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

#3858

Date September 29, 1995
Project 0805-123.02

To:

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

We are enclosing:

Copies	Description
1	Second quarter 1995 groundwater monitoring and remediation system performance evaluation report, ARCO service station 2035, Albany, California

For your:			Sent by:	
	X	Use		Regular Mail
		Approval		Standard Air
		Review		Courier
		Information	X	Other: Cert. Mail

Comments:

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

David Larsen
Project Coordinator

cc: Kevin Graves, RWQCB - SFBR
Michael Whelan, ARCO Products Company
David Larsen, EMCON
File

ARCO Products Company
Environmental Engineering
2155 South Bascom Avenue, Suite 202
Campbell, California 95008

Date: September 29, 1995

Re: ARCO Station # 2035 • 1001 San Pablo Avenue • Albany, CA
Second Quarter 1995 Groundwater Monitoring and
Remediation System Performance Evaluation Report

" 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:

Michael R. Whelan
Environmental Engineer

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

September 21, 1995
Project 20805-123.002

Mr. Michael Whelan
ARCO Products Company
2155 South Bascom Avenue, Suite 202
Campbell, California 95008

Re: Second quarter 1995 groundwater monitoring program and remediation system performance evaluation report, ARCO service station 2035, Albany, California

Dear Mr. Whelan:

This letter presents the results of the second quarter 1995 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 interim soil-vapor extraction (SVE) and groundwater extraction remediation systems at the site are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

BACKGROUND

Five on-site monitoring wells (MW-1 through MW-5), one off-site monitoring well (MW-6), one on-site groundwater extraction well (RW-1), nine on-site vapor extraction wells (VW-1 through VW-9), and two dual air-sparge/vapor extraction wells (AS-1 and AS-2) were installed as part of a comprehensive site assessment conducted at this site from October 1991 through August 1993 (Figure 2). Please refer to *Report of Findings, Air Sparge Pilot Test at ARCO Station 2035, 1001 San Pablo Avenue, Albany, California* (RESNA Industries [RESNA], April 1994), and *Fourth Quarter 1994 Groundwater Monitoring Program Results, ARCO Service Station 2035, Albany, California* (EMCON, May 1995) for more details.

MONITORING PROGRAM FIELD PROCEDURES

A program of quarterly groundwater monitoring was initiated during the fourth quarter of 1991 to provide information concerning water quality, flow direction, and gradient, and to meet ACHCSA and Regional Water Quality Control Board (RWQCB) requirements

regarding underground fuel tank investigations. Water levels are measured quarterly in wells MW-1 through MW-6 and RW-1. Wells MW-5 and MW-6 are sampled annually, during the first quarter of the year. Well MW-2 is sampled semiannually, during the first and third quarters. Wells MW-1, MW-3, MW-4, and RW-1 are sampled quarterly.

EMCON performed the second quarter 1995 groundwater monitoring event on May 24, 1995. Field work included (1) measuring depths to groundwater and subjectively analyzing groundwater for the presence of floating product in wells MW-1 through MW-6 and RW-1, (2) purging and subsequently sampling groundwater monitoring wells MW-1, MW-3, and MW-4 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. Well RW-1 contained 0.03 foot of floating product on May 24, 1995; therefore, the well was not sampled during second quarter 1995. Copies of all field data sheets from the second quarter 1995 groundwater monitoring event are included in Appendix A.

ANALYTICAL PROCEDURES

Groundwater samples collected during the second quarter 1995 monitoring event were analyzed for total petroleum hydrocarbons as gasoline (TPHG), and benzene, toluene, ethylbenzene, and total xylenes (BTEX). Groundwater samples were prepared for analysis by U.S. Environmental Protection Agency (USEPA) method 5030 (purge and trap). Groundwater was analyzed for TPHG by the methods accepted by the Department of Toxic Substances Control, California Environmental Protection Agency (Cal-EPA), and referenced in *Leaking Underground Fuel Tank* (LUFT) *Field Manual* (State Water Resources Control Board, October 1989). Samples were analyzed for BTEX by USEPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (EPA SW-846, November 1986, third edition). Groundwater samples collected from well MW-3 were also analyzed for total recoverable petroleum hydrocarbons (TRPH) by USEPA method 418.1. These methods are recommended in *Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank* Sites (August 10, 1990) for analysis of samples from petroleum-hydrocarbon-impacted sites.

MONITORING PROGRAM RESULTS

Results of the second quarter 1995 groundwater monitoring event are summarized in Table 1 and illustrated in Figure 3. Historical groundwater elevation data, including top-of-casing elevations, depth-to-water measurements, calculated groundwater elevations,

floating-product thickness measurements, and groundwater flow direction and gradient data, are summarized in Table 2. Table 3 summarizes historical laboratory data for TPHG and BTEX analyses. Additional historical laboratory data for well MW-3 are summarized in Table 4. Historical floating-product recovery data for well RW-1 are summarized in Table 5. Copies of the second quarter 1995 analytical results and chain-of-custody documentation are included in Appendix B.

Groundwater elevation data collected on May 24, 1995, indicate that groundwater beneath the site flows west-northwest with an approximate hydraulic gradient of 0.013 foot per foot (calculated using data from wells MW-4, MW-5, and RW-1). Figure 3 illustrates groundwater contours and analytical data for the second quarter of 1995.

Groundwater samples collected from wells MW-3 and MW-4 did not contain detectable concentrations of TPHG or BTEX. Groundwater samples from well MW-1 contained 4,800 micrograms per liter (µg/L) of TPHG, and 2,000 µg/L of benzene. Groundwater samples from well MW-3 did not contain detectable concentrations of TRPH. Well RW-1 contained 0.03 foot of floating product on May 24, 1995, and therefore the well was not sampled during second quarter 1995.

REMEDIATION SYSTEM PERFORMANCE EVALUATION

Floating-Product Recovery

Floating product was measured and recovered periodically (initially monthly, biweekly thereafter) by RESNA using a skimmer installed in recovery well RW-1. Approximately 22.3 gallons and 1.0 gallon of floating product were recovered by RESNA in 1992 and 1993, respectively. Before startup of the SVE system on December 7, 1993, the floating-product recovery skimmer was removed from well RW-1. ARCO began manual recovery of floating product from wells AS-1, AS-2, and RW-1 in February 1995. EMCON recovered approximately 0.1 gallon of floating product from these wells during second quarter 1995. The cumulative total of floating product recovered at this site is approximately 27.3 gallons (Table 5).

Soil-Vapor Extraction System

Description. RESNA completed construction of the SVE system in November 1993. The on-site SVE system extracts hydrocarbon vapor from subsurface soils by applying a

vacuum to 12 vapor extraction wells (VW-1 through VW-9, RW-1, AS-1, and AS-2) and an aeration tank in the remediation compound (installed for the treatment of hydrocarbon-impacted groundwater), using a 5-horsepower (hp) positive-displacement blower. Extracted hydrocarbon vapor from the wells is directed via subgrade remediation piping to an off-gas abatement unit in an enclosed treatment compound. The trailer-mounted off-gas abatement unit for treating the extracted vapor is a ThermTech, Inc., Model VAC 10 oxidizer unit that can operate in the thermal or catalytic oxidation mode. The unit has a nominal operating capacity of 100 standard cubic feet per minute (scfm). Treated off-gas from the unit is discharged to the atmosphere via a 12-inch square stack 15 feet above grade.

The system was operated in the thermal mode by RESNA from December 7, 1993, to January 24, 1994. RESNA manually shut down the SVE system on January 24, 1994, because rising groundwater levels at the site caused submergence of the well screen in the vapor extraction wells. ARCO transferred the site from RESNA to EMCON in November 1994. EMCON restarted the SVE system in the thermal mode on February 8, 1995.

Monitoring. The operating temperature of the oxidizer unit is measured and recorded continuously during system operation, consistent with the conditions stipulated in the site-specific air permit issued by the Bay Area Air Quality Management District (BAAQMD). Air samples are collected biweekly at three sampling locations, (1) effluent from the well field and before fresh-air dilution (sample port I-1); (2) influent to the oxidizer, after fresh-air dilution (sample port I-2); and (3) effluent from the oxidizer unit at the stack (sample port E-1). Air samples collected from sample ports I-1, I-2, and E-1 are submitted to a state-certified laboratory for chemical analysis. The samples are analyzed for total volatile hydrocarbons as gasoline (TVHG) and BTEX by USEPA methods 8015 and 8020, respectively.

In addition to the parameters described above, the SVE system is generally monitored monthly for (1) TVHG concentrations in extracted vapor from each vapor extraction well with a flame-ionization detector (FID) or a photo-ionization detector (PID), (2) applied and induced vacuum on vapor extraction wells, (3) depths to water in extraction wells, and (4) extracted vapor flow rate from individual wells and from the combined well field. Routine maintenance of the SVE and off-gas abatement systems is also performed during these visits.

Copies of all field monitoring data sheets for the SVE system are provided in Appendix C.

Operation. The SVE system was not operational during a portion of the second quarter 1995 because heavy precipitation in February and March 1995 caused resubmergence of the screen in the vapor extraction wells, resulting in minimal flow from the wells. In addition, the groundwater remediation system at the site was shut down from March 3 to June 20, 1995, because the February 1995 sampling results indicated that arsenic levels in treated groundwater exceeded the permitted discharge limit. Because of the shutdown, there was no available flow from the aeration tank to the SVE system (the flow rate from the aeration tank to the abatement unit is approximately 30 to 35 scfm).

After receiving the requested variance for an increase in the discharge limit for arsenic in treated effluent from the groundwater remediation system and observing available screen in the vapor extraction wells, the SVE system was restarted on June 20, 1995, in the catalytic mode. The SVE system operated for a total of 2.3 days during the 89-day reporting period for the second quarter 1995 from March 31 to June 28, 1995 (2.6 percent operational). Table 6 summarizes SVE system operation and performance data from startup on December 7, 1993, to the end of the second quarter 1995 reporting period.

Operational Status of Wells. Table 7 summarizes the operating status of the individual vapor extraction wells since startup of the SVE system on December 7, 1993, to the end of the second quarter 1995 reporting period. To maximize hydrocarbon removal rates, vapor extraction wells were typically brought on-line or closed depending on the TVHG concentrations of the vapor extracted from the well.

Air Sample Results. Copies of the laboratory analytical results for all air samples collected during the second quarter 1995 are provided in Appendix D.

Destruction Efficiency and Emission Rates. During the second quarter 1995 reporting period, the destruction efficiency of the off-gas abatement unit was in compliance with the air permit requirements for applicable ranges of influent TVHG concentrations. Emission rates for benzene from the off-gas abatement unit were below the 0.093 pound per day limit specified in the BAAQMD permit.

Hydrocarbon Removal Rates. Table 6 summarizes hydrocarbon removal rates, pounds of hydrocarbons removed this period, and cumulative pounds of hydrocarbons removed from SVE system startup on December 7, 1993, to the end of the second quarter 1995 reporting period. Figure 4 depicts historical hydrocarbon removal rates since system

startup. The calculations and assumptions made for estimating hydrocarbon removal rates for the SVE system are explained in the footnotes for Table 6.

Approximately 11.4 pounds (1.8 gallons) of hydrocarbons were recovered by the SVE and groundwater extraction systems during the 89-day reporting period from March 31 to June 28, 1995. A total of approximately 402.1 pounds (64.9 gallons) of hydrocarbons was recovered from the site from system startup on December 7, 1993, to the end of the second quarter 1995 reporting period.

Air-Sparge System

RESNA completed construction of an air-sparge (AS) system at the site in November 1993 in conjunction with the SVE system construction. The AS system consists of subgrade piping that directs compressed air from a 5-hp rotary-scroll oilless air compressor at the remediation compound into two AS wells, AS-1 and AS-2. The AS system has not been activated as yet, and therefore is not discussed in this report.

Groundwater Remediation System

Description. In November 1993, RESNA completed construction of a groundwater extraction and treatment system. The groundwater extraction and treatment system consists of a groundwater depression/extraction pump to extract groundwater from recovery well RW-1. Extracted groundwater from RW-1 is routed via subgrade piping to an above-grade 150-gallon diffused aeration tank installed in the treatment compound. Dissolved hydrocarbons in extracted groundwater are volatilized (stripped) in the aeration tank by a diffused air stream, which flows counter-current to the flow of extracted groundwater into the tank using the 5-hp vapor extraction blower installed on the VAC 10 oxidizer unit (off-gas abatement unit). Off-gas from the aeration tank is routed to the oxidizer unit for abatement. The aerated effluent water from the aeration tank is pumped through two 200-pound liquid-phase activated carbon canisters in series. The treated groundwater from the carbon canisters is then discharged to an on-site sewer lateral that discharges to the City of Albany sanitary sewer under a wastewater discharge permit issued by the East Bay Municipal Utility District (EBMUD).

Initial startup of the groundwater extraction and treatment system was conducted by EMCON on February 8, 1995.

Monitoring and Sampling. The groundwater extraction and treatment system is generally monitored monthly for (1) depth to water in the extraction well (RW-1); (2) flow rate of extracted groundwater; (3) flow totalizer readings after the second carbon canister, before discharge to the sewer; and (4) pH and temperature in effluent from the carbon canisters, before discharge to the sewer. Routine maintenance of the groundwater extraction and treatment system is also performed during these visits.

EMCON conducted initial startup of the groundwater extraction and treatment system on February 8, 1995. Consistent with the conditions specified in the wastewater discharge permit issued for the system by EBMUD, the system was sampled weekly during the first month of operation. After the first month of operation, water samples have been collected monthly at four sampling locations (1) influent to the aeration tank (sample port I-1 or A); (2) effluent from the aeration tank and influent to the first carbon canister (sample port I-2); (3) influent to the second canister and effluent from the first canister (sample port I-3 or D); and finally, (4) effluent from the second canister, before discharge to the sewer (sample port E-1 or E). The collected water samples are submitted to a state-certified laboratory for chemical analysis. The samples are analyzed for TPHG and BTEX by USEPA methods 5030 and 8020, respectively.

Copies of all field monitoring data sheets for the groundwater remediation system are provided in Appendix E.

Operation. The groundwater remediation system was manually shut off on March 3, 1995, and remained off-line during most of the second quarter 1995 because arsenic levels in treated groundwater exceeded the permitted discharge limit. After receiving the requested variance from EBMUD for an increase in the discharge limit for arsenic in treated effluent, the groundwater remediation system was restarted on June 20, 1995. Table 8 summarizes SVE system operation and performance data from startup on February 8, 1995, to the end of the second quarter 1995 reporting period.

Water Sample Results. Copies of the laboratory analytical results for all water samples collected for the groundwater extraction and treatment system during the second quarter 1995 are provided in Appendix E. Figure 5 depicts changes in TVHG and benzene concentrations over time, from initial startup of the SVE system on February 8, 1995, to the end of the second quarter 1995 reporting period. Results of groundwater remediation system sampling during the second quarter 1995 reporting period indicate that the groundwater remediation system has operated in compliance with the permit conditions and discharge limits specified in the wastewater discharge permit issued by EBMUD.

Table 8 summarizes groundwater remediation system sampling results from system startup to the end of the second quarter 1995 reporting period.

Hydrocarbon Removal Rates. Table 9 summarizes hydrocarbon removal rates, pounds of hydrocarbons removed this period, and cumulative pounds of hydrocarbons removed, from SVE system startup on February 8, 1995, to the end of the second quarter 1995 reporting period. Figure 6 depicts historical hydrocarbon removal rates since system startup. The calculations and assumptions made for estimating hydrocarbon removal rates for the SVE system are explained in the footnotes for Table 8.

A total of approximately 1.6 pounds (0.3 gallon) of dissolved-phase hydrocarbons was recovered from the site by the groundwater extraction system during the second quarter 1995 reporting period. A total of approximately 6.3 pounds (1.0 gallon) of hydrocarbons was recovered from the site from system startup on February 8 to the end of the second quarter 1995 reporting period.

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.

SITE STATUS UPDATE

This update reports site activities performed during the second quarter of 1995, and the anticipated site activities for the third quarter of 1995.

Second Quarter 1995 Activities

- Prepared and submitted the quarterly groundwater monitoring report for fourth quarter 1994.
- Prepared and submitted the quarterly groundwater monitoring and remediation system performance evaluation report for first quarter 1995.

- Performed quarterly groundwater monitoring for second quarter 1995.
- Prepared and submitted the semiannual groundwater remediation system discharge report to EBMUD.
- Collected groundwater samples for analysis of arsenic to determine the background level of arsenic in groundwater at the site.
- Submitted analytical results for arsenic in groundwater to EBMUD and requested a higher discharge limit for arsenic in treated groundwater.
- Received a higher discharge limit for arsenic in treated groundwater from EBMUD.
- Reactivated the SVE and groundwater extraction systems.

Work Anticipated for Third Quarter 1995

- Prepare and submit the quarterly groundwater monitoring and remediation system performance evaluation report for second quarter 1995.
- Perform quarterly groundwater monitoring for second quarter 1995.

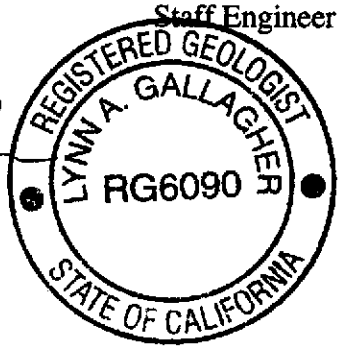
Please call if you have questions.

