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KAPREALIAN ENGINEERING
INCORPORATED

1140

April 2, 1993

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

Attention: Mr. Barney Chan

RE: Unocal Service Station #2656
4251 E. 14th St.
Oakland, California

Dear Mr. Chan:

Per the request of Mr. Dave Camille of Unocal Corporation, enclosed please find our report dated March 26, 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: Dave Camille, Unocal Corporation

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel 510 602.5100 Fax 510 687 0602

KAPREALIAN ENGINEERING
INCORPORATED

KEI-P90-0102.QR6
March 26, 1993

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

Attention: Mr. Dave Camille

RE: Quarterly Report
Unocal Service Station #2656
4251 E. 14th Street
Oakland, California

Dear Mr. Camille:

This report presents the results of the most recent quarter of monitoring and sampling of the monitoring wells at the referenced site by Kaprealian Engineering, Inc. (KEI), per KEI's proposal (KEI-P90-0102.P6) dated September 14, 1992. All of the wells are currently monitored quarterly. Monitoring wells MW1 through MW4 are sampled semi-annually, and wells MW5 and MW6 are sampled quarterly. This report covers the work performed by KEI during March of 1993.

BACKGROUND

The subject site contains a Unocal service station facility. One waste oil tank was removed from the site in January of 1990. The waste oil tank pit was subsequently overexcavated in order to remove contaminated soil. Two underground gasoline storage tanks and the associated product piping were removed from the site in April of 1992 during tank replacement activities. The fuel tank pit and the product pipe trenches were subsequently overexcavated in order to remove contaminated soil. Six monitoring wells have been installed at the site.

A site description, detailed background information including a summary of all of the soil and ground water subsurface investigation/remediation work conducted to date, site hydrogeologic conditions, and tables that summarize all of the soil and ground water sample analytical results are presented in KEI's report (KEI-P90-0102.R7) dated January 18, 1993.

RECENT FIELD ACTIVITIES

The six wells (MW1 through MW6) were monitored once and wells MW5 and MW6 were sampled once during the quarter. Wells MW1 through MW4 are sampled on a semi-annual basis, and thus were not sampled

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510.602.5100 Fax: 510 687.0602

this quarter. During monitoring, the wells were checked for depth to water and the presence of free product. Prior to sampling, wells MW5 and MW6 were also checked for the presence of a sheen. No free product or sheen was noted in any of the wells during the quarter. The monitoring data collected this quarter are summarized in Table 1.

Water samples were collected from wells MW5 and MW6 on March 4, 1993. Prior to sampling, the wells were each purged of 11 gallons of water by the use of a surface pump. The samples were collected by the use of a clean Teflon bailer. The samples were 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 a state-certified laboratory.

HYDROLOGY

The measured depth to ground water at the site on March 4, 1993, ranged between 32.21 and 33.88 feet below grade. The water levels in all of the wells have shown decreases ranging from 1.35 to 1.39 feet since December 4, 1992. Based on the water level data gathered on March 4, 1993, the ground water flow direction appeared to be complex (varying from the northeast to the southwest), as shown on the attached Potentiometric Surface Map, Figure 1. The flow direction reported this quarter is relatively similar to the flow direction reported in the previous quarter. The average hydraulic gradient across the site on March 4, 1993, was approximately 0.002.

ANALYTICAL RESULTS

The ground water samples collected from wells MW5 and MW6 were analyzed at Sequoia Analytical Laboratory and were accompanied by properly executed Chain of Custody documentation. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by EPA method 5030/modified 8015, benzene, toluene, xylenes, and ethylbenzene (BTX&E) by EPA method 8020, TPH as diesel by EPA method 3510/modified 8015, and total oil and grease (TOG) by Standard Methods 5520B&F.

The ground water sample analytical results are summarized in Table 2. The concentrations of TPH as gasoline and benzene detected in the ground water samples collected on March 4, 1993, are non-detectable, and are shown on the attached Figure 2. Copies of the laboratory analytical results and the Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results for the ground water samples collected and evaluated to date, and no evidence of free product or sheen in any of the wells, KEI recommends the continuation of the current ground water monitoring and sampling program, per KEI's proposal (KEI-P90-0102.P6) dated September 14, 1992. All of the wells are currently monitored quarterly. Monitoring wells MW1 through MW4 are sampled semi-annually, and wells MW5 and MW6 are sampled quarterly.

