



**EMCON**

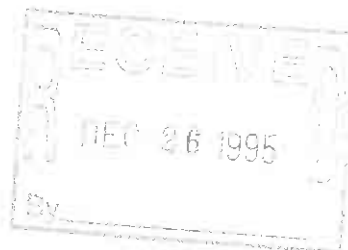
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

Date December 22, 1995  
Project 20805-130.003

*12/14/95*

To:

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



*3876*

We are enclosing:

Copies	Description
<u>1</u>	<u>Third quarter 1995 groundwater monitoring results</u>
<u> </u>	<u>for ARCO service station 2185, Oakland, California</u>
<u> </u>	<u> </u>

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

Comments:

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

*David Larsen*  
David Larsen  
Project Coordinator

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





Date:

December 22, 1995

Re: ARCO Station #

2185 • 9800 East 14th Street • Oakland, CA  
Third Quarter 1995 Groundwater Monitoring Results

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

Submitted by:

A handwritten signature in cursive script that reads "Michael R. Whelan".

Michael R. Whelan  
Environmental Engineer



December 14, 1995  
Project 20805-130.003

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

Re: Third quarter 1995 groundwater monitoring program results and intrinsic bioremediation study, ARCO service station 2185, Oakland, California

Dear Mr. Whelan:

This letter presents the results of the third quarter 1995 groundwater monitoring program at ARCO Products Company (ARCO) service station 2185, 9800 East 14th Street, Oakland, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

## **BACKGROUND**

Seven on-site groundwater monitoring wells (MW-1 through MW-6 and MW-8), three off-site groundwater monitoring well (MW-7, MW-9, and MW-10), and two vapor extraction wells (VW-1 and VW-2) were installed as part of a comprehensive site assessment conducted at this site between May 1991 and April 1994. Please refer to forthcoming *Well Installation Report, ARCO Service Station 2185, Oakland, California* for more details.

## **MONITORING PROGRAM FIELD PROCEDURES**

A program of quarterly groundwater monitoring was initiated during the third quarter of 1992 to provide information concerning water quality, flow direction, and gradient consistent with ACHCSA and Regional Water Quality Control Board (RWQCB) requirements for underground fuel tank investigations. Water levels are measured quarterly in wells MW-1 through MW-10. Wells MW-1 and MW-4 are sampled annually, during the first quarter of the year. Wells MW-2, MW-3, and MW-5 through MW-10 are sampled quarterly.

EMCON performed the third quarter 1995 groundwater monitoring event on September 20, 1995. Field work this quarter included (1) measuring depths to groundwater and subjectively analyzing groundwater for the presence of floating product



in wells MW-1 through MW-10, (2) purging and subsequently sampling groundwater monitoring wells MW-2, MW-3, and MW-5 through MW-10 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. Copies of all field data sheets from the third quarter 1995 groundwater monitoring event are included in Appendix A.

## **ANALYTICAL PROCEDURES**

Groundwater samples collected during third quarter 1995 monitoring were analyzed for total petroleum hydrocarbons as gasoline (TPHG), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl-tert-butyl ether (MTBE). 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 and MTBE by USEPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (EPA SW-846, November 1986, third edition). 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.

As requested by ACHCSA in a letter dated June 1, 1995, additional samples were collected from selected monitoring wells and analyzed for indicators of intrinsic biodegradation. Groundwater samples were collected from monitoring wells MW-2, MW-3, MW-5, MW-6, and MW-8. Samples were analyzed for total heterotrophic microorganisms and hydrocarbon-specific degraders using spread plate techniques based on *Methods of Soil Analysis, Part 2 Chemical and Microbiological Properties* (American Society of Agronomy, Soil Science Society of America, 1982, Madison, WI Chapter 37), and Method 9215C, *Standard Methods for the Examination of Water and Wastes, 17th Edition, 1989*. In addition, groundwater samples were also analyzed for ammonia as nitrogen, total Kjeldahl nitrogen, pH, orthophosphate, and dissolved potassium using U.S. EPA Methods 350.3, 351.4, 150.1, 365.2, and 6010A, respectively. Redox potential was measured in the field with a redox potential probe, and in the laboratory using ASTM Method D1498-76. Dissolved-oxygen readings were collected in the field using a colorimetric analysis.

