# QUARTERLY GROUNDWATER MONITORING REPORT
# THIRD QUARTER 1995

## FORMER BILL CHUN SERVICE STATION
## 2301 SANTA CLARA AVENUE
## ALAMEDA, CALIFORNIA

*Prepared for:*

**MR. WAYNE CHUN**
**265 Heron Drive**
**Pittsburg, California**

*Prepared by:*

**FUGRO WEST, INC.**
**44 Montgomery Street, Suite 1010**
**San Francisco, CA 94104**

*OCTOBER 1995*
*FUGRO PROJECT NO. 9537-0741*



**FUGRO WEST, INC.**

44 Montgomery Street, Suite 1010
San Francisco, California 94104

Phone : (415) 296-1041
Telefax : (415) 296-0944

# LETTER OF TRANSMITTAL

| | | | |
|---|---|---|---|
| To: | Alameda County-Env. Health Dept. | Project No. | 9537-0741 |
| | 1131 Harbor Bay Pkwy., #250 | Date | December 11, 1995 |
| | Alameda, CA 94502-6577 | | |
| Attn: | Juliet Shin | | |
| Phone: | (510) 567-6700 | Fax No. | |

From William Bassett

Subject Quarterly Groundwater Monitoring Report, Third Quarter 1995

**SENT BY:**

☐ Messenger ☐ Overnight Mail ☐ Overnight (by 10 AM) ☒ Regular mail ☐ Hand Delivered

**WE ARE TRANSMITTING:**

☐ Draft Report
☒ Final Report
☐ Proposal
☐ Other:

**THESE ARE TRANSMITTED:**

☐ For Your Review
☒ For Your Information and Use
☐ Per Your Request
☐ Other:

Quarterly Groundwater Report for 2301 Santa Clara Ave., Alameda, California - Fromer Bill Chun Service Station



Wm E Bassett 12/11/95

Signature Date

**FOR OFFICE USE ONLY**

Originator Please Initial Appropriate Box Prior to Sending

| | | | | |
|---|---|---|---|---|
| ☒ Create typed transmittal | ☒ Mail to Addressee | ☐ Mail copy, then file original | ☐ Mail copy, return original | ☐ Mail to Addressee and cc, file copy |

**FUGRO WEST, INC.**

44 Montgomery Street, Suite 1010
San Francisco, CA 94104
**Tel: (415) 296-1041**
Fax: (415) 296-0944

November 10, 1995
Project No. 9537-0741

Mr. Wayne Chun
265 Heron Drive
Pittsburg, California 94565

**Third Quarter 1995 Groundwater Monitoring Report**
**Former Bill Chun Service Station**
**2301 Santa Clara Avenue**
**Alameda, California**

Dear Mr. Chun,

This report documents the results of quarterly ground water monitoring conducted by Fugro West, Inc., (Fugro) on August 30, 1995, at the former Bill Chun Service Station, 2301 Santa Clara Avenue, Alameda, California (Figures 1 and 2).

## SITE ACTIVITIES

The monitoring included measurements of depth to ground water, depth to free product (if present), monitoring well purging, and ground water sample collection and analysis. All purge and decontamination water generated during field activities was stored onsite in Department of Transportation (DOT)-approved 55-gallon steel drums. All field activities were conducted according to the Fugro Standard Operating Procedures (SOP) included as Appendix A.

### Ground Water Elevations

Prior to purging, Fugro measured depth to ground water and depth to free product, if present. Ground water elevation and free product thickness data are summarized in Table 1. Free product was detected in wells MW-5 and MW-7 (free product thickness was 0.31 feet in each of the wells). Calculated ground water elevations decreased an average of 0.53 feet since the last monitoring event in May 1995. The ground water gradient at the site is generally directed toward the north at a magnitude of approximately 0.005 foot per foot (Figure 2). The calculated ground water gradient direction and magnitude are consistent with the previous quarterly monitoring event.

**Ground Water Sampling and Analyses**

Ground water samples were collected from five monitoring wells (MW-1, MW-2, MW-3, MW-4, and MW-6). No samples were collected from monitoring wells MW-5 and MW-7 due to the presence of free product in the wells. Samples were collected according to the attached SOP and submitted under chain-of-custody documentation to Excelchem Environmental Laboratories of Roseville, California, a State-certified analytical laboratory. Samples were analyzed for the following:

- Total Petroleum Hydrocarbons as gasoline (TPH-g), using EPA Method 8015M;
- Total Petroleum Hydrocarbons as diesel (TPH-d), using EPA Method 8015M; and
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) using EPA Method 602.

Ground water analytical results are summarized in Table 2. Laboratory reports and chain-of-custody records are presented in Appendix C.

## REMARKS

This report has been prepared solely for the use of Mr. Wayne Chun. Any reliance on this report by third parties shall be at such parties' sole risk. This report was prepared under the review and supervision of professional geologist registered with the State of California, whose signature appears below.

We appreciate the opportunity to provide environmental consulting services to Mr. Wayne Chun. If you have any questions concerning this report, or if we can assist you in any other matter, please contact us at (415) 296-1041.

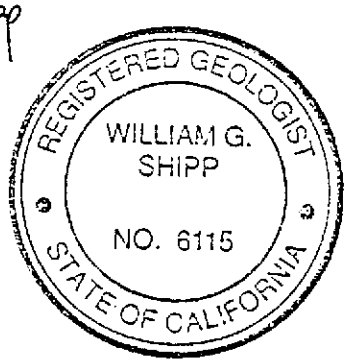
Sincerely,

FUGRO WEST, INC.

