



EMCON

1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

PE

ENVIRONMENTAL PROTECTION

57 SEP 30 AM 9:17

Date September 30, 1997

Project 20805-131.012

To:

STID 3942

Ms. Juliet Shin

Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harborbay Parkway, Suite 250
Alameda, California 94502-6577

We are enclosing:

| Copies | Description |
|----------|---|
| <u>1</u> | <u>Second quarter 1997 groundwater monitoring results,</u> <u>ARCO service station 6002, Oakland, California</u> |
| <u>1</u> | <u>Jeffrey Enebly letter</u> |

| | | | |
|-----------|---|----------|--|
| For your: | <input checked="" type="checkbox"/> Use | Sent by: | <input type="checkbox"/> Regular Mail |
| | <input type="checkbox"/> Approval | | <input type="checkbox"/> Standard Air |
| | <input type="checkbox"/> Review | | <input type="checkbox"/> Courier |
| | <input type="checkbox"/> Information | | <input checked="" type="checkbox"/> Other: <u>Certified Mail</u> |

Comments:

The enclosed groundwater monitoring report is being sent to you per the request of ARCO Products Company. Please call if you have questions or comments.


 Gary P. Messerotes
 Project Manager

cc: Kevin Graves, RWQCB - SFBR
Paul Supple, ARCO Products Company
File





Date: September 30, 1997

Re: ARCO Station #

6002 • 6235 Seminary Avenue • Oakland, CA
Second Quarter 1997 Groundwater Monitoring Results

"I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached proposal or report are true and correct."

Submitted by:

A handwritten signature in black ink that reads "Paul Supple". The signature is written in a cursive, flowing style.

Paul Supple
Environmental Engineer



EMCON

1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

August 27, 1997
Project 20805-131.012

Mr. Paul Supple
ARCO Products Company
P.O. Box 6549
Moraga, California 94570

Re: Second quarter 1997 groundwater monitoring results, ARCO service station 6002,
Oakland, California

Dear Mr. Supple:

This letter presents the results of the second quarter 1997 groundwater monitoring program at ARCO Products Company (ARCO) service station 6002, 6235 Seminary Avenue, Oakland, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

LIMITATIONS

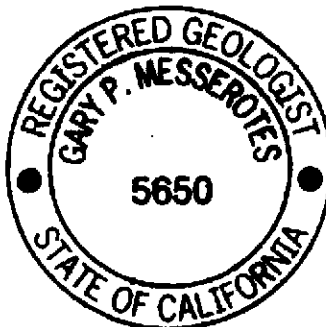
No monitoring event is thorough enough to describe all geologic and hydrogeologic conditions of interest at a given site. If conditions have not been identified during the monitoring event, results should not be construed as a guarantee of the absence of such conditions at the site, but rather as the product of the scope, and limitations, of work performed during the monitoring event.

Please call if you have questions.

Sincerely,

EMCON


Gary P. Messerotes, R.G. 5650
Project Manager



August 29, 1997

ARCO QUARTERLY REPORT

Station No.: 6002 Address: 6235 Seminary Avenue, Oakland, California
EMCON Project No.: 20805-131.012
ARCO Environmental Engineer/Phone No.: Paul Supple /(510) 299-8891
EMCON Project Manager/Phone No.: Gary P. Messerotes /(408) 453-7300
Primary Agency/Regulatory ID No.: ACHCSA /Juliet Shin

WORK PERFORMED THIS QUARTER (Second - 1997):

1. Prepared and submitted quarterly groundwater monitoring report for first quarter 1997.
2. Performed quarterly groundwater monitoring and sampling for second quarter 1997.

WORK PROPOSED FOR NEXT QUARTER (Third - 1997):

1. Prepare and submit quarterly groundwater monitoring report for second quarter 1997.
2. Perform quarterly groundwater monitoring and sampling for third quarter 1997.

QUARTERLY MONITORING:

Current Phase of Project: Quarterly Groundwater Monitoring
Frequency of Sampling: Quarterly (groundwater)
Frequency of Monitoring: Quarterly (groundwater)
Is Floating Product (FP) Present On-site: Yes No
Bulk Soil Removed to Date : approximately 370 cubic yards of TPH impacted soil
Bulk Soil Removed This Quarter : None
Water Wells or Surface Waters,
within 2000 ft., impacted by site: None
Current Remediation Techniques: None
Average Depth to Groundwater: 9.34 feet
Groundwater Gradient (Average): 0.069 ft/ft toward west-southwest (consistent with past events)

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Second Quarter 1997
- Table 2 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Figure 1 - Site Location
- Figure 2 - Groundwater Data, Second Quarter 1997
- Appendix A - Analytical Results and Chain of Custody Documentation, Second Quarter 1997 Groundwater Monitoring Event