## **MONITORING PROGRAM RESULTS**

Results of the third quarter 1995 groundwater monitoring event are summarized in Table 1 and illustrated in Figure 2. 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 analysis of petroleum hydrocarbons and their constituents. The results of microbial enumeration and inorganic chemical analyses for the evaluation of intrinsic bioremediation are summarized in Table 4. Copies of the third quarter 1995 analytical results and chain-of-custody documentation are included in Appendix B.

Groundwater elevation data collected on September 20, 1995, indicate that groundwater beneath the site flows west-southwest with an approximate hydraulic gradient of 0.005 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the third quarter of 1995.

Groundwater samples from wells MW-9 and MW-10 did not contain detectable concentrations of TPHG, BTEX, or MTBE. Samples from well MW-7 contained 400 micrograms per liter ( $\mu\text{g/L}$ ) of discrete components eluting in the gasoline range (the chromatogram does not match the typical gasoline fingerprint), but did not contain detectable concentrations of TPHG, BTEX, or MTBE. Based on discussions with the laboratory chemist, the discrete components eluting in the gasoline range appear to be several chlorinated compounds. A copy of the chromatogram for TPHG analysis of groundwater from well MW-7 is included in Appendix B. Samples from well MW-8 contained 470  $\mu\text{g/L}$  of TPHG and 52  $\mu\text{g/L}$  of MTBE, but did not contain detectable concentrations of benzene.

Samples from wells MW-2, MW-3, MW-5, and MW-6 contained concentrations of TPHG ranging from 1,200 to 3,300  $\mu\text{g/L}$ , and concentrations of benzene ranging from 1 to 47  $\mu\text{g/L}$ . Samples from wells MW-3 and MW-5 contained 280 and 70  $\mu\text{g/L}$  of MTBE, respectively, but samples from wells MW-2 and MW-6 did not contain detectable concentrations of MTBE (<5 and <30  $\mu\text{g/L}$ , respectively).

## **INTRINSIC BIOREMEDIATION STUDY RESULTS**

The results of microbial enumeration and inorganic chemical analyses performed during the third quarter 1995 are summarized in Table 4. Plots of select bioremediation parameters versus radial distance from the central portion of the groundwater plume (MW-3) suggest that intrinsic biodegradation is occurring at the site. Figure 3 contains plots of TPHG concentration and TPHG-utilizing bacteria versus distance from monitoring well MW-3. Consistent with intrinsic bioremediation processes, this graphs indicates a direct relationship between the concentrations of TPHG and TPHG-utilizing bacteria. Figure 4 contains plots of field dissolved-oxygen, laboratory redox potential, and TPHG-utilizing bacteria versus distance from monitoring well MW-3. Consistent with intrinsic bioremediation processes, this graph shows an inverse relationship between TPHG-utilizing bacteria and dissolved-oxygen, and an inverse relationship between TPHG-utilizing bacteria and redox potential. As requested by the ACHCSA in its letter

dated June 1, 1995, bacterial enumeration and other related inorganic analyses will be collected annually to monitor changes in intrinsic bioremediation parameters.

## **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 the site activities performed during the third quarter of 1995 and those anticipated for the fourth quarter of 1995.

### **Third Quarter 1995 Activities**

- Prepared and submitted quarterly groundwater monitoring report for second quarter 1995.
- Performed quarterly groundwater monitoring for third quarter 1995.
- Installed off-site monitoring wells MW-9 and MW-10.
- As requested by ACHCSA in a letter dated June 1, 1995, collected additional groundwater samples to monitor intrinsic biodegradation.

### **Work Anticipated for Fourth Quarter 1995**

- Prepare and submit quarterly groundwater monitoring report for third quarter 1995.
- Perform quarterly groundwater monitoring for fourth quarter 1995.