Sincerely,

EMCON

David Larsen
Project Coordinator

Sailaja Yelamanchili
Staff Engineer



Lynn A. Gallagher, R.G. 6090
Project Geologist

Attachments:

Table 1 -	Groundwater Monitoring Data, Second Quarter 1995
Table 2 -	Historical Groundwater Elevation Data
Table 3 -	Historical Groundwater Analytical Data (TPHG and BTEX)
Table 4 -	Historical Groundwater Analytical Data (Well MW-3)
Table 5 -	Approximate Cumulative Floating Product Recovered (Well RW-1)
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, Second Quarter 1995
Figure 4 -	Historical SVE System Hydrocarbon Removal Rates
Figure 5 -	Historical Groundwater Treatment System Influent TPHG and Benzene Concentrations
Figure 6 -	Historical Groundwater Treatment System Hydrocarbon Removal Rates
Appendix A -	Field Data Sheets, Second Quarter 1995 Groundwater Monitoring Event
Appendix B -	Analytical Results and Chain-of-Custody Documentation, Second Quarter 1995 Groundwater Monitoring Event
Appendix C -	Field Data Sheets, SVE System Operation and Maintenance Visits, Second Quarter 1995
Appendix D -	Analytical Results and Chain-of-Custody Documentation, SVE System Air Samples, Second Quarter 1995
Appendix E -	Field Data Sheets, Groundwater Treatment System, Operation and Maintenance Visits, Second Quarter 1995
Appendix F -	Analytical Results and Chain-of-Custody Documentation, Groundwater Treatment System, Second Quarter 1995

cc: Barney Chan ACHCSA
Kevin Graves, RWQCB-SFBR

Table 1
Groundwater Monitoring Data
Second Quarter 1995

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

Date: 09-20-95
Project Number: 0805-123.02

Well Desig-nation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
MW-1	05-24-95	41.41	9.37	32.04	ND	WNW	0.013	05-24-95	4800	2000	<20	52	<20
MW-2	05-24-95	40.38	10.02	30.36	ND	WNW	0.013	05-24-95	Not sampled: not scheduled for chemical analysis				
MW-3	05-24-95	41.44	9.53	31.91	ND	WNW	0.013	05-24-95	<50	<0.5	<0.5	<0.5	<0.5
MW-4	05-24-95	40.33	9.23	31.10	ND	WNW	0.013	05-24-95	<50	<0.5	<0.5	<0.5	<0.5
MW-5	05-24-95	41.84	9.61	32.23	ND	WNW	0.013	05-24-95	Not sampled: not scheduled for chemical analysis				
MW-6	05-24-95	40.13	12.45	27.68	ND	WNW	0.013	05-24-95	Not sampled: not scheduled for chemical analysis				
RW-1	05-24-95	40.33	9.75	** 30.60	0.03	WNW	0.013	05-24-95	Not sampled: well contained floating product				

TOC: top of casing
ft-MSL: elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter
ND: none detected
WNW: west-northwest
**: [corrected elevation (Z')] = Z + (h * 0.73); where Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

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Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation	Depth to Water	Ground-Water Elevation	Floating Product Thickness	Ground-Water Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
MW-1	10-29-91	41.41	11.86	29.55	ND	NR	NR
MW-1	11-07-91	41.41	10.94	30.47	ND	NR	NR
MW-1	11-14-91	41.41	10.97	30.44	ND	NR	NR
MW-1	01-19-92	41.41	10.06	31.35	ND	NR	NR
MW-1	02-19-92	41.41	8.65	32.76	ND	NR	NR
MW-1	03-19-92	41.41	8.33	33.08	ND	NR	NR
MW-1	04-21-92	41.41	9.32	32.09	ND	NR	NR
MW-1	05-12-92	41.41	9.82	31.59	ND	NR	NR
MW-1	06-12-92	41.41	10.50	30.91	ND	NR	NR
MW-1	07-15-92	41.41	10.69	30.72	ND	NR	NR
MW-1	08-07-92	41.41	10.53	30.88	ND	NR	NR
MW-1	09-08-92	41.41	11.04	30.37	ND	NR	NR
MW-1	10-26-92	41.41	11.24	30.17	ND	NR	NR
MW-1	11-23-92	41.41	10.90	30.51	ND	NR	NR
MW-1	12-16-92	41.41	9.40	32.01	ND	NR	NR
MW-1	01-13-93	41.41	7.73	33.68	ND	NR	NR
MW-1	02-22-93	41.41	7.56	33.85	ND	NR	NR
MW-1	03-25-93	41.41	8.48	32.93	ND	NR	NR
MW-1	04-13-93	41.41	8.91	32.50	ND	NR	NR
MW-1	05-22-93	41.41	9.68	31.73	ND	NR	NR
MW-1	06-17-93	41.41	9.68	31.73	ND	NR	NR
MW-1	07-27-93	41.41	10.09	31.32	ND	NR	NR
MW-1	08-24-93	41.41	10.51	30.90	ND	NR	NR
MW-1	12-08-93	41.41	10.39	31.02	ND	NR	NR
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

Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-2	10-29-91	40.38	11.10	29.28	ND	NR	NR
MW-2	11-07-91	40.38	11.20	29.18	ND	NR	NR
MW-2	11-14-91	40.38	11.21	29.17	ND	NR	NR
MW-2	01-19-92	40.38	10.44	29.94	ND	NR	NR
MW-2	02-19-92	40.38	8.70	31.68	ND	NR	NR
MW-2	03-19-92	40.38	8.84	31.54	ND	NR	NR
MW-2	04-21-92	40.38	9.80	30.58	ND	NR	NR
MW-2	05-12-92	40.38	10.29	30.09	ND	NR	NR
MW-2	06-12-92	40.38	10.95	29.43	ND	NR	NR
MW-2	07-15-92	40.38	11.15	29.23	ND	NR	NR
MW-2	08-07-92	40.38	11.01	29.37	ND	NR	NR
MW-2	09-08-92	40.38	11.41	28.97	ND	NR	NR
MW-2	10-26-92	40.38	11.60	28.78	ND	NR	NR
MW-2	11-23-92	40.38	7.31	33.07	ND	NR	NR
MW-2	12-16-92	40.38	9.82	30.56	ND	NR	NR
MW-2	01-13-93	40.38	8.25	32.13	ND	NR	NR
MW-2	02-22-93	40.38	8.25	32.13	ND	NR	NR
MW-2	03-25-93	40.38	8.82	31.56	ND	NR	NR
MW-2	04-13-93	40.38	9.30	31.08	ND	NR	NR
MW-2	05-22-93	40.38	10.57	29.81	ND	NR	NR
MW-2	06-17-93	40.38	10.25	30.13	ND	NR	NR
MW-2	07-27-93	40.38	10.48	29.90	ND	NR	NR
MW-2	08-24-93	40.38	10.82	29.56	ND	NR	NR
MW-2	12-08-93	40.38	10.68	29.70	ND	NR	NR
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

Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-3	10-29-91	41.44	11.62	29.82	ND	NR	NR
MW-3	11-07-91	41.44	11.52	29.92	ND	NR	NR
MW-3	11-14-91	41.44	11.50	29.94	ND	NR	NR
MW-3	01-19-92	41.44	10.56	30.88	ND	NR	NR
MW-3	02-19-92	41.44	9.52	31.92	ND	NR	NR
MW-3	03-19-92	41.44	9.01	32.43	ND	NR	NR
MW-3	04-21-92	41.44	9.70	31.74	ND	NR	NR
MW-3	05-12-92	41.44	10.29	31.15	ND	NR	NR
MW-3	06-12-92	41.44	11.26	30.18	ND	NR	NR
MW-3	07-15-92	41.44	11.28	30.16	ND	NR	NR
MW-3	08-07-92	41.44	11.15	30.29	ND	NR	NR
MW-3	09-08-92	41.44	11.70	29.74	ND	NR	NR
MW-3	10-26-92	41.44	12.15	29.29	ND	NR	NR
MW-3	11-23-92	41.44	12.55	28.89	ND	NR	NR
MW-3	12-16-92	41.44	10.15	31.29	ND	NR	NR
MW-3	01-13-93	41.44	9.12	32.32	ND	NR	NR
MW-3	02-22-93	41.44	8.18	33.26	ND	NR	NR
MW-3	03-25-93	41.44	8.57	32.87	ND	NR	NR
MW-3	04-13-93	41.44	9.55	31.89	ND	NR	NR
MW-3	05-22-93	41.44	10.56	30.88	ND	NR	NR
MW-3	06-17-93	41.44	10.41	31.03	ND	NR	NR
MW-3	07-27-93	41.44	10.53	30.91	ND	NR	NR
MW-3	08-24-93	41.44	10.86	30.58	ND	NR	NR
MW-3	12-08-93	41.44	10.91	30.53	ND	NR	NR
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

Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-4	01-13-93	40.33	8.05	32.28	ND	NR	NR
MW-4	02-22-93	40.33	7.58	32.75	ND	NR	NR
MW-4	03-25-93	40.33	8.27	32.06	ND	NR	NR
MW-4	04-13-93	40.33	8.54	31.79	ND	NR	NR
MW-4	05-22-93	40.33	9.52	30.81	ND	NR	NR
MW-4	06-17-93	40.33	9.53	30.80	ND	NR	NR
MW-4	07-27-93	40.33	10.14	30.19	ND	NR	NR
MW-4	08-24-93	40.33	10.42	29.91	ND	NR	NR
MW-4	12-08-93	40.33	10.31	30.02	ND	NR	NR
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-5	01-13-93	41.84	8.22	33.62	ND	NR	NR
MW-5	02-22-93	41.84	7.92	33.92	ND	NR	NR
MW-5	03-25-93	41.84	8.67	33.17	ND	NR	NR
MW-5	04-13-93	41.84	9.18	32.66	ND	NR	NR
MW-5	05-22-93	41.84	10.12	31.72	ND	NR	NR
MW-5	06-17-93	41.84	10.03	31.81	ND	NR	NR
MW-5	07-27-93	41.84	10.74	31.10	ND	NR	NR
MW-5	08-24-93	41.84	11.02	30.82	ND	NR	NR
MW-5	12-08-93	41.84	10.92	30.92	ND	NR	NR
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

Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
MW-6	01-13-93	40.13	9.84	30.29	ND	NR	NR
MW-6	02-22-93	40.13	9.94	30.19	ND	NR	NR
MW-6	03-25-93	40.13	10.68	29.45	ND	NR	NR
MW-6	04-13-93	40.13	11.12	29.01	ND	NR	NR
MW-6	05-22-93	40.13	11.74	28.39	ND	NR	NR
MW-6	06-17-93	40.13	11.75	28.38	ND	NR	NR
MW-6	07-27-93	40.13	12.20	27.93	ND	NR	NR
MW-6	08-24-93	40.13	12.41	27.72	ND	NR	NR
MW-6	12-08-93	40.13	10.11	30.02	ND	NR	NR
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

Table 2
Historical Groundwater Elevation Data

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Level Field Date	TOC Elevation ft-MSL	Depth to Water feet	Ground-Water Elevation ft-MSL	Floating Product Thickness feet	Ground-Water Flow Direction MWN	Hydraulic Gradient foot/foot
RW-1	10-29-91	40.33	10.85	29.48	Sheen	NR	NR
RW-1	11-07-91	40.33	11.97	28.36	0.01	NR	NR
RW-1	11-14-91	40.33	11.03	29.30	0.01	NR	NR
RW-1	01-19-92	40.33	^10.22	^30.11	3.26	NR	NR
RW-1	02-19-92	40.33	^8.49	^31.84	2.14	NR	NR
RW-1	03-19-92	40.33	^8.50	^31.83	0.50	NR	NR
RW-1	04-21-92	40.33	^9.68	^30.65	0.03	NR	NR
RW-1	05-12-92	40.33	10.47	29.86	NR	NR	NR
RW-1	06-12-92	40.33	11.41	28.92	NR	NR	NR
RW-1	07-15-92	40.33	11.35	28.98	ND	NR	NR
RW-1	08-07-92	40.33	^10.80	^29.53	0.02	NR	NR
RW-1	09-08-92	40.33	^10.80	^29.53	0.62	NR	NR
RW-1	10-26-92	40.33	^11.42	^28.91	0.04	NR	NR
RW-1	11-23-92	40.33	10.94	29.39	Sheen	NR	NR
RW-1	12-16-92	40.33	^9.78	^30.55	0.51	NR	NR
RW-1	01-13-93	40.33	8.35	31.98	Skimmer	NR	NR
RW-1	02-22-93	40.33	^7.94	^32.39	0.01	NR	NR
RW-1	03-25-93	40.33	8.81	31.52	ND	NR	NR
RW-1	04-13-93	40.33	^9.67	NR	NR	NR	NR
RW-1	05-22-93	40.33	10.04	30.29	Sheen	NR	NR
RW-1	06-17-93	40.33	^10.26	^30.07	0.01	NR	NR
RW-1	07-27-93	40.33	10.58	29.75	Sheen	NR	NR
RW-1	08-24-93	40.33	^10.80	^29.53	0.05	NR	NR
RW-1	12-08-93	40.33	^10.46	^29.87	0.30	NR	NR
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

TOC: top of casing
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
^ : groundwater elevation (GWE) and depth to water (DTW) adjusted to include 80 percent of the floating product thickness (FPT):
[GWE = (TOC - DTW) + (FPT x 0.8)]
**: [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
(TPHG and BTEX)

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
MW-1	10-29-91	620	76	69	15	60
MW-1	03-19-92	6500	2600	89	42	290
MW-1	06-12-92	2900	1100	2.5	21	15
MW-1	09-08-92	820	350	<5	<5	<5
MW-1	10-26-92	190	68	<0.5	0.6	<0.5
MW-1	01-13-93	430	130	5.3	5	9
MW-1	04-13-93	5300	2100	<20	63	36
MW-1	08-24-93	630	230	<2.5	3.1	3.3
MW-1	12-08-93	81	20	<0.5	0.9	<0.5
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-2	10-29-91	<60	2.4	4.6	0.48	2.3
MW-2	03-19-92	<50	6.8	0.9	<0.5	1.1
MW-2	06-12-92	<50	<0.5	<0.5	<0.5	<0.5
MW-2	09-08-92	<50	<0.5	<0.5	<0.5	<0.5
MW-2	10-26-92	<50	<0.5	<0.5	<0.5	<0.5
MW-2	01-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-2	04-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-2	08-24-93	<50	<0.5	<0.5	<0.5	<0.5
MW-2	12-08-93	<50	<0.5	<0.5	<0.5	<0.5
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	Not sampled: not scheduled for chemical analysis				

Table 3
Historical Groundwater Analytical Data
(TPHG and BTEX)

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
MW-3	10-29-91	32	2.1	2.8	0.35	1.8
MW-3	03-19-92	2100	780	8.8	16	58
MW-3	06-12-92	720	210	<2.5	23	4
MW-3	09-08-92	<50	5.3	<0.5	<0.5	<0.5
MW-3	10-26-92	<50	0.6	<0.5	<0.5	<0.5
MW-3	01-13-93	<50	1.1	<0.5	<0.5	<0.5
MW-3	04-13-93	68	13	<0.5	1.6	1.1
MW-3	08-24-93	<50	<0.5	<0.5	<0.5	<0.5
MW-3	12-08-93	<50	<0.5	<0.5	<0.5	<0.5
MW-3	02-01-94	<50	1.9	<0.5	2.1	<0.5
MW-3	04-26-94	<50	1.1	<0.5	2.4	0.9
MW-3	07-29-94	<50	<0.5	<0.5	<0.5	<0.5
MW-3	11-15-94	<50	<0.5	<0.5	<0.5	<0.5
MW-3	03-24-95	51	0.8	<0.5	2.4	<0.5
MW-3	05-24-95	<50	<0.5	<0.5	<0.5	<0.5
MW-4	01-13-93	<50	<0.5	1.3	<0.5	1.6
MW-4	04-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	08-24-93	<50	<0.5	<0.5	<0.5	<0.5
MW-4	12-08-93	<50	<0.5	<0.5	<0.5	<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

Table 3
Historical Groundwater Analytical Data
(TPHG and BTEX)

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
MW-5	01-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-5	04-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-5	08-24-93	<50	<0.5	<0.5	<0.5	<0.5
MW-5	12-08-93	<50	<0.5	<0.5	<0.5	<0.5
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	Not sampled: not scheduled for chemical analysis				
MW-6	01-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-6	04-13-93	<50	<0.5	<0.5	<0.5	<0.5
MW-6	08-24-93	<50	<0.5	<0.5	<0.5	<0.5
MW-6	12-08-93	<50	<0.5	<0.5	<0.5	<0.5
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	Not sampled: not scheduled for chemical analysis				
RW-1	10-29-91	Not sampled: well contained floating product				
RW-1	03-19-92	Not sampled: well contained floating product				
RW-1	06-12-92	Not sampled: well contained floating product				
RW-1	09-08-92	Not sampled: well contained floating product				
RW-1	10-23-92	Not sampled: well contained floating product				
RW-1	01-13-93	Not sampled: skimmer contained floating product				
RW-1	04-13-93	Not sampled: well contained floating product				
RW-1	08-24-93	Not sampled: well contained floating product				
RW-1	12-08-93	Not sampled: well contained floating product				
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				

TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter

Table 4
Historical Groundwater Analytical Data
(Additional Parameters)

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Sample Field Date	TPHD µg/L	TOG or TRPH µg/L	VOCs µg/L	BNAs µg/L	PCBs µg/L	Cadmium by EPA 6010 µg/L	Chromium by EPA 6010 µg/L	Lead by EPA 7421 µg/L	Zinc by EPA 6010 µg/L	Nickel by EPA 6010 µg/L
MW-3	10-29-91	NA	<5000(a)	ND(e)	NA	NA	<10	<10	<5	45	<50
MW-3	03-19-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	06-12-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	09-08-92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	10-26-92	<50	600(b), 600(c)	ND(f)	NA	NA	NA	NA	NA	NA	NA
MW-3	12-01-92	NA	NA	NA	ND(g)	ND(h)	NA	NA	NA	NA	NA
MW-3	01-13-93	NA	780(b), 1100(c)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	04-13-93	NA	<500(b), <500(c)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	08-24-93	NA	<500(b), <500(c)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	12-08-93	NA	900(b), 500(c)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	02-01-94	NA	<500(b), <500(c)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	04-26-94	NA	<600(d)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	07-29-94	NA	600(d)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	11-15-94	NA	<500(d)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	03-24-95	NA	<500(d)	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	05-24-95	NA	<500(d)	NA	NA	NA	NA	NA	NA	NA	NA

TPHD: total petroleum hydrocarbons as diesel by USEPA Method 3510/California DHS LUFT Method
TOG: total oil and grease analyzed using Standard Method: (a) 5520B&F or, (b) 5520C and (c) 5520F
TRPH: total recoverable petroleum hydrocarbons analyzed using: (d) USEPA Method 418.1
VOCs: volatile organic compounds analyzed using USEPA Method 624
BNAs: semi-volatile organic compounds analyzed using USEPA Method 3510/8270
PCBs: polychlorinated biphenyls analyzed using USEPA Method 3510/8080
µg/L: micrograms per liter
NA: not analyzed
ND: not detected (31 compounds tested for VOCs were nondetectable)
e: all 37 compounds analyzed were nondetectable except for toluene (3.0 ppb)
f: all 41 compounds analyzed were nondetectable
g: all 34 compounds analyzed were nondetectable
h: all 7 compounds analyzed were nondetectable

