



**EMCON**

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June 17, 1996  
Project 20805-123.003

Mr. Michael Whelan  
ARCO Products Company  
P.O. Box 612530  
San Jose, California 95161

Re: First quarter 1996 groundwater monitoring program results and remediation system performance evaluation report, ARCO service station 2035, Albany, California

Dear Mr. Whelan:

This letter presents the results of the first quarter 1996 groundwater monitoring program at ARCO Products Company (ARCO) service station 2035, 1001 San Pablo Avenue, Albany, California (Figure 1). Operation and performance data for the site's interim soil-vapor extraction (SVE) and groundwater extraction remediation systems are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

#### LIMITATIONS

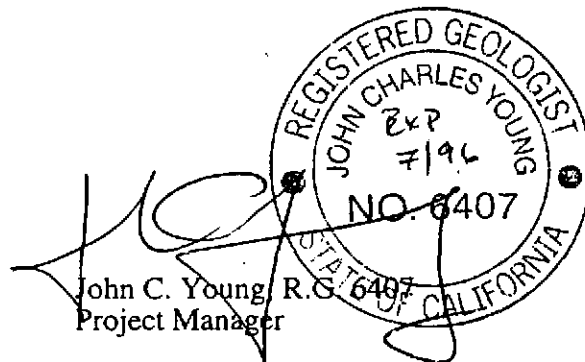
No monitoring event is thorough enough to describe all geologic and hydrogeologic conditions of interest at a given site. If conditions have not been identified during the monitoring event, such a finding should not therefore be construed as a guarantee of the absence of such conditions at the site,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

Please call if you have questions.

Sincerely,

EMCON

Sailaja Yelamanchili  
Staff Engineer



John C. Young, R.G. 6407  
Project Manager



**ARCO QUARTERLY REPORT**

Station No.: 2035 Address: 1001 San Pablo Avenue, San Pablo, California  
 EMCON Project No. 20805-123.003  
 ARCO Environmental Engineer/Phone No.: Michael Whelan /(408) 453-1640  
 EMCON Project Manager/Phone No.: John C. Young /(408) 453-7300  
 Primary Agency/Regulatory ID No.: ACHCSA /Barney Chan  
 Reporting Period: January 1, 1996 to April 1, 1996

**WORK PERFORMED THIS QUARTER (First- 1996):**

1. Conducted quarterly groundwater monitoring and sampling.
2. Prepared and submitted quarterly report for fourth quarter 1995.
3. Operation of soil-vapor extraction (SVE), air-bubbling, and groundwater extraction (GWE) systems.

**WORK PROPOSED FOR NEXT QUARTER (Second- 1996):**

1. Perform quarterly groundwater monitoring and sampling.
2. Restart SVE, air-sparge, and groundwater treatment systems.
3. Prepare and submit quarterly report for first quarter 1996.

**QUARTERLY MONITORING:**

Current Phase of Project: Quarterly Groundwater Monitoring and Operation and Maintenance of Remediation Systems  
 Frequency of Sampling: Quarterly (groundwater), Monthly (SVE)  
 Frequency of Monitoring: Quarterly (groundwater), Monthly (SVE)  
 Is Floating Product (FP) Present On-site:  Yes  No  
 Cumulative FP Recovered to Date : 27.9 gallons, Wells AS-1V, AS-2V, RW-1, VW-1, VW-2, and VW-7  
 FP Recovered This Quarter : None  
 Bulk Soil Removed to Date : 605 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: SVE, Air-Sparge, and Groundwater Extraction Systems  
 Approximate Depth to Groundwater: 9.5 feet  
 Groundwater Gradient (Average): 0.009 ft/ft toward southwest (consistent with past events)

**SVE QUARTERLY OPERATION AND PERFORMANCE:**

Equipment Inventory: Therm Tech Model VAC-10 Thermal/Catalytic Oxidizer SVE system was shut down on 2-7-96.  
 Operating Mode: Catalytic Oxidation  
 BAAQMD Permit #: 10931  
 TPH Conc. End of Period (lab): <15 ppmv (2-7-96)  
 Benzene Conc. End of Period (lab): <0.1 ppmv (2-7-96)  
 SVE Flowrate End of Period: 53.1 scfm (2-7-96)

