



GeoStrategies Inc.

93 OCT -7 PM 12:36

QUARTERLY MONITORING REPORT

1059

UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

781480-15

October 5, 1993



GeoStrategies Inc.

October 5, 1993

UNOCAL Corporation
P.O. Box 5155
San Ramon, California 94583

Attn: Mr. David DeWitt

Re: **QUARTERLY MONITORING REPORT**
UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

Mr. Howard:

This Quarterly Monitoring Report has been prepared by GeoStrategies Inc. (GSI) and presents the results of the 1993 second quarter sampling for the above-referenced site (Plate 1).

There are currently three monitoring wells at the site; Wells U-1, U-2, and U-3 (Plate 2). These wells were installed in 1990 by GSI.

CURRENT QUARTER SAMPLING RESULTS

Depth-to-water measurements were obtained in each monitoring well on May 7, 1993. Static groundwater levels were measured from the surveyed top of the well box and recorded to the nearest ± 0.01 foot. Water-level elevations were referenced to Mean Sea Level (MSL) and are presented in Table 1. Water-level data were used to construct a quarterly potentiometric map (Plate 3). Shallow groundwater flow is to the south-southeast with an approximate hydraulic gradient of 0.02. Historically, shallow groundwater flow has been to the southwest. The recent change in flow direction may possibly be due to recent heavy rains.

Each well was checked for the presence of floating product. Floating product was not observed in the wells this quarter. Floating product has never been observed in these wells. The field data sheets are included in Appendix A.

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Groundwater samples were collected on May 7, 1993. Samples were analyzed for Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) according to EPA Method 8015 (Modified), and for Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) according to EPA Method 8020. The groundwater samples were analyzed by Anametrix Inc., a California State-certified laboratory located in San Jose, California. The laboratory analytical report and Chain-of-Custody form are included in Appendix B. These data are summarized and included with the historical chemical analytical data presented in Table 2. A chemical concentration map for benzene is presented on Plate 4. Field methods and procedures were presented in a previous GSI report dated April 28, 1992.

GeoStrategies Inc.

Unocal Corporation
October 5, 1993
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If you have any questions, please call.

GeoStrategies Inc. by,

Ellen C. Fostersmith

Ellen C. Fostersmith
Geologist

Stephen J. Carter

Stephen J. Carter
Project Manager
RG 5577

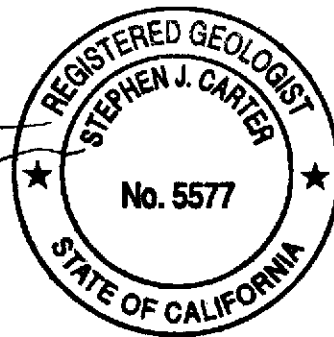


Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Potentiometric Map
Plate 4. Benzene Concentration Map

Appendix A: Field Data Sheets
Appendix B: Laboratory Analytical Report and Chain-of-Custody Form

QC Review: *CMG*

781480-15

TABLE 1
FIELD MONITORING DATA

| WELL NO. | MONITORING DATE | CASING DIA. (IN) | TOTAL WELL DEPTH (FT) | WELL ELEV. (FT) | DEPTH TO WATER (FT) | PRODUCT THICKNESS (FT) | STATIC WATER ELEV. (FT) | PURGED WELL VOLUMES | pH | TEMP. (F) | CONDUCTIVITY (uMHOS/cm) |
|----------|-----------------|------------------|-----------------------|-----------------|---------------------|------------------------|-------------------------|---------------------|------|-----------|-------------------------|
| U-1 | 07-May-93 | 3 | 20.30 | 5.75 | 8.60 | --- | (-2.85) | 6 | 6.74 | 68.4 | 1920 |
| U-2 | 07-May-93 | 3 | 20.0 | 4.94 | 7.62 | --- | (-2.68) | 5 | 6.60 | 71.4 | 1970 |
| U-3 | 07-May-93 | 3 | 20.0 | 8.14 | 11.77 | --- | (-3.63) | 5 | 8.13 | 70.5 | 924 |

- Notes:
1. Static water elevations referenced to Mean Sea Level (MSL).
 2. Physical parameter measurements represent stabilized values.