William E. Bassett, Jr.
Project Environmental Scientist

William Shipp
Senior Geologist
CRG No. 6115

11/9/95
Date




WEB:dlb
Attachments

cc: Ms. Julie Rose, Randick & O'Dea
Captain Steve McKinley, City of Alameda Fire Department

File: 3.0
c:..projects\94\9437765\95765S02.QMR

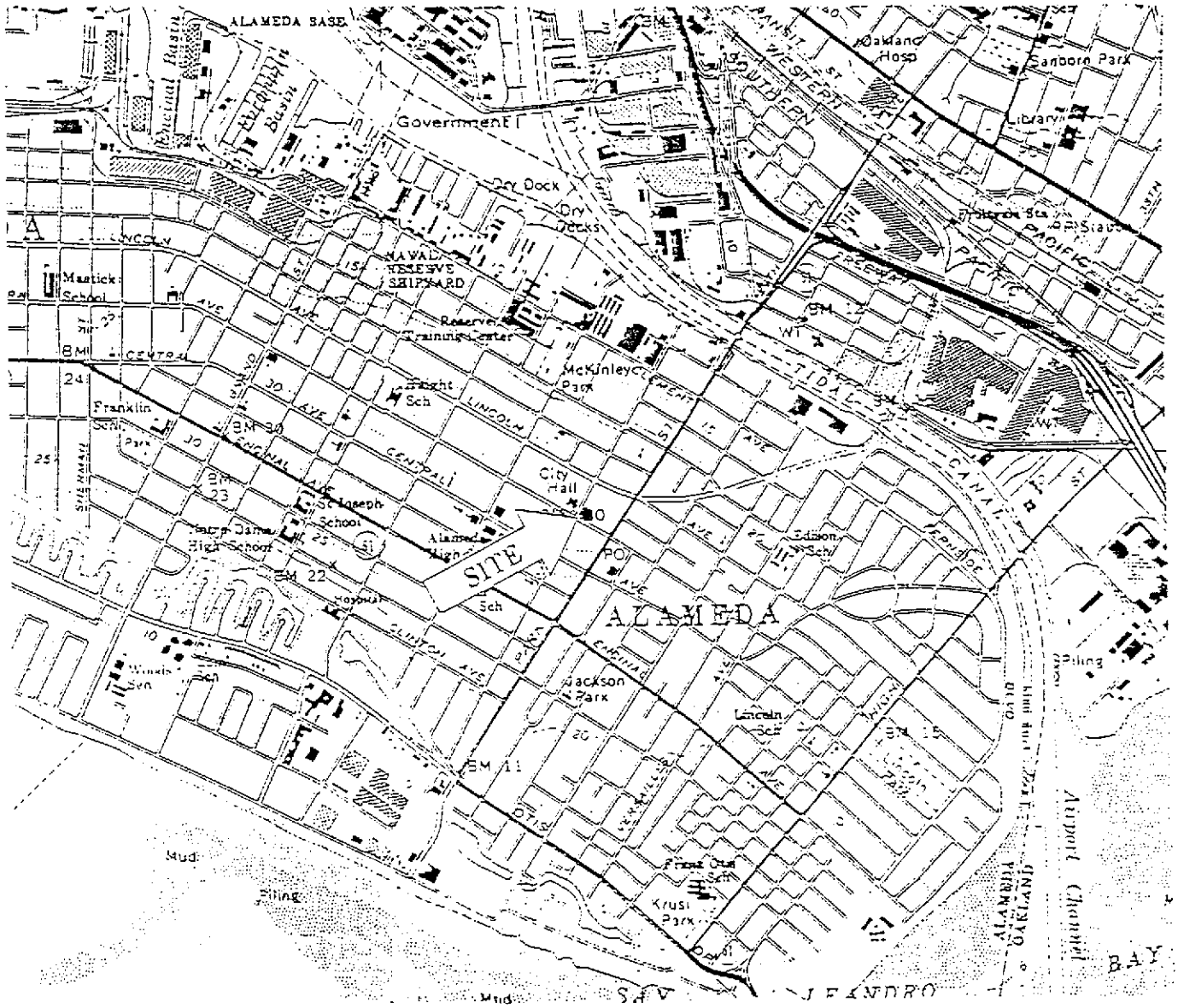
## FIGURES



## TABLES

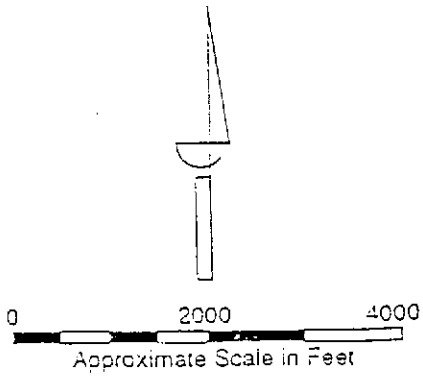


## APPENDICES

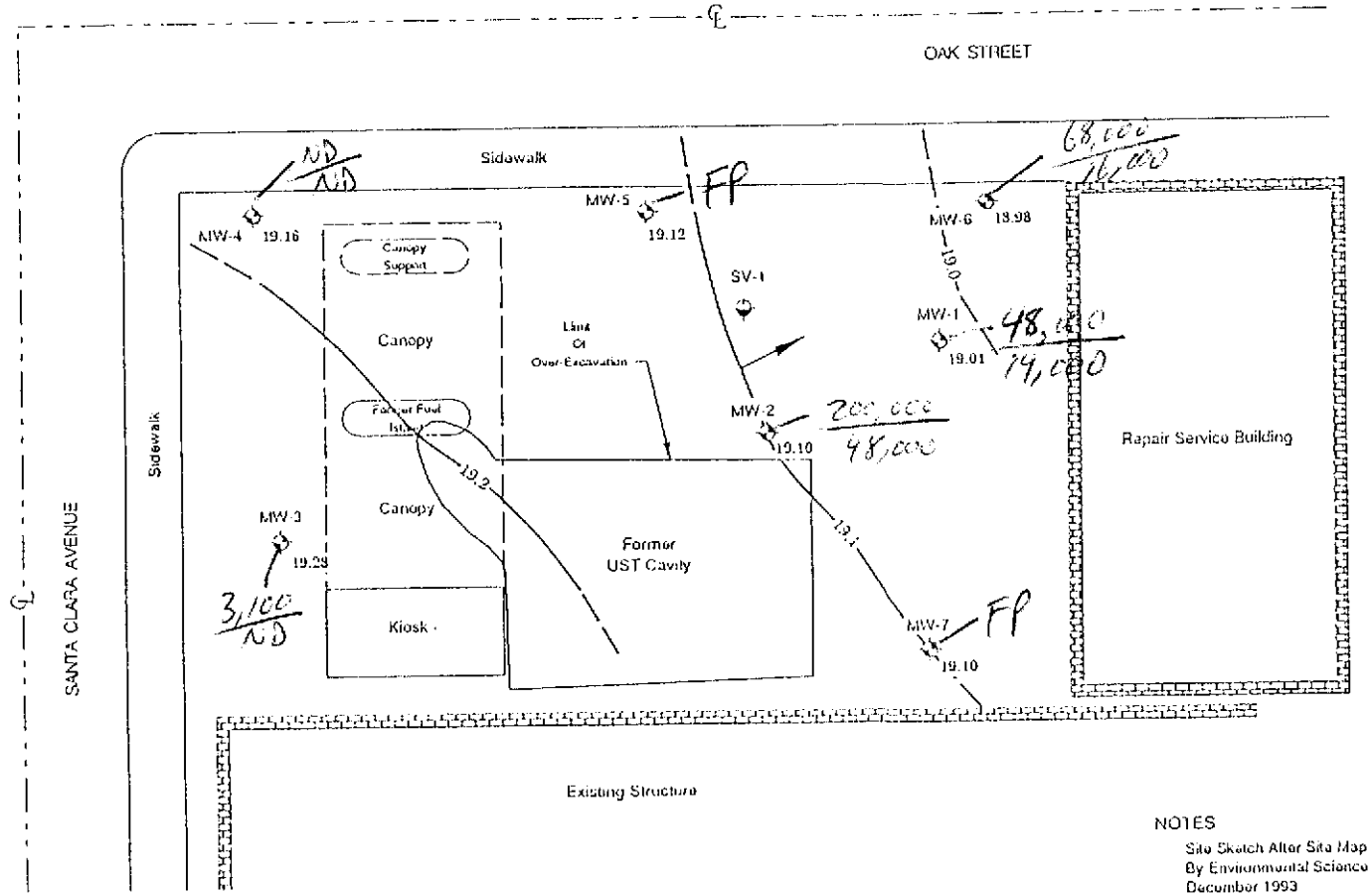



GENERAL NOTES:

BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
OAKLAND EAST & WEST, CA




| | | | |
|---|---|---|---|
| UGRD | DRAWN BY: D. Hada | SITE LOCATION MAP | FIGURE 1 |
| | DATE: January 5, 1995 | Former Bill Chun's Service Station<br>2301 Santa Clara Avenue<br>Alameda, CA | PROJECT NUMBER: 94-37-7658 |
| | REVISED BY: | | |
| | DATE: | | |




FUGRO

| | |
|---|---|
| DRAWN BY: | D. Hicks |
| DATE: | August 4, 1994 |
| REVISED BY: | J. Schaaf |
| DATE: | October 27, 1995 |

POTENTIOMETRIC SURFACE MAP
August 30, 1995

Former Bill Chun's Service Station
2301 Santa Clara Avenue
Alameda, CA

FIGURE 2

PROJECT NUMBER: 94-37-7658

# TABLE 1

## GROUNDWATER ELEVATION DATA

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | Top of Casing Elevation (ft. above MSL) | Depth to Water (feet) | Depth to Free Product (feet) | Free Product Thickness (feet) | Corrected Groundwater Elevation (ft. above MSL) |