KEI previously recommended (KEI's work plan/proposal KEI-P90-0102.P7 dated February 16, 1993) the installation of three vapor extraction test wells in the northern portion of the site. KEI also proposed conducting a pilot vapor extraction test after the installation of the test wells. The proposed locations of the vapor extraction test wells are shown on the attached Figure 3. KEI is currently in the process of obtaining the well installation permits. The wells are tentatively scheduled to be installed in April of 1993. The vapor extraction test will be performed after the installation of the wells is complete.

DISTRIBUTION

A copy of this report should be sent to Mr. Barney Chan of the 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 these 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 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 6/30/94

Aram Kaloustian
Project Engineer

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Attachments: Tables 1 & 2
Location Map
Potentiometric Surface Map - Figure 1
Concentrations of Petroleum Hydrocarbon - Figure 2
Well Location Map - Figure 3
Laboratory Analyses
Chain of Custody documentation

KEI-P90-0102.QR6
March 26, 1993

TABLE 1

SUMMARY OF MONITORING DATA

Well No.	Ground Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Sheen	Water Purged (gallons)
(Monitored and Sampled on March 4, 1993)					
MW1*	-9.21	32.80	0	--	0
MW2*	-9.37	32.21	0	--	0
MW3*	-9.36	33.56	0	--	0
MW4*	-9.32	32.67	0	--	0
MW5	-9.31	33.88	0	No	11
MW6	-9.30	33.27	0	No	11

Well #	Well Cover Elevation** (feet)
MW1	23.59
MW2	22.84
MW3	24.20
MW4	23.35
MW5	24.57
MW6	23.97

* Monitored only.

** The elevations of the tops of the well covers have been surveyed relative to Mean Sea Level, per a City of Oakland Benchmark #20-F (Elevation = 23.90)

-- Sheen determination was not performed.

KEI-P90-0102.QR6
March 26, 1993

TABLE 2

SUMMARY OF LABORATORY ANALYSES
WATER

Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
3/04/93	MW1	SAMPLED SEMI-ANNUALLY					
	MW2	SAMPLED SEMI-ANNUALLY					
	MW3	SAMPLED SEMI-ANNUALLY					
	MW4	SAMPLED SEMI-ANNUALLY					
	MW5*	ND	ND	ND	ND	ND	ND
	MW6*	ND	ND	ND	ND	ND	ND
12/04/92	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	0.65	0.91	ND
	MW3*	ND	ND	ND	ND	ND	ND
	MW4*	ND	ND	ND	ND	ND	ND
	MW5	--	ND	ND	ND	ND	ND
	MW6	--	ND	ND	ND	ND	ND
9/24/92	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
	MW4*	ND	ND	ND	ND	ND	ND
3/18/92	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
	MW4*	ND	ND	ND	ND	ND	ND
11/21/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
8/22/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
5/22/91	MW1*	ND	ND	ND	ND	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
2/22/91	MW1*	ND	ND	ND	ND	0.30	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND
	MWD**	ND	ND	ND	ND	ND	ND

TABLE 2 (Continued)