TABLE 2
HISTORICAL GROUNDWATER QUALITY DATABASE

| SAMPLE DATE | SAMPLE POINT | TPH-G (PPB) | BENZENE (PPB) | TOLUENE (PPB) | ETHYLBENZENE (PPB) | XYLENES (PPB) |
|-------------|--------------|-------------|---------------|---------------|--------------------|---------------|
| 08-Oct-90 | U-1 | 690. | 38. | 75. | 8.6 | 130. |
| 07-Jan-91 | U-1 | 250. | 22. | 16. | 4.2 | 17. |
| 01-Apr-91 | U-1 | 160. | 13. | 8.6 | 1.0 | 15. |
| 03-Jul-91 | U-1 | 140 | 21 | 4.3 | 0.36 | 17 |
| 09-Oct-91 | U-1 | <30 | <0.30 | <0.30 | <0.30 | <0.30 |
| 12-Feb-92 | U-1 | 250 | <0.30 | <0.30 | <0.30 | <0.30 |
| 05-May-92 | U-1 | 230 | 1.2 | <0.5 | <0.5 | <0.5 |
| 20-Aug-92 | U-1 | 400* | 1 | <0.5 | <0.5 | 0.6 |
| 06-Nov-92 | U-1 | 1000 | 80 | 1.4 | 6.7 | 41 |
| 22-Feb-93 | U-1 | 34000 | 1400 | 5500 | 910 | 7300 |
| 07-May-93 | U-1 | 8700 | 600 | 240 | 650 | 3300 |
| 08-Oct-90 | U-2 | 780. | 27. | 46. | 15. | 130. |
| 07-Jan-91 | U-2 | 1900. | 67. | 5.8 | 58. | 69. |
| 01-Apr-91 | U-2 | 1700. | 250. | 89. | 34. | 190. |
| 03-Jul-91 | U-2 | 2100 | 150 | 25 | 3.1 | 290 |
| 09-Oct-91 | U-2 | 230 | 7.1 | <0.30 | <0.30 | 11 |
| 12-Feb-92 | U-2 | 410 | 1.9 | <0.30 | 0.36 | 0.40 |
| 05-May-92 | U-2 | 1600 | 120 | 52 | 6.2 | 290 |
| 20-Aug-92 | U-2 | 700 | 28 | 6.5 | 1.3 | 4.6 |
| 06-Nov-92 | U-2 | 620 | 17 | 2.1 | <0.5 | 37 |
| 22-Feb-93 | U-2 | 3400 | 2400 | 2100 | 1200 | 5800 |
| 07-May-93 | U-2 | 17000 | 1800 | 660 | 1700 | 4000 |
| 08-Oct-90 | U-3 | <50. | <0.5 | <0.5 | <0.5 | <0.5 |
| 07-Jan-91 | U-3 | <50. | <0.5 | <0.5 | <0.5 | 1.8 |
| 01-Apr-91 | U-3 | <50. | 1.0 | 2.9 | 0.53 | 5.4 |
| 03-Jul-91 | U-3 | <30 | <0.30 | <0.30 | <0.30 | <0.30 |
| 09-Oct-91 | U-3 | <30 | <0.30 | <0.30 | <0.30 | <0.30 |
| 12-Feb-92 | U-3 | <30 | <0.30 | <0.30 | <0.30 | <0.30 |
| 05-May-92 | U-3 | <50 | <0.5 | <0.5 | <0.5 | <0.5 |
| 20-Aug-92 | U-3 | <50 | <0.5 | <0.5 | <0.5 | <0.5 |