cc: Juliet Shin, ACHCSA
Kevin Graves, RWQCB - SFBR

Table 1
Groundwater Monitoring Data
Second Quarter 1997

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation | Depth to Water | Groundwater Elevation | Floating Product Thickness | Groundwater Flow Direction | Hydraulic Gradient | Water Sample Field Date | TPHG LUFT Method | Benzene EPA 8020 | Toluene EPA 8020 | Ethylbenzene EPA 8020 | Total Xylenes EPA 8020 | MTBE EPA 8020 | MTBE EPA 8240 |
|------------------|---------------------------|----------------------------|----------------|--------------------------|-------------------------------|-------------------------------|-----------------------|----------------------------|--|---------------------|---------------------|--------------------------|---------------------------|------------------|------------------|
| | | ft-MSL | feet | ft-MSL | feet | MWN | ft/ft | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| MW-3 | 05-27-97 | 248.35 | 8.25 | 240.10 | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled annually, during the first quarter | | | | | | |
| MW-4 | 05-27-97 | 242.91 | 11.51 | 231.40 | ND | WSW | 0.069 | 05-27-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| MW-5 | 05-27-97 | 244.82 | 13.10 | 231.72 | ND | WSW | 0.069 | 05-27-97 | 21000 | 86 | <20 [^] | 810 | 610 | 1700 | -- |
| MW-6 | 05-27-97 | 252.20 | 7.08 | 245.12 | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled annually, during the first quarter | | | | | | |
| MW-7 | 05-27-97 | 235.95 | 9.02 | 226.93 | ND | WSW | 0.069 | 05-27-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| MW-8 | 05-27-97 | 240.37 | 11.06 | 229.31 | ND | WSW | 0.069 | 05-27-97 | 91 | 0.6 | <0.5 | <0.5 | 0.6 | 66 | -- |
| VW-1 | 05-27-97 | NR | 7.51 | NR | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled semi-annually, during the first and third quarters | | | | | | |
| VW-4 | 05-27-97 | NR | 9.34 | NR | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled semi-annually, during the first and third quarters | | | | | | |

ft-MSL: elevation in feet, relative to mean sea level

MWN: groundwater flow direction and gradient apply to the entire monitoring well network

ft/ft: foot per foot

TPHG: total petroleum hydrocarbons as gasoline

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl tert-butyl ether

NR: not reported; data not available or not measurable

ND: none detected

WSW: west-southwest

[^]: method reporting limit was raised due to: (1) high analyte concentration requiring sample dilution, or (2) matrix interference

--: not analyzed or not applicable

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation ft-MSL | Depth to Water feet | Groundwater Elevation ft-MSL | Floating Product Thickness feet | Groundwater Flow Direction MWN | Hydraulic Gradient ft/ft | Water Sample Field Date | TPHG LUFT Method µg/L | Benzene EPA 8020 µg/L | Toluene EPA 8020 µg/L | Ethylbenzene EPA 8020 µg/L | Total Xylenes EPA 8020 µg/L | MTBE EPA 8020 µg/L | MTBE EPA 8240 µg/L | |
|------------------|------------------------|-----------------------------------|------------------------------------|---------------------------------|------------------------------------|-----------------------------------|-----------------------------|-------------------------|--|------------------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|--|
| MW-1 | 03-15-95 | 247.06 | 7.37 | 239.69 | ND | WSW | 0.08 | 03-15-95 | 13000 | 1200 | 44 | 770 | 1100 | -- | -- | |
| MW-1 | 05-30-95 | 247.06 | 8.48 | 238.58 | ND | WSW | 0.08 | 05-30-95 | 19000 | 1600 | 30 | 890 | 1400 | -- | -- | |
| MW-1 | 09-01-95 | 247.06 | 9.47 | 237.59 | ND | WSW | 0.09 | 09-01-95 | 14000 | 1300 | 28 | 480 | 780 | 24000 | -- | |
| MW-1 | 11-13-95 | 247.06 | 8.78 | ** 238.29 | 0.01 | WSW | 0.08 | 11-13-95 | 11000 | 570 | 17 | 260 | 410 | -- | 25000 | |
| MW-1 | 02-23-96 | 247.06 | Well was decommissioned on 2-12-96 | | | | | | 03-01-96 | Well was decommissioned on 2-12-96 | | | | | | |
| | | | | | | | | | | | | | | | | |
| MW-2 | 03-15-95 | 249.30 | 8.25 | 241.05 | ND | WSW | 0.08 | 03-15-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-2 | 05-30-95 | 249.30 | 9.93 | 239.37 | ND | WSW | 0.08 | 05-30-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-2 | 09-01-95 | 249.30 | 10.69 | 238.61 | ND | WSW | 0.09 | 09-01-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-2 | 11-13-95 | 249.30 | 10.32 | 238.98 | ND | WSW | 0.08 | 11-13-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-2 | 02-23-96 | 249.30 | Well was decommissioned on 2-12-96 | | | | | | 03-01-96 | Well was decommissioned on 2-12-96 | | | | | | |
| | | | | | | | | | | | | | | | | |
| MW-3 | 03-15-95 | 248.35 | 6.76 | 241.59 | ND | WSW | 0.08 | 03-15-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-3 | 05-30-95 | 248.35 | 7.81 | 240.54 | ND | WSW | 0.08 | 05-30-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-3 | 09-01-95 | 248.35 | 8.65 | 239.70 | ND | WSW | 0.09 | 09-01-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-3 | 11-13-95 | 248.35 | 8.25 | 240.10 | ND | WSW | 0.08 | 11-13-95 | 120 | 45 | 0.7 | <0.5 | 6.2 | -- | -- | |
| MW-3 | 02-23-96 | 248.35 | 6.64 | 241.71 | ND | WSW | 0.08 | 03-01-96 | <50 | <0.5 | <0.5 | 0.6 | 1.9 | <3 | -- | |
| MW-3 | 05-10-96 | 248.35 | 7.95 | 240.40 | ND | WSW | 0.08 | 05-10-96 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-3 | 08-09-96 | 248.35 | 8.06 | 240.29 | ND | SW | 0.08 | 08-09-96 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-3 | 11-08-96 | 248.35 | Not surveyed: inaccessible | | | | SW | 0.055 | 11-11-96 | Not sampled: inaccessible | | | | | | |
| MW-3 | 03-21-97 | 248.35 | 8.21 | 240.14 | ND | WSW | 0.051 | 03-21-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-3 | 05-27-97 | 248.35 | 8.25 | 240.10 | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled annually, during the first quarter | | | | | | | |

