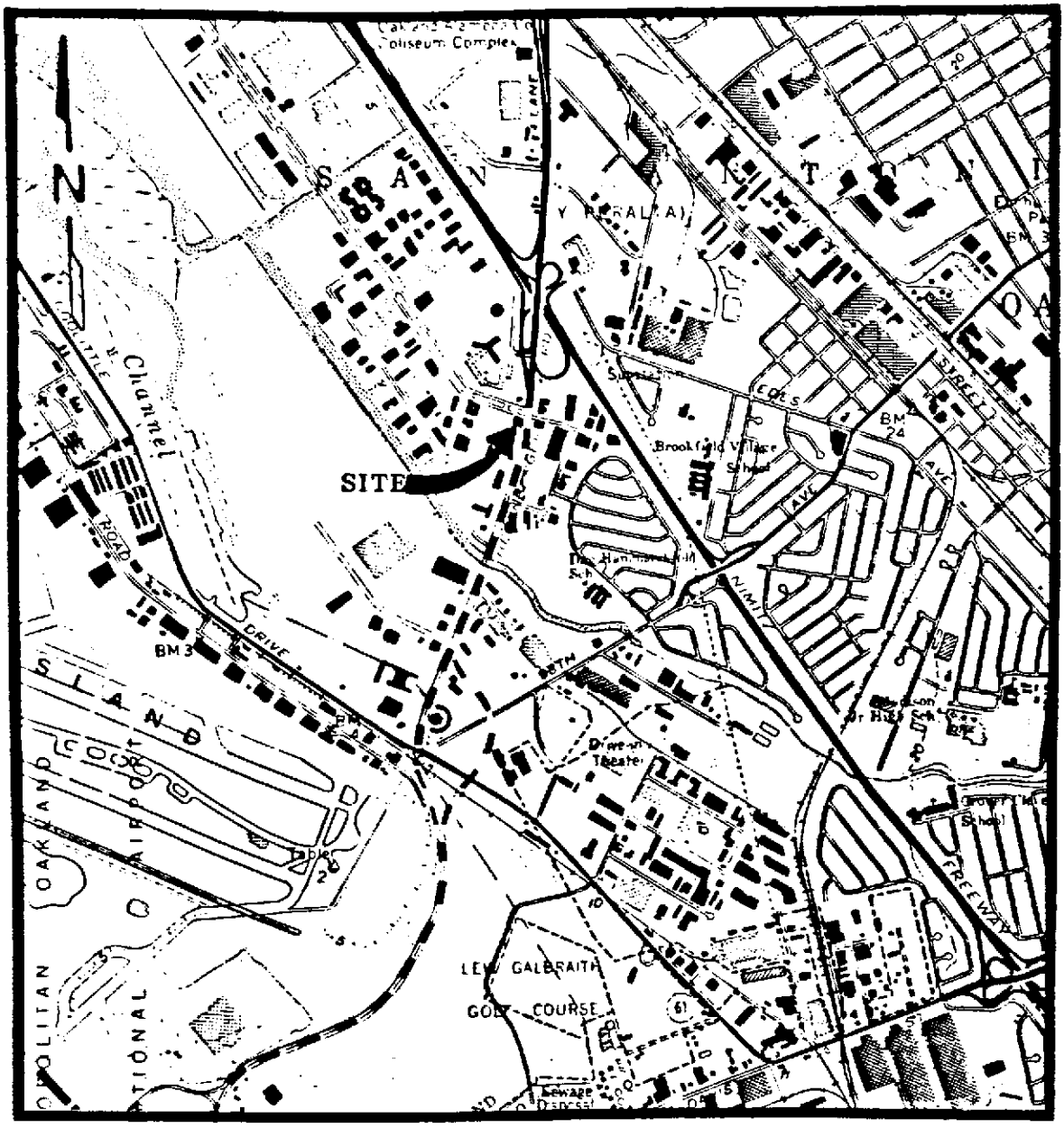
TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/25/91	P1	3	420	3,200	33	120	540	110
	P2	3	8,400	9,000	46	120	1,500	330
	P3	3	1,100	7,100	48	410	1,200	220
	P4	3	460	370	7.4	39	77	12
Detection Limits			1.0	1.0	0.0050	0.0050	0.0050	0.0050

ND = Non-detectable.

Results in parts per million (ppm), unless otherwise indicated.