SUMMARY OF LABORATORY ANALYSES
WATER

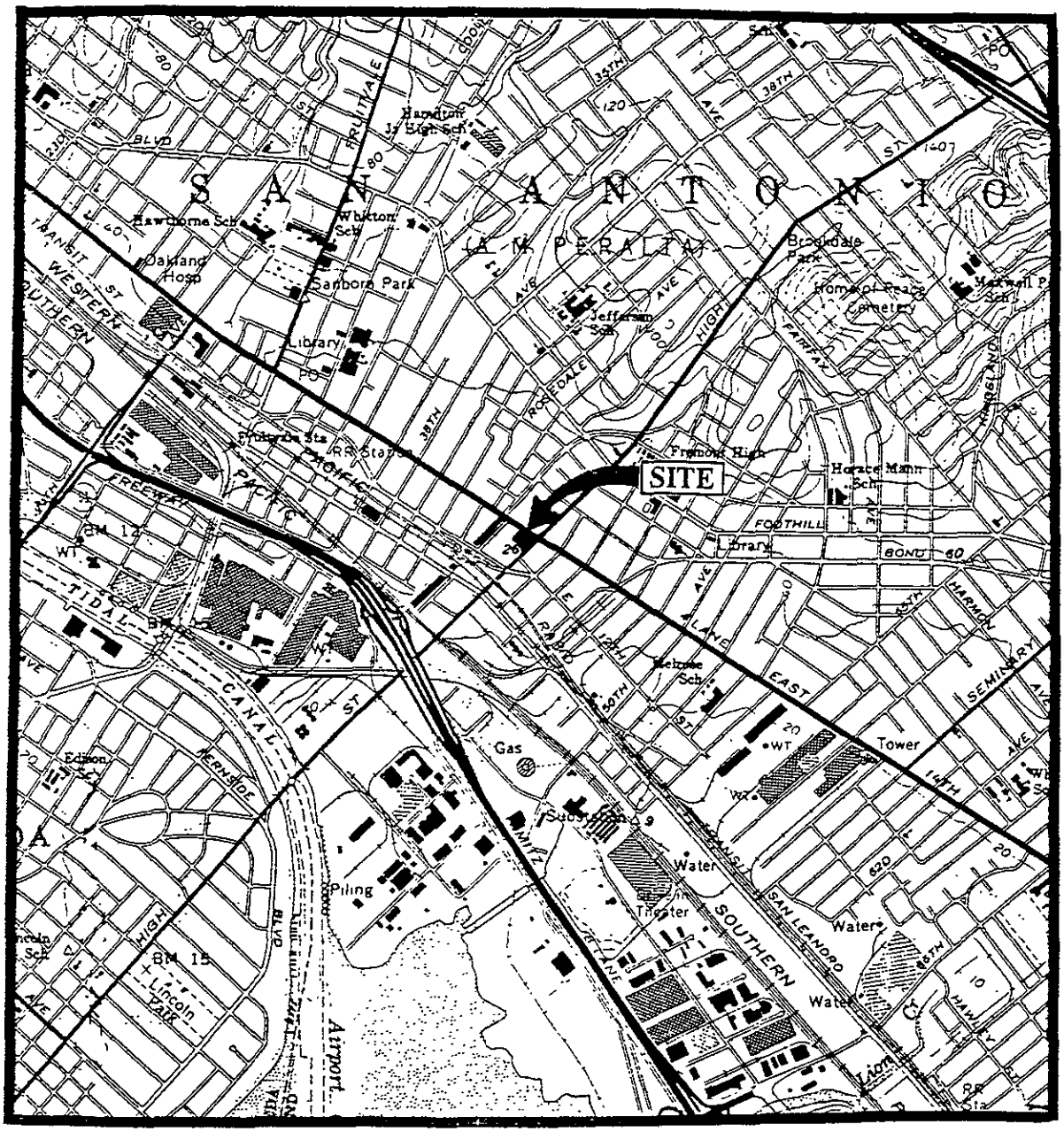
Date	Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
10/02/90	MW1*	ND	ND	ND	0.84	ND	ND
	MW2*	ND	ND	ND	ND	ND	ND
	MW3*	ND	ND	ND	ND	ND	ND

* TOG was non-detectable.

** Quality assurance duplicate water sample collected from monitoring well MW1. TOG was non-detectable.

ND = Non-detectable.