TABLE 2

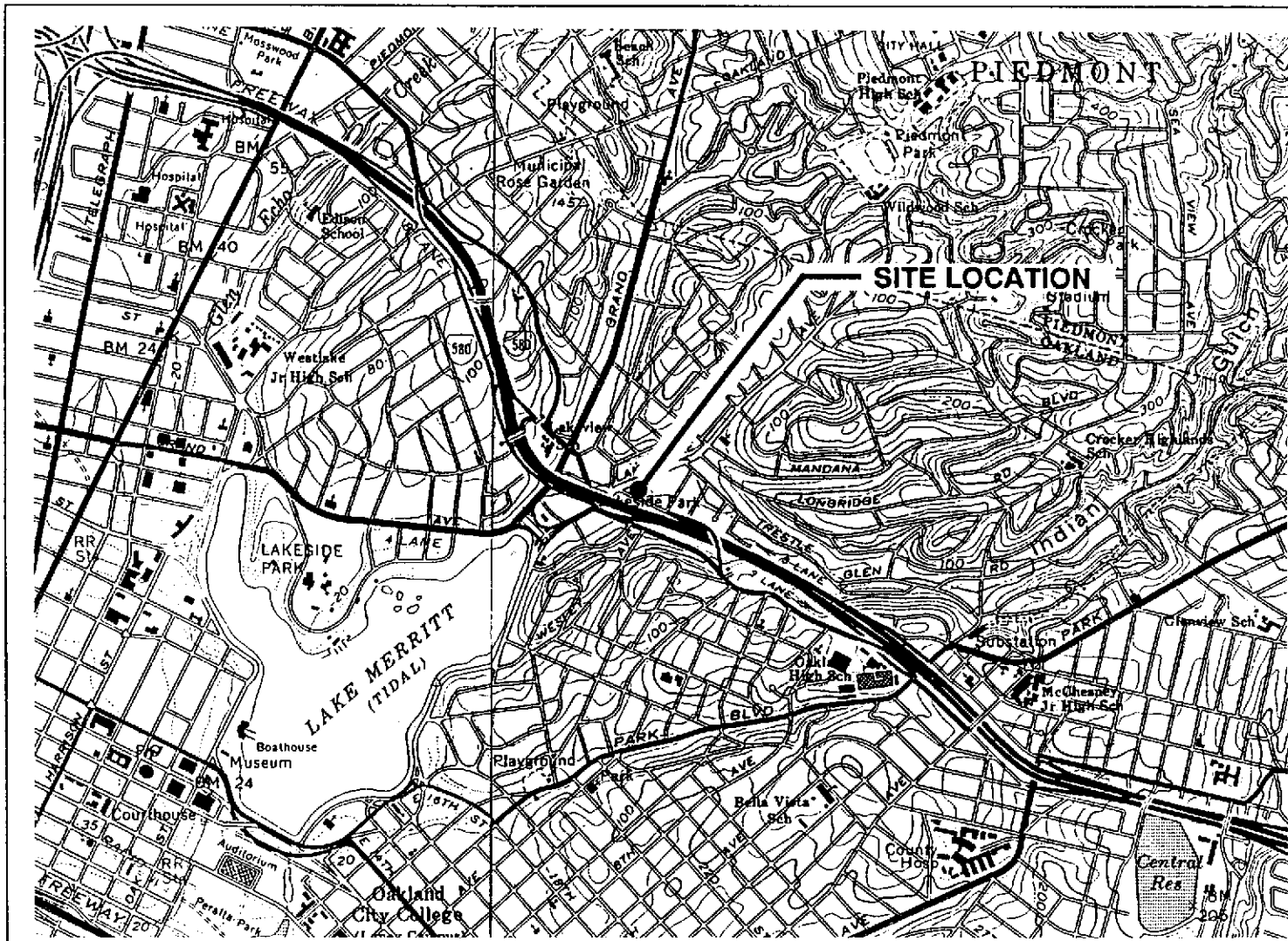
HISTORICAL GROUNDWATER QUALITY DATABASE

| SAMPLE DATE | SAMPLE POINT | TPH-G (PPB) | BENZENE (PPB) | TOLUENE (PPB) | ETHYLBENZENE (PPB) | XYLENES (PPB) |
|-------------|--------------|-------------|---------------|---------------|--------------------|---------------|
| 06-Nov-92 | U-3 | <50 | <0.5 | <0.5 | <0.5 | <0.5 |
| 22-Feb-93 | U-3 | <50 | <0.5 | <0.5 | <0.5 | <0.5 |
| 07-May-93 | U-3 | <50 | <0.5 | <0.5 | <0.5 | <0.5 |

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
 PPB = Parts Per Billion.

Notes: 1. All data shown as < x are reported as ND (none detected).
 2. Laboratory values are reported in units of ug/L, which are generally synonymous with parts per billion.

* The positive result for gasoline does not appear to have a typical gasoline pattern.



Base Map: USGS Topographic Map

Approximate Scale: 1" = 2000'



GeoStrategies Inc.

Vicinity Map
 UNOCAL Service Station #5325
 3220 Lakeshore Avenue
 Oakland, California