Table 5
Approximate Cumulative Floating Product Recovered

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Date	Floating Product Recovered gallons
RW-1	1992	22.3
RW-1	1993	1.0
RW-1	1994	0.0
AS-1, AS-2, and RW-1	1995	3.9
	1992 to 1995 Total:	27.2

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 06-28-95

Date Begin:		12-07-93	12-08-93	12-09-93	12-10-93	12-15-93
Date End:		12-08-93	12-09-93	12-10-93	12-15-93	12-16-93
Mode of Oxidation:		Therm-Ox (15)	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:		0.9	0.0	1.0	5.0	0.8
Days of Downtime:		0.1	0.9	0.0	0.0	0.0
Vapor Monitoring Concentrations						
Well Field Influent:	mg/m3 as gasoline (1)	10000	NA (16)	NA	NA	NA
	ppmv as gasoline (2) (3)	2800	NA	NA	NA	NA
	mg/m3 as benzene	540	NA	NA	NA	NA
	ppmv as benzene (4)	150	NA	NA	NA	NA
System Influent:	mg/m3 as gasoline	1400	NA	1400	1500	1800
	ppmv as gasoline	390	NA	390	410	500
	mg/m3 as benzene	38	NA	60	100	79
	ppmv as benzene	11	NA	17	28	22
System Effluent:	mg/m3 as gasoline	76	NA	130	21	NA
	ppmv as gasoline	21	NA	36	6	NA
	mg/m3 as benzene	2.3	NA	3.1	<0.05	NA
	ppmv as benzene	0.6	NA	0.9	<0.01	NA
Well Field Flow Rate, scfm (5):		10	0	10	5	45
System Influent Flow Rate, scfm:		100	0	100	87	100
Destruction Efficiency, percent (6):		94.6	NA	90.7	98.6	NA
Emission Rates (pounds per day) (7)						
Gasoline:		0.68	0.00	1.17	0.16	NA
Benzene:		0.02	0.00	0.03	<0.00	NA
Operating Hours This Period:		21.0	0.0	23.0	121.0	18.0
Operating Hours To Date:		21.0	21.0	44.0	165.0	183.0
SVE Pounds/ Hour Removal Rate, as gasoline (8) (9):		0.52	0.00	0.52	0.49	0.67
SVE Pounds Removed This Period, as gasoline (10):		11.004	0.000	12.052	59.100	12.126
GWE Pounds Removed This Period, as gasoline (11) (12):		0.000	0.000	0.000	0.000	0.000
Total Pounds Removed This Period, as gasoline (13):		11.004	0.000	12.052	59.100	12.126
Total Pounds Removed To Date, as gasoline:		11.0	11.0	23.1	82.2	94.3
Total Gallons Removed This Period, as gasoline (14):		1.8	0.0	1.9	9.5	2.0
Total Gallons Removed To Date, as gasoline:		1.8	1.8	3.7	13.3	15.2

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 06-28-95

Date Begin:		12-16-93	12-21-93	12-25-93	12-29-93	12-31-93
Date End:		12-21-93	12-25-93	12-29-93	12-31-93	01-07-94
Mode of Oxidation:		Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:		0.0	4.3	0.0	1.8	0.0
Days of Downtime:		5.0	0.0	4.0	0.0	6.6
Vapor Monitoring Concentrations						
Well Field Influent:	mg/m3 as gasoline	NA	NA	NA	NA	NA
	ppmv as gasoline	NA	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA	NA
System Influent:	mg/m3 as gasoline	NA	NA	NA	NA	NA
	ppmv as gasoline	NA	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA	NA
System Effluent:	mg/m3 as gasoline	NA	NA	NA	NA	NA
	ppmv as gasoline	NA	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA	NA
Well Field Flow Rate, scfm:		0	20	0	54	0
System Influent Flow Rate, scfm:		0	100	0	78	0
Destruction Efficiency, percent (6):		NA	NA	NA	NA	NA
Emission Rates (pounds per day) (7)						
Gasoline:		0.00	0.00	0.00	0.00	0.00
Benzene:		0.00	0.00	0.00	0.00	0.00
Operating Hours This Period:		0.0	104.0	0.0	43.0	0.0
Operating Hours To Date:		183.0	287.0	287.0	330.0	330.0
SVE Pounds/ Hour Removal Rate, as gasoline (9):		0.00	0.00	0.00	0.00	0.00
SVE Pounds Removed This Period, as gasoline (10):		0.000	0.000	0.000	0.000	0.000
GWE Pounds Removed This Period, as gasoline (12):		0.000	0.000	0.000	0.000	0.000
Total Pounds Removed This Period, as gasoline (13):		0.000	0.000	0.000	0.000	0.000
Total Pounds Removed To Date, as gasoline:		94.3	94.3	94.3	94.3	94.3
Total Gallons Removed This Period, as gasoline (14):		0.0	0.0	0.0	0.0	0.0
Total Gallons Removed To Date, as gasoline:		15.2	15.2	15.2	15.2	15.2

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 06-28-95

Date Begin:		01-07-94	01-12-94	01-24-94	03-31-94	12-31-94
Date End:		01-12-94	01-24-94	03-31-94	12-31-94	02-06-95
Mode of Oxidation:		Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:		5.1	11.9	0.0	0.0	0.4
Days of Downtime:		0.0	0.1	66.3	275.0	36.6
Vapor Monitoring Concentrations						
Well Field Influent:	mg/m3 as gasoline	NA	NA	NA	NA	NA
	ppmv as gasoline	NA	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA	NA
System Influent:	mg/m3 as gasoline	NA	2500	NA	NA	NA
	ppmv as gasoline	NA	690	NA	NA	NA
	mg/m3 as benzene	NA	37	NA	NA	NA
	ppmv as benzene	NA	10	NA	NA	NA
System Effluent:	mg/m3 as gasoline	NA	52	NA	NA	NA
	ppmv as gasoline	NA	14	NA	NA	NA
	mg/m3 as benzene	NA	0.93	NA	NA	NA
	ppmv as benzene	NA	0.26	NA	NA	NA
Well Field Flow Rate, scfm:		37	41	0	0	0
System Influent Flow Rate, scfm:		60	64	0	0	0
Destruction Efficiency, percent (6):		97.9	97.9	NA	NA	NA
Emission Rates (pounds per day) (7)						
Gasoline:		0.30	0.30	0.00	0.00	0.00
Benzene:		0.01	0.01	0.00	0.00	0.00
Operating Hours This Period:		123.0	285.0	0.0	0.0	8.9
Operating Hours To Date:		453.0	738.0	738.0	738.0	746.9
SVE Pounds/ Hour Removal Rate, as gasoline (9):		0.48	0.60	0.00	0.00	0.00
SVE Pounds Removed This Period, as gasoline (10):		59.399	170.669	0.000	0.000	0.000
GWE Pounds Removed This Period, as gasoline (12):		0.000	0.000	0.000	0.000	0.000
Total Pounds Removed This Period, as gasoline (13):		59.399	170.669	0.000	0.000	0.000
Total Pounds Removed To Date, as gasoline:		153.7	324.3	324.3	324.3	324.3
Total Gallons Removed This Period, as gasoline (14):		9.6	27.5	0.0	0.0	0.0
Total Gallons Removed To Date, as gasoline:		24.8	52.3	52.3	52.3	52.3

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 06-28-95

Date Begin:		02-06-95	03-03-95	03-31-95	04-27-95	05-26-95
Date End:		03-03-95	03-31-95	04-27-95	05-26-95	06-28-95
Mode of Oxidation:		Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox	Cat-Ox (17)
Days of Operation:		21.4	6.0	0.3	0.0	2.0
Days of Downtime:		3.6	22.1	26.7	29.0	31.0
Vapor Monitoring Concentrations						
Well Field Influent:	mg/m3 as gasoline	11000	8900	8900	NA	12000
	ppmv as gasoline	3000	2500	2500	NA	3300
	mg/m3 as benzene	110	99	99	NA	170
	ppmv as benzene	30	30	30	NA	50
System Influent:	mg/m3 as gasoline	880	<60	<60	NA	2200
	ppmv as gasoline	240	<17	<17	NA	610
	mg/m3 as benzene	21	<0.5	<0.5	NA	34
	ppmv as benzene	6	<0.2	<0.2	NA	9
System Effluent:	mg/m3 as gasoline	<60	<60	<60	NA	<60
	ppmv as gasoline	<17	<17	<17	NA	<17
	mg/m3 as benzene	<0.5	<0.5	<0.5	NA	1.5
	ppmv as benzene	<0.2	<0.2	<0.2	NA	0.4
Well Field Flow Rate, scfm:		5	6	19	0	17
System Influent Flow Rate, scfm:		36	33	37	0	25
Destruction Efficiency, percent (6):		96.6	NA	NA	NA	97.3
Emission Rates (pounds per day) (7)						
Gasoline:		<0.19	<0.18	<0.02	0.00	<0.13
Benzene:		<0.00	<0.00	<0.00	0.00	0.00
Operating Hours This Period:		512.5	143.3	7.2	0.0	48.0
Operating Hours To Date:		1259.4	1402.7	1409.9	1409.9	1457.9
SVE Pounds/ Hour Removal Rate, as gasoline (9):		0.12	0.01	0.01	0.00	0.21
SVE Pounds Removed This Period, as gasoline (10):		60.767	1.062	0.060	0.000	9.881
GWE Pounds Removed This Period, as gasoline (12):		4.282	0.313	0.000	0.000	1.423
Total Pounds Removed This Period, as gasoline (13):		65.049	1.375	0.060	0.000	11.304
Total Pounds Removed To Date, as gasoline:		389.4	390.8	390.8	390.8	402.1
Total Gallons Removed This Period, as gasoline (14):		10.5	0.2	0.0	0.0	1.8
Total Gallons Removed To Date, as gasoline:		62.8	63.0	63.0	63.0	64.9

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035	Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer
Location: 1001 San Pablo Avenue, Albany, California	
Consultant: EMCON, 1921 Ringwood Avenue, San Jose, California	Start-Up Date: 12-07-93
	Reporting Period From: 12-07-93
	To: 06-28-95

CURRENT REPORTING PERIOD:	03-31-95	to	06-28-95
DAYS / HOURS IN PERIOD:	89.0	2136.0	
DAYS / HOURS OF OPERATION:	2.3	55.2	
DAYS / HOURS OF DOWN TIME:	86.7	2080.8	
PERCENT OPERATIONAL:		2.6	%
PERIOD POUNDS REMOVED:	11.4		
PERIOD GALLONS REMOVED:	1.8		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		26.6	

1. mg/m3: milligrams per cubic meter
2. ppmv: parts per million by volume
3. Concentration (as gasoline in ppmv) = [concentration (as gasoline in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 87 lb/lb-mole
4. Concentration (as benzene in ppmv) = [concentration (as benzene in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 78 lb/lb-mole
5. scfm: flow in standard cubic feet per minute at one atmosphere and 70 degrees Farenheit
6. Destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - system effluent concentration (as gasoline in mg/m3)] / system influent concentration (as gasoline in mg/m3)) x 100 percent
7. Emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
8. SVE: soil-vapor extraction system
9. SVE pounds/ hour removal rate (as gasoline) = SVE system influent concentration (as gasoline in mg/m3) x SVE system influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
10. SVE pounds removed this period (as gasoline) = pounds/ hour removal rate (SVE) x hours of operation (SVE)
11. GWE: groundwater extraction system
12. Refer to Table 8 for GWE system performance data (system was started during the second quarter of 1995
13. Represents the total mass recovered by the SVE and GWE systems, and the total mass abated by the thermal/catalytic oxidizer
14. Total gallons removed this period (as gasoline) = total pounds removed this period (as gasoline) x 0.1667 gallons/pound of gasoline
15. Therm-Ox: thermal oxidation
16. NA: not analyzed, not applicable, or not available
17. Cat-Ox: catalytic oxidation; the SVE system's abatement unit was converted to the Cat-Ox mode of operation on June 20, 1995

Table 7
Soil-Vapor Extraction Well Data

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

Date: 09-20-95
Project Number: 0805-123.02

Date	Well Identification											
	VW-1			VW-2			VW-3			VW-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-07-93	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
12-09-93	open	2455 LAB	NA	open	5316 LAB	NA	open	2025 LAB	NA	open	2278 LAB	NA
12-15-93	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
01-12-94	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
01-24-94	* System shut down			System shut down			System shut down			System shut down		
02-08-95	open	<17 LAB	20	open	<17 LAB	20	open	0.0 PID	20	open	0.0 PID	20
02-14-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	11	open	NA	NA	open	NA	NA	open	NA	NA
03-08-95	open	NA	28	closed	NA	17	closed	NA	0	closed	NA	26
03-08-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
06-20-95	open	NA	9	open	NA	10	closed	NA	NA	closed	NA	NA
06-26-95	open	59000 LAB	17	open	56000 LAB	15	closed	NA	0	closed	NA	14

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
*: The SVE system was shut down manually because of no available well screens in the soil-vapor extraction wells

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Table 7
Soil-Vapor Extraction Well Data

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

Date: 09-20-95
Project Number: 0805-123.02

Date	Well Identification											
	VW-5			VW-6			VW-7			VW-8		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-07-93	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
12-09-93	open	532 LAB	NA	open	2430 LAB	NA	open	3038 LAB	NA	open	1240 LAB	NA
12-15-93	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
01-12-94	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
01-24-94	* System shut down			System shut down			System shut down			System shut down		
02-08-95	open	0.0 PID	24	open	<17 LAB	10	open	0.0 PID	24	open	<17 LAB	20
02-14-95	open	NA	NA	closed	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	NA	closed	NA	16	open	NA	NA	open	NA	NA
03-08-95	closed	NA	1	closed	NA	8	closed	NA	22	closed	NA	0
03-08-95	closed	NA	NA	open	NA	NA	closed	NA	NA	closed	NA	NA
06-20-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
06-26-95	closed	NA	7	closed	NA	34	closed	NA	16	closed	NA	2

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
*: The SVE system was shut down manually because of no available well screens in the soil-vapor extraction wells

Table 7
Soil-Vapor Extraction Well Data

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

Date: 09-20-95
Project Number: 0805-123.02

Date	Well Identification											
	VW-9			RW-1			AS-1 (vent)			AS-2 (vent)		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-07-93	open	NA	NA	open	NA	NA						
12-09-93	open	1671 LAB	NA	open	1721 LAB	NA						
12-15-93	open	NA	NA	closed	NA	NA						
01-12-94	open	NA	NA	closed	NA	NA						
01-24-94		* System shut down			System shut down							
02-08-95	open	0.0 PID	23	open	13.7 PID	20	open	<17 LAB	24	open	<17 LAB	24
02-14-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	NA	open	NA	13	passive	NA	5	passive	NA	1
03-08-95	closed	NA	8	open	NA	28	passive	NA	0	passive	NA	0
03-08-95	closed	NA	NA	closed	NA	NA	open	NA	NA	open	NA	NA
06-20-95	closed	NA	NA	open	NA	10	open	NA	10	open	NA	10
06-26-95	closed	NA	8	open	4800 LAB	19	open	40000 LAB	15	open	40000 LAB	15

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
*: The SVE system was shut down manually because of no available well screens in the soil-vapor extraction wells

Table 8
Influent and Effluent Groundwater Analyses

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

Date: 09-20-95
Project Number: 0805-123.02

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
I-1	02-08-95	NA	NA	NA	NA	NA
I-1	02-08-95	49000	4300	4900	1000	5200
I-1	02-14-95	33000	4300	5800	970	5600
I-1	02-21-95	21000	940	1500	360	4000
I-1	02-28-95	15000	430	290	54	2000
I-1	06-20-95	20000	1500	1200	220	2300
I-2	02-08-95	NA	NA	NA	NA	NA
I-2	02-08-95	1500	59	70	14	86
I-2	02-14-95	1500	59	70	14	86
I-2	02-21-95	340	7.2	8.8	1.9	37
I-2	02-28-95	390	3.9	2.5	0.9	16
I-2	06-20-95	2200	30	27	11	77
I-3	02-08-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-14-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-21-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-28-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	06-20-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-08-95	<50	0.7	<0.5	<0.5	<0.5
E-1	02-14-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-21-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-28-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	06-20-95	<50	<0.5	<0.5	<0.5	<0.5

TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter
NA: not analyzed

Table 9
Estimated Total Dissolved TPHG Removed

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

Date: 09-20-95
Project Number: 0805-123.02

Sample Designation	Sample Date	Groundwater Extraction: Total Volume Extracted (gallons)	Groundwater Extraction: Period Volume Extracted (gallons)	Groundwater Extraction: Period Flow Rate (gpd)	TPHG Removal Data: Period Influent Concentration (µg/L)	TPHG Removal Data: Period Removal Rate (lbs/day)	TPHG Removal Data: Period Pounds Removed [1] (pounds)	TPHG Removal Data: Total Pounds Removed (pounds)	TPHG Removal Data: Total Gallons Removed [2] (gallons)	Benzene Removal Data: Period Influent Concentration (µg/L)	Benzene Removal Data: Period Removal Rate (lbs/day)	Benzene Removal Data: Period Pounds Removed [3] (pounds)	Benzene Removal Data: Total Pounds Removed (pounds)	Benzene Removal Data: Total Gallons Removed [4] (gallons)
I-1	02-08-95	628	0	0	NA	0.000	0.000	0.000	0.000	NA	0.0000	0.0000	0.0000	0.0000
I-1	02-08-95	880	252	2,520	49,000	1.031	0.103	0.103	0.017	4,300	0.0904	0.0090	0.0090	0.0012
I-1	02-14-95	1,329	449	76	33,000	0.021	0.124	0.227	0.038	4,300	0.0027	0.0161	0.0251	0.0035
I-1	02-21-95	15,499	14,170	2,051	21,000	0.360	2.484	2.710	0.452	940	0.0161	0.1112	0.1363	0.0188
I-1	02-28-95	28,788	13,289	1,894	15,000	0.237	1.664	4.374	0.729	430	0.0068	0.0477	0.1840	0.0254
I-1	03-08-95	31,358	2,570	316	15,000	0.040	0.322	4.696	0.783	430	0.0011	0.0092	0.1932	0.0266
I-1	06-20-95	31,695	337	3	20,000	0.001	0.056	4.752	0.792	1,500	0.0000	0.0042	0.1975	0.0272
I-1	06-30-95	40,933	9,238	924	20,000	0.154	1.542	6.294	1.049	1,500	0.0116	0.1157	0.3131	0.0432
I-2	02-08-95	628	0	0	NA	0.000	0.000	0.000	0.000	NA	0.0000	0.0000	0.0000	0.0000
I-2	02-08-95	880	252	2,520	1,500	0.032	0.003	0.003	0.001	59	0.0012	0.0001	0.0001	0.0000
I-2	02-14-95	1,329	449	85	1,500	0.001	0.006	0.009	0.001	59	0.0000	0.0002	0.0003	0.0000
I-2	02-21-95	15,499	14,170	2,024	340	0.006	0.040	0.049	0.008	7	0.0001	0.0009	0.0012	0.0002
I-2	02-28-95	28,788	13,289	1,898	390	0.006	0.043	0.092	0.015	4	0.0001	0.0004	0.0016	0.0002
I-2	03-08-95	31,358	2,570	321	390	0.001	0.008	0.101	0.017	4	0.0000	0.0001	0.0017	0.0002
I-2	06-20-95	31,695	337	3	2,200	0.000	0.006	0.107	0.018	30	0.0000	0.0001	0.0018	0.0002
I-2	06-30-95	40,933	9,238	924	2,200	0.017	0.170	0.276	0.046	30	0.0002	0.0023	0.0041	0.0006