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

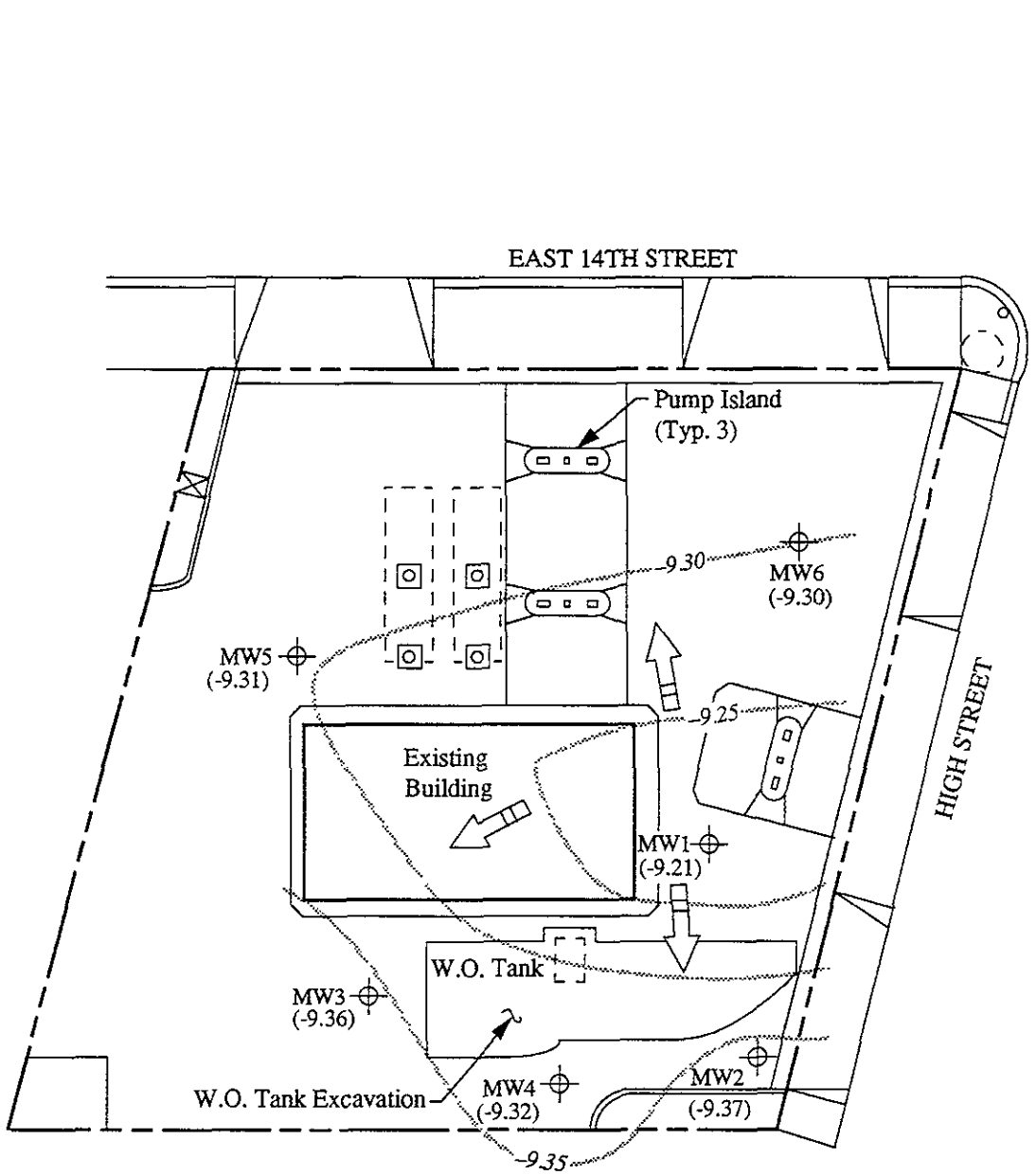


Base modified from 7.5 minute U.S.G.S. Oakland East Quadrangle
(photorevised 1980)

0 2000 4000

Approx. scale feet

KAPREALIAN ENGINEERING INCORPORATED	UNOCAL SERVICE STATION #2656 4251 EAST 14TH STREET OAKLAND, CA LIFORNIA	LOCATION MAP



LEGEND

- Monitoring well
- ( ) Ground water elevation in feet relative to Mean Sea Level
- Direction of ground water flow
- Coutours of ground water elevation

0 30 60

Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE MARCH 4, 1993 MONITORING EVENT