PLATE

1

JOB NUMBER
7814

REVIEWED BY RG/CEG
RG

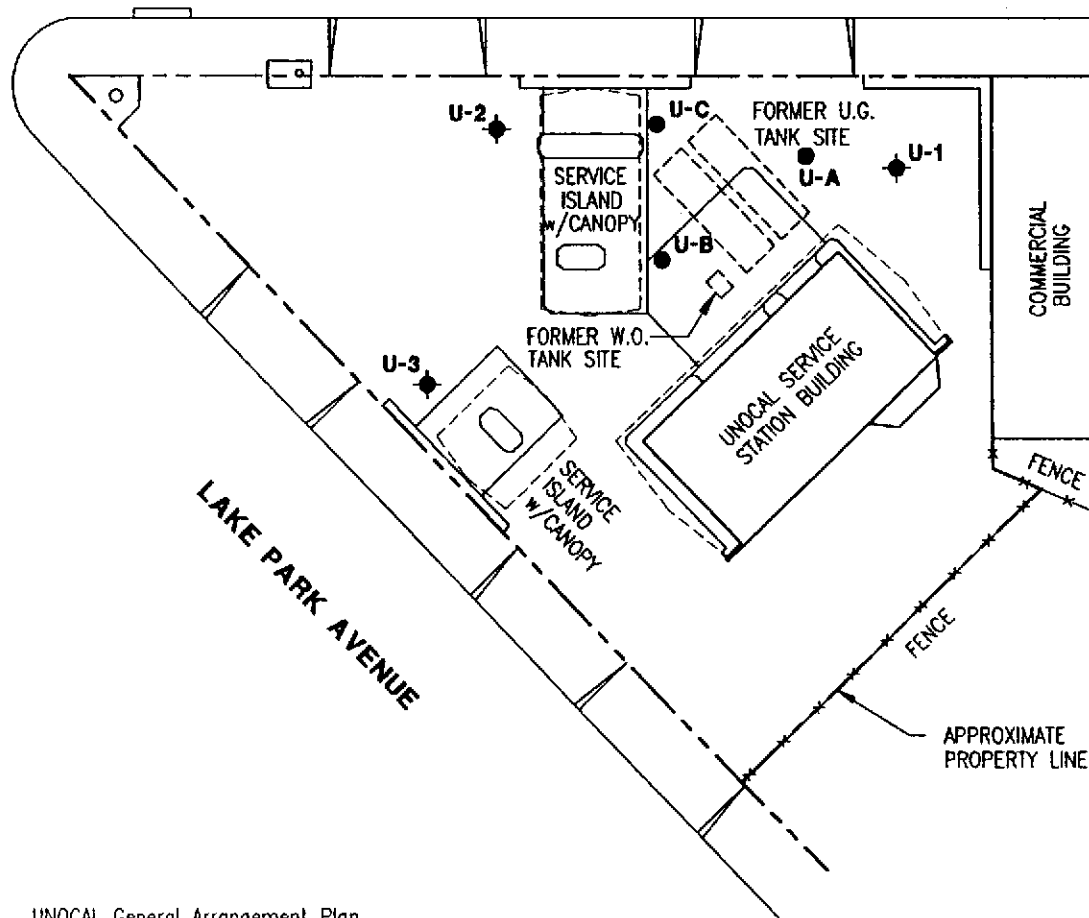
DATE
6/90

REVISED DATE

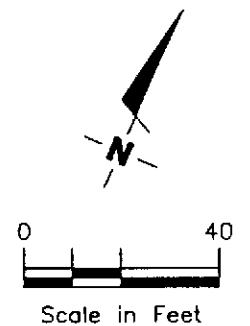
LAKESHORE AVENUE

EXPLANATION

- ◆ Groundwater monitoring well
- Soil boring



Base Map: UNOCAL General Arrangement Plan dated 7-8-66 (Rev. 12-4-84) and field observations



GeoStrategies Inc.