Table 9
Estimated Total Dissolved TPHG Removed

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

Date: 09-20-95
Project Number: 0805-123.02

Sample Designation	Sample Date	Groundwater Extraction: Total Volume Extracted (gallons)	Groundwater Extraction: Period Volume Extracted (gallons)	Groundwater Extraction: Period Flow Rate (gpd)	TPHG Removal Data: Period Influent Concentration (µg/L)	TPHG Removal Data: Period Removal Rate (lbs/day)	TPHG Removal Data: Period Pounds Removed [1] (pounds)	TPHG Removal Data: Total Pounds Removed (pounds)	TPHG Removal Data: Total Gallons Removed [2] (gallons)	Benzene Removal Data: Period Influent Concentration (µg/L)	Benzene Removal Data: Period Removal Rate (lbs/day)	Benzene Removal Data: Period Pounds Removed [3] (pounds)	Benzene Removal Data: Total Pounds Removed (pounds)	Benzene Removal Data: Total Gallons Removed [4] (gallons)

CURRENT REPORTING PERIOD:	03-08-95	to	06-30-95
DAYS / HOURS IN PERIOD:	113.8	2,730.5	
DAYS / HOURS OF OPERATION:	4.1	98.7	
DAYS / HOURS OF DOWN TIME:	109.7	2,631.8	
PERCENT OPERATIONAL:		4%	

PERIOD GROUNDWATER EXTRACTED:		9,575							
PERIOD HYDROCARBON REMOVAL (TOTAL):				1.598		0.266		0.0000	0.0165
HYDROCARBONS REMOVED BY AERATION TANK:				1.423		0.237		0.1915	0.0162
HYDROCARBONS REMOVED BY CARBON:				0.176		0.029		0.0024	0.0003

PERCENT PRIMARY CARBON LOADING: [5]	3%	
PERIOD AVERAGE FLOW RATE (gpd):	84	(includes down time)
PERIOD AVERAGE FLOW RATE (gpd):	2,328	(excludes down time)
PERIOD AVERAGE FLOW RATE (gpm):	1.6	(excludes down time)

TPHG: total petroleum hydrocarbons as gasoline
gpd: gallons per day
µg/L: micrograms per liter
lbs/day: pounds per day
NA: not analyzed
gpm: gallons per minute

1. Period TPHG removed (pounds) = period influent TPHG concentration (µg/L) x period volume of groundwater extracted (gallons) x 3.7854 (liters/gallon) x 0.000000002205 (pounds/µg)
2. Total TPHG removed (gallons) = total TPHG removed (pounds) x 0.1667 (gallons/pound)
3. Period benzene removed (pounds) = period influent benzene concentration (µg/L) x period volume of groundwater extracted (gallons) x 3.7854 (liters/gallon) x 0.000000002205 (pounds/µg)
4. Total benzene removed (gallons) = total benzene removed (pounds) x 0.1379 (gallons/pound)
5. Percent carbon loading = (total TPHG removed (0.276 pounds) / 10 pounds of TPH-G) x 100
   The percent carbon loading calculation assumes a 5% by weight carbon adsorption efficiency. The treatment system uses two 200 pound carbon canisters.
   Carbon Loading (10 lbs TPHG) = 1 canister x 200 lbs carbon/canister x 1 lb TPHG/20 lb carbon

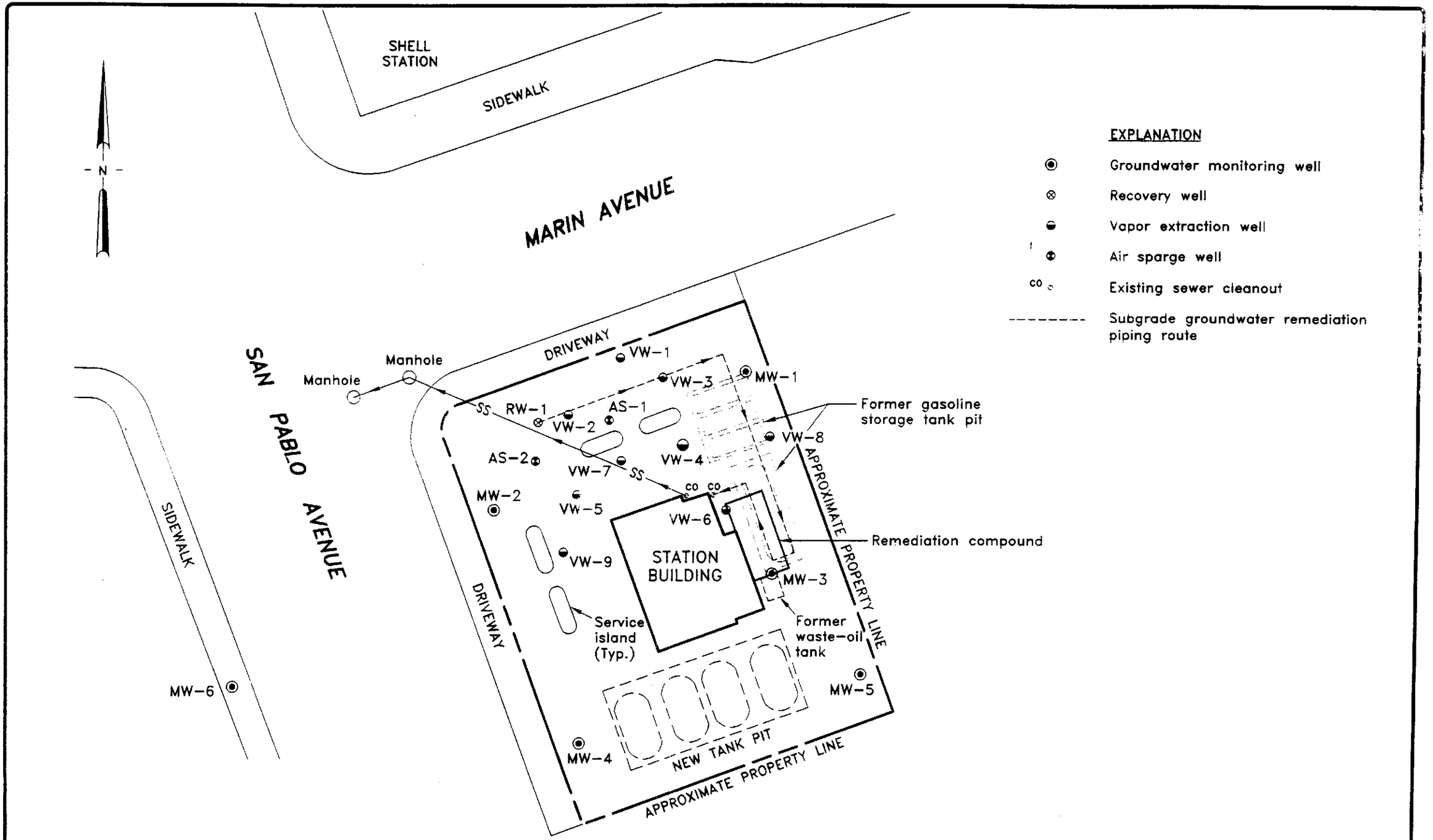
152753

EMCON

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-123.02



EMCON

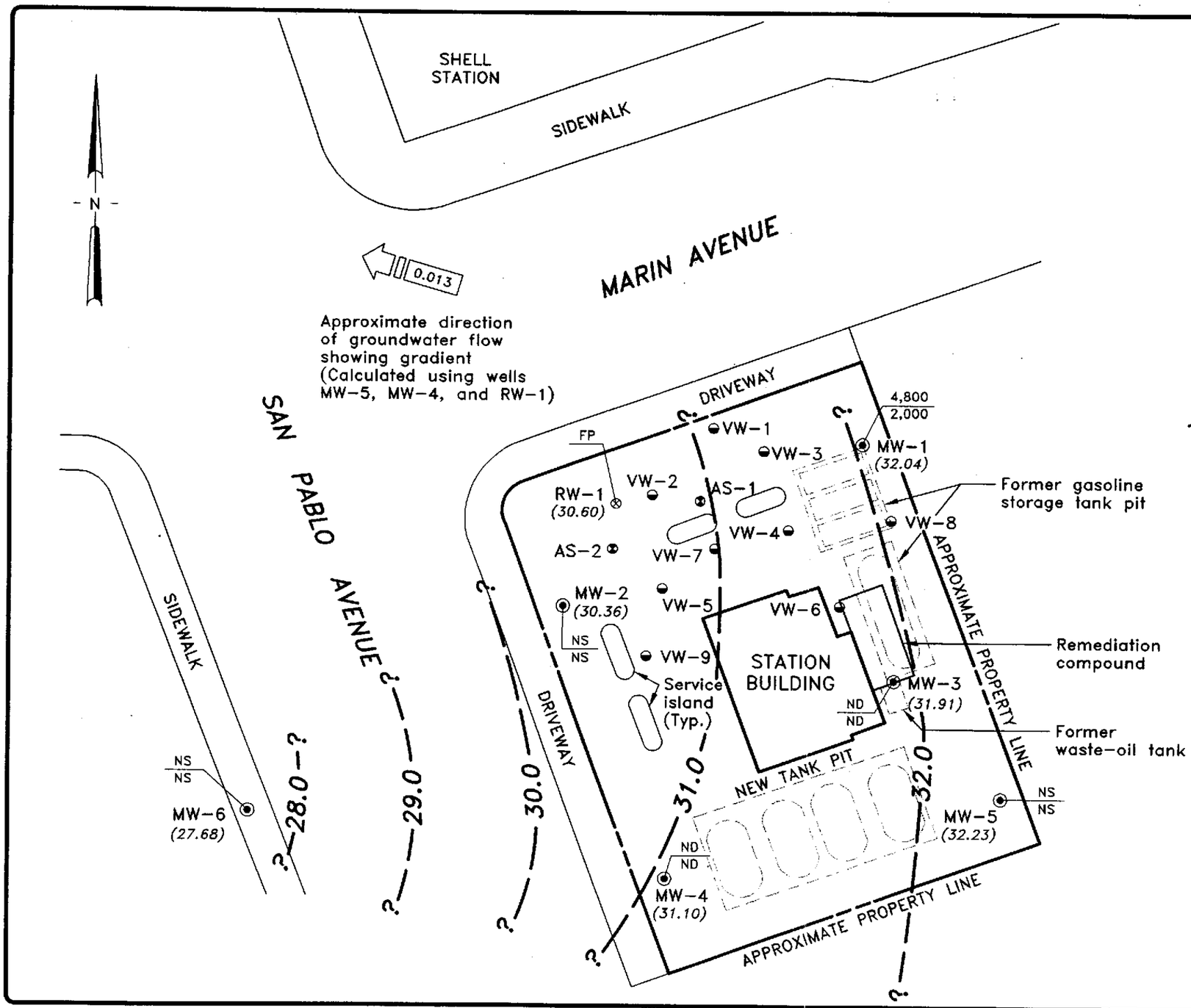
SCALE: 0 30 60 FEET

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

SITE PLAN

FIGURE NO.
2

PROJECT NO.
805-123.02



EXPLANATION

- ◉ Groundwater monitoring well
- ⊗ Recovery well
- ◒ Vapor extraction well
- ◓ Air sparge well
- (30.60) Groundwater elevation (Ft.–MSL); measured 5/24/95
- 29.0 Groundwater elevation contour (Ft.–MSL)
- 4,800 / 2,000 TPHG concentration in groundwater (ug/L); sampled 5/24/95 / Benzene concentration in groundwater (ug/L); sampled 5/24/95
- ND Not detected at or above the method reporting limit for TPHG (50 ug/L) or benzene (0.5 ug/L)
- NS Not sampled; not scheduled for chemical analysis
- FP Well was not sampled due to the presence of floating product

EMCON

SCALE: 0 30 60 FEET

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

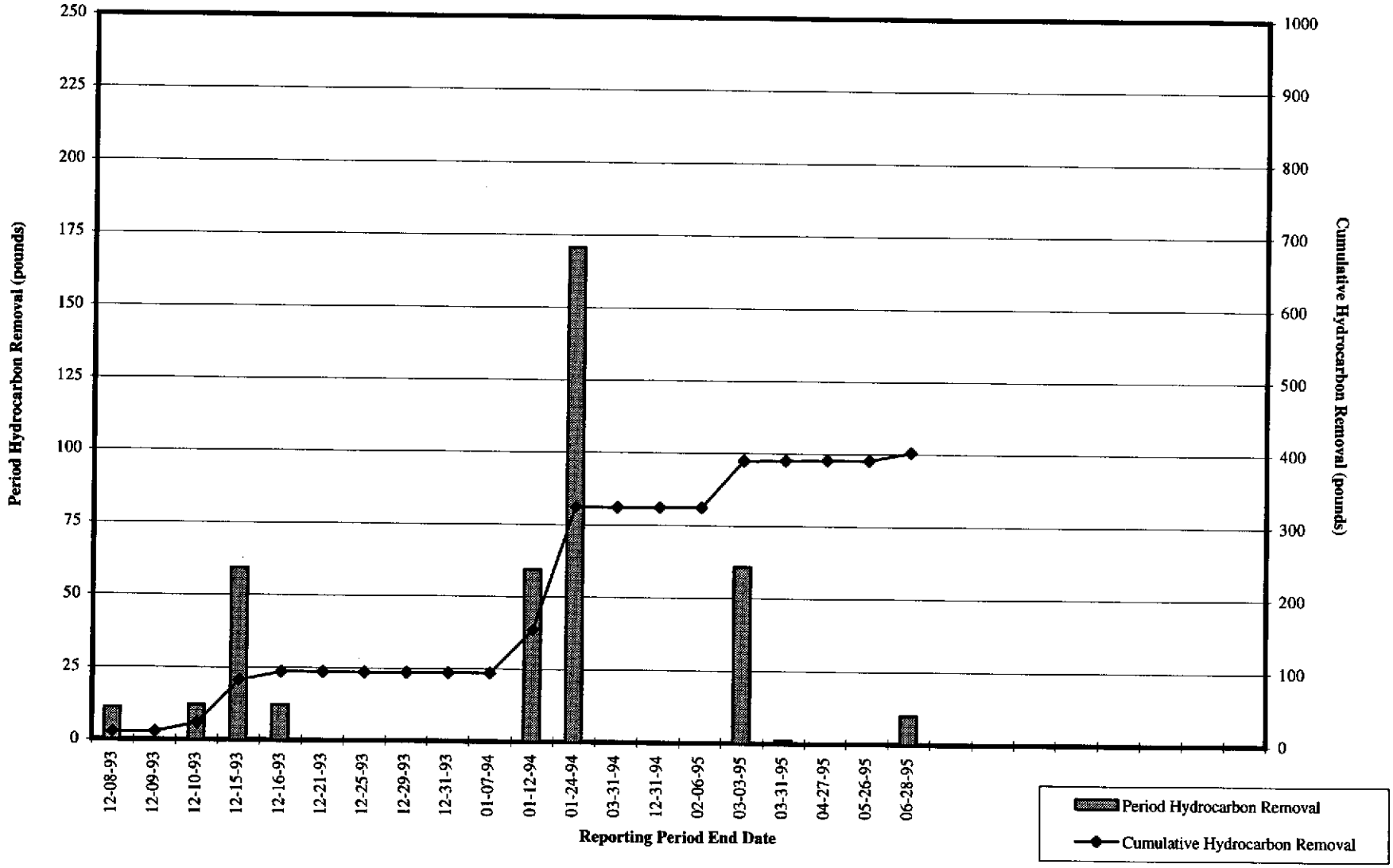
GROUNDWATER DATA
SECOND QUARTER 1995

FIGURE NO. 3

PROJECT NO. 805-123.02

Figure 4

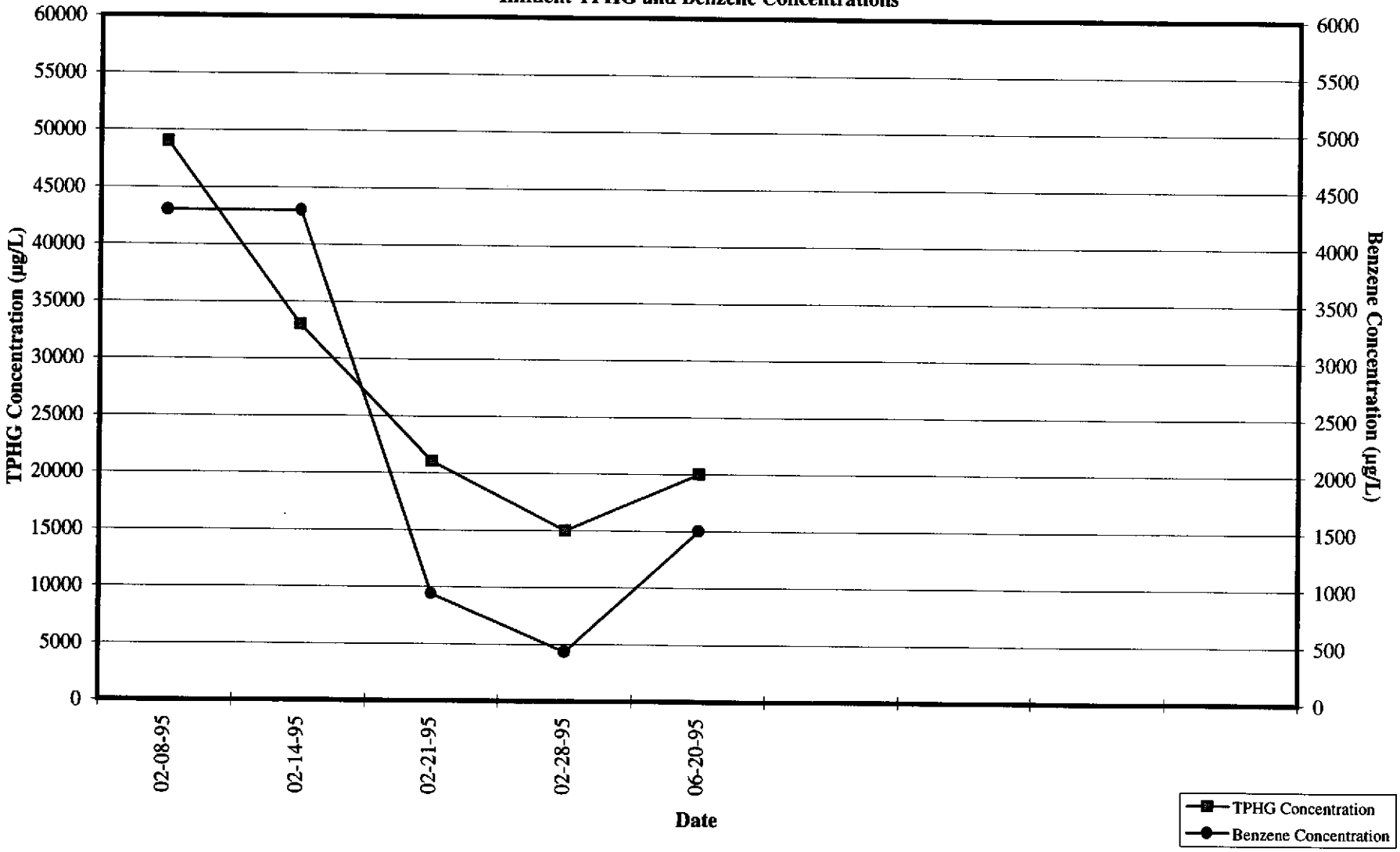
ARCO Service Station 2035
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