|  |   |
|--|---|
| Total HC Recovered This Period:            | 9.2 pounds  |
| Total HC Recovered to Date:                | 2996.5 pounds   |
| Utility Usage                              |   |
| Electric (KWH):                            | 10,174  |
| Gas/Propane (CF):                          | 1,292   |
| Operating Hours This Period (SVE):         | 902.0 hours   |
| Operating Hours to Date (SVE):             | 6149.5 hours  |
| Percent Operational (SVE):                 | 41.3%   |
| Operating Hours This Period (GWE):         | 1934.1 hours  |
| Percent Operational (GWE):                 | 80.0%   |
| Unit Maintenance:                          | NA  |
| Number of Auto Shut Downs:                 | 0   |
| Destruction Efficiency Permit Requirement: | 90%   |
| Percent TPH Conversion:                    | NA  |
|  | Laboratory analytical results collected during this period indicated the TVHG and benzene concentrations in extracted soil vapor discharged to the atmosphere were below laboratory detection limits. |
| Stack Temperature:                         | 703°F   |
| SVE Source Flow:                           | 28.6 scfm (2-7-96)  |
| SVE Process Flow:                          | 53.1 scfm (2-7-96)  |
| Source Vacuum:                             | 20 inches of water (2-7-96)   |

## DISCUSSION:

Rising water levels resulted in the submergence of hydrocarbon-impacted zone of soil and screen in the SVE wells. As a result, TPH concentration in extracted soil vapor was below the detection limits in January 1996. Therefore the SVE wells were taken off-line on February 7, 1996. The groundwater treatment system was shut down on March 25, 1996 because of substantial fuel costs being incurred to operate the ThermTech unit for the abatement of off-gas from the groundwater treatment system (aeration tank), and because TPHG concentrations in extracted groundwater decreased from 49,000 µg/L on February 8, 1995 to 70 µg/L on January 30, 1996.

## ATTACHED:

- Table 1 - Groundwater Monitoring Data, First Quarter 1996
- Table 2 - Historical Groundwater Elevation Data
- Table 3 - Historical Groundwater Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 4 - Historical Groundwater Analytical Data, Well MW-3
- Table 5 - Approximate Cumulative Floating Product Recovered, Wells AS-1, AS-2, RW-1, VW-1, VW-2, and VW-7
- Table 6 - Soil-Vapor Extraction System Operation and Performance Data
- Table 7 - Soil-Vapor Extraction Well Data
- Table 8 - Influent and Effluent Groundwater Analyses Summary Report
- Table 9 - Estimated Total Dissolved TPHG and Benzene Removed, Summary Report
- Figure 1 - Site Location
- Figure 2 - Site Plan
- Figure 3 - Groundwater Data, First Quarter 1996
- Figure 4 - Soil-Vapor Extraction and Treatment System, Historical System Influent TVHG and Benzene Concentrations
- Figure 5 - Soil-Vapor Extraction and Treatment System, Historical Hydrocarbon Removal Rates

- Figure 6 - Groundwater Treatment System, Historical System Influent TPHG and Benzene Concentrations
- Figure 7 - Groundwater Treatment System, Historical Hydrocarbon Removal Rates
- Appendix A - Field Data Sheets, First Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, First Quarter 1996 Groundwater Monitoring Event
- Appendix C - SVE System Monitoring Data Log Sheets
- Appendix D - Field Data Sheets, Operation and Maintenance Visits, SVE System, First Quarter 1996
- Appendix E - Analytical Results and Chain-of-Custody Documentation, SVE System, First Quarter 1996
- Appendix F - Field Data Sheets, Operation and Maintenance Visits, Groundwater Treatment System, First Quarter 1996
- Appendix G - Analytical Results and Chain-of-Custody Documentation, Groundwater Treatment System, First Quarter 1996