SITE PLAN
UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

PLATE

2

JOB NUMBER
7814

REVIEWED BY

DATE
7/93

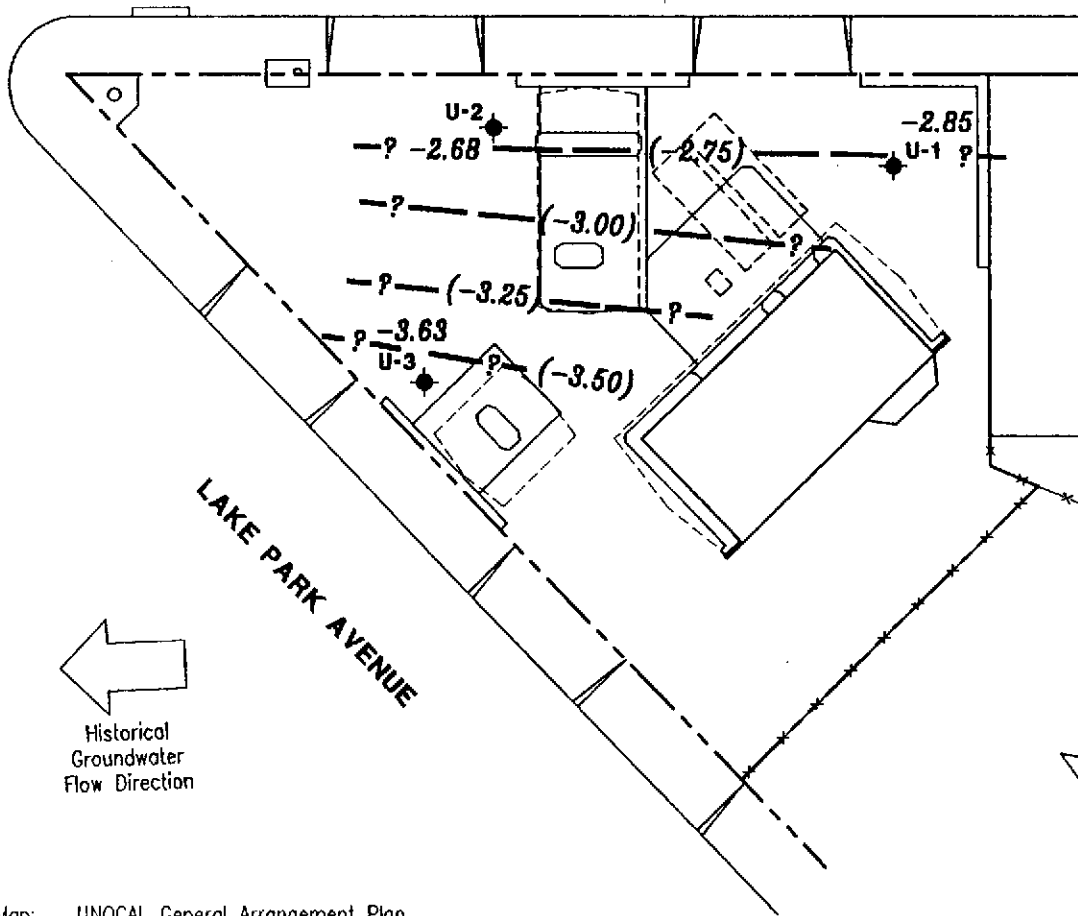
REVISED DATE

LAKESHORE AVENUE

EXPLANATION

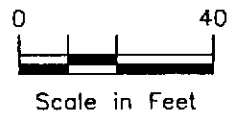
- ◆ Groundwater monitoring well
- 99.99 Groundwater elevation in feet referenced to Mean Sea Level (MSL) measured on May 7, 1993
- - - 99.99 - - - Groundwater elevation contour
Approximate Gradient = 0.02

NOTES: 1. Contours may be influenced by irrigation practices and/or site construction activities.



←
Historical
Groundwater
Flow Direction

↓
Approximate
Groundwater
Flow Direction



Base Map: UNOCAL General Arrangement Plan dated 7-8-66 (Rev, 12-4-84) and field observations



GeoStrategies Inc.