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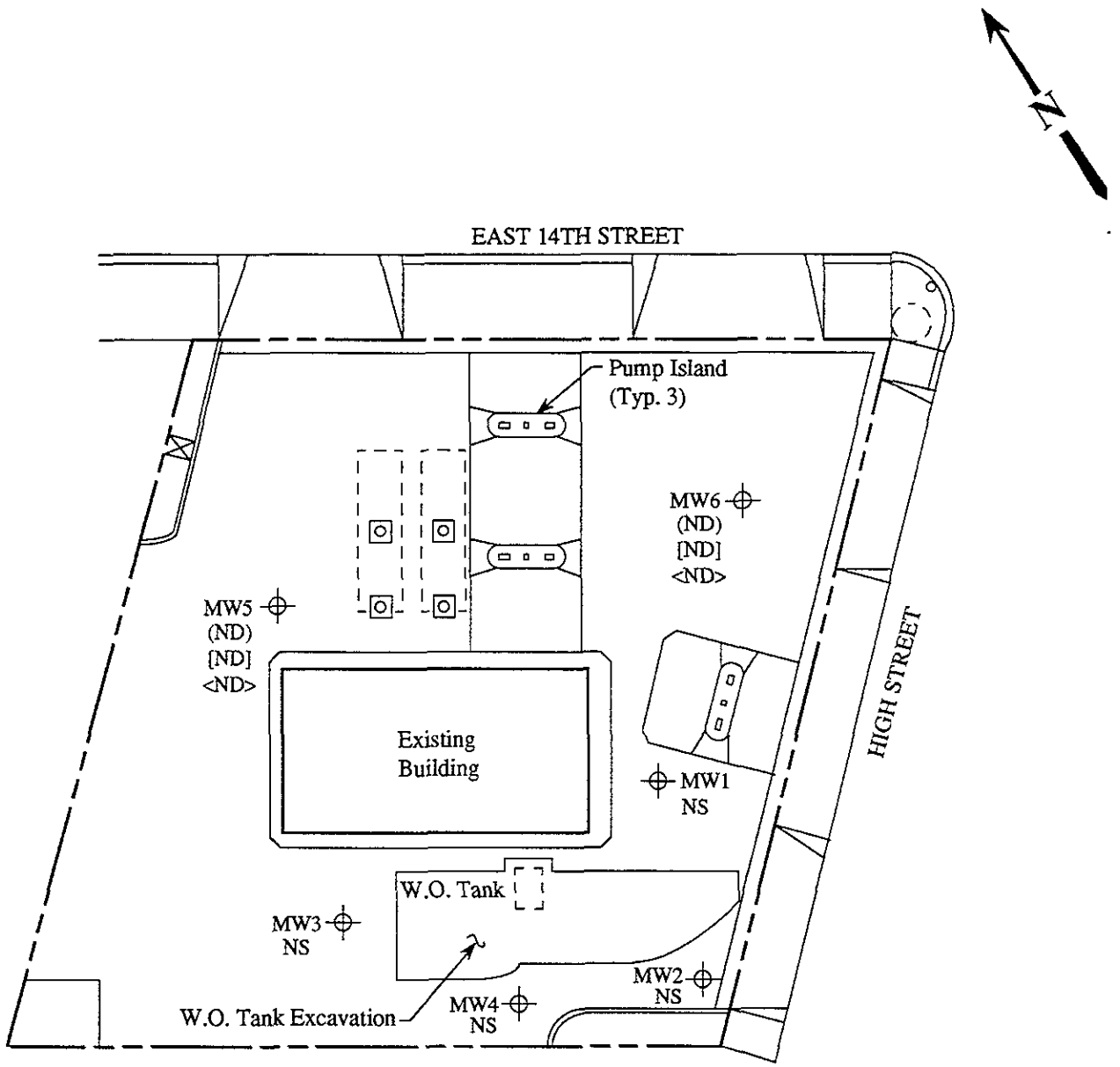
INCORPORATED

UNOCAL SERVICE STATION #2656
4251 EAST 14TH STREET
OAKLAND, CA

FIGURE
1



LEGEND

- ⊕ Monitoring well
- ( ) Concentration of TPH as gasoline in ppb
- [ ] Concentration of benzene in ppb
- < > Concentration of TPH as diesel in ppb
- ND = Non-detectable
- NS = Not sampled