esj/h:\2035\2035tss.xls\2035tss:dcl
0805-123.02

Figure 5

ARCO Service Station 2035
Historical Groundwater Treatment System
Influent TPHG and Benzene Concentrations

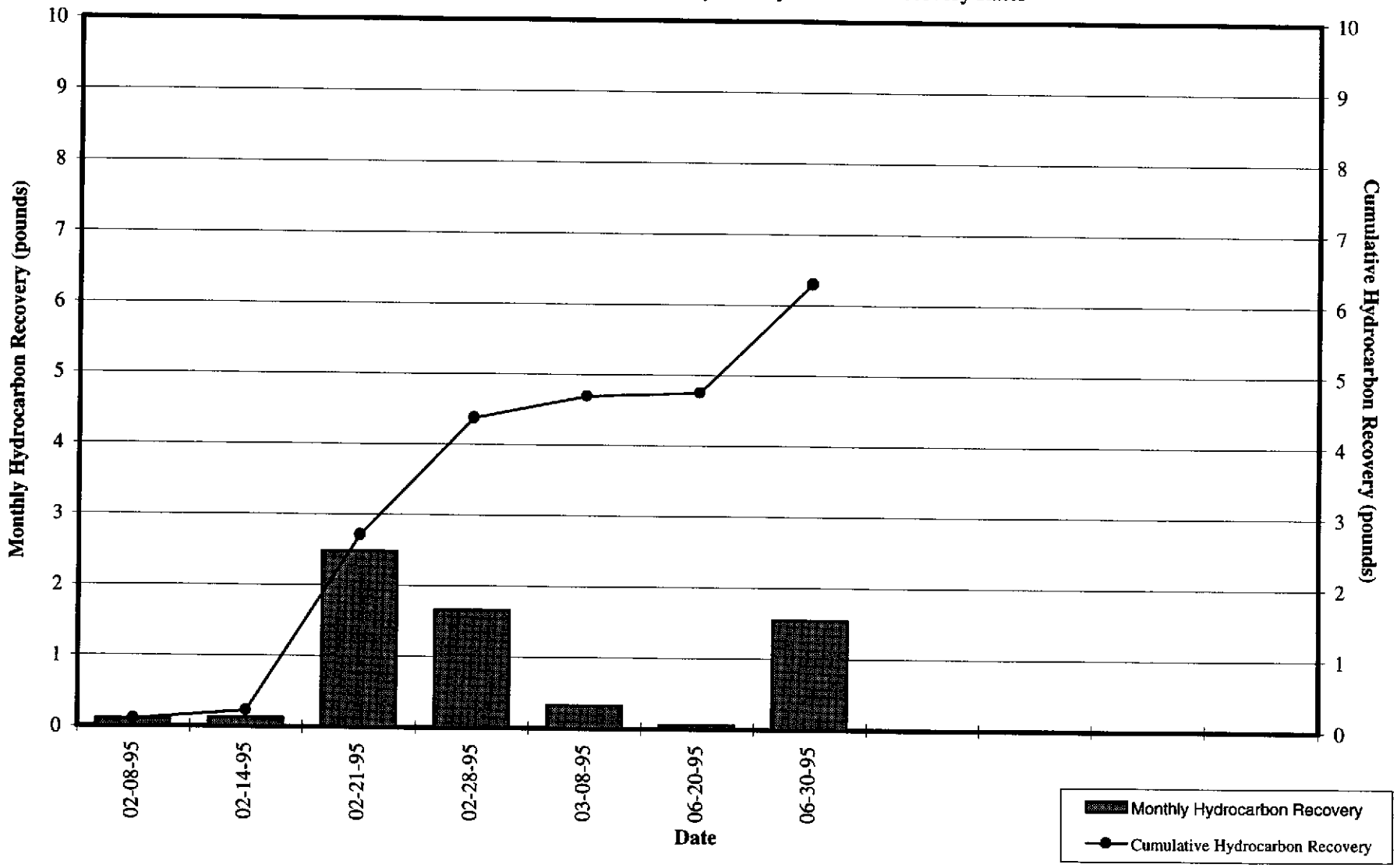


TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter

esj/h:\2035\2035tss.xls\Table 8:dcl
0805-123.02

Figure 6

ARCO Service Station 2035
Historical Groundwater Treatment System Hydrocarbon Recovery Rates



esj/h:\2035\2035tss.xls\Table 9:dcl
0805-123.02

APPENDIX A

FIELD DATA SHEETS, SECOND QUARTER 1995 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 1775-217.01 STATION ADDRESS : 101 San Pablo Avenue DATE : 5/24/95

ARCO STATION # : 2035 FIELD TECHNICIAN : R. Davis DAY : Wednesday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-2	ok	OK	ok	ok	ok	~~9.80~~ 10.02	10.02	ND	NA	29.15	under neg. pressure
2	MW-3	ok	ok	ok	ok	ok	9.53	9.53			33.99	"
3	MW-5	ok	ok	ok	ok	ok	9.61	9.61			24.20	ok
4	MW-6	ok	ok	ok	ok	ok	12.45	12.45			24.30	
5	MW-4	ok					9.23	9.23			25.00	
6	MW-1	ok					9.37	9.37			29.50	
7	RW-1	ok					9.75	9.75		0.03	25.4	0.03 in bailer

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-217.01 SAMPLE ID: MW-1

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 2035

SAMPLED BY: " LOCATION: Albany CA.

TYPE: Ground Water / Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 X Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 13.15

DEPTH TO WATER (feet): 9.37 CALCULATED PURGE (gal.): 39.45

DEPTH OF WELL (feet): 29.5 ACTUAL PURGE VOL. (gal.): 40.0

DATE PURGED: 5-24-95 Start (2400 Hr) 12:20 End (2400 Hr) 1227

DATE SAMPLED: " Start (2400 Hr) 1230 End (2400 Hr) ~

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmnos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:22	13.0	6.61	800	68.4	tan	mod.
12:33	26.0	6.33	858	66.6	~~clear~~ H. brown	clear
12:27	40.0	6.57	863	67.5	H. brown	clear

D. O. (ppm): NR ODOR: strong

NR (COBALT 0 - 500) NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: FR-1 (@ 1235)

Parameters field filtered at this well: N2

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- X Centrifugal Pump
- ___ Submersible Pump
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- X Bailer (Teflon®)
- ___ DDL Sampler
- ___ Dipper
- ___ Well Wizard™
- ___ Bailer (Stainless Steel)
- ___ Submersible Pump
- ___ Dedicated

Other: ___

WELL INTEGRITY: Good LOCK #: ARCO Key

REMARKS: all samples taken

Meter Calibration: Date: 5-24-95 Time: ___ Meter Serial #: 3011 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: [signature] Page 1 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-217.01 SAMPLE ID: MW-3

PURGED BY: M. Gallegos CLIENT NAME: ARCO 2035

SAMPLED BY: ↓ LOCATION: Albany, CA.

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 15.98

DEPTH TO WATER (feet): 9.53 CALCULATED PURGE (gal.): 47.96

DEPTH OF WELL (feet): 34.0 ACTUAL PURGE VOL. (gal.): 37.0

DATE PURGED: 5-24-95 Start (2400 Hr) 1106 End (2400 Hr) 1123

DATE SAMPLED: ↓ Start (2400 Hr) 1130 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
11:11	11.0	6.40	822	64.8	tan	heavy
11:19	32.0	6.54	739	67.1	tan	heavy
	~~46.0~~	well dry at 37 gallons				
1130	Yrecharge	6.62	7.48		tan	↓

D. O. (ppm): NR ODOR: Mode- COLOR: NR (COBALT 0 - 500) TURBIDITY: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good LOCK #: Arco Key

REMARKS: well dried after purging 37.0 gallons
all samples taken

Meter Calibration: Date: 5/24/95 Time: 1100 Meter Serial #: 9011 Temperature °F: 66.4

(EC 1000 982 / 1000) (DI ___) (pH 7 700 / 700) (pH 10 1000 / 1000) (pH 4 400 / 400)

Location of previous calibration: ___

Signature: [signature] Reviewed By: SA Page 2 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-217.01 SAMPLE ID: MW-4

PURGED BY: M. Gallegos CLIENT NAME: ARCO #2025

SAMPLED BY: " LOCATION: Alban, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 10.30

DEPTH TO WATER (feet): 9.23 CALCULATED PURGE (gal.): 30.90

DEPTH OF WELL (feet): 25.0 ACTUAL PURGE VOL. (gal.): 25.0

DATE PURGED: 5-24-95 Start (2400 Hr) 11:50 AM End (2400 Hr) 11:54

DATE SAMPLED: " Start (2400 Hr) 12:00 PM End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
11:50	10.0	6.60	402	66.9	gray	mod.
11:53	20.5	6.19	505	66.2	gray	mod.
11:54	~~3 to~~	well dried at		25.0 gallons		
12:00	recharge:	6.42	551	67.2	gray	mod.

D. O. (ppm): NR ODOR: none COLOR: NR (COBALT 0 - 500) TURBIDITY: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
X Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good LOCK #: ARCO Key

REMARKS: Well dried at 25 gallons

all samples taken

Meter Calibration: Date: 5-24-95 Time: ___ Meter Serial #: Sn 11 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: ARCO?

Signature: [signature] Reviewed By: [signature] Page 3 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-217.01 SAMPLE ID: RW-1

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 2035

SAMPLED BY: ↓ LOCATION: Albany, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ___ 4.5 ___ 6 X Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): NR

DEPTH TO WATER (feet): 9.75 CALCULATED PURGE (gal.): ↓

DEPTH OF WELL (feet): 25.4 ACTUAL PURGE VOL. (gal.): ↓

DATE PURGED: 5-24-95 Start (2400 Hr) ___ End (2400 Hr) ___

DATE SAMPLED: ↓ Start (2400 Hr) ___ End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
___	no sample taken, product in well (0.03')				___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___

D. O. (ppm): NR ODOR: ___ NR (COBALT 0 - 500) NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- ___ Centrifugal Pump
- ___ Submersible Pump
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- ___ DDL Sampler
- ___ Dipper
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (Stainless Steel)
- ___ Submersible Pump
- ___ Dedicated

Other: ___

WELL INTEGRITY: ___ LOCK #: ___

REMARKS: no sample taken, product in well (measured 0.03' in bailer)

Meter Calibration: Date: 5/24/95 Time: ___ Meter Serial #: Eq'll Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: ___

Signature: M. Gallegos Reviewed By: SAT Page 4 of 4

APPENDIX B

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, SECOND QUARTER 1995, GROUNDWATER MONITORING EVENT

Columbia
Analytical
Services INC.

June 8, 1995

Service Request No. S950666

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 2035 / EMCON Project No. 0805-123.002**

Dear Mr. Young:

Attached are the results of the water sample(s) submitted to our lab on May 25, 1995. For your reference, these analyses have been assigned our service request number S950666.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

001

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is 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
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 MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950666
Project:	ARCO Facility No. 2035/EMCON Project No. 0805-123.002	**Date Collected:**	5/24/95
Sample Matrix:	Water	**Date Received:**	5/25/95
		Date Extracted:	NA
		Date Analyzed:	6/2-7/95

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Analyte:	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name / **Lab Code**					
MW-3 (34) S950666-001	ND	ND	ND	ND	ND
MW-4 (25) S950666-002	ND	ND	ND	ND	ND
MW-1 (29.5) S950666-003	4,800	2,000	<20*	52	<20*
FB-1 S950666-004	ND	ND	ND	ND	ND
Method Blank S950602-WB1	ND	ND	ND	ND	ND
Method Blank S950607-WB1	ND	ND	ND	ND	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: _____

5ABTXGAS/061694

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.002
Sample Matrix: Water

Service Request: S950666
Date Collected: 5/24/95
Date Received: 5/25/95
Date Extracted: NA
Date Analyzed: 6/2/95

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline
EPA Methods 5030/California DHS LUFT Method
Units: ug/L (ppb)

Sample Name: MW-4 (25)
Lab Code: S950666-002

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Gasoline	250	250	ND	234	233	94	93	67-121	<1

Approved By: _____ Date: _____

DMS1S/060194

0666.XLS - wgasms 6/8/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.002
Sample Matrix: Water

Service Request: S950666
Date Collected: 5/24/95
Date Received: 5/25/95
Date Extracted: NA
Date Analyzed: 6/2-7/95

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery α,α,α-Trifluorotoluene
MW-3 (34)	S950666-001	94
MW-4 (25)	S950666-002	91
MW-1 (29.5)	S950666-003	99
FB-1	S950666-004	92
MW-4 (25) (MS)	S950666-002MS	103
MW-4 (25) (DMS)	S950666-002DMS	103
Method Blank	S950602-WB1	92
Method Blank	S950607-WB1	91

CAS Acceptance Limits: 69-116

Approved By: _____ Date: _____

SUR1/062994

0666.XLS - GBTX.SrW 6/8/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.002

Service Request: S950666
Date Analyzed: 6/2/95

Initial Calibration Verification (ICV) Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	25.8	103	85-115
Toluene	25	24.9	100	85-115
Ethylbenzene	25	25.0	100	85-115
Xylenes, Total	75	72.2	96	85-115
Gasoline	250	238	95	90-110

Approved By: _____ Date: _____

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.002
Sample Matrix: Water

Service Request: L952560
Date Collected: 5/24/95
Date Received: 6/9/95
Date Extracted: 6/9/95
Date Analyzed: 6/9/95

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Result
MW-3 (34')	L952560-001	0.5	ND
Method Blank	L952560-MB	0.5	ND

Approved By: Eydie Schwartz Date: 6/9/95

AMRL/060194
Genlcs32 - 418w 6/9/95

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L952560
Project:	ARCO Products Company #2035/#0805-123.002	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	6/9/95
		Date Analyzed:	6/9/95

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary*
Total Recoverable Petroleum Hydrocarbons (TRPH)
EPA Method 418.1
Units: mg/L (ppm)

	True Value		Result		Percent Recovery			
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	CAS Acceptance Limits	**Relative Percent Difference**
TRPH	2.03	2.03	1.68	1.72	83	85	75-125	2

* Sample quantity was insufficient to perform matrix spike and matrix spike duplicate. Three separate, replicate one liter samples are required to analyze sample and spikes.