cc: Barney Chan, ACHCSA  
Kevin Graves, RWQCB-SFBR

Table 1  
Groundwater Monitoring Data  
First Quarter 1996

ARCO Service Station 2035  
1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Level Field Date | Top of Casing Elevation<br>ft-MSL | Depth to Water<br>feet | Groundwater Elevation<br>ft-MSL | Floating Product Thickness<br>feet | Groundwater Flow Direction<br>MWN | Hydraulic Gradient<br>ft/ft | Water Sample Field Date | TPHG LUFT Method<br>µg/L | Benzene EPA 8020<br>µg/L | Toluene EPA 8020<br>µg/L | Ethylbenzene EPA 8020<br>µg/L | Total Xylenes EPA 8020<br>µg/L | MTBE EPA 8020<br>µg/L | MTBE EPA 8240<br>µg/L | Oil and Grease SM 5520B&F<br>µg/L | Oil and Grease SM 5520C<br>µg/L | Oil and Grease SM 5520F<br>µg/L | TRPH EPA 418.1<br>µg/L | TPHD LUFT Method<br>µg/L |
|------------------|------------------------|-----------------------------------|------------------------|---------------------------------|------------------------------------|-----------------------------------|-----------------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------------------|---------------------------------|---------------------------------|------------------------|--------------------------|
| MW-1             | 02-27-96               | 41.41                             | 9.08                   | 32.33                           | ND                                 | SW                                | 0.009                       | 02-27-96                | 2700                     | 930                      | 12                       | 18                            | 32                             | 51                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 02-27-96               | 40.38                             | 10.25                  | 30.13                           | ND                                 | SW                                | 0.009                       | 02-27-96                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-3             | 02-27-96               | 41.44                             | 9.41                   | 32.03                           | ND                                 | SW                                | 0.009                       | 02-27-96                | 120                      | 3.6                      | <0.5                     | 2.2                           | 3.7                            | 90                    | --                    | --                                | --                              | --                              | <0.5                   | --                       |
| MW-4             | 02-27-96               | 40.33                             | 8.84                   | 31.49                           | ND                                 | SW                                | 0.009                       | 02-27-96                | <50                      | 0.8                      | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 02-27-96               | 41.84                             | 9.52                   | 32.32                           | ND                                 | SW                                | 0.009                       | 02-27-96                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 02-27-96               | 40.13                             | 11.86                  | 28.27                           | ND                                 | SW                                | 0.009                       | 02-27-96                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| RW-1             | 02-27-96               | 40.33                             | 16.56                  | 23.77                           | ND                                 | SW                                | 0.009                       | 02-27-96                | 210                      | 44                       | 7.5                      | 2.5                           | 24                             | 29                    | --                    | --                                | --                              | --                              | --                     | --                       |

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, California DHS LUFT Method