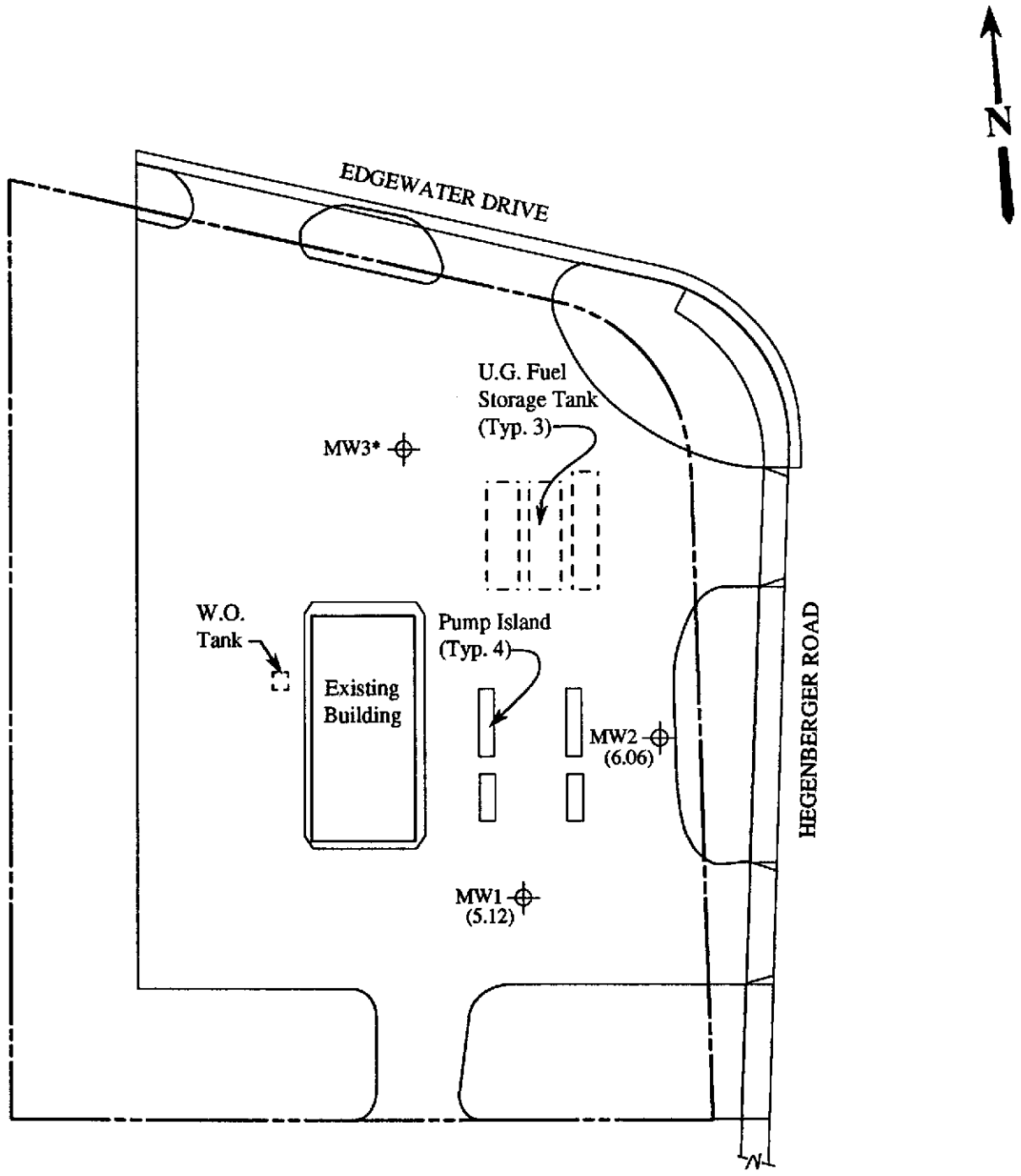


Base modified from 7.5 minute U.S.G.S. San Leandro Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA	LOCATION MAP



SITE PLAN

LEGEND

⊕ Monitoring well

( ) Ground water elevation in feet above Mean Sea Level on 5/20/92

* Well was inaccessible

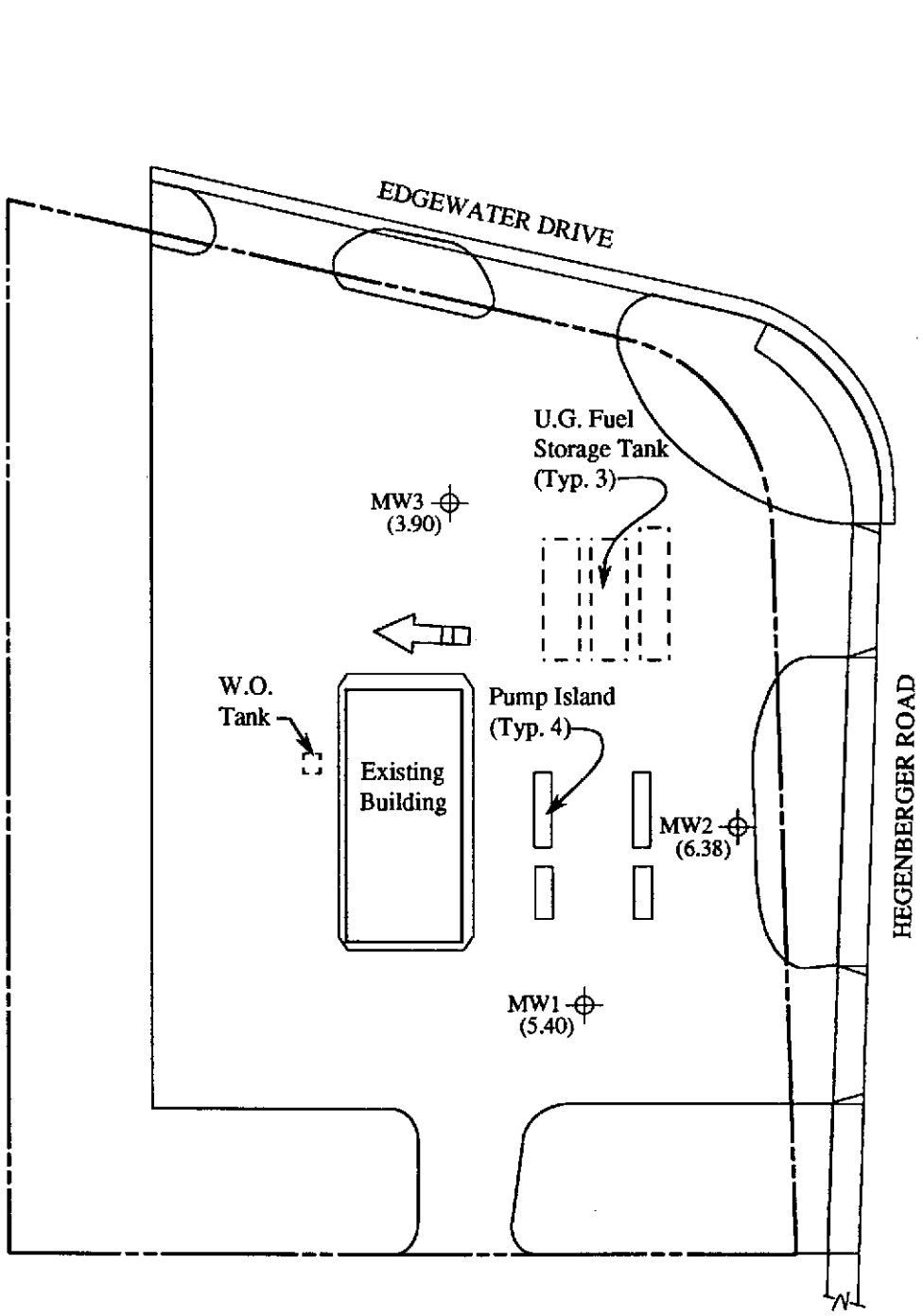
0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5043
449 HEGENBERGER ROAD
OAKLAND, CA