Approved By: Eydie Schwartz Date: 6/9/95

DLCS/060194
Genlcs32 - genlcs3 6/9/95

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 17075.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave San Jose, CA 95131		Contract number

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TRPH (418.1)
1	MW-3(24)		4		X		X	HCL	5/24/95	1130		X										X
2	MW-4(25)		2		X		X	HCL	↓	1200		X										
3	MW-1(26)		2		X		X	HCL	↓	~~1230~~ ~~1230~~		X										
	RW-1( )		2		X		X	HCL	—	—		~~X~~	no	samples				taken.				
4	FB-1		2		X		X	HCL	5/24/95	1235		X										

Condition of sample: ok

Temperature received: Cool

Relinquished by sampler	Date 5-25-95	Time	Received by
Relinquished by	Date	Time	Received by LAB 6-9-95 13:15
Relinquished by	Date	Time	Received by laboratory Date 6/14/95 Time 8:45

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2 40ml HCL VOAs add: 2 Glass HCL liters for MW-3 9404.0123.002 #0805-123.002

Lab number: 295260 595-0666

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APP-8292 (2-91)

CAS-S: GBTEX CAS-L: 418.1 Due 6/9

APPENDIX C

FIELD DATA SHEETS, SVE SYSTEM OPERATION AND MAINTENANCE VISITS, SECOND QUARTER 1995

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 0805-123.02

Remarks: System OFF - Ran unit on fresh air only to check High Temp controller. Mike Hedges of Therm Tech arrived after I called R.A. - He switched thermal couple switch, Controller - OK Sampled MW-5 (see next sheet) Bailed product from AW-1 and AS-1 (vent) Unscheduled site visit [X] Scheduled site visit [] 9 bumper posts needs locks Changed chart paper

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)			
Arrival Time (24:00 hour)	0909	Effluent (E-1) (12"x12")	
System Status (on or off)	OFF	Stack Temperature (°F)	
Shutdown Time (24:00 hour)	—	SYSTEM	
Restart Time (24:00 hour)	—	Total Flow (3") (cfm) (before blower-same as Para-Fax)	
Reading Time (24:00 hour)	1019	Fire Box Temperature (°F)	
Well Field WF-1 (3")		Set Point (°F)	
Vacuum (in. of H2O)		TOTAL HOURS	4560.23
Velocity (ft/min)		Electric Meter (kwh)	07067
Temperature (°F)		Natural Gas (cf)	1720
Aeration Tank AT-1 (2")		AIR MONITORING	
Vacuum (in. of H2O)		FID (ppm) / Amb / WF-1 / AT-1 / I-1 / I-2 / E-1	
Velocity (ft/min)		Date:	
Flow (scfm)			
After Blower I-2 (4") (AFTER DILUTION)		PID (ppm) CAL GAS:	
Total Pressure (in. of H2O)		Date:	
Total Flow (in. of H2O)		Date:	
Influent I-1 (3") (BEFORE DILUTION)		Lab samples taken for analysis at: water - MW-5	
Vacuum (in. of H2O)		PARA-FAX on/off	Turned OFF
Velocity (ft/min)		Cleaned K.O. pump pre-filter ? yes/no	No

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (In. of H2O)	FID (ppm)	PID (ppm)	Bubbler (on/off)	Remarks
VW-1	4"	5'-17'							NA	
VW-2	4"	5'-17'							NA	
VW-3	4"	4.5'-9.5'							NA	
VW-4	4"	5'-17'							NA	
VW-5	4"	4.5'-14.5'							NA	
VW-6	4"	5'-12.5'							NA	
VW-7	4"	5'-15'							NA	
VW-8	4"	5'-15'							NA	
VW-9	4"	5'-15'							NA	
RW-1	6"	11'-26'	7.05	9.11			Removed 5 gal water			Removed 40ml. product
AS-1 (vent)	2"	5'-15'	7.38	7.87			Removed 5 gal water			Removed 360 ml. product
AS-2 (vent)	2"	5'-15'	ND	7.25						

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'	ND	9.13					
AS-2	2"	28.8'-30.8'	ND	9.00					

Total Sparge Data

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: MAdler Date: 4-19-95

Project# 0805-123.02

ARCO 2035 Soil Vapor Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 0805-123.02

Remarks: System OFF upon arrival . Took DTW & DTFP at all vapor & sparge wells
Installed catalyst in SVE unit Started unit on Fresh air at 11:58
Total HRS = 4563.25 Total HRS at 16:14 = 4567.40

Unscheduled site visit [] Scheduled site visit [X] RW-1 Counter 422380

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	0859	Effluent (E-1) (12"x12")	
System Status (on or off)	OFF	Stack Temperature (°F)	754
Shutdown Time (24:00 hour)	~~16:14~~ 16:14	SYSTEM	
Restart Time (24:00 hour)	11:58	Total Flow (3") (cfm) (before blower-same as Para-Fax)	52-55
Reading Time (24:00 hour)	13:57	Fire Box Temperature (°F)	652
Well Field WF-1 (3")		Set Point (°F)	650
Vacuum (in. of H2O)	29.8-31.3	TOTAL HOURS	4565.12
Velocity (ft/min)	100-450	Electric Meter (kwh)	07357
Temperature (°F)	72	Natural Gas (cf)	1742
Aeration Tank AT-1 (2")		**AIR MONITORING**	
Vacuum (in. of H2O)	19.7-20.0		
Velocity (ft/min)	2500		
Flow (scfm)	48-49		
After Blower I-2 (4") (AFTER DILUTION)	Dilution closed		
Total Pressure (in. of H2O)	.25		
Total Flow (in. of H2O)	.012		
Influent I-1 (3") (BEFORE DILUTION)			
Vacuum (in. of H2O)	31.8		
Velocity (ft/min)	1200-1500		

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:	2.0		7.0	>1000	NA	

PID (ppm)	CAL GAS:					
Date:						
Date:						

Lab samples taken for analysis at: WF-1 AT-1 I-1 E-1
PARA-FAX on/off: ON
Cleaned K.O. pump pre-filter ? yes/no: No

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	FID (ppm)	PID (ppm)	Bubbler (on/off)	Remarks
VW-1	4"	5'-17'	9.49	9.96	Full ON	8-9			NA	
VW-2	4"	5'-17'	9.55	9.89	Full on	9.8			NA	
VW-3	4"	4.5'-9.5'	ND	6.80	CLOSED				NA	
VW-4	4"	5'-17'	8.13	8.60					NA	
VW-5	4"	4.5'-14.5'	ND	9.02					NA	
VW-6	4"	5'-12.5'	ND	6.06					NA	
VW-7	4"	5'-15'	7.77	8.56					NA	
VW-8	4"	5'-15'	ND	7.65					NA	
VW-9	4"	5'-15'	8.04	8.06					NA	
RW-1	6"	11'-26'	9.81	9.94	Full ON	9.5-10.2			ON	Static w.l.
AS-1 (vent)	2"	5'-15'	8.98	9.75	Full ON	10			—	
AS-2 (vent)	2"	5'-15'	ND	8.59	Full ON	10			—	

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'	ND	10.03	CLOSED				
AS-2	2"	28.8'-30.8'	ND	9.95	CLOSED				

Total Sparge Data

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: MAdler Date: 6/20/95

Project# 0805-123.02
ARCO 2035 Soil Vapor Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 0805-123.02

Remarks: Restarted System at 11:54 . Took readings . Took lab samples at AS-1/AS-2 vent common, VW-1, VW-2, and RW-1. Could not take FID's of well heads - the flame would go out due to low O_2. Unscheduled site visit [] Scheduled site visit [✓]

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	11:25	**Effluent (E-1) (12"x12")**	
System Status (on or off)	OFF	Stack Temperature (°F)	814
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	11:54	Total Flow (3") (cfm) (before blower-same as Para-Fax)	40-46
Reading Time (24:00 hour)	12:33	Fire Box Temperature (°F)	685
Well Field WF-1 (3")		Set Point (°F)	650
Vacuum (in. of H2O)	36.3-37.5	TOTAL HOURS	4568.02
Velocity (ft/min)	150-450	Electric Meter (kwh)	07393
Temperature (°F)	70	Natural Gas (cf)	1746
Aeration Tank AT-1 (2")		**AIR MONITORING**	
Vacuum (in. of H2O)	19.3		
Velocity (ft/min)	1700		
Flow (scfm)	38		
After Blower I-2 (4") (AFTER DILUTION)	Dilution Closed	**PID (ppm)** CAL GAS:	
Total Pressure (in. of H2O)	.25		
Total Flow (in. of H2O)	.005		
Influent I-1 (3") (BEFORE DILUTION)		**Lab samples taken for analysis at:** AS-1/AS-2 vent, VW-1, VW-2, RW-1	
Vacuum (in. of H2O)	37.9-36.6	**PARA-FAX on/off**	ON
Velocity (ft/min)	900-1100	**Cleaned K.O. pump pre-filter ? yes/no**	No

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						

PID (ppm)						
Date:						
Date:						

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	FID (ppm)	PID (ppm)	Bubbler (on/off)	Remarks
VW-1	4"	5'-17'			Full ON	17.0			NA	
VW-2	4"	5'-17'			Full ON	15.0			NA	
VW-3	4"	4.5'-9.5'			CLOSED	0			NA	
VW-4	4"	5'-17'				14.0			NA	
VW-5	4"	4.5'-14.5'				7.0			NA	
VW-6	4"	5'-12.5'				34.0			NA	
VW-7	4"	5'-15'				16.0			NA	
VW-8	4"	5'-15'				2.0			NA	
VW-9	4"	5'-15'				8.0			NA	
RW-1	6"	11'-26'			Full ON	19.0			ON	
AS-1 (vent)	2"	5'-15'			Full ON	15.0	} common		—	
AS-2 (vent)	2"	5'-15'			Full ON	15.0			—	

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'							
AS-2	2"	28.8'-30.8'							

Total Sparge Data

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: MAdler Date: 6/26/95

Project# 0805-123.02

ARCO 2035 Soil Vapor Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 0805-123.02

Remarks: System on & running fault readings changed temp. chart Para-Fax hasn't been sending faxes – light shows it's on – just Sent Test FAX – OK

Unscheduled site visit [X] Scheduled site visit [ ]

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	1050	**Effluent (E-1) (12"x12")**	
System Status (on or off)	ON	Stack Temperature (°F)	701
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	—	Total Flow (3") (cfm) (before blower-same as Para-Fax)	50-58
Reading Time (24:00 hour)	1159	Fire Box Temperature (°F)	654
Well Field WF-1 (3")		Set Point (°F)	650
Vacuum (in. of H2O)	33.2-33.6	TOTAL HOURS	4663.56
Velocity (ft/min)	300-600	Electric Meter (kwh)	07854
Temperature (°F)	71	Natural Gas (cf)	1775
Aeration Tank AT-1 (2")		**AIR MONITORING**	
Vacuum (in. of H2O)	20		
Velocity (ft/min)	1700		
Flow (scfm)	46-47		
After Blower I-2 (4") (AFTER DILUTION)		**PID (ppm)** CAL GAS:	
Total Pressure (in. of H2O)	.25		
Total Flow (in. of H2O)	.01		
Influent I-1 (3") (BEFORE DILUTION)		**Lab samples taken for analysis at:**	none
Vacuum (in. of H2O)	33.2-33.6	**PARA-FAX on/off**	ON
Velocity (ft/min)	850 - ~~900~~	**Cleaned K.O. pump pre-filter ? yes/no**	NO

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						

PID (ppm)						
Date:						
Date:						

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (In. of H2O)	FID (ppm)	PID (ppm)	Bubbler (on/off)	Remarks
VW-1	4"	5'-17'							NA	
VW-2	4"	5'-17'							NA	
VW-3	4"	4.5'-9.5'							NA	
VW-4	4"	5'-17'							NA	
VW-5	4"	4.5'-14.5'							NA	
VW-6	4"	5'-12.5'							NA	
VW-7	4"	5'-15'							NA	
VW-8	4"	5'-15'							NA	
VW-9	4"	5'-15'							NA	
RW-1	6"	11'-26'								
AS-1 (vent)	2"	5'-15'								
AS-2 (vent)	2"	5'-15'								

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'							
AS-2	2"	28.8'-30.8'							

Total Sparge Data

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: MAdler Date: 6/30/95

Project# 0805-123.02

ARCO 2035 Soil Vapor Extraction System

APPENDIX D

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, SVE SYSTEM AIR SAMPLES, SECOND QUARTER 1995

Columbia
Analytical
Services INC.

June 23, 1995

Service Request No. S950767

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 2035 / 0805-123.02**

Dear Ms. Yelamanchili:

Attached are the results of the vapor sample(s) submitted to our lab on June 21, 1995. For your reference, these analyses have been assigned our service request number S950767.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is 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
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 MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.02
Sample Matrix: Vapor

Service Request: S950767
Date Collected: 6/20/95
Date Received: 6/21/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name:	**WF-1**	**AT-1**	**I-1**
Lab Code:	S950767-001	S950767-002	S950767-003
Date Analyzed:	6/20/95	6/20/95	6/20/95

Analyte	**MRL**			
Benzene	0.5	170	6.2	34
Toluene	0.5	340	4.5	68
Ethylbenzene	0.5	120	1.0	29
Total Xylenes	1	530	9.9	150
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20	<400*	ND	<100*
C_5 - C_8 Hydrocarbons	20	10,000	25	1,600
C_9 - C_{12} Hydrocarbons	20	2,000	33	520
Gasoline Fraction (C_5-C_{12})	60	12,000	ND	2,200

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 6/23/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.02
Sample Matrix: Vapor

Service Request: S950767
Date Collected: 6/20/95
Date Received: 6/21/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

	Sample Name:	**E-1**	**Method Blank**
	Lab Code:	S950767-004	S950621-VB1
	Date Analyzed:	6/21/95	6/21/95
Analyte	**MRL**		
Benzene	0.5	1.5	ND
Toluene	0.5	2.0	ND
Ethylbenzene	0.5	0.6	ND
Total Xylenes	1	3.3	ND
Total Volatile Hydrocarbons			
C_1 - C_4 Hydrocarbons	20	ND	ND
C_5 - C_8 Hydrocarbons	20	26	ND
C_9 - C_{12} Hydrocarbons	20	ND	ND
Gasoline Fraction (C_5-C_{12})	60	ND	ND

Approved By: _____ Date: 6/23/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.02
Sample Matrix: Vapor

Service Request: S950767
Date Collected: 6/20/95
Date Received: 6/21/95
Date Extracted: NA
Date Analyzed: 6/21/95

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: WF-1
Lab Code: S950767-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	167	153	160	9
Toluene	0.5	337	302	320	11
Ethylbenzene	0.5	118	94.8	106	22
Xylenes, Total	1	533	419	476	24
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	<400*	<400*	<400*	<1
C_5 - C_8 Hydrocarbons	20	10,400	10,200	10,300	32
C_9 - C_{12} Hydrocarbons	20	2,010	1,470	1,740	31
Gasoline Fraction (C_5-C_{12})	60	12,400	11,700	12,050	6

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 6/23/95

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035/EMCON Project No. 0805-123.02

Service Request: S950767
Date Analyzed: 6/21/95

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	16	16.6	104	85-115
Toluene	16	16.7	104	85-115
Ethylbenzene	16	16.5	103	85-115
Xylenes, Total	48	49.3	103	85-115
Gasoline	200	218	109	90-110

Approved By: _____ Date: 6/23/95

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 8121.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) S. Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 4083778697	Telephone no. (Consultant) 4084537300	Fax no. (Consultant) 4084530452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA.		Contract number 07077

Method of shipment: Tech

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 8020/EPA 8020	BTEX/TPH 8020/8015 EPA M8020/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	O_2 CO_2
WF-1		1			X			6/20/95	1544		X										
AT-1		1			X				1538		X										
I-1		2			X				1549		X										X
E-1		1			X				1531		X										

Special detection Limit/reporting: please report result of TPH-G & BTEX in ug/m^3 O_2 & CO_2 in %

Special QA/QC

Remarks: 0805-123.02

Lab number: S95-0767

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days 6/23 X
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample: ok		Temperature received: 4°	
Relinquished by sampler	Date 6/21/95	Time 0907	Received by
Relinquished by	Date	Time	Received by
Relinquished by Joanne Brown	Date 6-21-95	Time 1630	Received by laboratory / Date / Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

CAS-S: GBTEX CAS-L: O_2/CO_2

Columbia Analytical Services inc.

June 30, 1995

Service Request No. S950801

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 2035 / EMCON Project No. 0805-123.02**

Dear Ms. Yelamanchili:

Attached are the results of the vapor sample(s) submitted to our lab on June 26, 1995. For your reference, these analyses have been assigned our service request number S950801.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is 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
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 MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Facility No. 2035 / EMCON Project No. 0805-123.02
Sample Matrix: Vapor

Service Request: S950801
Date Collected: 6/26/95
Date Received: 6/26/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name:	**AS-1/AS-2**	**RW-1**	**VW-1**
Lab Code:	S950801-001	S950801-002	S950801-003
Date Analyzed:	6/27/95	6/27/95	6/27/95

Analyte	**MRL**			
Benzene	0.5	600	130	600
Toluene	0.5	790	170	3,000
Ethylbenzene	0.5	480	80	1,200
Total Xylenes	1	2,200	510	5,600
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20	<4,000 *	<200 *	<4,000 *
C_5 - C_8 Hydrocarbons	20	33,000	2,900	43,000
C_9 - C_{12} Hydrocarbons	20	7,400	1,900	16,000
Gasoline Fraction (C_5-C_{12})	60	40,000	4,800	59,000

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 7/6/95

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950801
Project:	ARCO Facility No. 2035 / EMCON Project No. 0805-123.02	**Date Collected:**	6/26/95
Sample Matrix:	Vapor	**Date Received:**	6/26/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

		Sample Name:	**VW-2**	**Method Blank**
		Lab Code:	S950801-004	S950627-VB
		Date Analyzed:	6/27/95	6/27/95
Analyte	**MRL**			
Benzene	0.5		820	ND
Toluene	0.5		670	ND
Ethylbenzene	0.5		330	ND
Total Xylenes	1		1,900	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20		<4,000 *	ND
C_5 - C_8 Hydrocarbons	20		48,000	ND
C_9 - C_{12} Hydrocarbons	20		7,700	ND
Gasoline Fraction (C_5-C_{12})	60		56,000	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: _____ Date: 7/6/95

3S22/060194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035 / EMCON Project No. 0805-123.02
Sample Matrix: Vapor

Service Request: S950801
Date Collected: 6/26/95
Date Received: 6/26/95
Date Extracted: NA
Date Analyzed: 6/27/95

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: RW-1
Lab Code: S950801-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	129	123	126	5
Toluene	0.5	167	157	162	6
Ethylbenzene	0.5	79.6	74.6	77.1	6
Xylenes, Total	1	508	469	488.5	8
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	<200 *	<200 *	<200 *	<1
C_5 - C_8 Hydrocarbons	20	2,870	2,730	2800	5
C_9 - C_{12} Hydrocarbons	20	1,910	1,720	1815	10
Gasoline Fraction (C_5-C_{12})	60	4,780	4,450	4615	7

Approved By: _____ Date: 7/6/95

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035 / EMCON Project No. 0805-123.02

Service Request: S950801
Date Analyzed: 6/27/95

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	16	14.2	89	85-115
Toluene	16	14.4	90	85-115
Ethylbenzene	16	14.3	89	85-115
Xylenes, Total	48	42.9	89	85-115
Gasoline	200	199	100	90-110

Approved By: _____ Date: 7/6/95

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 8121.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) S. Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408 377-8697	Telephone no. (Consultant) 408 453 7300	Fax no. (Consultant) 408 453 0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood	San Jose, CA. 95131	Contract number 07077

Method of shipment: Tech

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Vapor)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	
AS-1/AS-2 Vent	1	1			X			6/26/95	13:17		X										
RW-1	2	1			X			6/26/95	13:38		X										
VW-1	3	1			X			6/26/95	13:32		X										
VW-2	4	1			X			6/26/95	13:43		X										

Special detection Limit/reporting: please report in mg/m³

Special QA/QC

Remarks: 0805-123.02

Lab number: 595-0801

Condition of sample: ok

Temperature received: RT

Relinquished by sampler	Date 6/26/95	Time 1730	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory — Date 6/26/95 — Time 17:30

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

Due 7/11

Columbia Analytical Services, Inc.