|---|---|---|---|---|---|---|
| MW-1 | 01/07/93 | 28.53 | 8.87 | -- | 0.00 | 19.66 |
| | 09/07/93 | | 9.63 | -- | 0.00 | 18.90 |
| | 11/16/93 | | 9.89 | -- | 0.00 | 18.64 |
| | 12/07/93 | | 9.66 | -- | 0.00 | 18.87 |
| | 01/06/94 | | 9.67 | -- | 0.00 | 18.86 |
| | 02/03/94 | | 9.50 | -- | 0.00 | 19.03 |
| | 03/04/94 | | 9.18 | -- | 0.00 | 19.35 |
| | 06/06/94 | | 9.55 | -- | 0.00 | 18.98 |
| | 11/09/94 | | 8.83 | -- | 0.00 | 19.70 |
| | 12/20/94 | | 9.00 | -- | 0.00 | 19.53 |
| | 03/29/95 | | 8.44 | -- | 0.00 | 20.09 |
| | 05/24/95 | | 9.01 | -- | 0.00 | 19.52 |
| | 08/30/95 | | 9.52 | -- | 0.00 | 19.01 |
| MW-2 | 01/07/93 | 28.51 | 8.78 | -- | 0.00 | 19.73 |
| | 09/07/93 | | 9.52 | -- | 0.00 | 18.99 |
| | 11/16/93 | | 9.73 | -- | 0.00 | 18.78 |
| | 12/07/93 | | 9.54 | -- | 0.00 | 18.97 |
| | 01/06/94 | | 9.54 | -- | 0.00 | 18.97 |
| | 02/03/94 | | 9.37 | -- | 0.00 | 19.14 |
| | 03/04/94 | | 9.02 | -- | 0.00 | 19.49 |
| | 06/06/94 | | 9.40 | -- | 0.00 | 19.11 |
| | 11/09/94 | | NM(1) | NM | NM | NM |
| | 12/20/94 | | NM(1) | NM | NM | NM |
| | 03/29/95 | | 8.26 | -- | 0.00 | 20.25 |
| | 05/24/95 | | 8.89 | -- | 0.00 | 19.62 |
| | 08/30/95 | | 9.41 | -- | 0.00 | 19.10 |