0 30 60

Approx. scale feet

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER ON MARCH 4, 1993

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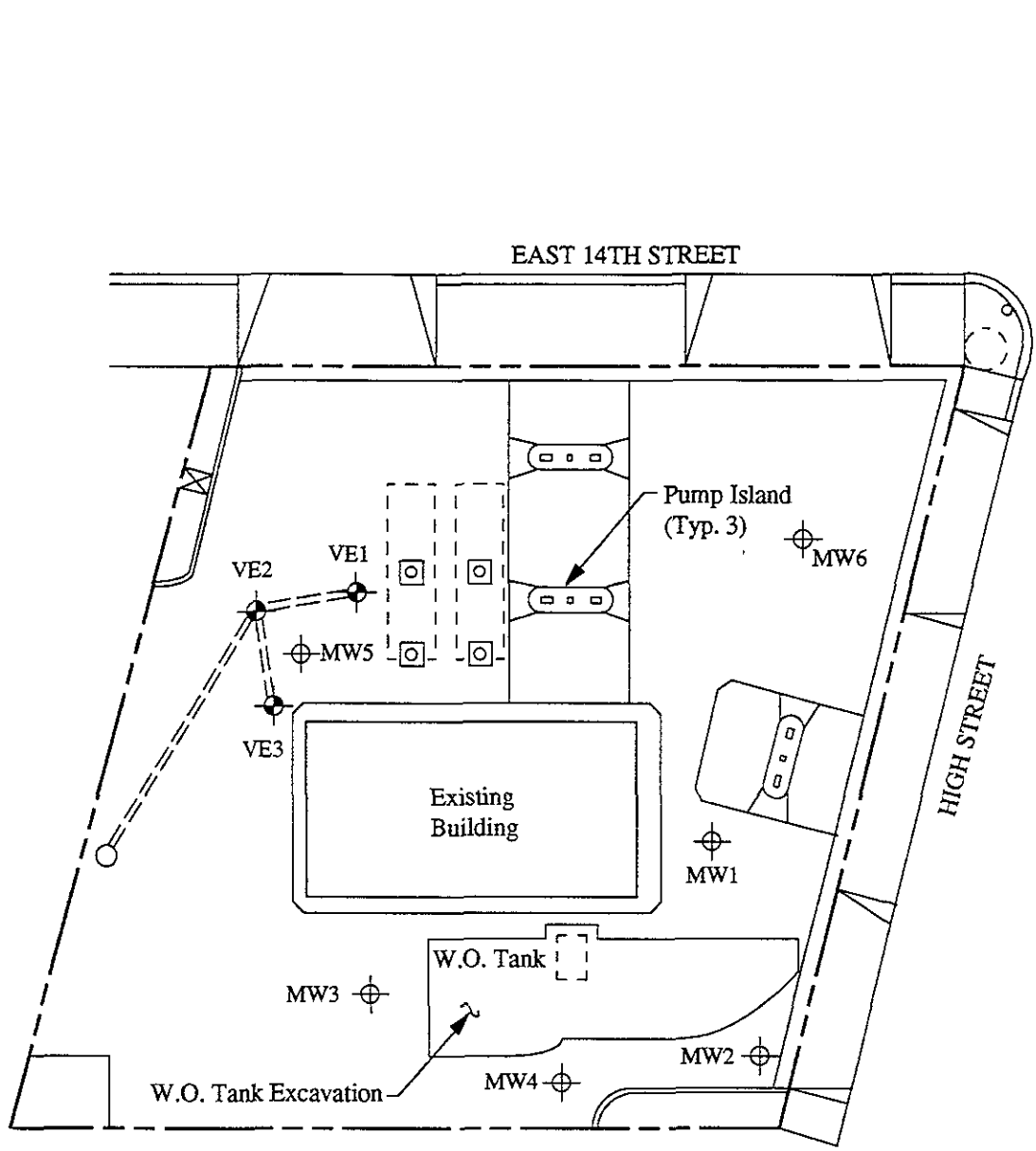
INCORPORATED

UNOCAL SERVICE STATION #2656
4251 EAST 14TH STREET
OAKLAND, CA

FIGURE
2



LEGEND

- Monitoring well (existing)
- Vapor extraction well (proposed)
- Vapor extraction subsurface conduit

0 30 60

Approx. scale feet

WELL LOCATION MAP

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INCORPORATED

UNOCAL SERVICE STATION #2656
4251 EAST 14TH STREET
OAKLAND, CA

FIGURE
3

SEQUOIA ANALYTICAL

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

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 4251 E. 14th St., Oakland	Sampled: Mar 4, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received: Mar 4, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported: Mar 17, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	303-0198	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 303-0198 MW 5	Sample I.D. 303-0199 MW 6	Sample I.D. Matrix Blank
Purgeable Hydrocarbons	50	N.D.	N.D.	
Benzene	0.5	N.D.	N.D.	
Toluene	0.5	N.D.	N.D.	
Ethyl Benzene	0.5	N.D.	N.D.	
Total Xylenes	0.5	N.D.	N.D.	
Chromatogram Pattern:		--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0
Date Analyzed:	3/8/93	3/8/93	3/8/93
Instrument Identification:	HP-4	HP-4	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	98	97	100