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation | Depth to Water | Groundwater Elevation | Floating Product Thickness | Groundwater Flow Direction | Hydraulic Gradient | Water Sample Field Date | TPHC LUFT Method | Benzene EPA 8020 | Toluene EPA 8020 | Ethylbenzene EPA 8020 | Total Xylenes EPA 8020 | MTBE EPA 8020 | MTBE EPA 8240 |
|------------------|------------------------|-------------------------|----------------------------|-----------------------|----------------------------|----------------------------|--------------------|-------------------------|---------------------------|------------------|------------------|-----------------------|------------------------|---------------|---------------|
| | | ft-MSL | feet | ft-MSL | feet | MWN | ft/ft | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| MW-4 | 03-15-95 | 242.91 | 9.37 | 233.54 | ND | WSW | 0.08 | 03-15-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- |
| MW-4 | 05-30-95 | 242.91 | 11.47 | 231.44 | ND | WSW | 0.08 | 05-30-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- |
| MW-4 | 09-01-95 | 242.91 | 12.28 | 230.63 | ND | WSW | 0.09 | 09-01-95 | 78 | <0.5 | 0.7 | <0.5 | <0.5 | <3 | -- |
| MW-4 | 11-13-95 | 242.91 | 11.75 | 231.16 | ND | WSW | 0.08 | 11-13-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- |
| MW-4 | 02-23-96 | 242.91 | 8.51 | 234.40 | ND | WSW | 0.08 | 03-01-96 | 59 | 1.2 | 7.4 | 1.6 | 9.3 | 3 | -- |
| MW-4 | 05-10-96 | 242.91 | 11.35 | 231.56 | ND | WSW | 0.08 | 05-10-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| MW-4 | 08-09-96 | 242.91 | 9.70 | 233.21 | ND | SW | 0.08 | 08-09-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| MW-4 | 11-08-96 | 242.91 | 11.79 | 231.12 | ND | SW | 0.055 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| MW-4 | 03-21-97 | 242.91 | 10.94 | 231.97 | ND | WSW | 0.051 | 03-21-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | 81 | -- |
| MW-4 | 05-27-97 | 242.91 | 11.51 | 231.40 | ND | WSW | 0.069 | 05-27-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- |
| | | | | | | | | | | | | | | | |
| MW-5 | 03-15-95 | 244.82 | 11.99 | 232.83 | ND | WSW | 0.08 | 03-15-95 | 21000 | 870 | 22 | 1600 | 1900 | -- | -- |
| MW-5 | 05-30-95 | 244.82 | 12.97 | 231.85 | ND | WSW | 0.08 | 05-30-95 | 17000 | 2100 | 250 | 1000 | 520 | -- | -- |
| MW-5 | 09-01-95 | 244.82 | 14.03 | 230.79 | ND | WSW | 0.09 | 09-01-95 | 19000 | 1500 | 25 | 1600 | 880 | 8300 | -- |
| MW-5 | 11-13-95 | 244.82 | 13.65 | 231.17 | ND | WSW | 0.08 | 11-13-95 | 21000 | 1300 | 22 | 1400 | 630 | -- | -- |
| MW-5 | 02-23-96 | 244.82 | 11.93 | 232.89 | ND | WSW | 0.08 | 03-01-96 | 27000 | 1300 | <50 | 1600 | 1500 | 730 | -- |
| MW-5 | 05-10-96 | 244.82 | 13.05 | 231.77 | ND | WSW | 0.08 | 05-10-96 | 17000 | 460 | 21 | 760 | 480 | 1000 | -- |
| MW-5 | 08-09-96 | 244.82 | 13.22 | 231.60 | ND | SW | 0.08 | 08-09-96 | 16000 | 420 | 14 | 870 | 390 | 1500 | -- |
| MW-5 | 11-08-96 | 244.82 | Not surveyed: inaccessible | | | SW | 0.055 | 11-11-96 | Not sampled: inaccessible | | | | | | |
| MW-5 | 03-21-97 | 244.82 | 13.24 | 231.58 | ND | WSW | 0.051 | 03-21-97 | 18000 | 110 | <50^ | 730 | 1500 | 1800 | -- |
| MW-5 | 05-27-97 | 244.82 | 13.10 | 231.72 | ND | WSW | 0.069 | 05-27-97 | 21000 | 86 | <20^ | 810 | 610 | 1700 | -- |