# TABLE 1

## GROUNDWATER ELEVATION DATA

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | Top of Casing Elevation (ft. above MSL) | Depth to Water (feet) | Depth to Free Product (feet) | Free Product Thickness (feet) | Corrected Groundwater Elevation (ft. above MSL) |
|---|---|---|---|---|---|---|
| MW-3 | 01/07/93 | 28.82 | 8.86 | -- | 0.00 | 19.96 |
| | 09/07/93 | | 9.62 | -- | 0.00 | 19.20 |
| | 11/16/93 | | 9.82 | -- | 0.00 | 19.00 |
| | 12/07/93 | | 9.60 | -- | 0.00 | 19.22 |
| | 01/06/94 | | 9.62 | -- | 0.00 | 19.20 |
| | 02/03/94 | | 9.45 | -- | 0.00 | 19.37 |
| | 03/04/94 | | 9.11 | -- | 0.00 | 19.71 |
| | 06/06/94 | | 9.50 | -- | 0.00 | 19.32 |
| | 11/09/94 | | 8.82 | -- | 0.00 | 20.00 |
| | 12/20/94 | | 9.00 | -- | 0.00 | 19.82 |
| | 03/29/95 | | 8.45 | -- | 0.00 | 20.37 |
| | 05/24/95 | | 8.99 | -- | 0.00 | 19.83 |
| | 08/30/95 | | 9.54 | -- | 0.00 | 19.28 |
| MW-4 | 09/07/93 | 28.57 | 9.39 | -- | 0.00 | 19.18 |
| | 11/16/93 | | 9.60 | -- | 0.00 | 18.97 |
| | 12/07/93 | | 9.42 | -- | 0.00 | 19.15 |
| | 01/06/94 | | 9.44 | -- | 0.00 | 19.13 |
| | 02/03/94 | | 9.31 | -- | 0.00 | 19.26 |
| | 03/04/94 | | 9.05 | -- | 0.00 | 19.52 |
| | 06/06/94 | | 9.31 | -- | 0.00 | 19.26 |
| | 11/09/94 | | 8.68 | -- | 0.00 | 19.89 |
| | 12/20/94 | | 8.97 | -- | 0.00 | 19.60 |
| | 03/29/95 | | 8.46 | -- | 0.00 | 20.11 |
| | 05/24/95 | | 8.86 | -- | 0.00 | 19.71 |
| | 08/30/95 | | 9.41 | -- | 0.00 | 19.16 |
| MW-5 | 09/07/93 | 28.37 | 9.31 | 0.00 | -- | 19.06 |
| | 11/16/93 | | 9.99 | 9.45 | 0.54 | 18.81 |
| | 12/07/93 | | 9.88 | 9.27 | 0.61 | 18.98 |
| | 01/06/94 | | 9.85 | 9.27 | 0.58 | 18.98 |

# TABLE 1

## GROUNDWATER ELEVATION DATA

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | Top of Casing Elevation (ft. above MSL) | Depth to Water (feet) | Depth to Free Product (feet) | Free Product Thickness (feet) | Corrected Groundwater Elevation (ft. above MSL) |
|---|---|---|---|---|---|---|
| | 02/03/94 | | 9.51 | 9.19 | 0.32 | 19.12 |
| | 03/04/94 | | 8.99 | 8.96 | 0.03 | 19.40 |
| | 06/06/94 | | 9.72 | 9.14 | 0.58 | 19.11 |
| | 11/09/94 | | 8.58 | 8.56 | 0.02 | 19.81 |
| | 12/20/94 | | 8.77 | 8.76 | 0.01 | 19.61 |
| | 03/29/95 | | 8.31 | -- | 0.00 | 20.06 |
| | 05/24/95 | | 8.77 | 8.76 | 0.01 | 19.61 |
| | 08/30/95 | | 9.50 | 9.19 | 0.31 | 19.12 |
| MW-6 | 09/07/93 | 28.41 | 9.53 | -- | 0.00 | 18.88 |
| | 11/16/93 | | 9.74 | -- | 0.00 | 18.67 |
| | 12/07/93 | | 9.58 | -- | 0.00 | 18.83 |
| | 01/06/94 | | 9.60 | -- | 0.00 | 18.81 |
| | 02/03/94 | | 9.47 | -- | 0.00 | 18.94 |
| | 03/04/94 | | 9.18 | -- | 0.00 | 19.23 |
| | 06/06/94 | | 9.46 | -- | 0.00 | 18.95 |
| | 11/09/94 | | 8.72 | -- | 0.00 | 19.69 |
| | 12/20/94 | | 9.00 | -- | 0.00 | 19.41 |
| | 03/29/95 | | 8.44 | -- | 0.00 | 19.97 |
| | 05/24/95 | | 8.94 | -- | 0.00 | 19.47 |
| | 08/30/95 | | 9.43 | -- | 0.00 | 18.98 |
| MW-7 | 09/07/93 | 28.56 | 9.61 | -- | 0.00 | 18.95 |
| | 11/16/93 | | 9.86 | -- | 0.00 | 18.70 |
| | 12/07/93 | | 9.58 | -- | 0.00 | 18.98 |
| | 01/06/94 | | 9.59 | -- | 0.00 | 18.97 |
| | 02/03/94 | | 9.56 | 9.39 | 0.17 | 19.14 |

# TABLE 1

## GROUNDWATER ELEVATION DATA

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | Top of Casing Elevation (ft. above MSL) | Depth to Water (feet) | Depth to Free Product (feet) | Free Product Thickness (feet) | Corrected Groundwater Elevation (ft. above MSL) |
|---|---|---|---|---|---|---|
| | 03/04/94 | | 9.04 | 9.01 | 0.03 | 19.54 |
| | 06/06/94 | | 9.67 | 9.37 | 0.30 | 19.13 |
| | 11/09/94 | | 8.57 | 8.52 | 0.05 | 20.03 |
| | 12/20/94 | | 9.08 | 8.67 | 0.41 | 19.81 |
| | 03/29/95 | | 8.51 | 7.96 | 0.55 | 20.49 |
| | 05/24/95 | | 8.98 | 8.81 | 0.17 | 19.72 |
| | 08/30/95 | | 9.71 | 9.40 | 0.31 | 19.10 |

NOTES:

(1) MW-2 could not be located; well box was buried during tank excavation activities.
MSL = mean seal level
NM = not measured
Groundwater elevations (GWE) are corrected for free product thickness (FPT) using the following equation:
Corrected GWE = Measured GWE + (0.8 x FPT)
Data prior to 11/09/94 from Environmental Science and Engineering, Inc.