FIGURE
1



SITE PLAN

LEGEND

- Monitoring well
- ( ) Ground water elevation in feet above Mean Sea Level on 4/22/92
- Direction of ground water flow

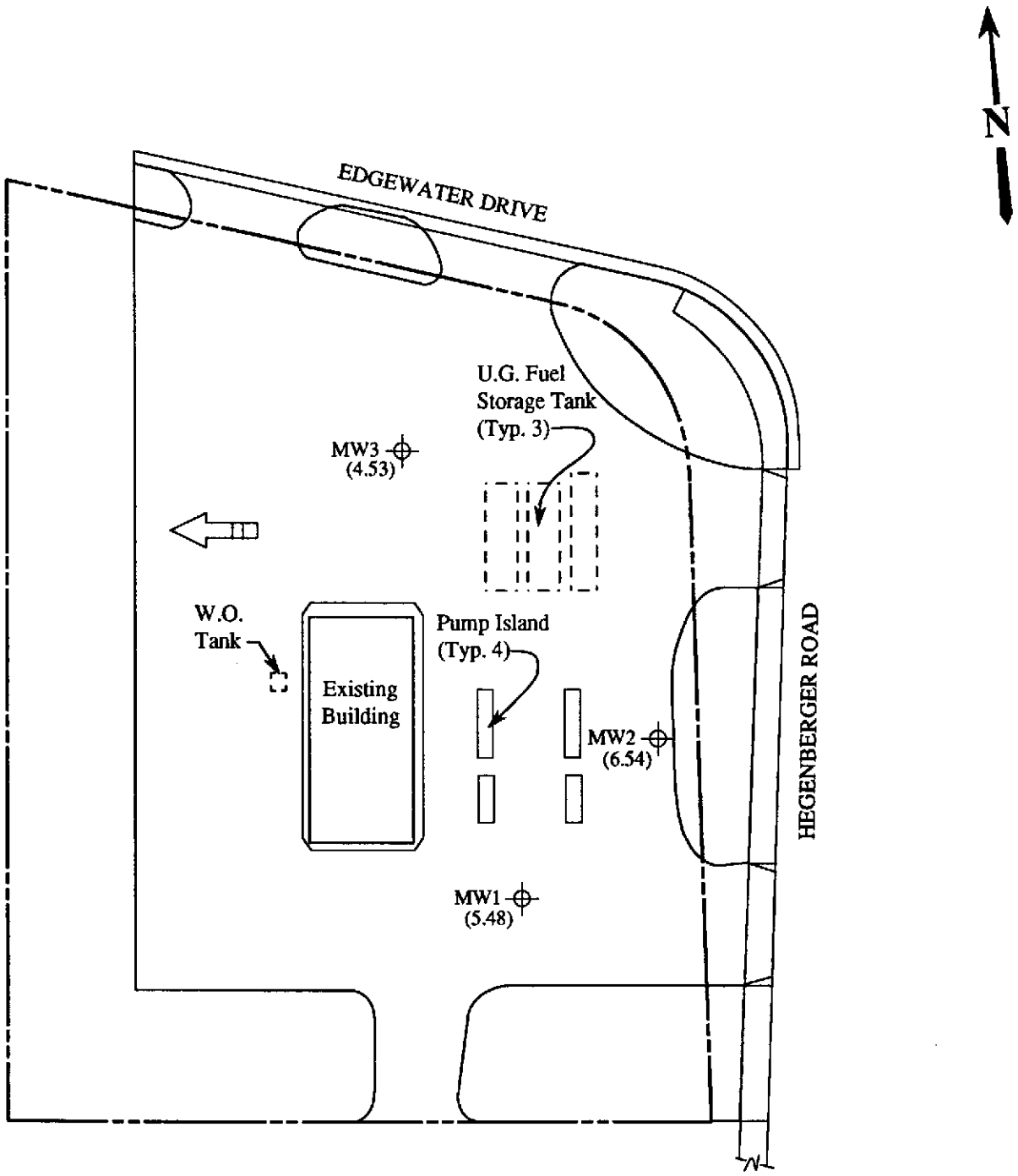
0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5043
449 HEGENBERGER ROAD
OAKLAND, CA