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation ft-MSL | Depth to Water feet | Groundwater Elevation ft-MSL | Floating Product Thickness feet | Groundwater Flow Direction MWN | Hydraulic Gradient ft/ft | Water Sample Field Date | TPHG LUFT Method µg/L | Benzene EPA 8020 µg/L | Toluene EPA 8020 µg/L | Ethylbenzene EPA 8020 µg/L | Total Xylenes EPA 8020 µg/L | MTBE EPA 8020 µg/L | MTBE EPA 8240 µg/L | |
|------------------|------------------------|-----------------------------------|----------------------------|---------------------------------|------------------------------------|-----------------------------------|-----------------------------|-------------------------|--|---------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|--|
| MW-6 | 06-29-95 | NR | 6.63 | NR | ND | NR | NR | 06-30-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | |
| MW-6 | 09-01-95 | NR | Not surveyed: | | | | | 09-01-95 | Not sampled: | | | | | | | |
| MW-6 | 11-13-95 | NR | 7.70 | NR | ND | WSW | 0.08 | 11-13-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-6 | 02-23-96 | NR | 9.82 | NR | ND | WSW | 0.08 | 03-01-96 | <50 | <0.5 | 0.8 | <0.5 | 0.6 | <3 | -- | |
| MW-6 | 05-10-96 | NR | 15.25 | NR | ND | WSW | 0.08 | 05-10-96 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-6 | 08-09-96 | 252.20 | 11.11 | 241.09 | ND | SW | 0.08 | 08-09-96 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-6 | 11-08-96 | 252.20 | 9.31 | 242.89 | ND | SW | 0.055 | 11-11-96 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-6 | 03-21-97 | 252.20 | 9.40 | 242.80 | ND | WSW | 0.051 | 03-21-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-6 | 05-27-97 | 252.20 | 7.08 | 245.12 | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled annually, during the first quarter | | | | | | | |
| MW-7 | 08-09-96 | 235.95 | Not surveyed: well was dry | | | | SW | 0.08 | 08-09-96 | Not sampled: well was dry | | | | | | |
| MW-7 | 11-08-96 | 235.95 | Not surveyed: well was dry | | | | SW | 0.055 | 11-11-96 | Not sampled: well was dry | | | | | | |
| MW-7 | 01-27-97 | 235.95 | NR | NR | ND | NR | NR | 01-27-97 | 2900 | 29 | <5^ | <5^ | 580 | 220 | -- | |
| MW-7 | 03-21-97 | 235.95 | 7.13 | 228.82 | ND | WSW | 0.051 | 03-21-97 | 590 | 3.5 | <0.5 | <0.5 | 1.3 | 90 | -- | |
| MW-7 | 05-27-97 | 235.95 | 9.02 | 226.93 | ND | WSW | 0.069 | 05-27-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-8 | 08-09-96 | 240.37 | 9.41 | 230.96 | ND | SW | 0.08 | 08-09-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-8 | 11-08-96 | 240.37 | 9.19 | 231.18 | ND | SW | 0.055 | 11-11-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-8 | 03-21-97 | 240.37 | 8.55 | 231.82 | ND | WSW | 0.051 | 03-21-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | -- | |
| MW-8 | 05-27-97 | 240.37 | 11.06 | 229.31 | ND | WSW | 0.069 | 05-27-97 | 91 | 0.6 | <0.5 | <0.5 | 0.6 | 66 | -- | |
| AS-1 | 06-29-95 | NR | 9.20 | NR | ND | NR | NR | 06-30-95 | <50 | 1.6 | <0.5 | 0.9 | 0.9 | -- | -- | |

Table 2
 Historical Groundwater Elevation and Analytical Data
 Petroleum Hydrocarbons and Their Constituents
 1995 - Present*

ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation ft-MSL | Depth to Water feet | Groundwater Elevation ft-MSL | Floating Product Thickness feet | Groundwater Flow Direction MWN | Hydraulic Gradient ft/ft | Water Sample Field Date | TPHC LUFT Method µg/L | Benzene EPA 8020 µg/L | Toluene EPA 8020 µg/L | Ethylbenzene EPA 8020 µg/L | Total Xylenes EPA 8020 µg/L | MTBE EPA 8020 µg/L | MTBE EPA 8240 µg/L | |
|------------------|------------------------|---|------------------------|---------------------------------|------------------------------------|-----------------------------------|-----------------------------|-------------------------|--|---------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|--|
| VW-1 | 02-23-96 | NR | 5.29 | NR | ND | WSW | 0.08 | 03-01-96 | 21000 | 490 | 57 | 520 | 1500 | 240 | -- | |
| VW-1 | 05-10-96 | NR | 6.80 | NR | ND | WSW | 0.08 | 05-10-96 | 3700 | 61 | <5 | 100 | 50 | 200 | -- | |
| VW-1 | 08-09-96 | NR | 7.03 | NR | ND | SW | 0.08 | 08-09-96 | 970 | 2.7 | <2.5 | 2.7 | 3.7 | 180 | -- | |
| VW-1 | 11-08-96 | NR Not surveyed: inaccessible | | | | | SW | 0.055 | 11-11-96 | Not sampled: inaccessible | | | | | | |
| VW-1 | 03-21-97 | NR | 7.51 | NR | ND | WSW | 0.051 | 03-21-97 | 640 | <4 [^] | <1 [^] | 1 | 3 | 194 | -- | |
| VW-1 | 05-27-97 | NR | 7.51 | NR | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled semi-annually, during the first and third quarters | | | | | | | |
| VW-2 | 02-23-96 | NR | 6.92 | NR | ND | WSW | 0.08 | 03-01-96 | Not sampled: not part of sampling program | | | | | | | |
| VW-2 | 05-10-96 | NR Not surveyed: not scheduled for monitoring | | | | | | 05-10-96 | Not sampled: not part of sampling program | | | | | | | |
| VW-4 | 05-10-96 | NR | 8.58 | NR | ND | WSW | 0.08 | 05-10-96 | 13000 | 2500 | 41 | 420 | 660 | 43000 | -- | |
| VW-4 | 08-09-96 | NR | 11.70 | NR | ND | SW | 0.08 | 08-09-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | 6200 | -- | |
| VW-4 | 11-08-96 | NR | 9.38 | NR | ND | SW | 0.055 | 11-08-96 | 7800 | 510 | 7 | 180 | 370 | 21000 | -- | |
| VW-4 | 03-21-97 | NR | 9.11 | NR | ND | WSW | 0.051 | 03-21-97 | 10000 | 290 | 10 | 270 | 230 | 8900 | -- | |
| VW-4 | 05-27-97 | NR | 9.34 | NR | ND | WSW | 0.069 | 05-27-97 | Not sampled: well sampled semi-annually, during the first and third quarters | | | | | | | |