Mr. Michael Whelan  
December 14, 1995  
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Project 20805-130.003

Please call if you have questions.

Sincerely,

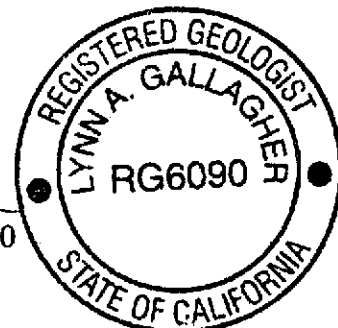
EMCON



David Larsen  
Project Coordinator



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



- Attachments:
- Table 1 - Groundwater Monitoring Data, Third Quarter 1995
  - Table 2 - Historical Groundwater Elevation Data
  - Table 3 - Historical Groundwater Analytical Data, Petroleum Hydrocarbons and Their Constituents
  - Table 4 - Intrinsic Bioremediation Parameters
  - Figure 1 - Site Location
  - Figure 2 - Groundwater Data, Third Quarter 1995
  - Figure 3 - Intrinsic Bioremediation Parameters, TPHG and TPHG-Utilizing Bacteria
  - Figure 4 - Intrinsic Bioremediation Parameters, Dissolved-Oxygen, Redox Potential, and TPHG-Utilizing Bacteria
  - Appendix A - Field Data Sheets, Third Quarter 1995 Groundwater Monitoring Event
  - Appendix B - Analytical Results and Chain-of-Custody Documentation, Third Quarter 1995

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

Table 1  
Groundwater Monitoring Data  
Third Quarter 1995

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-30-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	09-20-95	29.15	11.70	17.45	ND	WSW	0.005	09-20-95	Not sampled: not scheduled for chemical analysis						
MW-2	09-20-95	28.47	11.37	17.10	ND	WSW	0.005	09-21-95	1200	1	<1	68	16	<5	--
MW-3	09-20-95	28.57	11.30	17.27	ND	WSW	0.005	09-21-95	2100	12	<3	77	38	280	--
MW-4	09-20-95	29.21	12.02	17.19	ND	WSW	0.005	09-20-95	Not sampled: not scheduled for chemical analysis						
MW-5	09-20-95	28.12	10.90	17.22	ND	WSW	0.005	09-21-95	1500	47	2	120	86	70	--
MW-6	09-20-95	27.79	10.75	17.04	ND	WSW	0.005	09-21-95	3300	36	<5	360	120	<30	--
MW-7	09-20-95	27.88	11.52	16.36	ND	WSW	0.005	09-20-95	<400*	<0.8	<0.5	<0.5	<0.5	<7	--
MW-8	09-20-95	28.08	11.07	17.01	ND	WSW	0.005	09-21-95	470	<0.5	<0.5	3	1.2	52	--
MW-9	09-20-95	27.73	11.67	16.06	ND	WSW	0.005	09-20-95	<50	<0.5	<0.5	<0.5	<0.5	<4	--
MW-10	09-20-95	27.55	10.65	16.90	ND	WSW	0.005	09-21-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--