FIGURE
1a



SITE PLAN

LEGEND

- Monitoring well
- ( ) Ground water elevation in feet above Mean Sea Level on 3/20/92
- Direction of ground water flow

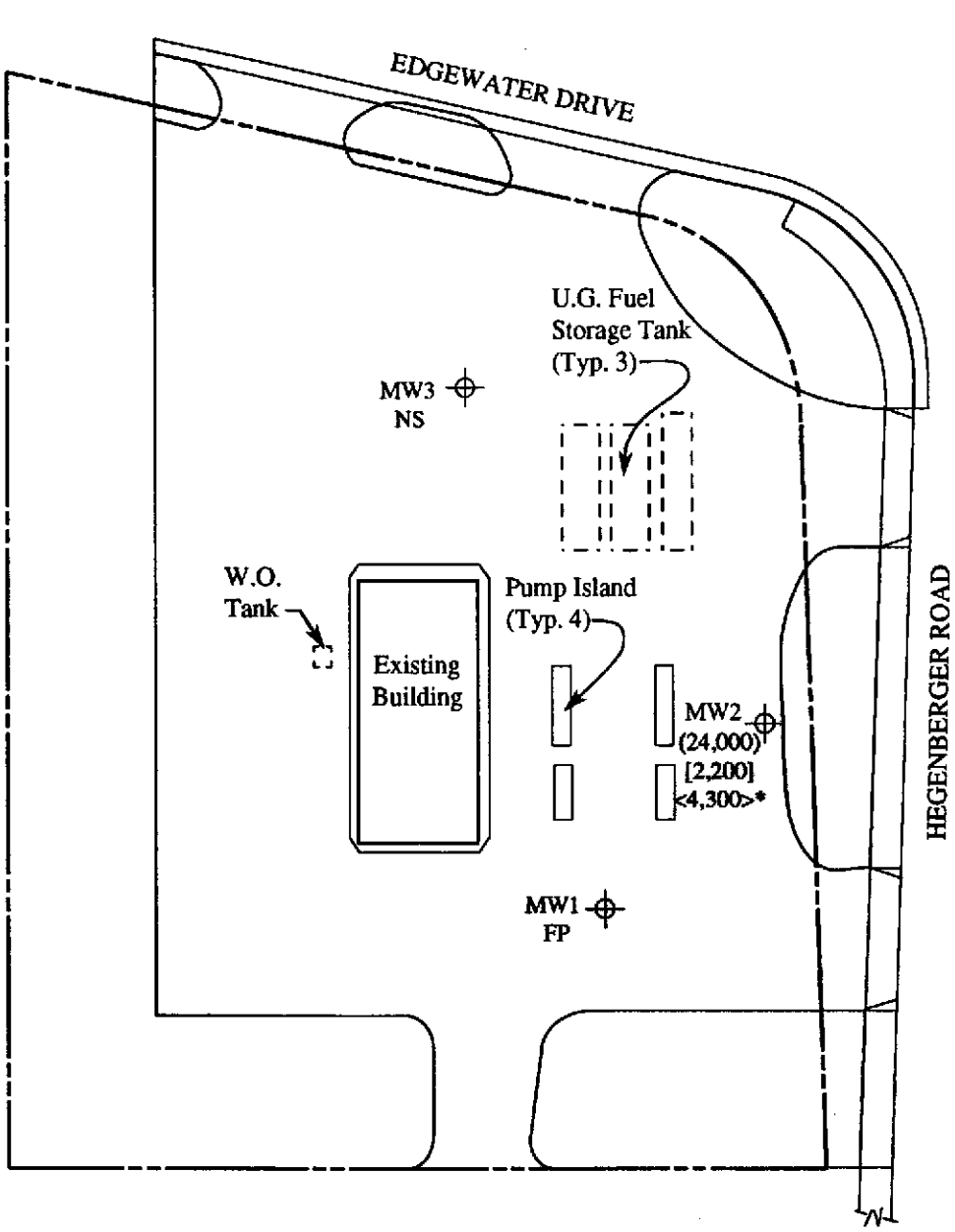
0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5043
449 HEGENBERGER ROAD
OAKLAND, CA

FIGURE
1b



SITE PLAN

(Samples Collected on 5/20/92)

LEGEND

- ⊕ Monitoring Well
- ( ) Concentrations of TPH as gasoline in ppb
- [ ] Concentrations of benzene in ppb
- < > Concentrations of TPH as diesel in ppb
- ND = Non-detectable
- FP = Free product
- NS = Not sampled (inaccessible)

* The lab reported that the"sample does not appear to contian diesel."