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-27-97

| Well Designation | Water Level Field Date | Top of Casing Elevation ft-MSL | Depth to Water feet | Groundwater Elevation ft-MSL | Floating Product Thickness feet | Groundwater Flow Direction MWN | Hydraulic Gradient ft/ft | Water Sample Field Date | TPHG LUFT Method µg/L | Benzene EPA 8020 µg/L | Toluene EPA 8020 µg/L | Ethylbenzene EPA 8020 µg/L | Total Xylenes EPA 8020 µg/L | MTBE EPA 8020 µg/L | MTBE EPA 8240 µg/L |
|------------------|---------------------------|--------------------------------------|------------------------|------------------------------------|---------------------------------------|--------------------------------------|--------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------------|-----------------------------------|--------------------------|--------------------------|
|------------------|---------------------------|--------------------------------------|------------------------|------------------------------------|---------------------------------------|--------------------------------------|--------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------------|-----------------------------------|--------------------------|--------------------------|

ft-MSL: elevation in feet, relative to mean sea level

MWN: ground-water flow direction and gradient apply to the entire monitoring well network

ft/ft: foot per foot

TPHG: total petroleum hydrocarbons as gasoline

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl-tert-butyl ether

ND: none detected

NR: not reported; data not available or not measurable

WSW: west-southwest

SW: southwest

- -: not analyzed or not applicable

*: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6002, Oakland, California*, (EMCON, February 23, 1996).

^: method reporting limit was raised due to: (1) high analyte concentration requiring sample dilution, or (2) matrix interference

** [corrected elevation (Z')] = Z + (h * 0.73) where: Z: measured elevation, h: floating product thickness, 0.73: density ratio of oil to water

Table 3
Bioremediation Indicator Parameters
Second Quarter 1996

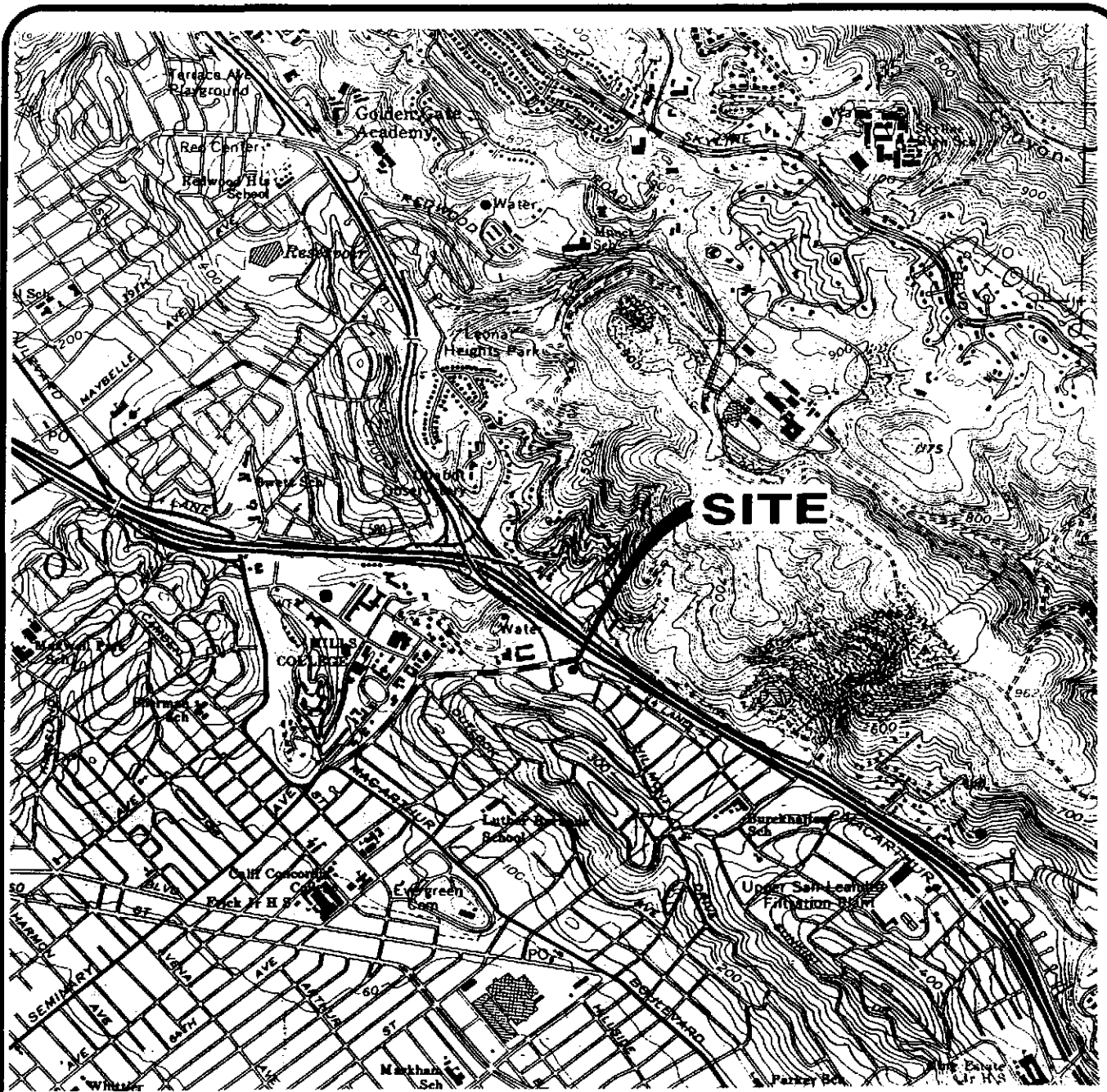
ARCO Service Station 6002
 6235 Seminary Avenue, Oakland, California