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# TABLE 2

## GROUNDWATER ANALYTICAL RESULTS

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | TPH-g (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Total Xylenes (µg/L) | TPH-d (µg/L) |
|---|---|---|---|---|---|---|---|
| MW-1 | 01/07/93 | 110,000 | 14,000 | 17,000 | 2,500 | 8,800 | ND (3,000) |
| | 09/07/93 | 28,000 | 11,000 | 2,100 | 380 | 1,200 | 1,000 (2) |
| | 12/07/93 | 17,000 | 10,000 | 3,000 | 610 | 2,000 | 1,800 (1) |
| | 03/04/94 | 6,600 | 4,400 | 870 | 150 | 590 | 920 (4) |
| ↑ | 06/06/94 | 12,000 | 6,300 | 230 | ND (0.5) | ND (0.5) | 710 (4) |
| | 11/09/94 | 28,000 | 9,500 | 3,000 | 810 | 2,300 | 250 |
| | 12/20/94 | 5,600 | 3,000 | 92 | 86 | 76 | ND (50) |
| | 03/29/95 | 24,000 | 5,800 | 3,100 | 390 | 1,300 | ND (50) |
| | 05/24/95 | 2,500 | 800 | 280 | 31 | 130 | ND (50) |
| | 08/30/95 | 48,000 | 14,000 | 3,500 | 620 | 1,600 | 800 |
| MW-2 | 01/07/93 | 85,000 | 20,000 | 8,500 | 1,500 | 4,300 | ND (3,000) |
| | 09/07/93 | 140,000 | 46,000 | 28,000 | 3,300 | 15,000 | 8,200 (2) |
| | 12/07/93 | 86,000 | 28,000 | 17,000 | 35,000 | 16,000 | 8,200 (2) |
| | 03/04/94 | 130,000 | 22,000 | 22,000 | 3,500 | 16,000 | 18,000 (4) |
| ↓ | 06/06/94 | 100,000 | 27,000 | 22,000 | 2,300 | 10,000 | 9,600 (5) |
| | 11/09/94 | NSL | NSL | NSL | NSL | NSL | NSL |
| | 12/20/94 | NSL | NSL | NSL | NSL | NSL | NSL |
| | 03/29/95 | 240,000 | 56,000 | 30,000 | 3,100 | 7,000 | 3,800 |
| | 05/24/95 | 330,000 | 54,000 | 51,000 | 4,700 | 22,000 | 28,000 |
| | 08/30/95 | 200,000 | 48,000 | 52,000 | 3,900 | 16,000 | 8,000 |
| MW-3 | 01/07/93 | 8,500 (3) | 170 | 70 | ND (30) | ND (30) | ND (3,000) |
| | 09/07/93 | 2,800 | 19 | 46 | 7.7 | 23 | 2,500 (1) |
| | 12/07/93 | 3,000 | 17 | 43 | 13 | 28 | 520 (2) |
| | 03/04/94 | 2,300 | 22 | 46 | 9.0 | 27 | 1,300 (5) |
| ↓ | 06/06/94 | 1,900 | 3.9 | ND (0.5) | 9.0 | 27 | 1,600 (5) |
| | 11/09/94 | 2,800 | 2.6 | 17 | 17 | 32 | ND (50) |
| | 12/20/94 | 2,700 | 10 | 62 | 24 | 59 | ND (50) |
| | 03/29/95 | 1,200 | 230 | 230 | 13 | 37 | 500 |
| | 05/24/95 | 5,700 | ND (5) | 73 | 20 | 57 | ND (50) |
| | 08/30/95 | 3,100 | ND (1.0) | 29 | 13 | 28 | ND (50) |
| MW-4 | 09/07/93 | 440 | 2.7 | 1.2 | 1 | 1.9 | 330 (2) |
| | 12/07/93 | 610 | 6.6 | 0.5 | 0.61 | 2.5 | 460 (2) |
| | 03/04/94 | 110 | ND (0.5) | ND (0.5) | ND (0.5) | 0.63 | 56 (5) |
| | 06/06/94 | 68 | ND (0.5) | ND (0.5) | ND (0.5) | ND (0.5) | 68 (4) |
| ↓ | 11/09/94 | 90 | 0.7 | 1.1 | 0.5 | 2.1 | ND(50) |
| | 12/20/94 | 130 | 2.2 | 33 | 4.8 | 27 | ND (50) |
| | 03/29/95 | ND (50) | ND (0.5) | 0.5 | ND (0.5) | ND (0.5) | ND (50) |
| | 05/24/95 | ND (50) | ND (0.5) | ND (0.5) | ND (0.5) | ND (0.5) | ND (50) |
| | 08/30/95 | ND (50) | ND (0.5) | ND (0.5) | ND (0.5) | ND (0.5) | ND (50) |
| MW-5 | 09/07/93 | 37,000 | 2,700 | 1,700 | 870 | 4,600 | 1,700 (2) |
| ↑ | 12/07/93 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 03/04/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |

↑ = Levels went up this qtr from last qtr

↓ = Levels went down this qtr from last qtr

# TABLE 2

## GROUNDWATER ANALYTICAL RESULTS

### Former Bill Chun Service Station
### 2301 Santa Clara Avenue
### Alameda, California

| Well | Date | TPH-g (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Total Xylenes (µg/L) | TPH-d (µg/L) |
|---|---|---|---|---|---|---|---|
| | 06/06/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 11/09/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 12/20/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 03/29/95 | 54,000 | 6,800 | 3,600 | 1,500 | 7,600 | 7,500 |
| | 05/24/95 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 08/30/95 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| MW-6 | 09/07/93 | 10,000 | 1,300 | 540 | 370 | 1,600 | 1,400 (2) |
| | 12/07/93 | 17,000 | 4,300 | 1,200 | 600 | 2,700 | 2,400 (2) |
| | 03/04/94 | 21,000 | 4,600 | 1,000 | 460 | 1,800 | 1,800 (4) |
| | 06/06/94 | 12,000 | 5,400 | 350 | ND (0.5) | 1,200 | 1,600 (4) |
| | 11/09/94 | 29,000 | 4,600 | 1,600 | 820 | 3,600 | 7,500 |
| | 12/20/94 | 66,000 | 5,800 | 2,200 | 1,100 | 4,600 | 1,100 |
| | 03/29/95 | 25,000 | 8,000 | 780 | 450 | 1,300 | 1,300 |
| | 05/24/95 | 56,000 | 1,600 | 1,300 | 1,200 | 7,200 | 40,000 |
| | 08/30/95 | 68,000 | 16,000 | 3,400 | 1,900 | 6,800 | 4,900 |
| MW-7 | 09/07/93 | 24,000 | 6,000 | 4,800 | 490 | 2,300 | 1,300 |
| | 12/07/93 | 95,000 | 28,000 | 24,000 | 1,600 | 8,700 | 2,200 |
| | 03/04/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 06/06/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 11/09/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 12/20/94 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 03/29/95 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 05/24/95 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |
| | 08/30/95 | NSFP | NSFP | NSFP | NSFP | NSFP | NSFP |

NOTES:

TPH-g = Total Petroleum Hydrocarbons as gasoline
TPH-d = Total Petroleum Hydrocarbons as diesel
µg/L = micrograms per liter or parts per billion (ppb)
NSFP = Not Sampled - Free Product present
NSL = Not Sampled - well could not be located
ND = Not Detected (detection limit in parentheses)
(1) = Results typical of a non-diesel mixture (<C16)
(2) = Results typical of a diesel and non-diesel mixture (<C16)
(3) = Results typical of weathered gasoline
(4) = Results typical of diesel and unidentified hydrocarbons (<C14)
(5) = Results typical of unidentified hydrocarbons (<C14)

# APPENDIX A

# STANDARD OPERATING PROCEDURES

## SAMPLE IDENTIFICATION AND CHAIN-OF-CUSTODY PROCEDURES

SOP-4

Sample identification and chain-of-custody procedures ensure sample integrity, and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis is labeled to identify the job number, date, time of sample collection, a sample number unique to the sample, any name(s) of on-site personnel and any other pertinent field observations also recorded on the field excavation or boring log.

Chain-of-custody forms are used to record possession of the sample from time of collection to its arrival at the laboratory. During shipment, the person with custody of the samples will relinquish them to the next person by signing the chain-of-custody form(s) and noting the date and time. The sample-control officer at the laboratory will verify sample integrity, correct preservation, confirm collection in the proper container(s), and ensure adequate volume for analysis.

If these conditions are met, the samples will be assigned unique laboratory log numbers for identification throughout analysis and reporting. The log numbers will be recorded on the chain-of-custody forms and in the legally-required log book maintained in the laboratory. The sample description, date received, client's name, and any other relevant information will also be recorded.

## LABORATORY ANALYTICAL QUALITY ASSURANCE AND CONTROL

SOP-5

In addition to routine instrument calibration, replicates, spikes, blanks, spiked blanks, and certified reference materials are routinely analyzed at method-specific frequencies to monitor precision and bias. Additional components of the laboratory Quality Assurance/Quality Control program include:

1. Participation in state and federal laboratory accreditation/certification programs;
2. Participation in both U.S. EPA Performance Evaluation studies (WS and WP studies) and inter-laboratory performance evaluation programs;
3. Standard operating procedures describing routine and periodic instrument maintenance;
4. "Out-of-Control" Corrective Action documentation procedures; and,
5. Multi-level review of raw data and client reports.

## GROUNDWATER PURGING AND SAMPLING

SOP-7

Prior to water sampling, each well is purged by evacuating a minimum of three wetted well-casing volumes of groundwater. When required, purging will continue until either the discharge water temperature, conductivity, or pH stabilize to within 10% of previously measured values; and a maximum of ten wetted casing volumes of groundwater have been recovered, or the well is bailed dry. When practical, the groundwater sample should be collected when the water level in the well recovers to at least 80 percent of its static level. Field measurements, observations and procedures are noted.

The sampling equipment consists of a clean bailer, or stainless steel bladder pump with a "Teflon" bladder. If the sampling system is dedicated to the well, then the bailer is usually "Teflon," but the bladder pump may be PVC with a polypropylene bladder. Sample container type, preservation, and volume depends on the intended analyses.

The groundwater sample is decanted into each VOA vial in such a manner that there is no meniscus at the top of the vial. A cap is quickly secured to the top of the vial. The vial is then inverted and gently tapped to see if air bubbles are present. If none are present, the vial is labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. Label information should include a unique sample identification number, job identification number, date, time, and the sampler's initials.

For quality control purposes, a duplicate water sample may be collected from a well. When required, a trip blank is prepared at the laboratory and placed in the transport cooler. It is labeled similar to the well samples, remains in the cooler during transport, and is analyzed by the laboratory along with the groundwater samples. In addition, a field blank may be prepared in the field when sampling equipment is not dedicated. The field blank is prepared after a pump or bailer has been either steam cleaned or properly washed, prior to use in the next well, and is analyzed along with the other samples. The field blank analysis demonstrates the effectiveness of in-field cleaning procedures to prevent cross-contamination.

To minimize the potential for cross-contamination between wells, all well development and water sampling equipment not dedicated to a well is either steam cleaned or properly washed between use. As a second precautionary measure, wells are sampled in order of lowest to highest concentrations as established by available previous analytical data.

In the event the water samples cannot be submitted to the analytical laboratory on the same day they are collected (e.g., due to weekends or holidays), the samples are temporarily stored until the first opportunity for submittal either on ice in a cooler, such as when in the field, or in a refrigerator.