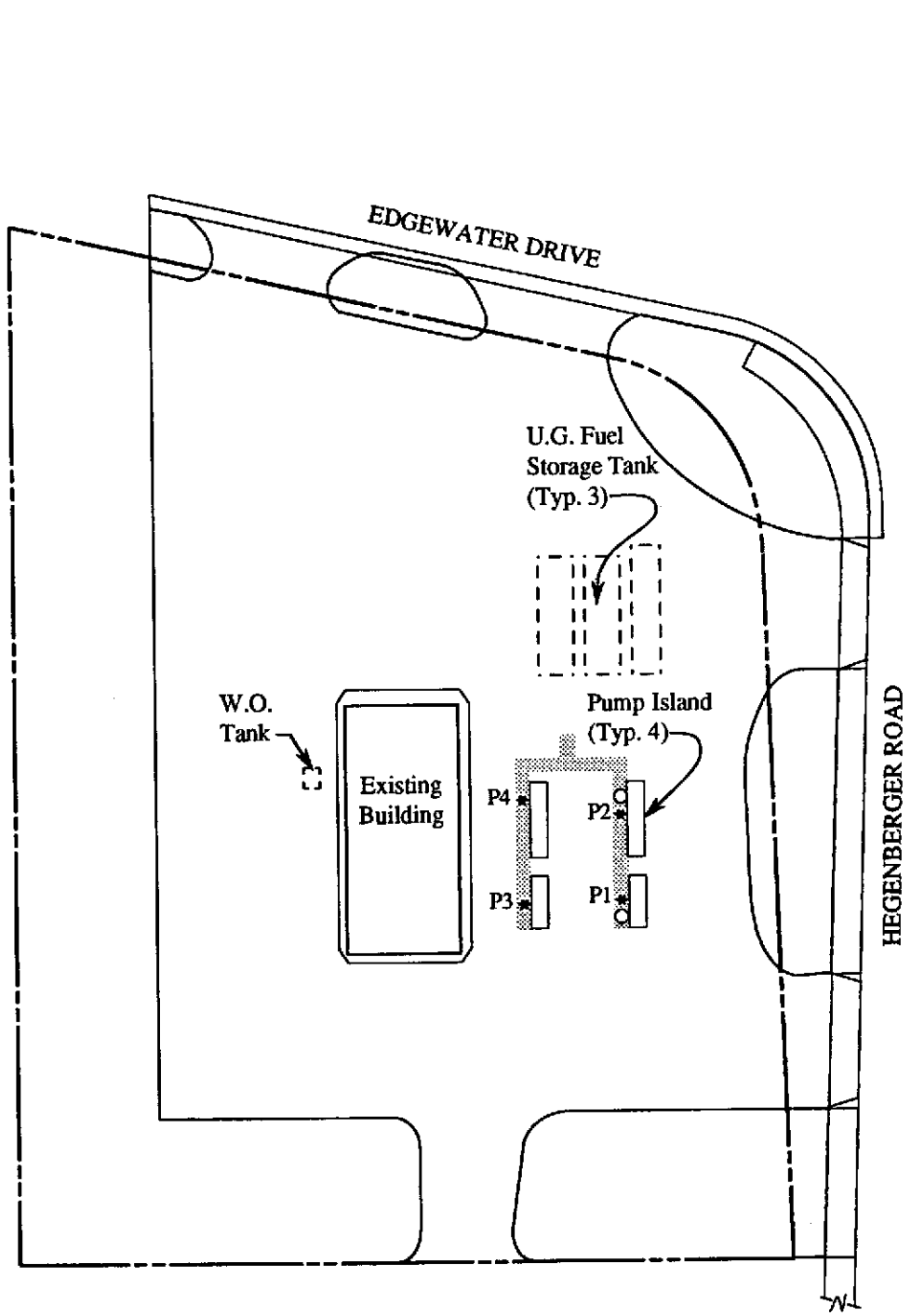
0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5043
449 HEGENBERGER ROAD
OAKLAND, CA

FIGURE
1c



SITE PLAN

LEGEND

- * Sample point location
- O Hand augered boring location
- Area excavated to ground water (approx. 4 – 4.5 feet below grade)

0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING
INCORPORATED

UNOCAL SERVICE STATION #5043
449 HEGENBERGER ROAD
OAKLAND, CA

FIGURE
2

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 449 Hegenberger Rd., Oakland	Sampled: May 20, 1992
2401 Stanwell Drive, Suite 400	Sample Descript.:	Water, MW -2	Received: May 20, 1992
Concord, CA 94520	Analysis Method:	EPA 5030/ 8015/8020	Analyzed: 5/28 & 5/29/92
Attention: Mardo Kaprealian, P.E.	Lab Number:	205-0926	Reported: Jun 5, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS WITH BTEX DISTINCTION (EPA 8015/8020)

Analyte	Method Detection Limit µg/L (ppb)	Sample Results µg/L (ppb)
Low to Medium Boiling Point Hydrocarbons	30	24,000
Benzene	0.30	2,200
Toluene	0.30	7,600
Ethyl Benzene	0.30	630
Xylenes	0.30	11,000

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 449 Hegenberger Rd., Oakland	Sampled:	May 20, 1992
2401 Stanwell Drive, Suite 400	Matrix Descript:	Water	Received:	May 20, 1992
Concord, CA 94520	Analysis Method:	EPA 3510/8015	Extracted:	May 26, 1992
Attention: Mardo Kaprealian, P.E.	First Sample #:	205-0926	Analyzed:	Jun 4, 1992
			Reported:	Jun 5, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
205-0926	MW -2*	4,300

Method Detection Limits:	50

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

Please Note: * The above sample does not appear to contain diesel. HBP is due to LMBP fuel.