Date: 08-22-97

| Well Designation | Water Sample Field Date | TPHG Concentration | Methane Concentration | Hydrocarbon-Utilizing Bacteria | Field Dissolved Oxygen | Field Redox Potential | Ferrous Iron | Nitrate as Nitrogen | Sulfate | pH |
|------------------|-------------------------|--------------------|-----------------------|--------------------------------|------------------------|-----------------------|--------------|---------------------|---------|------------|
| | | µg/L | µg/L | CFUs/ml | mg/L | millivolts | mg/L | mg/L | mg/L | std. units |
| MW-4 | 05-10-96 | <50 | -- | -- | 1.5 | 215 | <0.1 | 1.5 | 33 | 6.38 |
| MW-4 | 05-14-96 | -- | <4 | 56,000 | -- | -- | -- | -- | -- | -- |
| MW-5 | 05-10-96 | 17,000 | -- | -- | 5.5 | -80 | 21 | <0.2 | 0.4 | 6.51 |
| MW-5 | 05-14-96 | -- | 91 | 14,000 | -- | -- | -- | -- | -- | -- |
| VW-1 | 05-10-96 | 3,700 | -- | -- | 2.5 | NA | 42 | <0.2 | 49 | 6.64 |
| VW-1 | 05-14-96 | -- | 8.8 | 390,000 | -- | -- | -- | -- | -- | -- |
| VW-4 | 05-10-96 | 13,000 | -- | -- | 2.5 | NA | 13 | <0.2 | 1.5 | 6.86 |
| VW-4 | 05-14-96 | -- | 6.4 | 4,100,000 | -- | -- | -- | -- | -- | -- |

µg/L: micrograms per liter
 CFUs/ml: colony forming units per milliliter
 mg/L: milligrams per liter
 std. units: standard pH units
 --: Not Analyzed
 NA: Not Available

EA-SANJOSE-CAD/DRAWINGS: I:\02002\SITELOC.dwg Xrefs: <NONE>
 Scale: 1 = 1.00 DimScale: 1 = 1.00 Date: 3/12/97 Time: 5:19 PM Operator: KAJ

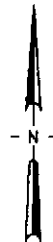


Base map from USGS 7.5' Quad. Map:
 Oakland East, California. Photorevised 1980.

0 2000 4000



SCALE IN FEET



DATE APR. 1997
 DWN KAJ
 APP _____
 REV _____
 PROJECT NO.
 805-131.012

FIGURE 1
 ARCO PRODUCTS COMPANY
 SERVICE STATION 6002, 6235 SEMINARY AVE.
 OAKLAND, CALIFORNIA
**QUARTERLY GROUNDWATER MONITORING
 SITE LOCATION**



June 16, 1997

Service Request No.: S9700984

Ms. Ivy Inouye
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 20805-131.012/TO#19350.00/6002 OAKLAND

Dear Ms. Inouye:

The following pages contain analytical results for sample(s) received by the laboratory on May 28, 1997. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above. To help expedite our service, please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 10, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

Please feel welcome to contact me should you have questions or further needs.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven L. Green", written in a cursive style.

Steven L. Green
Project Chemist

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

| | |
|-------------------|---|
| A2LA | American Association for Laboratory Accreditation |
| ASTM | American Society for Testing and Materials |
| BOD | Biochemical Oxygen Demand |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylenes |
| CAM | California Assessment Metals |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| COD | Chemical Oxygen Demand |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DLCS | Duplicate Laboratory Control Sample |
| DMS | Duplicate Matrix Spike |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| IC | Ion Chromatography |
| ICB | Initial Calibration Blank sample |
| ICP | Inductively Coupled Plasma atomic emission spectrometry |
| ICV | Initial Calibration Verification sample |
| J | Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding. |
| LCS | Laboratory Control Sample |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MBAS | Methylene Blue Active Substances |
| MCL | Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| MS | Matrix Spike |
| MTBE | Methyl tert-Butyl Ether |
| NA | Not Applicable |
| NAN | Not Analyzed |
| NC | Not Calculated |
| NCASI | National Council of the paper industry for Air and Stream Improvement |
| ND | Not Detected at or above the method reporting/detection limit (MRL/MDL) |
| NIOSH | National Institute for Occupational Safety and Health |
| NTU | Nephelometric Turbidity Units |
| ppb | Parts Per Billion |
| ppm | Parts Per Million |
| PQL | Practical Quantitation Limit |
| QA/QC | Quality Assurance/Quality Control |
| RCRA | Resource Conservation and Recovery Act |
| RPD | Relative Percent Difference |
| SIM | Selected Ion Monitoring |
| SM | Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992 |
| STLC | Solubility Threshold Limit Concentration |
| SW | Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB. |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TDS | Total Dissolved Solids |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding. |
| TRPH | Total Recoverable Petroleum Hydrocarbons |
| TSS | Total Suspended Solids |
| TTLc | Total Threshold Limit Concentration |
| VOA | Volatile Organic Analyte(s) |

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: 5/27/97
Date Received: 5/28/97

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-5 (23)
Lab Code: S9700984-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|-------------|-----------------|-----|-----------------|----------------|---------------|--------|--------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 40 | NA | 6/4/97 | 21000 | |
| Benzene | EPA 5030 | 8020 | 0.5 | 40 | NA | 6/4/97 | 86 | |
| Toluene | EPA 5030 | 8020 | 0.5 | 40 | NA | 6/4/97 | <20 | C1 |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 40 | NA | 6/4/97 | 810 | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 40 | NA | 6/4/97 | 610 | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 40 | NA | 6/4/97 | 1700 | |

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: 5/27/97
Date Received: 5/28/97