## MEASURING LIQUID LEVELS USING A WATER LEVEL INDICATOR OR INTERFACE PROBE

SOP-12

Field equipment used for liquid-level gauging typically includes the measuring probe (water level or interface) and a clean product bailer(s). The field kit also includes cleaning supplies (buckets, TSP, spray bottles, and deionized water) to be used in cleaning the equipment between wells.

Prior to measurement, the probe tip is lowered into the well until it touches bottom. Using the previously established top-of-casing or top-of-box (i.e., wellhead vault) point, the probe cord (or halyard) is marked and a measuring tape (graduated in hundredths of a foot) is used to determine the distance between the probe end and the marking on the cord. This measurement is then recorded on the liquid-level data sheet as the "Measured Total Depth" of the well.

When necessary in using the interface probe to measure liquid levels, the probe is first electrically grounded to either the metal stove pipe or another metal object nearby. When no ground is available, reproducible measurements can be obtained by clipping the ground lead to the handle of the interface probe case.

The probe tip is then lowered into the well and submerged in the groundwater. An oscillating (beeping) tone indicates the probe is in water. The probe is slowly raised until either the oscillating tone ceases or becomes a steady tone. In either case, this is the depth-to-water (DTW) indicator and the DTW measurement is made accordingly. The steady tone indicates floating hydrocarbons. In this case, the probe is slowly raised until the steady tone ceases. This is the depth-to-product (DTP) indicator and the measurement of DTP is recorded. A corrected depth to groundwater to account for floating hydrocarbons can be calculated by using the following formula:

CDTW = DTW - (SP.G x LHT).
CDTW = Corrected depth to groundwater.
DTW = Measured depth to groundwater.
SP.G = Specific gravity: unweathered gasoline = 0.75; diesel = 0.80
LHT = Measured liquid hydrocarbon thickness.

The corresponding groundwater elevation is the difference between a previously determined well reference elevation and either the depth to groundwater or the corrected depth to groundwater.

The process of lowering and raising the probe must be repeated several times to ensure accurate measurements. The DTW and DTP measurements are recorded on the liquid-level data sheet. When floating product is indicated by the probe's response, a product bailer is lowered partially through the product-water interface to confirm the product on the water surface, and as further indication of product thickness, particularly in cases where the product layer is quite thin. Either this measurement or the difference between DTW and DTP is recorded on the data sheet as "product thickness."

In order to avoid cross-contamination of wells during the liquid-level measurement process, wells are measured in the order of "clean" to "dirty" (where such information is available). In addition, all measurement equipment is cleaned with TSP or similar solution and thoroughly rinsed with deionized water before use, between measurements in respective wells, and at the completion of the day's activities.

# APPENDIX B

## LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

**Environmental Labs**

500 Giuseppe Court, Suite 9
Roseville, Ca. 95678
(916) 773-3664

# CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Bill Bassett
Phone #: (415) 296-1041

Company/Address: Fugro West, S.F., CA
FAX #: (415) 296-0944

Project Number:
P.O.#:
Project Name: Chun

Project Location: 2301 S. Clara, Alameda, CA
Sampler Signature: Bill Bassett

## ANALYSIS REQUEST

9950C1

TAT

| Sample ID | Sampling DATE | Sampling TIME | Container VOA | Container SLEEVE | Container 1L GLASS | Container 1L PLASTIC | Method Preserved HCl | Method Preserved $HNO_3$ | Method Preserved ICE | Method Preserved NONE | Matrix WATER | Matrix SOIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 8/30/95 | | X | | X | | X | | | X | X | |
| MW-2 | ↓ | | X | | X | | X | | | X | X | |
| MW-3 | | | X | | X | | X | | | X | X | |
| MW-4 | | | X | | X | | X | | | X | X | |
| MW-6 | | | X | | X | | X | | | X | X | |

| Sample ID | BTEX (602/8020) | BTEX/TPH as Gasoline (602/8020/8015) | TPH as Diesel (8015) | TPH as Oil (8015) | Total Oil & Grease (5520 B/E,F) | Total Oil & Grease IR (5520 B/E,F,C) | 96 - Hour Fish Bioassay | EPA 601/8010 | EPA 602/8020 | EPA 615/8150 | EPA 608/8080 - Pesticides | EPA 608/8080-PCBs | EPA 624/8240 | EPA 625/8270 | ORGANIC LEAD | Reactivity, Corrosivity, Ignitibility | W.E.T. (✓) CAM - 17 Metals | W.E.T. (✓) EPA - Priority Pollutant Metals | TOTAL (✓) LEAD(7420/7421/239.2) | TOTAL (✓) Cd, Cr, Pb, Zn, Ni | RUSH SERVICE (12 hr) or (24 hr) | EXPEDITED SERVICE (48 hr) or (1 wk) | STANDARD SERVICE (2wk) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | | X | X | | | | | | | | | W | 0 | 9 | 9 | 5 | 0 | 0 | 1 | | | | X |
| MW-2 | | X | X | | | | | | | | | ↓ | | | ↓ | ↓ | 0 | 0 | 2 | | | | X |
| MW-3 | | X | X | | | | | | | | | | | | | | 0 | 0 | 3 | | | | X |
| MW-4 | | X | X | | | | | | | | | | | | | | 0 | 0 | 4 | | | | X |
| MW-6 | | X | X | | | | | | | | | W | 0 | 9 | 9 | 5 | 0 | 0 | 5 | | | | X |

| Relinquished by | Date | Time | Received by |
|---|---|---|---|
| Bill Bassett | 8/31/95 | | |
| | 8/31/95 | 1305 | |
| | 9-1-95 | 0945 | Nancy Robinson |

Remarks:

Bill To:

EXCELCHEM
ENVIRONMENTAL LABS

500 Giuseppe Court, Suite 9
Roseville, CA 95678
Phone#: (916) 773-3664 Fax#: (916) 773-4784

# ANALYSIS REPORT

Attention: Mr. Bill Bassett
FUGRO-WEST, INC.
44 Montgomery St., Ste. 1010
San Francisco, CA. 94104