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: methyl-tert-butyl ether

SM: standard method

TRPH: total recoverable petroleum hydrocarbons

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

ND: none detected

SW: southwest

--: not analyzed

Table 2  
Historical Groundwater Elevation Data  
1994 - Present\*

ARCO Service Station 2035  
1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Level Field Date | Top of Casing Elevation | Depth to Water | Groundwater Elevation | Floating Product Thickness | Groundwater Flow Direction | Hydraulic Gradient |
|------------------|------------------------|-------------------------|----------------|-----------------------|----------------------------|----------------------------|--------------------|
|                  |                        | ft-MSL                  | feet           | ft-MSL                | feet                       | MWN                        |                    |
| MW-1             | 02-01-94               | 41.41                   | 9.29           | 32.12                 | ND                         | NR                         | NR                 |
| MW-1             | 04-26-94               | 41.41                   | 9.25           | 32.16                 | ND                         | NR                         | NR                 |
| MW-1             | 07-29-94               | 41.41                   | 9.87           | 31.54                 | ND                         | WSW                        | 0.016              |
| MW-1             | 11-15-94               | 41.41                   | 8.76           | 32.65                 | ND                         | WSW                        | 0.019              |
| MW-1             | 03-24-95               | 41.41                   | 6.21           | 35.20                 | ND                         | NW                         | 0.037              |
| MW-1             | 05-24-95               | 41.41                   | 9.37           | 32.04                 | ND                         | WNW                        | 0.013              |
| MW-1             | 08-22-95               | 41.41                   | 10.30          | 31.11                 | ND                         | SW                         | 0.012              |
| MW-1             | 11-09-95               | 41.41                   | 12.25          | 29.16                 | ND                         | WSW                        | 0.01               |
| MW-1             | 02-27-96               | 41.41                   | 9.08           | 32.33                 | ND                         | SW                         | 0.009              |
|                  |                        |                         |                |                       |                            |                            |                    |
| MW-2             | 02-01-94               | 40.38                   | 9.66           | 30.72                 | ND                         | NR                         | NR                 |
| MW-2             | 04-26-94               | 40.38                   | 9.60           | 30.78                 | ND                         | NR                         | NR                 |
| MW-2             | 07-29-94               | 40.38                   | 10.61          | 29.77                 | ND                         | WSW                        | 0.016              |
| MW-2             | 11-15-94               | 40.38                   | 9.23           | 31.15                 | ND                         | WSW                        | 0.019              |
| MW-2             | 03-24-95               | 40.38                   | 6.96           | 33.42                 | ND                         | NW                         | 0.037              |
| MW-2             | 05-24-95               | 40.38                   | 10.02          | 30.36                 | ND                         | WNW                        | 0.013              |
| MW-2             | 08-22-95               | 40.38                   | 10.87          | 29.51                 | ND                         | SW                         | 0.012              |
| MW-2             | 11-09-95               | 40.38                   | 13.12          | 27.26                 | ND                         | WSW                        | 0.01               |
| MW-2             | 02-27-96               | 40.38                   | 10.25          | 30.13                 | ND                         | SW                         | 0.009              |
|                  |                        |                         |                |                       |                            |                            |                    |
| MW-3             | 02-01-94               | 41.44                   | 9.71           | 31.73                 | ND                         | NR                         | NR                 |
| MW-3             | 04-26-94               | 41.44                   | 9.56           | 31.88                 | ND                         | NR                         | NR                 |
| MW-3             | 07-29-94               | 41.44                   | 10.65          | 30.79                 | ND                         | WSW                        | 0.016              |
| MW-3             | 11-15-94               | 41.44                   | 9.25           | 32.19                 | ND                         | WSW                        | 0.019              |
| MW-3             | 03-24-95               | 41.44                   | 7.29           | 34.15                 | ND                         | NW                         | 0.037              |
| MW-3             | 05-24-95               | 41.44                   | 9.53           | 31.91                 | ND                         | WNW                        | 0.013              |
| MW-3             | 08-22-95               | 41.44                   | 11.19          | 30.25                 | ND                         | SW                         | 0.012              |
| MW-3             | 11-09-95               | 41.44                   | 12.77          | 28.67                 | ND                         | WSW                        | 0.01               |
| MW-3             | 02-27-96               | 41.44                   | 9.41           | 32.03                 | ND                         | SW                         | 0.009              |
|                  |                        |                         |                |                       |                            |                            |                    |
| MW-4             | 02-01-94               | 40.33                   | 9.10           | 31.23                 | ND                         | NR                         | NR                 |
| MW-4             | 04-26-94               | 40.33                   | 8.94           | 31.39                 | ND                         | NR                         | NR                 |
| MW-4             | 07-29-94               | 40.33                   | 10.02          | 30.31                 | ND                         | WSW                        | 0.016              |
| MW-4             | 11-15-94               | 40.33                   | 8.47           | 31.86                 | ND                         | WSW                        | 0.019              |
| MW-4             | 03-24-95               | 40.33                   | 5.92           | 34.41                 | ND                         | NW                         | 0.037              |
| MW-4             | 05-24-95               | 40.33                   | 9.23           | 31.10                 | ND                         | WNW                        | 0.013              |
| MW-4             | 08-22-95               | 40.33                   | 10.61          | 29.72                 | ND                         | SW                         | 0.012              |
| MW-4             | 11-09-95               | 40.33                   | 11.97          | 28.36                 | ND                         | WSW                        | 0.01               |
| MW-4             | 02-27-96               | 40.33                   | 8.84           | 31.49                 | ND                         | SW                         | 0.009              |