June 27, 1995

Service Request No.: S950767

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Ave.
San Jose, Ca 95131

RE: **ARCO Facility No. 2035 / Project No. 0805-123.02**

Dear Ms. Yelamanchili:

Attached are the results oxygen and carbon dioxide analyses for the vapor sample submitted to our laboratory on June 21, 1995. For your information, these analyses have been assigned our service request number S950767. The results from the Gasoline/BTEX analyses were distributed to you on June 23, 1995 on a separate report.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

CVR_PG.DOC 1/26/95

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

Columbia Analytical Services, Inc.

Acronyms

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
COD	Chemical Oxygen Demand
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH	Department of Health
EPA	US Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank Sample
ICP	Inductively Coupled Plasma atomic emission spectrometry (an instrument used to measure concentration of metals in samples)
ICV	Initial Calibration Verification sample
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit
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
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, Third Edition, 1986.
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.
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:	EMCON	**Service Request:**	L952669
Project:	ARCO Products Company #2035/#0805-123.02	**Date Collected:**	6/20/95
Sample Matrix:	Vapor	**Date Received:**	6/21/95
		Date Extracted:	NA

Permanent Gases*
Units: (ppmV)

	Sample Name:	**I-1**	**Method Blank**
	Lab Code:	L952669-001	L952669-MB
	Date Analyzed:	6/22/95	6/22/95
Analyte	**MRL**		
Carbon Dioxide	10000	ND	ND
Oxygen	10000	220000	ND

* Analysis performed using gas chromatography with a thermal conductivity detector.

Approved By: Eydie Schwartz Date: 6/23/95

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Vapor

Service Request: L952669
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 6/22/95

Duplicate Summary
Permanent Gases*
Units: (ppmV)

Sample Name: I-1
Lab Code: L952669-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Carbon Dioxide	10000	ND	ND	ND	NA
Oxygen	10000	222000	213000	218000	4

* Analysis performed using gas chromatography with a thermal conductivity detector.

Approved By: Eydie Schwartz Date: 6/23/95

DUP1A/060194
L952669.XLS - prmgsdup 6/23/95

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 8121.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) S. Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 4083778697	Telephone no. (Consultant) 4084537300	Fax no. (Consultant) 4084530452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA.		Contract number 07077

Method of shipment: Tech

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other (Vapor)	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH Gas EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	O_2 CO_2
WF-1		1			X			6/20/95	1544		X										
AT-1		1			X				1538		X										
I-1		2			X				1549		X										X
E-1		1			X				1531		X										

Special detection Limit/reporting: please report results of TPH-G & BTEX in mg/m^3 O_2 & CO_2 in %

Special QA/QC

Remarks: 0805-123.02

Lab number: 595-2669 595-0767

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days 6/23 ☒
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample: ok

Temperature received: RT

	Date	Time		Date	Time
Relinquished by sampler	6/21/95	0907	Received by		
Relinquished by			Received by		
Relinquished by Joanne Brown	6-21-95	1630	Received by laboratory	6-22-95	0900

CAS-S: GBTEX CAS-L: C_2/CO_2

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

COLUMBIA ANALYTICAL SERVICES, INC.
INTRA-LABORATORY SERVICE REQUEST

Originating Lab:	CAS - San Jose	Receiving Lab:	CAS - Golden State
Service Request No.	S9500767	Service Request No.	L95-
Project Chemist:	Steve Green	Project Chemist:	Eydie Schwartz
Samples Received:	6/21/95	Date Prelims Due:	
	JUN 26 1995	Hard Copy Due:	6/23/95

REPORTING INFORMATION

See Chain of Custody [X]

Client Name:	EMCON/SAN JOSE	Project Manager:	SAILAJA YELAMANCHILI
Address:		Project Name:	ARCO 2035-ALBANY
		Project No.	0805-123.02
FAX Prelims To:	CAS - San Jose	Mail Report To:	CAS - San Jose
Attn:	Steve Green	Attn:	Steve Green
FAX No:	408-437-9356		

Tier I [ ] Tier II [ ] Tier III [ ] Tier IV [ ] Other [x]

BILLING INFORMATION

Originating Lab will Invoice: [x] Receiving Lab Bill Client Directly: [ ]

Invoice To: ARCO/MIKE WHELAN Address: TO 8121.00

Purchase Order No.

Service Requested: Std [ ] 24 Hr [ ] 48 Hr [x] 3-5 Day [ ] Other [ ]_____

PRICING

Matrix	Analysis	Qty	Unit Price	Ext. Price	CAS Location
AIR	O2/CO2	1	119.00	119.00	CAS-Golden State
	@ RUSH TURNAROUND				
			Subtotal	119.00	
Discount Percent:			Discount Amount		
			Total	119.00	

Special Instructions Attached? Yes [ ] No [x] Today's Date: 6/26/95 8:57

EMCON - San Jose

CHAIN OF CUSTODY /LABORATORY ANALYSIS REQUEST FORM

1921 Ringwood Avenue, San Jose, CA 95131 (408) 453-7300 FAX (408) 437-9526

Date 6-13-95 Page ___ of ___

Project Name: Lorentz Barrel & Drum
Project No: 0787-003.052
Project Manager: David Larsen

Company/Address: EMCON
1921 Ringwood Avenue
San Jose, CA 95131
Phone: (408) 453-7300

Sampler's Signature:

Sample I.D.	Date	Time	LAB I.D.	Sample Matrix	Number of Containers	Analysis Requested: EPA 8240	REMARKS
						HCl	Preservations
MW-2	6/12/95	1455	1	H_2O	2	X	
MW-11	6/13/95	1130	2		2	X	
MW-22	6/13/95	1215	3		2	X	
MW-34	6/13/95	1035	4		2	X	
MW-25	6/13/95	0910	5		2	X	
MW-41	6/12/95	1238	6		2	X	
MW-42	6/12/95	1410	7		2	X	
MW-39	6/13/95	1250	8		2	X	
MW-40	6/13/95	1338	9		2	X	

Relinquished By	Received By
Signature: [signature]	Signature: [signature]
Printed Name: MANUel Gallegos	Printed Name: Joanne Brown
Firm: Emcon	Firm: CAS-SJ
Date/Time: 6-13-95 / 1515	Date/Time: 6-13-95 1515

Relinquished By	Received By
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr ___ 5 day
X Standard (~10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP, MS MSD, as required, may be charged as samples)
X III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION
P.O. # ___
Bill to: ___

SAMPLE RECEIPT
Shipping VIA: ___
Shipping #: ___
Condition: ___
Lab No: 5950237

Special Instructions/Comments:
Tier III laboratory QC

Please submit original analytical results and data validation report to David Larsen

Run MS/MSD on samples collected from well MW-40

See attached SAR

EMCON - San Jose

CHAIN OF CUSTODY /LABORATORY ANALYSIS REQUEST FORM

1921 Ringwood Avenue, San Jose, CA 95131 (408) 453-7300 FAX (408) 437-9526

Date 6-13-95 Page ___ of ___

Project Name: Lorentz Barrel & Drum
Project No: 0787-003.052
Project Manager: David Larsen

Company/Address: EMCON
1921 Ringwood Avenue
San Jose, CA 95131
Phone: (408) 453-7300

Sampler's Signature:

Sample I.D.	Date	Time	LAB I.D.	Sample Matrix	Number of Containers	Analysis Requested: EPA 8240	REMARKS
						HCl	Preservations
MW-38	6/3/95	1410	10	H_2O	2	X	
FB-1	6/12/95	1505	11		2	X	
FB-2	6/13/95	1415	12		2	X	
TB-1	↓	—	13		2	X	
DUP-1	↓	—	14	↓	2	X	

Relinquished By	Received By
Signature: [signature]	Signature: [signature]
Printed Name: Emcon	Printed Name: CAS-SJ
Firm	Firm
Date/Time: 6-13-95 1515	Date/Time: 6-13-95 1515

Relinquished By	Received By
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr ___ 5 day
X Standard (~10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP, MS MSD, as required, may be charged as samples)
X III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION
P.O. # ___
Bill to: ___

SAMPLE RECEIPT
Shipping VIA: ___
Shipping #: ___
Condition: ___
Lab No: 595073-7

Special Instructions/Comments:
Tier III laboratory QC

Please submit original analytical results and data validation report to David Larsen

Run MS/MSD on samples collected from well MW-40

See attached SAR

APPENDIX E

FIELD DATA SHEETS, GROUNDWATER TREATMENT SYSTEM, OPERATION AND MAINTENANCE VISITS, SECOND QUARTER 1995

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction Syste. . EMCON Project # 0805-123.02

Remarks: System off due to Arsenic levels even discharge ~~limit~~ limit Turned system on to sample E-1 & I-1 for Arsenic Field Filtered both samples and Took extra samples non filtered at E-1 & I-1 also took readings

Ran System from 1601 to 1628 then shut off system.

2min after taking RW-1 DTW retook DTW= 7.80

Unscheduled site visit [X] Scheduled site visit [ ]

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	1036
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	1628
Restart Time (24:00 hour)	1601
Reading Time (24:00 hour)	1627
RW-1 Ejection Pressure (psi)	17
RW-1 Stroke volume (ml)	—
RW-1 Strokes per minute	—
RW-1 Stroke counter	421964
RW-1 DTFP (ft)	7.00
RW-1 DTW (ft)	7.15
Transfer pump flow rate (gpm)	—
GAC-1 Pressure (psi)	6.5
GAC-2 Pressure (psi)	3.0
#1 Filter IN (psi)	4
#1 Filter OUT (psi)	2
#2 Filter IN (psi)	17
#2 Filter OUT (psi)	10
Air compressor run time (hrs)	38.3
Air compressor discharge (psi)	90
Regulated discharge (psi)	65
RW-1 RUN TIME (hrs) 1601-1628	.5
TOTALIZER (gal)	313571.6

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?		X	
Change Bag Filters ?		X	
Check Scale Control Unit ?		X	
Check Aeration Tank Baffles ?		X	
Clean Pad ?		X	
Backwash Carbon Drums ?		X	

Notes:

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP	EC	pH
E-1 (E) effluent			
I-3 (D) between carbon drums			
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: MAdler Date: 3-8-95

ARCO 2035 Groundwater Extraction System
Project # 0805-123.02

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction System . EMCON Project # 0805-123.02

Remarks: Restarted system today

gallons at start = 31357.2 Started pump at 12:17

Turned on bubbler to RW-1 at 13:55

RW-1 Bubbler reg at compound = 10-14 PSI at well head = 4 PSI

* Installed Hourmeter on well field Solenoid before leaving site *

RW-1 at static = 9.94' DTFP = 9.81'

Took samples at I-1 I-2 I-3 and E-1

Shut off system at 16:14 Total gallons = 31695.0

Unscheduled site visit ☐ Scheduled site visit ☒

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	0859
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	~~0840~~ 16:14
Restart Time (24:00 hour)	12:17
Reading Time (24:00 hour)	1422
RW-1 Ejection Pressure (psi)	NA
RW-1 Stroke volume (ml)	
RW-1 Strokes per minute	
RW-1 Stroke counter	
RW-1 DTFP (ft)	
RW-1 DTW (ft)	
Transfer pump flow rate (gpm)	5
GAC-1 Pressure (psi)	6.0
GAC-2 Pressure (psi)	3.0
#1 Filter IN (psi)	3.5
#1 Filter OUT (psi)	3.0
#2 Filter IN (psi)	19.0
#2 Filter OUT (psi)	9.0
Air compressor run time (hrs)	39.1
Air compressor discharge (psi)	100
Regulated discharge (psi)	70
RW-1 RUN TIME (hrs)	
TOTALIZER (gal)	31505.2

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?		X	
Change Bag Filters ?	X		
Check Scale Control Unit ?		X	
Check Aeration Tank Baffles ?	X		OK
Clean Pad ?	X		
Backwash Carbon Drums ?		X	

Notes:

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent	69.6	1100	7.18
I-3 (D) between carbon drums	69.0	1088	7.69
I-2 after aeration tank	69.1	1102	8.13
I-1 (A) influent	69.3	1151	7.31

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: MAdler Date: 6/20/95

Project # 0805-123.02
ARCO 2035 Groundwater Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction System . EMCON Project # 0805-123.02

Remarks:

Restarted groundwater system at 12:00

RW-1 Air bubbler pressure = 6-10psi

Flow is to low to see on flow meter - meter starts at 4 SCFM

* Well Field Hour Meter (RW-1 Runtime started at zero at 12:00)

Unscheduled site visit [] Scheduled site visit []

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	11:25
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	—
Restart Time (24:00 hour)	12:00
Reading Time (24:00 hour)	14:04
RW-1 Ejection Pressure (psi)	NA
RW-1 Stroke volume (ml)	
RW-1 Strokes per minute	
RW-1 Stroke counter	
RW-1 DTFP (ft)	
RW-1 DTW (ft)	
Transfer pump flow rate (gpm)	
GAC-1 Pressure (psi)	6.0
GAC-2 Pressure (psi)	3.0
#1 Filter IN (psi)	3.5
#1 Filter OUT (psi)	3.0
#2 Filter IN (psi)	18.0
#2 Filter OUT (psi)	10.0
Air compressor run time (hrs)	40.0
Air compressor discharge (psi)	100
Regulated discharge (psi)	70.0
RW-1 RUN TIME (hrs)	2.1
TOTALIZER (gal)	31927.0

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?		X	
Change Bag Filters ?		X	OK
Check Scale Control Unit ?		X	
Check Aeration Tank Baffles ?		X	
Clean Pad ?		X	
Backwash Carbon Drums ?		X	

Notes:

System came right on - No problems

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent			
I-3 (D) between carbon drums			
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: MAdler Date: 6/26/95

Project # 0805-123.02
ARCO 2035 Groundwater Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction System . EMCON Project # 0805-123.02

Remarks: System off upon arrival - Turned on by hitting reset switch - all OK Dont Knows why air was off
Met EBMUD on site sampled E-1 for EPA 624 & 625
EBMUD sampled for these parameters. No paper work was checked. He asked some general questions about the aeration Tank only

Unscheduled site visit [X] Scheduled site visit []

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	1050
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	
Restart Time (24:00 hour)	1051
Reading Time (24:00 hour)	1100
RW-1 Ejection Pressure (psi)	
RW-1 Stroke volume (ml)	
RW-1 Strokes per minute	
RW-1 Stroke counter	
RW-1 DTFP (ft)	
RW-1 DTW (ft)	
Transfer pump flow rate (gpm)	
GAC-1 Pressure (psi)	21.0
GAC-2 Pressure (psi)	11.0
#1 Filter IN (psi)	4.0
#1 Filter OUT (psi)	3.0
#2 Filter IN (psi)	8.0
#2 Filter OUT (psi)	2.5
Air compressor run time (hrs)	64.7
Air compressor discharge (psi)	100
Regulated discharge (psi)	72
RW-1 RUN TIME (hrs)	94.9
TOTALIZER (gal)	40932.5

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?	X		
Change Bag Filters ?		X	
Check Scale Control Unit ?		X	
Check Aeration Tank Baffles ?		X	
Clean Pad ?		X	
Backwash Carbon Drums ?		X	

Notes:

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent	69.5	1105	7.16
I-3 (D) between carbon drums			
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:
Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: MAdler Date: 6/30/95

Project # 0805-123.02
ARCO 2035 Groundwater Extraction System

APPENDIX F

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, GROUNDWATER TREATMENT SYSTEM, SECOND QUARTER 1995

Columbia Analytical Services, Inc.

June 30, 1995

Service Request No. S950766

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 2035 / EMCON Project No. 0805-123.02**

Dear Ms. Yelamanchili:

Attached are the results of the water sample(s) submitted to our lab on June 21, 1995. For your reference, these analyses have been assigned our service request number S950766.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is 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
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 MRL
NIOSH	National Institute for Occupational Safety and Health
NR	Not Requested
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S950766
Project:	ARCO Facility No. 2035 / EMCON Project No. 0805-123.02	**Date Collected:**	6/20/95
Sample Matrix:	Water	**Date Received:**	6/21/95
		Date Extracted:	NA
		Date Analyzed:	6/27,28/95

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Analyte:	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name **Lab Code**					
I-1A S950766-001	20,000	1,500	1,200	220	2,300
I-2 S950766-002	2,200	30	27	11	77
I-3 (D) S950766-003	ND	ND	ND	ND	ND
E-1 (E) S950766-004	ND	ND	ND	ND	ND
Method Blank S950627-WB	ND	ND	ND	ND	ND
Method Blank S950628-WB	ND	ND	ND	ND	ND

Approved By: _____ Date: 7/5/95

5ABTXGAS/061694

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035 / EMCON Project No. 0805-123.02
Sample Matrix: Water

Service Request: S950766
Date Collected: 6/20/95
Date Received: 6/21/95
Date Extracted: NA
Date Analyzed: 6/27,28/95

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Lab Code	Percent Recovery α,α,α-Trifluorotoluene
I-1A	S950766-001	91
I-2	S950766-002	101
I-3 (D)	S950766-003	89
E-1 (E)	S950766-004	89
I-1A (MS)	S950766-001MS	93
I-1A (DMS)	S950766-001DMS	92
Method Blank	S950627-WB	90
Method Blank	S950628-WB	92

CAS Acceptance Limits: 69-116

Approved By: _____ Date: 7/5/95

SUR1/062994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Facility No. 2035 / EMCON Project No. 0805-123.02

Service Request: S950766
Date Analyzed: 6/27/95

Initial Calibration Verification (ICV) Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	23.4	94	85-115
Toluene	25	22.8	91	85-115
Ethylbenzene	25	23.1	92	85-115
Xylenes, Total	75	66.5	89	85-115
Gasoline	250	229	92	90-110

Approved By: GA Date: 7/5/95

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	S950766
Project:	ARCO Facility No. 2035 / EMCON Project No. 0805-123.02	**Date Collected:**	6/20/95
Sample Matrix:	Water	**Date Received:**	6/21/95
		Date Extracted:	NA
		Date Analyzed:	6/27/95

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
Units: ug/L (ppb)

Sample Name: I-1A
Lab Code: S950766-001

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	1,000	1,000	1,520	2,540	2,540	102	102	75-135	<1
Toluene	1,000	1,000	1,240	2,240	2,220	100	98	73-136	1
Ethylbenzene	1,000	1,000	216	1,210	1,230	99	101	69-142	2

Approved By: _____ Date: 7/5/95

DMS1S/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 8121.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) S. Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 7083778697	Telephone no. (Consultant) 4084537300	Fax no. (Consultant) 4084530452
Consultant name	Address (Consultant)		Contract number 07077

Method of shipment: Tech

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
I-1(A)	1	2		X		X	X	6/20/95	1450		X											
I-2	2	2		X		X	X		1444		X											
I-3(D)	3	2		X		X	X		1440		X											
E-1(E)	4	2		X		X	X	↓	1437		X											

Special detection Limit/reporting

Special QA/QC

Remarks: 0805-123.02

Lab number: 595-0766

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample: ok.		Temperature received: cool	
Relinquished by sampler	Date 6/21/95 Time 0907	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by (laboratory)	Date 6/21/95 Time 0907

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

Due 7/6

Columbia
Analytical
Services inc.