2050926.KEI <2>

SEQUOIA ANALYTICAL

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

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

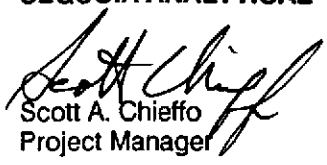
Client Project ID: Unocal, 449 Hegenberger Rd., Oakland
QC Sample Group: 205-0926
Reported: Jun 5, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA8015
Analyst:	A.T.	A.T.	A.T.	A.T.	K.Wimer
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	May 29, 1992	May 29, 1992	May 29, 1992	May 29, 1992	May 28, 1992
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60	300
Conc. Matrix Spike:	23	23	24	73	260
Matrix Spike % Recovery:	115	115	120	122	87
Conc. Matrix Spike Dup.:	23	23	24	72	250
Matrix Spike Duplicate % Recovery:	115	115	120	120	83
Relative % Difference:	0.0	0.0	0.0	1.4	3.9

Laboratory blank contained the following analytes: None Detected

SEQUOIA ANALYTICAL



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

2050926.KEI <3>

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.
P.O. Box 996
Benicia, CA 94510
Attention: Mardo Kaprealian, P.E.

Client Project ID: Unocal, 449 Hegenberger Rd., Oakland
QC Sample Group: 205-0926

Reported: Jun 5, 1992

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015/8020	EPA 8015/8020	EPA8015	EPA8015
Analyst:	A.T.	A.T.	K.Wimer	K.Wimer
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	May 29, 1992	May 29, 1992	May 28, 1992	May 28, 1992
Sample #:	205-0926	Matrix Blank	205-0926	Matrix Blank
Surrogate % Recovery:	101	108	99	87

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

2050926.KEI <4>

KAPREALIAN ENGINEERING, INC.

CHAIN OF CUSTODY

SAMPLER: Vartkes

WITNESSING AGENCY:

SITE NAME & ADDRESS: Unocal / Oakland
449 Hegenberger Rd.

ANALYSES REQUESTED: TPHG/BTKE; TPH D

TURN AROUND TIME: Regular

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG/BTKE	TPH D	REMARKS
MW-2	5/20/92	12:05 P.M.		✓	✓		3	Monitoring Well	✓	✓	2050926AC

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Vartkes	5/20/92 1110	K. Walker 5/20/92 1:19
K. Walker	5/20/92	[illegible] 5-20-92 1:40PM
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?
2. Will samples remain refrigerated until analyzed? /
3. Did any samples received for analysis have head space? NO
4. Were samples in appropriate containers and properly packaged? /

Signature	Title	Date
[illegible]	Ice-in	5-20-92

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P91-1004.P2
July 7, 1992

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

Attention: Mr. Tim Howard

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

INTRODUCTION

In Kaprealian Engineering, Inc's. (KEI) most recent quarterly report KEI-P91-1004.QR1 dated July 7, 1992, KEI recommended the installation of three additional monitoring wells. The purpose of these wells is to further define the extent of contamination at the site. 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 three additional two-inch diameter monitoring wells, designated as MW4 through MW6 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 and/or 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. Based on our present understanding of the site, the proposed wells will be drilled and installed to depths of about 13 to 18 feet below grade.

2. Soil samples will be collected continuously, beginning at a depth of 2 feet below grade and continuing until the first water table is encountered (the initial water table is anticipated at about 3 feet below grade). Sampling for lithologic logging purposes only will continue below the water

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

table to the total depth drilled. At least one representative soil sample of the saturated zone will be collected and submitted to a laboratory for a particle size analysis (sieve and hydrometer analysis) for verification of casing slot size and filter pack design. 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. 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.

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 will be submitted to the Alameda County Health Care Services Agency and to the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region.

5. Ground water is anticipated at approximately 3 feet below grade, based on the ground water levels encountered in existing monitoring wells.

6. <u>Well Construction</u>:

   Casing Type: Schedule 40 PVC, flush threaded joints, 0.01 inch factory slot, two-inch diameter. Screen to run from total depth of the well to approximately the elevation of the first encountered ground water. Monterey sand (#2/12) will fill the annular space from total depth to the top of the perforated casing interval. The choice of screen slot size and sand filter pack material is based on soils encountered in previous borings and in a previous particle size analysis. A 2-foot thick bentonite seal will be placed in the annular space on top of the sand pack. Ready mix-concrete 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.

7. 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.

   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 feet.

8. 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 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.

   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 samples.

9. 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 in conjunction with modified 8015, benzene, toluene, xylenes, and ethylbenzene (BTX&E) by EPA method 8020, and TPH as diesel by EPA methods 3550 (soil) and 3510 (water).

   The analytical results will be presented in tabular form, showing the sample depths, results, and the detection limits.

The analytical results will be used to delineate the vertical and lateral extent of the contaminants in soil and ground water.

10. Hydrology:

The ground water flow direction will be determined from the survey data and the ground water elevations from both the new and existing wells. The flow direction will be shown on the Site Plan.

11. Ongoing Pumping, Monitoring, and Sampling:

11.1 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.

11.2 Ground water from all of the existing monitoring wells will be purged, sampled, and analyzed for TPH as gasoline, TPH as diesel, and BTX&E on a quarterly basis. Prior to sampling, the water level in each well will be recorded as well as the presence of any free product and sheen.