POTENTIOMETRIC MAP
UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

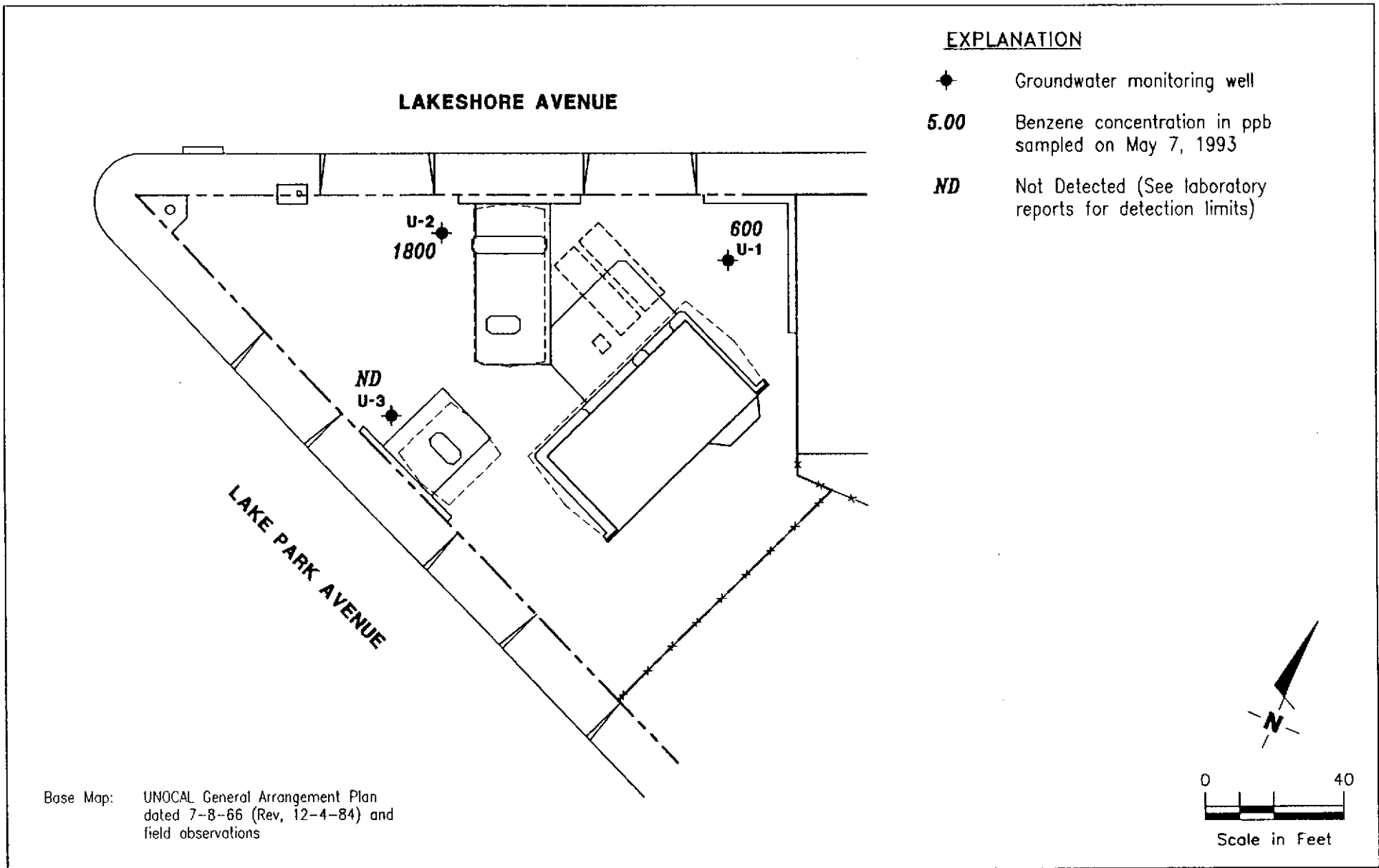
PLATE
3

JOB NUMBER
781480-15

REVIEWED BY

DATE
7/93

REVISED DATE



GeoStrategies Inc.

BENZENE CONCENTRATION MAP
 UNOCAL Service Station #5325
 3220 Lakeshore Avenue
 Oakland, California

PLATE

4

JOB NUMBER
781480-15

REVIEWED BY
cu

DATE
7/93

REVISED DATE

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Unocal JOB # 3814.01
 LOCATION 3220 Lakeshore DATE 5-7-93
 CITY Oakland TIME 5-7-93

Well ID. U-1 Well Condition OK
 Well Diameter 3 in. Hydrocarbon Thickness - ft.

Total Depth 20.30 ft.

Depth to Liquid- 8.60 ft.

| | | | |
|--------------------|-----------|------------|------------|
| Volume Factor (VF) | 2" = 0.17 | 6" = 1.50 | 12" = 5.80 |
| | 3" = 0.38 | 8" = 2.60 | |
| | 4" = 0.66 | 10" = 4.10 | |

(# of casing volumes) 5 x 11.70 x (VF) .38 = (Estimated Purge Volume) 9.4 220 gal.

Purging Equipment DD

Sampling Equipment Bailer

11.70
38
446.0

Starting Time 12:00 Purging Flow Rate _____ gpm.

(Estimated Purge Volume) _____ gal. / (Purging Flow Rate) _____ gpm. = (Anticipated Purging Time) _____ min.

| Time | pH | Conductivity | Temperature | Volume |
|--------------|-------------|--------------|-------------|--------------|
| <u>12:02</u> | <u>6.25</u> | <u>1854</u> | <u>20.6</u> | <u>5</u> gal |
| <u>12:04</u> | <u>6.71</u> | <u>1886</u> | <u>20.2</u> | <u>10</u> |
| <u>12:06</u> | <u>6.75</u> | <u>1907</u> | <u>20.2</u> | <u>15</u> |
| <u>12:08</u> | <u>6.71</u> | <u>1920</u> | <u>20.3</u> | <u>20</u> |
| <u>12:10</u> | <u>6.74</u> | <u>1920</u> | <u>20.2</u> | <u>25</u> |

Did well dewater? _____ If yes, time _____ Volume _____

Sampling Time 12:15 Weather Conditions plc

Analysis gas (BTXE) Bottles Used 3 x 40 ml

Chain of Custody Number _____

COMMENTS _____

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Unocal JOB # 3814.01
 LOCATION 3220 Lakeshore DATE 8-7-93
 CITY Oakland TIME 5-7-93 PM

Well ID. U-2 Well Condition OK
 Well Diameter 3 in. Hydrocarbon Thickness - ft.

Total Depth ~~200.762~~
90.60 ft.
 Depth to Liquid- 7.02 ft.

| | | | |
|--------------------|-----------|------------|------------|
| Volume Factor (VF) | 2" = 0.17 | 6" = 1.50 | 12" = 5.80 |
| | 3" = 0.38 | 8" = 2.60 | |
| | 4" = 0.66 | 10" = 4.10 | |

(# of casing volumes) 5 x 12.38 x (VF) .38 = (Estimated Purge Volume) 4.7 gal.

Purging Equipment DD $\begin{matrix} .62 \\ 12.38 \\ \hline 23.5 \end{matrix}$

Sampling Equipment Bailer $\begin{matrix} .35 \\ 49.04 \\ \hline 37.14 \end{matrix}$

Starting Time 11:40 Purging Flow Rate 47.04 gpm.
 (Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

| Time | pH | Conductivity | Temperature | Volume |
|-------|------|--------------|-------------|--------|
| 11:42 | 6.89 | 1408 | 22.0 | 5 gal |
| 11:44 | 6.75 | 1970 | 21.8 | 10 |
| 11:46 | 6.56 | 1990 | 21.8 | 15 |
| 11:48 | 6.59 | 1970 | 21.8 | 20 |
| 11:50 | 6.50 | 1970 | 21.9 | 25 |

Did well dewater? No If yes, time _____ Volume _____

Sampling Time 11:55 Weather Conditions plc

Analysis gas (BTXE) Bottles Used 3 x 40 ml

Chain of Custody Number _____

COMMENTS _____

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Unocal JOB # 3814.01
 LOCATION 3220 Lakeshore DATE 5-7-93
 CITY Oakland TIME 5-7-93 *FA*

Well ID. U-3 Well Condition OK
 Well Diameter 3 in. Hydrocarbon Thickness - ft.