**Table 2**  
**Historical Groundwater Elevation Data**  
**1994 - Present\***

ARCO Service Station 2035  
 1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Level Field Date | Top of Casing Elevation | Depth to Water | Groundwater Elevation | Floating Product Thickness | Groundwater Flow Direction | Hydraulic Gradient |
|------------------|------------------------|-------------------------|----------------|-----------------------|----------------------------|----------------------------|--------------------|
|                  |                        | ft-MSL                  | feet           | ft-MSL                | feet                       | MWN                        |                    |
| MW-5             | 02-01-94               | 41.84                   | 9.74           | 32.10                 | ND                         | NR                         | NR                 |
| MW-5             | 04-26-94               | 41.84                   | 9.51           | 32.33                 | ND                         | NR                         | NR                 |
| MW-5             | 07-29-94               | 41.84                   | 10.54          | 31.30                 | ND                         | WSW                        | 0.016              |
| MW-5             | 11-15-94               | 41.84                   | 9.10           | 32.74                 | ND                         | WSW                        | 0.019              |
| MW-5             | 03-24-95               | 41.84                   | 6.23           | 35.61                 | ND                         | NW                         | 0.037              |
| MW-5             | 05-24-95               | 41.84                   | 9.61           | 32.23                 | ND                         | WNW                        | 0.013              |
| MW-5             | 08-22-95               | 41.84                   | 11.12          | 30.72                 | ND                         | SW                         | 0.012              |
| MW-5             | 11-09-95               | 41.84                   | 12.52          | 29.32                 | ND                         | WSW                        | 0.01               |
| MW-5             | 02-27-96               | 41.84                   | 9.52           | 32.32                 | ND                         | SW                         | 0.009              |
|                  |                        |                         |                |                       |                            |                            |                    |
| MW-6             | 02-01-94               | 40.13                   | 11.80          | 28.33                 | ND                         | NR                         | NR                 |
| MW-6             | 04-26-94               | 40.13                   | 11.33          | 28.80                 | ND                         | NR                         | NR                 |
| MW-6             | 07-29-94               | 40.13                   | 12.16          | 27.97                 | ND                         | WSW                        | 0.016              |
| MW-6             | 11-15-94               | 40.13                   | 11.01          | 29.12                 | ND                         | WSW                        | 0.019              |
| MW-6             | 03-24-95               | 40.13                   | 9.03           | 31.10                 | ND                         | NW                         | 0.037              |
| MW-6             | 05-24-95               | 40.13                   | 12.45          | 27.68                 | ND                         | WNW                        | 0.013              |
| MW-6             | 08-22-95               | 40.13                   | 13.32          | 26.81                 | ND                         | SW                         | 0.012              |
| MW-6             | 11-09-95               | 40.13                   | 14.13          | 26.00                 | ND                         | WSW                        | 0.01               |
| MW-6             | 02-27-96               | 40.13                   | 11.86          | 28.27                 | ND                         | SW                         | 0.009              |
|                  |                        |                         |                |                       |                            |                            |                    |
| RW-1             | 02-01-94               | 40.33                   | 1.00           | 39.33                 | ND                         | NR                         | NR                 |
| RW-1             | 04-26-94               | 40.33                   | 9.30           | ** 31.06              | 0.04                       | NR                         | NR                 |
| RW-1             | 07-29-94               | 40.33                   | 9.91           | ** 30.43              | 0.02                       | WSW                        | 0.016              |
| RW-1             | 11-15-94               | 40.33                   | 8.89           | ** 31.51              | 0.10                       | WSW                        | 0.019              |
| RW-1             | 03-24-95               | 40.33                   | 9.32           | ** 31.02              | 0.01                       | NW                         | 0.037              |
| RW-1             | 05-24-95               | 40.33                   | 9.75           | ** 30.60              | 0.03                       | WNW                        | 0.013              |
| RW-1             | 08-22-95               | 40.33                   | 10.86          | ** 29.48              | 0.02                       | SW                         | 0.012              |
| RW-1             | 11-09-95               | 40.33                   | 20.61          | 19.72                 | ND                         | WSW                        | 0.01               |
| RW-1             | 02-27-96               | 40.33                   | 16.56          | 23.77                 | ND                         | SW                         | 0.009              |

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

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

ND: none detected

NR: not reported; data not available

WSW: west-southwest

NW: northwest

WNW: west-northwest

SW: southwest

\*: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 2035, Albany, California*, (EMCON, March 25, 1996).

\*\* : [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  
 Historical Groundwater Analytical Data  
 Petroleum Hydrocarbons and Their Constituents  
 1994 - Present\*