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

12. Conclusions:

Conclusions and results of Phase II will be described in a technical report.

The technical report will be submitted to the Alameda County Health Care Services 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:

Kaprealian Engineering, Inc.

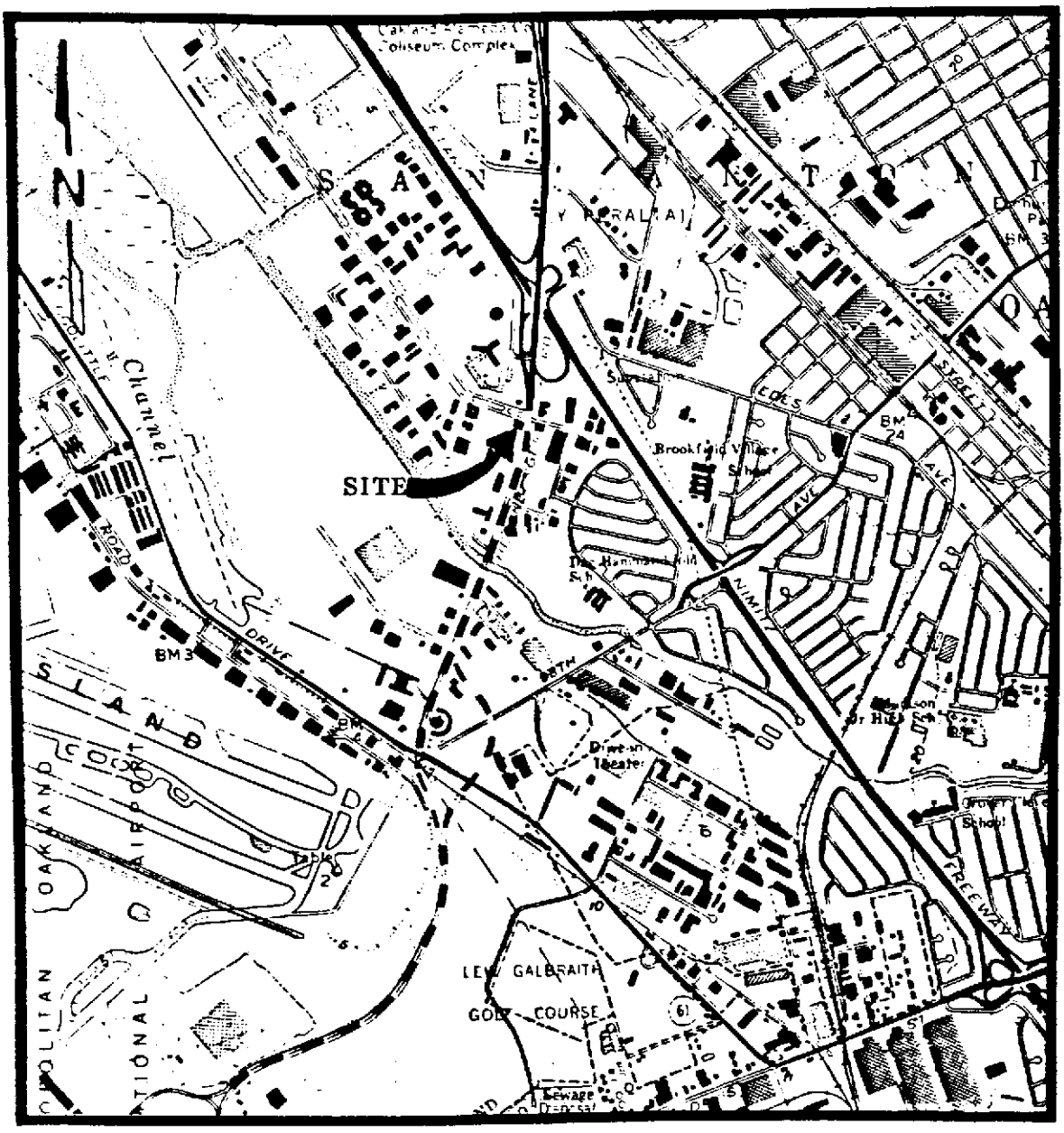
Joel G. Greger, C.E.G.
Senior Engineering Geologist