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-7 (13)
Lab Code: S9700984-002
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|-------------|-----------------|-----|-----------------|----------------|---------------|--------|--------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 6/4/97 | ND | |
| Benzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Toluene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 1 | NA | 6/4/97 | ND | |

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: 5/27/97
Date Received: 5/28/97

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-4 (23)
Lab Code: S9700984-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|-------------|-----------------|-----|-----------------|----------------|---------------|--------|--------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 6/4/97 | ND | |
| Benzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Toluene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 1 | NA | 6/4/97 | ND | |

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S970604-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|-------------|-----------------|-----|-----------------|----------------|---------------|--------|--------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 6/4/97 | ND | |
| Benzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Toluene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 1 | NA | 6/4/97 | ND | |

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8020 CALUFT

Units: PERCENT
Basis: NA

| Sample Name | Lab Code | Test Notes | Percent Recovery | |
|--------------|-----------------|------------|----------------------|------------------------|
| | | | 4-Bromofluorobenzene | a,a,a-Trifluorotoluene |
| MW-5 (23) | S9700984-001 | | 104 | 106 |
| MW-7 (13) | S9700984-002 | | 102 | 94 |
| MW-4 (23) | S9700984-004 | | 101 | 96 |
| Batch QC | S9700984-003MS | | 97 | 110 |
| Batch QC | S9700984-003DMS | | 96 | 107 |
| Method Blank | S970604-WB1 | | 101 | 96 |

CAS Acceptance Limits: 69-116 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 6/4/97

Matrix Spike/Duplicate Matrix Spike Summary
 TPH as Gasoline

Sample Name: Batch QC Units: ug/L (ppb)
Lab Code: S9700984-003MS, S9700984-003DMS Basis: NA
Test Notes:

Percent Recovery

| Analyte | Prep Method | Analysis Method | Spike Level | | Sample Result | Spike Result | | | | CAS Acceptance | | Relative Percent Difference | Result Notes |
|----------|-------------|-----------------|-------------|-----|---------------|--------------|-----|-----|----|----------------|--------|-----------------------------|--------------|
| | | | MRL | MS | | DMS | MS | DMS | MS | DMS | Limits | | |
| Gasoline | EPA 5030 | CA/LUFT | 50 | 250 | 250 | 91 | 310 | 320 | 88 | 92 | 75-135 | 3 | |

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND

Service Request: S9700984
Date Analyzed: 6/4/97

Initial Calibration Verification (ICV) Summary
 BTEX, MTBE and TPH as Gasoline

Sample Name: ICV Units: ug/L (ppb)
Lab Code: ICV1 Basis: NA
Test Notes:

ICV Source:

| Analyte | Prep Method | Analysis Method | True Value | Result | CAS Percent Recovery | | Result Notes |
|---------------------------------|-------------|-----------------|------------|--------|----------------------|------------------|--------------|
| | | | | | Acceptance Limits | Percent Recovery | |
| TPH as Gasoline | EPA 5030 | CA/LUFT | 250 | 240 | 90-110 | 96 | |
| Benzene | EPA 5030 | 8020 | 25 | 26 | 85-115 | 104 | |
| Toluene | EPA 5030 | 8020 | 25 | 26 | 85-115 | 104 | |
| Ethylbenzene | EPA 5030 | 8020 | 25 | 27 | 85-115 | 108 | |
| Xylenes, Total | EPA 5030 | 8020 | 75 | 80 | 85-115 | 107 | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 25 | 27 | 85-115 | 108 | |

ICV/032196



August 25, 1997
Project 20805-131.012

Mr. Jeffrey Enebly
6267 Sunnymere Avenue
Oakland, California 94605

Re: Second quarter 1997 laboratory analytical results, groundwater samples,
6267 Sunnymere Avenue, Oakland, California


Dear Mr. Enebly:

Enclosed please find a copy of the second quarter 1997 groundwater monitoring results for ARCO service station 6002, Oakland, California. Included are the laboratory analytical results for the groundwater sample collected from well MW-8 during the second quarter of 1997. This well is located at 6267 Sunnymere Avenue, Oakland, California. The groundwater sample was collected on May 27, 1997, during quarterly sampling of the ARCO Products Company service station 6002, 6235 Seminary Avenue, Oakland.

Please call if you have questions.

Sincerely,

EMCON


Gary P. Messerotes
Project Manager

Attachments: Figure 1 -Generalized Site Plan
Attachment A - Copy of Analytical Results and Chain-of-Custody
Documentation, Well MW-8, Second Quarter 1997

cc: Juliet Shin, ACHCSA
Kevin Graves, RWQCB - SFBR
Paul Supple, ARCO Products Company
File



ARCO
SERVICE
STATION
BUILDING

4' block wall

PLANTER

PLANTER

8' block wall

TREE

TREE

6267

GARAGE

● MW-8

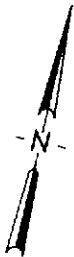
Approximate property
line (Typ.)

EXPLANATION

● Groundwater monitoring well

0 15 30

SCALE IN FEET



EMCON

DATE JUNE 1997

DWN KMM

APP _____

REV 0

PROJECT NO.

20805-131.012

FIGURE 1

ARCO PRODUCTS COMPANY
SERVICE STATION 6002, 6235 SEMINARY AVE.
OAKLAND, CALIFORNIA
**QUARTERLY GROUNDWATER MONITORING
GENERALIZED SITE PLAN**

EA--SANJOSE--CAD/DRAWINGS: G:\805-131\SJGENSP.dwg Xrefs: <NONE>
Scale: 1 = 15.00 DimScale: 1 = 30.00 Date: 6/12/97 Time: 12:13 PM Operator: KMM



June 16, 1997

Service Request No.: S9700984

Ms. Ivy Inouye
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 20805-131.012/TO#19350.00/6002 OAKLAND

Dear Ms. Inouye:

The following pages contain analytical results for sample(s) received by the laboratory on May 28, 1997. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above. To help expedite our service, please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 8, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

Please feel welcome to contact me should you have questions or further needs.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven L. Green", written in a cursive style.