ARCO Service Station 2035  
 1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Sample Field Date | TPHG LUFT Method<br>µg/L | Benzene EPA 8020<br>µg/L | Toluene EPA 8020<br>µg/L | Ethylbenzene EPA 8020<br>µg/L | Total Xylenes EPA 8020<br>µg/L | MTBE EPA 8020<br>µg/L | MTBE EPA 8240<br>µg/L | Oil and Grease SM 5520B&F<br>µg/L | Oil and Grease SM 5520C<br>µg/L | Oil and Grease SM 5520F<br>µg/L | TRPH EPA 418.1<br>µg/L | TPHD LUFT Method<br>µg/L |
|------------------|-------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------------------|---------------------------------|---------------------------------|------------------------|--------------------------|
| MW-1             | 02-01-94                | <50                      | 13                       | <0.5                     | 0.5                           | 0.6                            | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 04-26-94                | 990                      | 290                      | 3.5                      | 18                            | 14                             | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 07-29-94                | 760                      | 280                      | <2.5                     | 7.1                           | <2.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 11-15-94                | 570                      | 150                      | 7.3                      | <2.5                          | 30                             | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 03-24-95                | 8800                     | 3600                     | <50                      | 62                            | 99                             | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 05-24-95                | 4800                     | 2000                     | <20                      | 52                            | <20                            | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 08-22-95                | 780                      | 310                      | <2.5                     | 12                            | <2.5                           | 14                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 11-09-95                | 58                       | 14                       | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-1             | 02-27-96                | 2700                     | 930                      | 12                       | 18                            | 32                             | 51                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 02-01-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 04-26-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 07-29-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 11-15-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 03-24-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 05-24-95                | al analysis              |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-2             | 08-22-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-2             | 11-09-95                | al analysis              |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-2             | 02-27-96                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-3             | 02-01-94                | <50                      | 1.9                      | <0.5                     | 2.1                           | <0.5                           | --                    | --                    | --                                | <500                            | <500                            | --                     | --                       |
| MW-3             | 04-26-94                | <50                      | 1.1                      | <0.5                     | 2.4                           | 0.9                            | --                    | --                    | --                                | --                              | --                              | <600                   | --                       |
| MW-3             | 07-29-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | 600                    | --                       |
| MW-3             | 11-15-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | <500                   | --                       |
| MW-3             | 03-24-95                | 51                       | 0.8                      | <0.5                     | 2.4                           | <0.5                           | --                    | --                    | --                                | --                              | --                              | <500                   | --                       |
| MW-3             | 05-24-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | <500                   | --                       |
| MW-3             | 08-22-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | 79                    | --                    | --                                | --                              | --                              | <500                   | --                       |
| MW-3             | 11-09-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | 600                    | --                       |
| MW-3             | 02-27-96                | 120                      | 3.6                      | <0.5                     | 2.2                           | 3.7                            | 90                    | --                    | --                                | --                              | --                              | <0.5                   | --                       |
| MW-4             | 02-01-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 04-26-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 07-29-94                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 11-15-94                | 220                      | 12                       | 19                       | 0.9                           | 39                             | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 03-24-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 05-24-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 08-22-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | 99                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 11-09-95                | <50                      | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | 89                    | --                                | --                              | --                              | --                     | --                       |
| MW-4             | 02-27-96                | <50                      | 0.8                      | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |



Table 3  
 Historical Groundwater Analytical Data  
 Petroleum Hydrocarbons and Their Constituents  
 1994 - Present\*

ARCO Service Station 2035  
 1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Sample Field Date | TPHG LUFT Method<br>µg/L                              | Benzene EPA 8020<br>µg/L | Toluene EPA 8020<br>µg/L | Ethylbenzene EPA 8020<br>µg/L | Total Xylenes EPA 8020<br>µg/L | MTBE EPA 8020<br>µg/L | MTBE EPA 8240<br>µg/L | Oil and Grease SM 5520B&F<br>µg/L | Oil and Grease SM 5520C<br>µg/L | Oil and Grease SM 5520F<br>µg/L | TRPH EPA 418.1<br>µg/L | TPHD LUFT Method<br>µg/L |
|------------------|-------------------------|---|--------------------------|--------------------------|-------------------------------|--------------------------------|-----------------------|-----------------------|-----------------------------------|---------------------------------|---------------------------------|------------------------|--------------------------|
| MW-5             | 02-01-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 04-26-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 07-29-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 11-15-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 03-24-95                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-5             | 05-24-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-5             | 08-22-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-5             | 11-09-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-5             | 02-27-96                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
|                  |                         |   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-6             | 02-01-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 04-26-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 07-29-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 11-15-94                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 03-24-95                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| MW-6             | 05-24-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-6             | 08-22-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-6             | 11-09-95                | al analysis   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| MW-6             | 02-27-96                | <50   | <0.5                     | <0.5                     | <0.5                          | <0.5                           | <3                    | --                    | --                                | --                              | --                              | --                     | --                       |
|                  |                         |   |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 02-01-94                | Not sampled: well connected to the remediation system |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 04-26-94                | Not sampled: well contained floating product          |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 07-29-94                | Not sampled: well contained floating product          |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 11-15-94                | Not sampled: well contained floating product          |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 03-24-95                | 11000   | 560                      | 660                      | 150                           | 1700                           | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| RW-1             | 05-24-95                | Not sampled: well contained floating product          |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 08-22-95                | Not sampled: well contained floating product          |                          |                          |                               |                                |                       |                       |                                   |                                 |                                 |                        |                          |
| RW-1             | 11-09-95                | 1600  | 79                       | 46                       | 13                            | 240                            | --                    | --                    | --                                | --                              | --                              | --                     | --                       |
| RW-1             | 02-27-96                | 210   | 44                       | 7.5                      | 2.5                           | 24                             | 29                    | --                    | --                                | --                              | --                              | --                     | --                       |

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method  
 µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl-tert-butyl ether

SM: standard method

TRPH: total recoverable petroleum hydrocarbons

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

--: not analyzed

\*: For previous historical analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 2035, Albany, California*, (EMCON, March 25, 1996).