License No. 1633
Exp. Date 6/30/93

Timothy R. Ross
Project Manager

\bp

Attachments: Location Map
Site Plan - Figure 1
Typical Well Completion Diagram

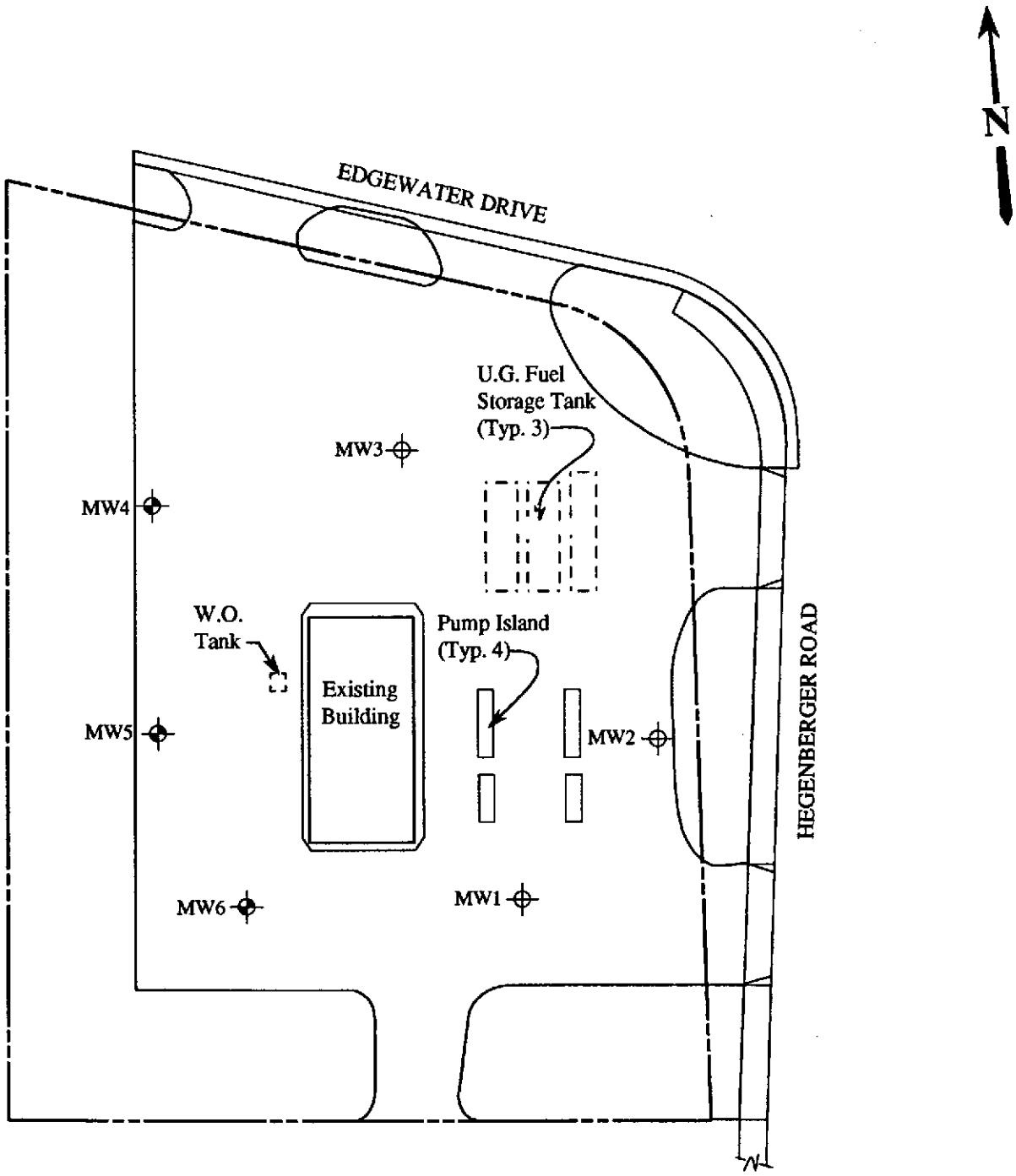


Base modified from 7.5 minute U.S.G.S. San Leandro Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #5043 449 HEGENBERGER ROAD OAKLAND, CA	LOCATION MAP



SITE PLAN

LEGEND

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

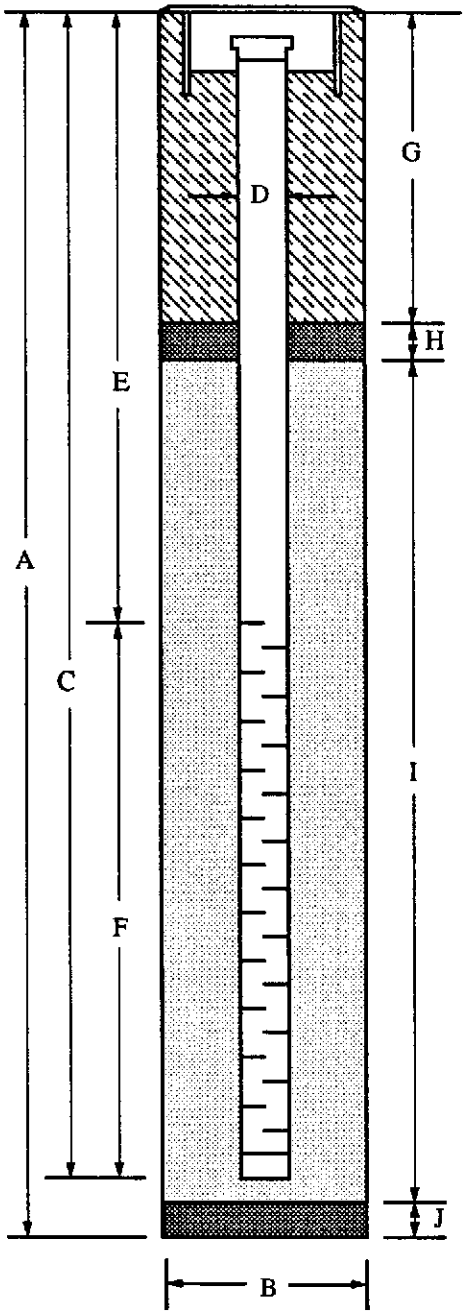
0 40 80

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	**UNOCAL SERVICE STATION #5043** **449 HEGENBERGER ROAD** **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.