Total Depth 20'00 ft.
 Depth to Liquid- 11.77 ft.

| | | | |
|--------------------|-----------|------------|------------|
| Volume Factor (VF) | 2" = 0.17 | 6" = 1.50 | 12" = 5.80 |
| | 3" = 0.38 | 8" = 2.60 | |
| | 4" = 0.66 | 10" = 4.10 | |

(# of casing volumes) 5 x 4.23 x (VF) .38 = (Estimated Purge Volume) 3.1 gal.

Purging Equipment DD
 Sampling Equipment Bailer

$$\begin{array}{r} 8.23 \\ 1.38 \\ \hline 16.84 \\ 2.69 \\ \hline 3.1274 \end{array}$$

Starting Time 11:23 Purging Flow Rate _____ gpm.
 (Estimated Purge Volume) _____ gal. / (Purging Flow Rate) _____ gpm. = (Anticipated Purging Time) _____ min.

| Time | pH | Conductivity | Temperature | Volume |
|-------|------|--------------|-------------|--------|
| 11:24 | 7.17 | 965 | 20.7 | 3 gal |
| 11:26 | 8.11 | 964 | 20.6 | 6 |
| 11:27 | 7.14 | 930 | 21.3 | 8 |
| 11:28 | 8.14 | 923 | 21.4 | 12 |
| 11:29 | 8.13 | 924 | 21.4 | 15 |

Did well dewater? No If yes, time _____ Volume _____

Sampling Time 11:33 Weather Conditions PLC

Analysis gas (BTXE) Bottles Used 3 x 40 ml

Chain of Custody Number _____

COMMENTS _____



MR. CLIFF GARRETT
 GETTLER RYAN/GEOSTRATEGIES
 2150 W. WINTON AVENUE
 HAYWARD, CA 94545

Workorder # : 9305066
 Date Received : 05/07/93
 Project ID : 9814.80
 Purchase Order: 9814.80


The following samples were received at Anamatrix, Inc. for analysis :

| ANAMETRIX ID | CLIENT SAMPLE ID |
|--------------|------------------|
| 9305066- 1 | U-1 |
| 9305066- 2 | U-2 |
| 9305066- 3 | U-3 |
| 9305066- 4 | T. BLANK |

This report consists of 5 pages not including the cover letter, and is organized in sections according to the specific Anamatrix laboratory group or section which performed the analysis(es) and generated the data. The Report Summary that precedes each section will help you determine which Anamatrix group is responsible for those test results, and will bear the signatures of the department supervisor and the chemist who have reviewed the analytical data. Please refer all questions to the department supervisor who signed the form.

Anamatrix is certified by the California Department of Health Services (DHS) to perform environmental testing under Certificate Number 1234. A detailed list of the approved fields of testing can be obtained by calling our office, or the DHS Environmental Laboratory Accreditation Program at (415)540-2800.

If you have any further questions or comments on this report, please give us a call as soon as possible. Thank you for using Anamatrix.


 Sarah Schoen, Ph.D.
 Laboratory Director

5-19-93
 Date

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. CLIFF GARRETT
GETTLER RYAN/GEOSTRATEGIES
2150 W. WINTON AVENUE
HAYWARD, CA 94545

Workorder # : 9305066
Date Received : 05/07/93
Project ID : 9814.80
Purchase Order: 9814.80
Department : GC
Sub-Department: TPH

SAMPLE INFORMATION:

| ANAMETRIX SAMPLE ID | CLIENT SAMPLE ID | MATRIX | DATE SAMPLED | METHOD |
|------------------------|---------------------|--------|-----------------|-----------|
| 9305066- 1 | U-1 | WATER | 05/07/93 | TPHg/BTEX |
| 9305066- 2 | U-2 | WATER | 05/07/93 | TPHg/BTEX |
| 9305066- 3 | U-3 | WATER | 05/07/93 | TPHg/BTEX |
| 9305066- 4 | T. BLANK | WATER | 05/04/93 | TPHg/BTEX |

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MR. CLIFF GARRETT
GETTLER RYAN/GEOSTRATEGIES
2150 W. WINTON AVENUE
HAYWARD, CA 94545

Workorder # : 9305066
Date Received : 05/07/93
Project ID : 9814.80
Purchase Order: 9814.80
Department : GC
Sub-Department: TPH

QA/QC SUMMARY :

- No QA/QC problems encountered for these samples.