July 14, 1995 Service Request No. S950831

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **ARCO Facility No. 2035 / EMCON Project No. 0805-123.82**

Dear Ms. Yelamanchili:

Attached are the results of the water sample(s) submitted to our lab on June 30, 1995. For your reference, these analyses have been assigned our service request number S950831.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Steven L. Green
Project Chemist

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is 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
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 MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: L952821
Date Collected: 6/30/95
Date Received: 6/30/95
Date Extracted: 7/7/95

Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625
Units: µg/L (ppb)

	Sample Name:	**E-1 (E)**	**Method Blank**
	Lab Code:	L952821-001	L952821-MB
	Date Analyzed:	7/10/95	7/10/95
Base Neutral Analyte	**MRL**		
N-Nitrosodimethylamine	5	ND	ND
Aniline	5	ND	ND
Bis(2-chloroethyl) Ether	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
Bis(2-chloroisopropyl) Ether	5	ND	ND
N-Nitrosodi-n-propylamine	5	ND	ND
Hexachloroethane	5	ND	ND
Nitrobenzene	5	ND	ND
Isophorone	5	ND	ND
Bis(2-chloroethoxy)methane	5	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND
Naphthalene	5	ND	ND
4-Chloroaniline	5	ND	ND
Hexachlorobutadiene	5	ND	ND
2-Methylnaphthalene	5	ND	ND
Hexachlorocyclopentadiene	10	ND	ND
2-Chloronaphthalene	5	ND	ND
2-Nitroaniline	20	ND	ND
Dimethyl Phthalate	5	ND	ND
Acenaphthylene	5	ND	ND
3-Nitroaniline	20	ND	ND
Acenaphthene	5	ND	ND
Dibenzofuran	5	ND	ND
2,4-Dinitrotoluene	5	ND	ND

Approved By: Steve Green for Cydnie Schwartz Date: 7/15/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: L952821
Date Collected: 6/30/95
Date Received: 6/30/95
Date Extracted: 7/7/95

Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625
Units: µg/L (ppb)

	Sample Name:	E-1 (E)	Method Blank
	Lab Code:	L952821-001	L952821-MB
	Date Analyzed:	7/10/95	7/10/95
Base Neutral Analyte	**MRL**		
2,6-Dinitrotoluene	5	ND	ND
Diethyl Phthalate	5	7	ND
4-Chlorophenyl Phenyl Ether	5	ND	ND
Fluorene	5	ND	ND
4-Nitroaniline	20	ND	ND
N-Nitrosodiphenylamine	5	ND	ND
4-Bromophenyl Phenyl Ether	5	ND	ND
Hexachlorobenzene	5	ND	ND
Phenanthrene	5	ND	ND
Anthracene	5	ND	ND
Di-n-butyl Phthalate	5	ND	ND
Fluoranthene	5	ND	ND
Pyrene	5	ND	ND
Butylbenzyl Phthalate	5	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benz(a)anthracene	5	ND	ND
Bis(2-ethylhexyl) Phthalate	5	ND	ND
Chrysene	5	ND	ND
Di-n-octyl Phthalate	5	ND	ND
Benzo(b)fluoranthene	5	ND	ND
Benzo(k)fluoranthene	5	ND	ND
Benzo(a)pyrene	5	ND	ND
Indeno(1,2,3-c,d)pyrene	5	ND	ND
Dibenz(a,h)anthracene	5	ND	ND
Benzo(g,h,i)perylene	5	ND	ND
Pyridine	10	ND	ND

Approved By: Steven Green for Cyndie Schwartz Date: 7/15/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: L952821
Date Collected: 6/30/95
Date Received: 6/30/95
Date Extracted: 7/7/95

Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625
Units: µg/L (ppb)

	Sample Name:	E-1 (E)	Method Blank
	Lab Code:	L952821-001	L952821-MB
	Date Analyzed:	7/10/95	7/10/95
Acid Analyte	**MRL**		
Phenol	5	ND	ND
2-Chlorophenol	5	ND	ND
Benzyl Alcohol	10	ND	ND
2-Methylphenol	5	ND	ND
3- and 4-Methylphenol[a]	5	ND	ND
2-Nitrophenol	5	ND	ND
2,4-Dimethylphenol	5	ND	ND
Benzoic Acid	50	ND	ND
2,4-Dichlorophenol	5	ND	ND
4-Chloro-3-methylphenol	5	ND	ND
2,4,6-Trichlorophenol	5	ND	ND
2,4,5-Trichlorophenol	5	ND	ND
2,4-Dinitrophenol	50	ND	ND
4-Nitrophenol	50	ND	ND
2-Methyl-4,6-dinitrophenol	20	ND	ND
Pentachlorophenol	30	ND	ND

[a] Quantified as 4-Methylphenol.

Approved By: Steve Mizen for Eydie Schwartz Date: 7/15/95

3S3PBNA/060794

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: S950831
Date Collected: 6/30/95
Date Received: 6/30/95
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8240
Units: ug/L (ppb)

	Sample Name:	**E-1 (E)**	**Method Blank**
	Lab Code:	S950831-001	S950705-WB
	Date Analyzed:	7/5/95	7/5/95
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
Trichlorofluoromethane (CFC 11)	1	ND	ND
Trichlorotrifluoroethane (CFC 113)	10	ND	ND
1,1-Dichloroethene	1	ND	ND
Acetone	20	ND	ND
Carbon Disulfide	1	ND	ND
Methylene Chloride	10	ND	ND
trans-1,2-Dichloroethene	1	ND	ND
cis-1,2-Dichloroethene	1	ND	ND
2-Butanone (MEK)	10	ND	ND
1,1-Dichloroethane	1	ND	ND
Chloroform	1	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND
Carbon Tetrachloride	1	ND	ND
Benzene	1	ND	ND
1,2-Dichloroethane	1	ND	ND
Vinyl Acetate	10	ND	ND
Trichloroethene (TCE)	1	ND	ND
1,2-Dichloropropane	1	ND	ND
Bromodichloromethane	1	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
trans-1,3-Dichloropropene	1	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND
2-Hexanone	10	ND	ND
Toluene	1	ND	ND
cis-1,3-Dichloropropene	1	ND	ND
1,1,2-Trichloroethane	1	ND	ND
Tetrachloroethene (PCE)	1	ND	ND
Dibromochloromethane	1	ND	ND
Chlorobenzene	1	ND	ND
Ethylbenzene	1	ND	ND
Styrene	1	ND	ND
Total Xylenes	5	ND	ND
Bromoform	1	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND
1,3-Dichlorobenzene	1	ND	ND
1,4-Dichlorobenzene	1	ND	ND
1,2-Dichlorobenzene	1	ND	ND

Approved By: _____ Date: 7/15/95

3S44/060194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: L952821
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625

		Percent Recovery					
Sample Name	**Lab Code**	2FP	PHL	TBP	NBZ	FBP	TPH
E-1 (E)	L952821-001	51	33	63	89	78	86
Method Blank	L952821-MB	57	37	72	87	82	99
Matrix Spike	L952796-1MS	52	32	85	84	88	89
Duplicate Matrix Spike	L952796-1DMS	49	30	79	80	82	83
CAS Acceptance Limits:		21-100	10-94	10-123	35-114	43-116	33-141

2FP	2-Fluorophenol
PHL	Phenol-D_6
TBP	2,4,6-Tribromophenol
NBZ	Nitrobenzene-D_5
FBP	2-Fluorobiphenyl
TPH	Terphenyl-D_{14}

Approved By: Steven Shen for Cydis Schwartz Date: 7/15/95

SUR6/060894

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: L952821
Date Collected: NA
Date Received: NA
Date Extracted: 7/5/95
Date Analyzed: 7/6/95

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625
Units: µg/L (ppb)

Sample Name: BATCH QC
Lab Code: L952796-001

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Phenol	50.0	50.0	ND	16.4	15.6	33	31	12-89	5
2-Chlorophenol	50.0	50.0	ND	42.1	40.2	84	80	27-123	5
1,4-Dichlorobenzene	50.0	50.0	ND	36.5	35.4	73	71	36-97	3
N-Nitrosodi-n-propylamine	50.0	50.0	ND	44.6	42.2	89	84	41-116	6
1,2,4-Trichlorobenzene	50.0	50.0	ND	38.5	37.2	77	74	39-98	3
4-Chloro-3-methylphenol	50.0	50.0	ND	41.6	39.6	83	79	23-97	5
Acenaphthene	50.0	50.0	ND	40.2	38.5	80	77	46-118	4
4-Nitrophenol	50.0	50.0	ND	10.0	10.1	20	20	10-80	1
2,4-Dinitrotoluene	50.0	50.0	ND	45.8	45.0	92	90	24-96	2
Pentachlorophenol	50.0	50.0	ND	34.6	33.4	69	67	9-103	4
Pyrene	50.0	50.0	ND	44.5	41.7	89	83	26-127	6

Approved By: Steve Wren for Cynthia Schwartz Date: 7/15/95

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
LCS Matrix: Water

Service Request: L952821
Date Collected: NA
Date Received: NA
Date Extracted: 7/7/95
Date Analyzed: 7/10/95

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Method 625
Units: µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Phenol	50.0	17.5	35	5-112
2-Chlorophenol	50.0	40.6	81	23-134
1,4-Dichlorobenzene	50.0	36.1	72	20-124
N-Nitrosodi-n-propylamine	50.0	43.6	87	D-230
1,2,4-Trichlorobenzene	50.0	38.3	77	44-142
4-Chloro-3-methylphenol	50.0	39.6	79	22-147
Acenaphthene	50.0	40.0	80	47-145
4-Nitrophenol	50.0	18.7	37	D-132
2,4-Dinitrotoluene	50.0	45.1	90	39-139
Pentachlorophenol	50.0	30.3	61	14-176
Pyrene	50.0	46.7	93	52-115

D Detected; result must be greater than zero.

Approved By: Steve Green for Cynthia Schwartz Date: 7/15/95

LCS/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02
Sample Matrix: Water

Service Request: S950831
Date Collected: 6/30/95
Date Received: 6/30/95
Date Extracted: NA
Date Analyzed: 7/5/95

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240

Sample Name	Lab Code	Percent Recovery 1,2-Dichloroethane-D_4	Toluene-D_8	4-Bromofluorobenzene
E-1 (E)	S950831-001	93	96	93
MS	S950808-001MS	102	102	93
DMS	S950808-001DMS	95	98	92
Method Blank	S950705-WB	95	96	92
CAS Acceptance Limits:		76-114	88-110	86-115

Approved By: _____ Date: 7/5/95

SUR3/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	S950831
Project:	ARCO Products Company #2035/#0805-123.02	**Date Collected:**	6/30/95
Sample Matrix:	Water	**Date Received:**	6/30/95
		Date Extracted:	NA
		Date Analyzed:	7/5/95

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 8240
Units: ug/L (ppb)

Sample Name: Batch QC
Lab Code: S950808-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
1,1-Dichloroethene	250	250	ND	233	236	93	94	61-145	1
Trichloroethene	250	250	ND	277	281	111	112	71-120	1
Chlorobenzene	250	250	ND	259	266	104	106	75-130	3
Toluene	250	250	364	647	643	113	112	76-125	<1
Benzene	250	250	64.7	330	336	106	108	76-127	2

Approved By: _____ Date: 7/15/95

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #2035/#0805-123.02

Service Request: S950701
Date Analyzed: 5/24/95

Initial Calibration Verification (ICV) Summary
Volatile Organic Compounds
EPA Method 624
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Chloromethane	50	55.0	110	70-130
Vinyl Chloride	50	52.8	106	70-130
Bromomethane	50	52.8	106	70-130
Chloroethane	50	55.8	112	70-130
Acetone	50	65.1	130	70-130
1,1-Dichloroethene	50	46.4	93	70-130
Carbon Disulfide	50	45.8	92	70-130
Methylene Chloride	50	46.3	93	70-130
trans-1,2-Dichloroethene	50	46.3	93	70-130
cis-1,2-Dichloroethene	50	45.4	91	70-130
1,1-Dichloroethane	50	47.0	94	70-130
Vinyl Acetate	50	39.7	79	70-130
2-Butanone (MEK)	50	46.6	93	70-130
Chloroform	50	46.1	92	70-130
1,1,1-Trichloroethane (TCA)	50	47.4	95	70-130
Carbon Tetrachloride	50	46.7	93	70-130
Benzene	50	40.3	81	70-130
1,2-Dichloroethane	50	45.2	90	70-130
Trichloroethene (TCE)	50	44.6	89	70-130
1,2-Dichloropropane	50	40.2	80	70-130
Bromodichloromethane	50	41.1	82	70-130
2-Chloroethyl Vinyl Ether	50	37.8	76	70-130
2-Hexanone	50	56.6	113	70-130
trans-1,3-Dichloropropene	50	45.1	90	70-130
Toluene	50	40.6	81	70-130
cis-1,3-Dichloropropene	50	39.6	79	70-130
1,1,2-Trichloroethane	50	46.5	93	70-130
Tetrachloroethene (PCE)	50	48.9	98	70-130
Dibromochloromethane	50	46.9	94	70-130
Chlorobenzene	50	47.2	94	70-130
Ethylbenzene	50	46.8	94	70-130
o- Xylene	50	46.4	93	70-130
Styrene	50	45.0	90	70-130
Bromoform	50	41.2	82	70-130
1,1,2,2-Tetrachloroethane	50	44.8	90	70-130

Approved By:  Date: 7/15/95

ICV41/060194

ARCO Products Company

Division of AtlanticRichfieldCompany

Task Order No. 00 8121.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) S. Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408 3778697	Telephone no. (Consultant) 4084537300	Fax no. (Consultant) 4084530452
Consultant name Emcon	Address (Consultant) 1921 Ringwood San Jose, CA. 95131		Contract number 07077

Method of shipment: Tech.

Sample I.D.	Lab no. 495821	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.2 ☐ 413.1 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
E-1(E)	1	4		X		X	X	6/30/95	1105							✓	X			

Special detection Limit/reporting

Special QA/QC

Remarks: 0805-123.82

Lab number: 2824 595-0831

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample: OK

Temperature received: Cool

	Date	Time		Date	Time
Relinquished by sampler	6/30/95	1430	Received by		
Relinquished by	7/5/95	17:00	Received by		CAS-SJ
Relinquished by			Received by laboratory	7-6-95	0900

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC-3292 (2-91)

Due 7/7

Columbia Analytical Services, Inc.

May 1, 1995

Service Request No.: S950485/K9502374

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, California 95131

RE: **ARCO #2035/EMCON Project No. 0805-123.02**

Dear Ms. Yelamanchili:

Attached are the results of the water samples submitted to our laboratory on April 19, 1995. For your information, these analyses have been assigned our service request number S950485 and were performed by our Kelso, Washington laboratory.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Steven L. Green
Project Chemist

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
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
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
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 MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO #2035/EMCON Project No. 085-123.02
Sample Matrix: Water

Service Request: K9402374
Date Collected: 4/19/95
Date Received: 4/20/95
Date Extracted: 4/20/95
Date Analyzed: 4/20/95

Total Arsenic
EPA Method 200.8
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
MW-5(a)	K9502374-001	1	58
MW-5(b)	K9502374-002	1	38
Method Blank	K9502374-MB	1	ND

Approved By: Howard Power Date: 4/26/95

1AMRL/102594
K9502374.XLS - Sample 4/26/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO #2035/EMCON Project No. 085-123.02
Sample Matrix: Water

Service Request: K9402374
Date Collected: 4/19/95
Date Received: 4/20/95
Date Extracted: 4/20/95
Date Analyzed: 4/20/95

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals
Units: µg/L (ppb)

Sample Name: MW-5(a)
Lab Code: K9502374-001

Analyte	MRL	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Arsenic	1	40	58	108	108	125	125	75-125	<1

Approved By: _____ Date: 4/26/95

DMS1SMRL/102194
K9502374.XLS - DMS 4/26/95

(K2374)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 8121.06

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	Project manager (Consultant) Sailaja Yelamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 4083778697	Telephone no. (Consultant) 4084537300	Fax no. (Consultant) 4084530452	Contract number 07077
Consultant name EMCON	Address (Consultant) 1921 Ringwood San Jose, CA.		Method of shipment Tech

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Arsenic	CAP/MS
MW-5(a)		1		X		X	X	4-17-95	1037												X	
MW-5(b)		1		X		X	X	4-17-95	1114												X	

Special detection Limit/reporting: Arsenic 1.0 ug/l

Special QA/QC

Remarks: 0805-123.02

Lab number K95-2374
9504185

Turnaround time
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☒
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample: ok

Temperature received: Cool

	Date	Time		Date	Time
Relinquished by/sampler: [signature]	4-19-95	1456	Received by: Joanne Brown CAS-SJ	4-19-95	1500
Relinquished by			Received by		
Relinquished by: Joanne Brown	4-19-95	1700	Received by laboratory: [signature] CAS-K	4/20/95	1000

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

KLab: AS/ICP-MS