Table 4  
Historical Groundwater Analytical Data  
Additional Parameters

ARCO Service Station 2035  
1001 San Pablo Avenue, Albany, California

Date: 05-15-96

| Well Designation | Water Sample Field Date | Total VOCs<br>EPA 624<br>µg/L                                     | Total SVOCs<br>EPA 3510/ 8270<br>µg/L | Total PCBs<br>EPA 3510/ 8080<br>µg/L | Cadmium<br>EPA 6010<br>µg/L | Chromium<br>EPA 6010<br>µg/L | Lead<br>EPA 7421<br>µg/L | Zinc<br>EPA 6010<br>µg/L | Nickel<br>EPA 6010<br>µg/L |
|------------------|-------------------------|---|---------------------------------------|--------------------------------------|-----------------------------|------------------------------|--------------------------|--------------------------|----------------------------|
| MW-3             | 10-29-91                | ND(a)   | --                                    | --                                   | <10                         | <10                          | <5                       | 45                       | <50                        |
| MW-3             | 03-19-92                | --  | --                                    | --                                   | --                          | --                           | --                       | --                       | --                         |
| MW-3             | 06-12-92                | --  | --                                    | --                                   | --                          | --                           | --                       | --                       | --                         |
| MW-3             | 09-08-92                | --  | --                                    | --                                   | --                          | --                           | --                       | --                       | --                         |
| MW-3             | 10-26-92                | ND(b)   | --                                    | --                                   | --                          | --                           | --                       | --                       | --                         |
| MW-3             | 12-01-92                | --  | ND(c)                                 | ND(d)                                | --                          | --                           | --                       | --                       | --                         |
| MW-3             | 01-13-93                | Not analyzed: sampling for additional parameters was discontinued |                                       |                                      |                             |                              |                          |                          |                            |

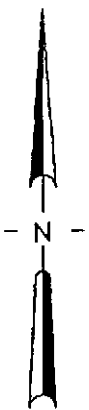
VOCs: volatile organic compounds  
EPA: United States Environmental Protection Agency  
µg/L: micrograms per liter  
SVOCs: semi-volatile organic compounds  
PCBs: polychlorinated biphenyls analyzed  
ND: not detected (31 compounds tested for VOCs were nondetectable)  
(a): all 37 compounds analyzed were nondetectable except for toluene (3.0 ppb)  
(b): all 41 compounds analyzed were nondetectable  
(c): all 34 compounds analyzed were nondetectable  
(d): all 7 compounds analyzed were nondetectable  
-- : not analyzed