Steven L. Green
Project Chemist

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

| | |
|------------|---|
| A2LA | American Association for Laboratory Accreditation |
| ASTM | American Society for Testing and Materials |
| BOD | Biochemical Oxygen Demand |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylenes |
| CAM | California Assessment Metals |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| COD | Chemical Oxygen Demand |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DLCS | Duplicate Laboratory Control Sample |
| DMS | Duplicate Matrix Spike |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| IC | Ion Chromatography |
| ICB | Initial Calibration Blank sample |
| ICP | Inductively Coupled Plasma atomic emission spectrometry |
| ICV | Initial Calibration Verification sample |
| J | Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding. |
| LCS | Laboratory Control Sample |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MBAS | Methylene Blue Active Substances |
| MCL | Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| MS | Matrix Spike |
| MTBE | Methyl tert-Butyl Ether |
| NA | Not Applicable |
| NAN | Not Analyzed |
| NC | Not Calculated |
| NCASI | National Council of the paper industry for Air and Stream Improvement |
| ND | Not Detected at or above the method reporting/detection limit (MRL/MDL) |
| NIOSH | National Institute for Occupational Safety and Health |
| NTU | Nephelometric Turbidity Units |
| ppb | Parts Per Billion |
| ppm | Parts Per Million |
| PQL | Practical Quantitation Limit |
| QA/QC | Quality Assurance/Quality Control |
| RCRA | Resource Conservation and Recovery Act |
| RPD | Relative Percent Difference |
| SIM | Selected Ion Monitoring |
| SM | Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992 |
| STLC | Solubility Threshold Limit Concentration |
| SW | Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB. |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TDS | Total Dissolved Solids |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding. |
| TRPH | Total Recoverable Petroleum Hydrocarbons |
| TSS | Total Suspended Solids |
| TTLC | Total Threshold Limit Concentration |
| VOA | Volatile Organic Analyte(s) |

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: 5/27/97
Date Received: 5/28/97

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-8 (12)
Lab Code: S9700984-003
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|--------------------|------------------------|------------|------------------------|-----------------------|----------------------|---------------|---------------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 6/4/97 | 91 | |
| Benzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | 0.6 | |
| Toluene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | 0.6 | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 1 | NA | 6/4/97 | 66 | |

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S970604-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---------------------------------|--------------------|------------------------|------------|------------------------|-----------------------|----------------------|---------------|---------------------|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 6/4/97 | ND | |
| Benzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Toluene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Ethylbenzene | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Xylenes, Total | EPA 5030 | 8020 | 0.5 | 1 | NA | 6/4/97 | ND | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 3 | 1 | NA | 6/4/97 | ND | |

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8020 CA/LUFT

Units: PERCENT
Basis: NA

| Sample Name | Lab Code | Test Notes | Percent Recovery | |
|--------------|-----------------|------------|----------------------|------------------------|
| | | | 4-Bromofluorobenzene | a,a,a-Trifluorotoluene |
| MW-8 (12) | S9700984-003 | | 101 | 97 |
| MW-8 (12) | S9700984-003MS | | 97 | 110 |
| MW-8 (12) | S9700984-003DMS | | 96 | 107 |
| Method Blank | S970604-WB1 | | 101 | 96 |

CAS Acceptance Limits: 69-116 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND
Sample Matrix: Water

Service Request: S9700984
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 6/4/97

Matrix Spike/Duplicate Matrix Spike Summary
 TPH as Gasoline

Sample Name: MW-8 (12) Units: ug/L (ppb)
Lab Code: S9700984-003MS, S9700984-003DMS Basis: NA
Test Notes:

| Analyte | Prep Method | Analysis Method | Spike Level | | Sample Result | Percent Recovery | | | | CAS Acceptance Limits | Relative Percent Difference | Result Notes |
|----------|-------------|-----------------|-------------|---------|---------------|------------------|-----|----|-----|-----------------------|-----------------------------|--------------|
| | | | MRL | MS DMS | | MS | DMS | MS | DMS | | | |
| Gasoline | EPA 5030 | CA/LUFT | 50 | 250 250 | 91 | 310 | 320 | 88 | 92 | 75-135 | 3 | |

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#19350.00/6002 OAKLAND

Service Request: S9700984
Date Analyzed: 6/4/97

Initial Calibration Verification (ICV) Summary
 BTEX, MTBE and TPH as Gasoline

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: ug/L (ppb)
Basis: NA

ICV Source:

| Analyte | Prep Method | Analysis Method | True Value | Result | CAS Percent Recovery | | Result Notes |
|---------------------------------|-------------|-----------------|------------|--------|----------------------|------------------|--------------|
| | | | | | Acceptance Limits | Percent Recovery | |
| TPH as Gasoline | EPA 5030 | CA/LUFT | 250 | 240 | 90-110 | 96 | |
| Benzene | EPA 5030 | 8020 | 25 | 26 | 85-115 | 104 | |
| Toluene | EPA 5030 | 8020 | 25 | 26 | 85-115 | 104 | |
| Ethylbenzene | EPA 5030 | 8020 | 25 | 27 | 85-115 | 108 | |
| Xylenes, Total | EPA 5030 | 8020 | 75 | 80 | 85-115 | 107 | |
| Methyl <i>tert</i> -Butyl Ether | EPA 5030 | 8020 | 25 | 27 | 85-115 | 108 | |