Charles Bateman 5/17/93
Department Supervisor Date

Diana Shor 5/17/93
Chemist Date

ANALYSIS DATA SHEET - TOTAL PETROLEUM HYDROCARBONS
(GASOLINE WITH BTEX)
ANAMETRIX, INC. - (408) 432-8192

Anamatrix W.O.: 9305066
Matrix : WATER
Date Sampled : 05/04 & 07/93

Project Number : 9814.80
Date Released : 05/17/93

| Reporting Limit | Sample I.D.# U-1 | Sample I.D.# U-2 | Sample I.D.# U-3 | Sample I.D.# T. BLANK | Sample I.D.# BY1201E3 |
|----------------------|------------------|------------------|------------------|-----------------------|-----------------------|
| COMPOUNDS (ug/L) | -01 | -02 | -03 | -04 | -05 |
| Benzene | 0.5 | 600 | 1800 | ND | ND |
| Toluene | 0.5 | 240 | 660 | ND | ND |
| Ethylbenzene | 0.5 | 650 | 1700 | ND | ND |
| Total Xylenes | 0.5 | 3300 | 4000 | ND | ND |
| TPH as Gasoline | 50 | 8700 | 17000 | ND | ND |
| % Surrogate Recovery | 134% | 127% | 128% | 130% | 130% |
| Instrument I.D. | HP4 | HP4 | HP4 | HP4 | HP4 |
| Date Analyzed | 05/13/93 | 05/12/93 | 05/12/93 | 05/12/93 | 05/12/93 |
| RLMF | 100 | 100 | 1 | 1 | 1 |

- ND - Not detected at or above the practical quantitation limit for the method.
- TPHg - Total Petroleum Hydrocarbons as gasoline is determined by GCFID using modified EPA Method 8015 following sample purge and trap by EPA Method 5030.
- BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA Method 8020 following sample purge and trap by EPA Method 5030.
- RLMF - Reporting Limit Multiplication Factor.

Anamatrix control limits for surrogate p-Bromofluorobenzene recovery are 61-139%.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Lucia Skov 5/17/93
Analyst Date

Cheryl Salmer 5/17/93
Supervisor Date

TOTAL VOLATILE HYDROCARBON MATRIX SPIKE REPORT
 EPA METHOD 5030 WITH GC/FID
 ANAMETRIX, INC. (408) 432-8192

| | |
|---------------------------|---------------------------|
| Sample I.D. : 9814.80 U-3 | Anamatrix I.D. : 05066-03 |
| Matrix : WATER | Analyst : J.S. |
| Date Sampled : 05/07/93 | Supervisor : [Signature] |
| Date Analyzed : 05/12/93 | Date Released : 05/17/93 |
| | Instrument I.D.: HP4 |

| COMPOUND | SPIKE AMT (ug/L) | SAMPLE CONC (ug/L) | REC MS (ug/L) | %REC MS | REC MD (ug/L) | %REC MD | RPD | %REC LIMITS |
|---------------|------------------------|--------------------------|---------------------|------------|---------------------|------------|-----|----------------|
| BENZENE | 20.0 | 0.0 | 18.3 | 92% | 19.8 | 99% | 8% | 45-139 |
| TOLUENE | 20.0 | 0.0 | 20.8 | 104% | 22.3 | 112% | 7% | 51-138 |
| ETHYLBENZENE | 20.0 | 0.0 | 21.2 | 106% | 22.8 | 114% | 7% | 48-146 |
| TOTAL XYLENES | 20.0 | 0.0 | 22.9 | 115% | 24.3 | 122% | 6% | 50-139 |
| p-BFB | | | | 120% | | 118% | | 61-139 |

* Quality control established by Anamatrix, Inc.

TOTAL VOLATILE HYDROCARBON LABORATORY CONTROL SAMPLE REPORT
 EPA METHOD 5030 WITH GC/PID
 ANAMETRIX, INC. (408) 432-8192

| | | | |
|---------------|----------------------|-----------------|-------------|
| Sample I.D. | : LAB CONTROL SAMPLE | Anamatrix I.D. | : LCSW0512 |
| Matrix | : WATER | Analyst | : <u> </u> |
| Date Sampled | : N/A | Supervisor | : <u> </u> |
| Date Analyzed | : 05/12/93 | Date Released | : 05/17/93 |
| | | Instrument I.D. | : HP4 |

| COMPOUND | SPIKE AMT. (ug/L) | LCS (ug/L) | REC LCS | %REC LIMITS |
|---------------|-------------------------|---------------|------------|----------------|
| Benzene | 20.0 | 20.2 | 101% | 52-133 |
| Toluene | 20.0 | 22.2 | 111% | 57-136 |
| Ethylbenzene | 20.0 | 23.2 | 116% | 56-139 |
| TOTAL Xylenes | 20.0 | 24.3 | 122% | 61-139 |
| P-BFB | | | 122% | 61-139 |

* Limits established by Anamatrix, Inc.