Project: Chun

Date Sampled : 08-30-95
Date Received: 09-01-95
BTEX Analyzed: 09-05-95
TPHg Analyzed: 09-05-95
TPHd Analyzed: 09-07-95
Matrix: Water

| | Benzene PPB | Toluene PPB | Ethyl-benzene PPB | Total Xylenes PPB | TPHg PPB | TPHd PPB |
|---|---|---|---|---|---|---|
| Reporting Limit: | 10 | 10 | 10 | 10 | 1,000 | 50 |
| SAMPLE Laboratory Identification: | | | | | | |
| MW-1 W0995001 | 14,000 | 3,500 | 620 | 1,600 | 48,000 | *800 |

ppb = Parts per billion = ug/L = micrograms per liter
* Peaks in diesel range however sample chromatography does not look like our diesel #2 standard chromatography.
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

**ANALYTICAL PROCEDURES**

**BTEX**-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are analyzed by using EPA Method 602 which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID).

**TPHg**--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are analyzed by using modified EPA Method 8015, which utilizes a GC equipped with an FID.

**TPHd**--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3510 followed by modified EPA 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

09-08-95
Date Reported

EXCELCHEM
ENVIRONMENTAL LABS

500 Giuseppe Court, Suite 9
Roseville, CA 95678
Phone#: (916) 773-3664 Fax#: (916) 773-4784

# ANALYSIS REPORT

Attention: Mr. Bill Bassett
FUGRO-WEST, INC.
44 Montgomery St., Ste. 1010
San Francisco, CA. 94104

Project: Chun

Date Sampled : 08-30-95
Date Received: 09-01-95
BTEX Analyzed: 09-05-95
TPHg Analyzed: 09-05-95
TPHd Analyzed: 09-07-95
Matrix: Water

| | Benzene PPB | Toluene PPB | Ethyl-benzene PPB | Total Xylenes PPB | TPHg PPB | TPHd PPB |
|---|---|---|---|---|---|---|
| Reporting Limit: | 1,000 | 1,000 | 1,000 | 1,000 | 100,000 | 50 |
| SAMPLE Laboratory Identification: | | | | | | |
| MW-2 W0995002 | 48,000 | 52,000 | 3,900 | 16,000 | 200,000 | *8,000 |

ppb = Parts per billion = ug/L = micrograms per liter
* Peaks in diesel range however sample chromatography does not look like our diesel #2 standard chromatography.
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

**ANALYTICAL PROCEDURES**

**BTEX**-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are analyzed by using EPA Method 602 which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID).

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Laboratory Representative

09-08-95
Date Reported

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# ANALYSIS REPORT

Attention: Mr. Bill Bassett
FUGRO-WEST, INC.
44 Montgomery St., Ste. 1010
San Francisco, CA. 94104

Project: Chun

Date Sampled : 08-30-95
Date Received: 09-01-95
BTEX Analyzed: 09-05-95
TPHg Analyzed: 09-05-95
TPHd Analyzed: 09-07-95
Matrix: Water

| | Benzene PPB | Toluene PPB | Ethyl-benzene PPB | Total Xylenes PPB | TPHg PPB | TPHd PPB |
|---|---|---|---|---|---|---|
| Reporting Limit: | 1.0 | 1.0 | 1.0 | 1.0 | 100 | 50 |
| SAMPLE Laboratory Identification: | | | | | | |
| MW-3 W0995003 | ND | 29 | 13 | 28 | 3,100 | ND |

ppb = Parts per billion = ug/L = micrograms per liter
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

**ANALYTICAL PROCEDURES**

**BTEX**-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are analyzed by using EPA Method 602 which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID).

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Laboratory Representative

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Attention: Mr. Bill Bassett
FUGRO-WEST, INC.
44 Montgomery St., Ste. 1010
San Francisco, CA. 94104

Project: Chun

Date Sampled : 08-30-95
Date Received: 09-01-95
BTEX Analyzed: 09-05-95
TPHg Analyzed: 09-05-95
TPHd Analyzed: 09-07-95
Matrix: Water

| | Benzene PPB | Toluene PPB | Ethyl-benzene PPB | Total Xylenes PPB | TPHg PPB | TPHd PPB |
|---|---|---|---|---|---|---|
| Reporting Limit: | 0.5 | 0.5 | 0.5 | 0.5 | 50 | 50 |
| SAMPLE Laboratory Identification: | | | | | | |
| MW-4 W0995004 | ND | ND | ND | ND | ND | ND |

ppb = Parts per billion = ug/L = micrograms per liter
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

**ANALYTICAL PROCEDURES**

**BTEX**– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are analyzed by using EPA Method 602 which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID).

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**TPHd**–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3510 followed by modified EPA 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

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Date Reported

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Attention: Mr. Bill Bassett
FUGRO-WEST, INC.
44 Montgomery St., Ste. 1010
San Francisco, CA. 94104

Project: Chun

Date Sampled : 08-30-95
Date Received: 09-01-95
BTEX Analyzed: 09-05-95
TPHg Analyzed: 09-05-95
TPHd Analyzed: 09-07-95
Matrix: Water

| | Benzene PPB | Toluene PPB | Ethyl-benzene PPB | Total Xylenes PPB | TPHg PPB | TPHd PPB |
|---|---|---|---|---|---|---|
| Reporting Limit: | 400 | 400 | 400 | 400 | 40,000 | 50 |
| SAMPLE Laboratory Identification: | | | | | | |
| MW-6 W0995005 | 16,000 | 3,400 | 1,900 | 6,800 | 68,000 | *4,900 |

ppb = Parts per billion = ug/L = micrograms per liter
* Peaks in diesel range however sample chromatography does not look like our diesel #2 standard chromatography.
ND = Not detected. Compound(s) may be present at concentrations below the reporting limit.

**ANALYTICAL PROCEDURES**

**BTEX**-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are analyzed by using EPA Method 602 which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID).

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09-08-95
Date Reported