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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, 4251 E. 14th St., Oakland	Sampled:	Mar 4, 1993
2401 Stanwell Drive, Suite 400	Sample Matrix:	Water	Received:	Mar 4, 1993
Concord, CA 94520	Analysis Method:	EPA 3510/3520/8015	Reported:	Mar 17, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	303-0198		

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 303-0198 MW 5	Sample I.D. 303-0199 MW 6	Sample I.D. Matrix Blank
Extractable Hydrocarbons	50	N.D.	N.D.	
Chromatogram Pattern:		--	--	

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0
Date Extracted:	3/11/93	3/11/93	3/11/93
Date Analyzed:	3/15/93	3/15/93	3/15/93
Instrument Identification:	HP-3A	HP-3A	HP-3B

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Scott A. Chieffo
Project Manager

SEQUOIA ANALYTICAL

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(510) 686-9600 • FAX (510) 686-9689

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, 4251 E. 14th St., Oakland	Sampled:	Mar 4, 1993
2401 Stanwell Drive, Suite 400	Matrix Descript:	Water	Received:	Mar 4, 1993
Concord, CA 94520	Analysis Method:	SM 5520 B&F (Gravimetric)	Extracted:	Mar 8, 1993
Attention: Mardo Kaprealian, P.E.	First Sample #:	303-0198	Analyzed:	Mar 9, 1993
			Reported:	Mar 17, 1993

TOTAL RECOVERABLE PETROLEUM OIL

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
303-0198	MW 5	N.D.
303-0199	MW 6	N.D.

Detection Limits:	**5.0**

Analytes reported as N.D. were not present above the stated limit of detection.

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

Client Project ID: Unocal, 4251 E. 14th St., Oakland
QC Sample Group: 3030198-199
Reported: Mar 17, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Diesel	Oil and Grease
Method:	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA 8015/8020	EPA8015	SM5520
Analyst:	J.F.	J.F.	J.F.	J.F.	K.Wimer	D. Newcomb
Reporting Units:	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Date Analyzed:	Mar 8, 1993	Mar 8, 1993	Mar 8, 1993	Mar 8, 1993	Mar 15, 1993	Mar 8, 1993
QC Sample #:	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank	Matrix Blank
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60	300	100
Conc. Matrix Spike:	20	20	20	63	289	97
Matrix Spike % Recovery:	100	100	100	105	96	97
Conc. Matrix Spike Dup.:	20	20	20	64	293	97
Matrix Spike Duplicate % Recovery:	100	100	100	107	98	97
Relative % Difference:	0.0	0.0	0.0	1.6	1.4	0.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.
Laboratory Blank contained the following analytes: None detected.

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

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, 4251 E. 14th St., Oakland
QC Sample Group: 3030198-199

Reported: Mar 17, 1993

QUALITY CONTROL DATA REPORT

SURROGATE

Method:	EPA 8015	EPA 8015	EPA 8015
Analyst:	K. Wimer	K. Wimer	K. Wimer
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Mar 15, 1993	Mar 15, 1993	Mar 15, 1993
Sample #:	303-0198	303-0199	Matrix Blank
Surrogate % Recovery:	92	110	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

KAPREALIAN ENGINEERING
INCORPORATED

CHAIN OF CUSTODY

SAMPLER: Vartkes
WITNESSING AGENCY:
SITE NAME & ADDRESS: Unocal / Oakland, 4251 E. 14th St.

SAMPLE ID NO.	DATE	TIME	SOIL	WATER	GRAB	COMP	NO. OF CONT.	SAMPLING LOCATION	TPHG&BTXE	TPHD	TOG(SSTO BAT)				
MW5	3/4/93	11:00 am.		X	X		4	Monitoring Well	X	X	X				
MW6	"	11:45 am.		X	X		4	" "	X	X	X				

ANALYSES REQUESTED

TURN AROUND TIME: Regular.

REMARKS: 3030 198AD ↓ 199AD

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
W. Vartkes	3/4/93 2:40	A. Nagra
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	3/5/93 2:40	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	3-5-93 1852	1852
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? yes
2. Will samples remain refrigerated until analyzed? yes
3. Did any samples received for analysis have head space? NO
4. Were samples in appropriate containers and properly packaged?

A. Nagra — Signature; Technician — Title; 3/4/93 — Date

2401 Stanwell Drive, Suite 400
Concord, California 94520
Tel: 510 602 5100 Fax: 510 687 0602