Table 5  
Approximate Cumulative Floating Product Recovered

ARCO Service Station 2035  
1001 San Pablo Avenue, Albany, California

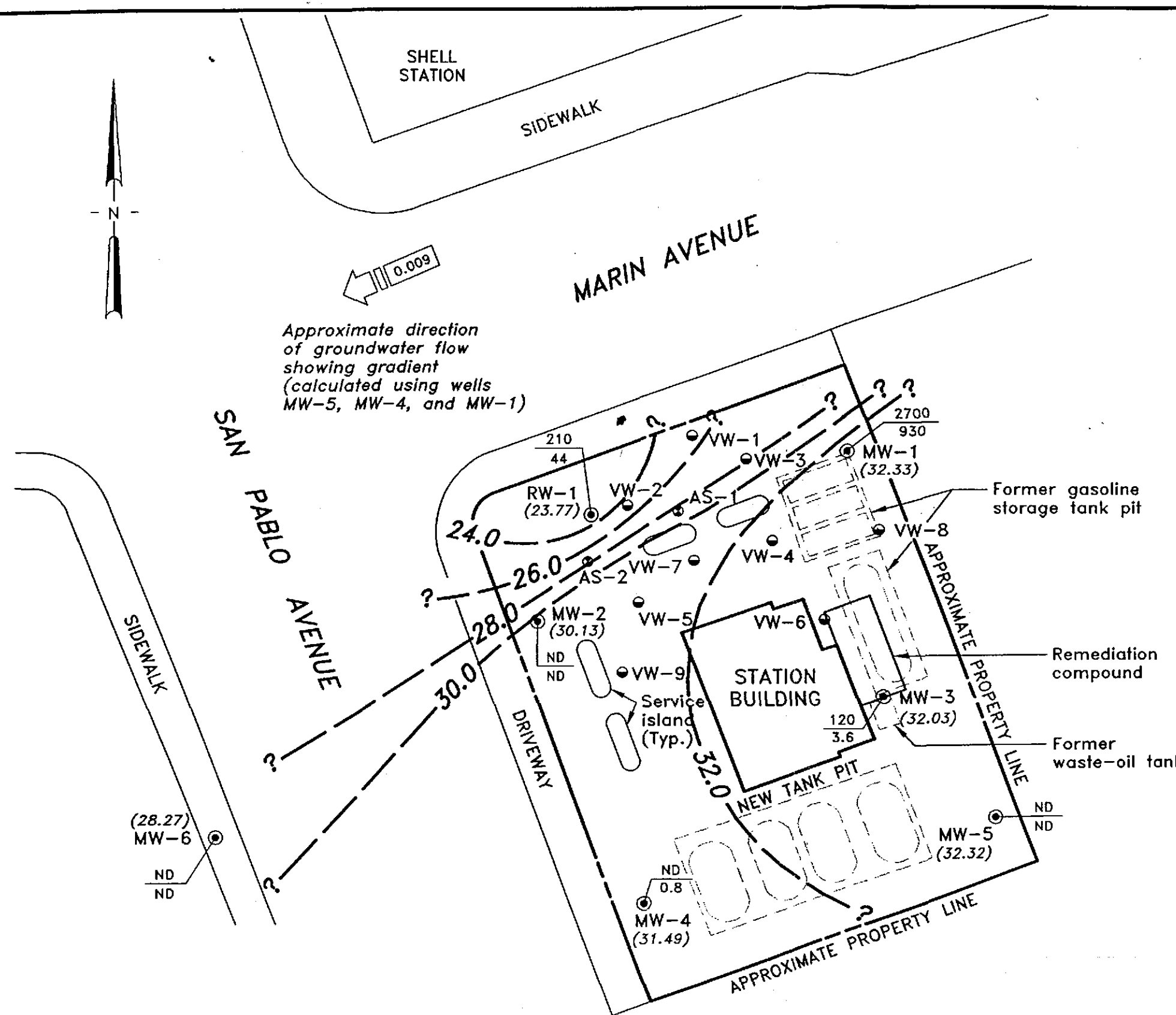
Date: 06-10-96

| Well Designations                      | Date | Floating Product Recovered<br>gallons |
|--|------|---------------------------------------|
| RW-1                                   | 1992 | 22.3                                  |
| RW-1                                   | 1993 | 1.0                                   |
| RW-1                                   | 1994 | 0.0                                   |
| AS-1, AS-2, RW-1, VW-1, VW-2, and VW-7 | 1995 | 4.6                                   |
| VW-7                                   | 1996 | 0.003                                 |
| 1992 to 1996 Total:                    |      | 27.9                                  |



0.009

Approximate direction of groundwater flow showing gradient (calculated using wells MW-5, MW-4, and MW-1)



**EXPLANATION**

- ⊙ Groundwater monitoring well
- Vapor extraction well
- ⊙ Air sparge well
- (32.33) Groundwater elevation (Ft.-MSL); measured 2/27/96
- 28.0 — Groundwater elevation contour (Ft.-MSL)
- 2700 / 930 TPHG concentration in groundwater (ug/L); sampled 2/27/96
- 2700 / 930 Benzene concentration in groundwater (ug/L); sampled 2/27/96
- ND Not detected at or above the method reporting limit for TPHG (50 ug/L) or benzene (0.5 ug/L)

805-123.003  
 08/96  
 0394



SCALE: 0 30 60 FEET

ARCO PRODUCTS COMPANY  
 SERVICE STATION 2035, 1001 SAN PABLO AVENUE  
 QUARTERLY GROUNDWATER MONITORING  
 ALBANY, CALIFORNIA  
 GROUNDWATER DATA  
 FIRST QUARTER 1996

FIGURE NO.  
**3**  
 PROJECT NO.  
 805-123.003