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

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

ft/ft: foot per foot

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: methyl-tert-butyl ether

ND: none detected

WSW: west-southwest

--: not analyzed

\*: chromatogram does not match the typical gasoline fingerprint



Table 2  
Historical Groundwater Elevation Data

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-1	07-24-92	29.15	13.38	15.77	ND	NR	NR
MW-1	08-26-92	29.15	13.92	15.23	ND	NR	NR
MW-1	09-22-92	29.15	14.18	14.97	ND	NR	NR
MW-1	10-19-92	29.15	14.52	14.63	ND	NR	NR
MW-1	11-23-92	29.15	14.54	14.61	ND	NR	NR
MW-1	12-16-92	29.15	12.20	16.95	ND	NR	NR
MW-1	01-14-93	29.15	9.32	19.83	ND	NR	NR
MW-1	02-26-93	29.15	9.38	19.77	ND	NR	NR
MW-1	03-26-93	29.15	10.04	19.11	ND	NR	NR
MW-1	04-09-93	29.15	10.50	18.65	ND	NR	NR
MW-1	05-19-93	29.15	11.26	17.89	ND	NR	NR
MW-1	06-17-93	29.15	11.53	17.62	ND	NR	NR
MW-1	07-28-93	29.15	12.00	17.15	ND	NR	NR
MW-1	08-23-93	29.15	12.31	16.84	ND	NR	NR
MW-1	09-28-93	29.15	12.60	16.55	ND	NR	NR
MW-1	10-11-93	29.15	12.74	16.41	ND	NR	NR
MW-1	11-16-93	29.15	12.96	16.19	ND	NR	NR
MW-1	12-16-93	29.15	11.68	17.47	ND	NR	NR
MW-1	02-08-94	29.15	11.29	17.86	ND	NR	NR
MW-1	03-04-94	29.15	10.61	18.54	ND	NR	NR
MW-1	05-10-94	29.15	11.12	18.03	ND	NR	NR
MW-1	08-12-94	29.15	12.55	16.60	ND	SW	0.004
MW-1	09-23-94	29.15	11.27	17.88	ND	NR	NR
MW-1	11-22-94	29.15	11.12	18.03	ND	SW	0.003
MW-1	03-15-95	29.15	8.50	20.65	ND	NW	0.01
MW-1	05-30-95	29.15	10.28	18.87	ND	SW	0.005
MW-1	09-20-95	29.15	11.70	17.45	ND	WSW	0.005

Table 2  
Historical Groundwater Elevation Data

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
MW-2	07-24-92	28.47	12.95	15.52	ND	NR	NR
MW-2	08-26-92	28.47	13.55	14.92	ND	NR	NR
MW-2	09-22-92	28.47	13.78	14.69	ND	NR	NR
MW-2	10-19-92	28.47	14.09	14.38	ND	NR	NR
MW-2	11-23-92	28.47	14.06	14.41	ND	NR	NR
MW-2	12-16-92	28.47	11.70	16.77	ND	NR	NR
MW-2	01-14-93	28.47	8.87	19.60	ND	NR	NR
MW-2	02-26-93	28.47	8.98	19.49	ND	NR	NR
MW-2	03-26-93	28.47	9.57	18.90	ND	NR	NR
MW-2	04-09-93	28.47	10.02	18.45	ND	NR	NR
MW-2	05-19-93	28.47	10.81	17.66	ND	NR	NR
MW-2	06-17-93	28.47	11.08	17.39	ND	NR	NR
MW-2	07-28-93	28.47	11.60	16.87	ND	NR	NR
MW-2	08-23-93	28.47	11.90	16.57	ND	NR	NR
MW-2	09-28-93	28.47	12.17	16.30	ND	NR	NR
MW-2	10-11-93	28.47	12.31	16.16	ND	NR	NR
MW-2	11-16-93	28.47	12.54	15.93	Sheen	NR	NR
MW-2	12-16-93	28.47	11.29	17.18	ND	NR	NR
MW-2	02-08-94	28.47	10.85	17.62	ND	NR	NR
MW-2	03-04-94	28.47	10.16	18.31	ND	NR	NR
MW-2	05-10-94	28.47	10.70	17.77	ND	NR	NR
MW-2	08-12-94	28.47	12.12	16.35	ND	SW	0.004
MW-2	09-23-94	28.47	10.87	17.60	ND	NR	NR
MW-2	11-22-94	28.47	10.65	17.82	ND	SW	0.003
MW-2	03-15-95	28.47	8.37	20.10	ND	NW	0.01
MW-2	05-30-95	28.47	9.95	18.52	ND	SW	0.005
MW-2	09-20-95	28.47	11.37	17.10	ND	WSW	0.005

Table 2  
Historical Groundwater Elevation Data

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
MW-3	07-24-92	28.57	12.90	15.67	Sheen	NR	NR
MW-3	08-26-92	28.57	13.51	15.06	ND	NR	NR
MW-3	09-22-92	28.57	13.73	14.84	ND	NR	NR
MW-3	10-19-92	28.57	14.04	14.53	ND	NR	NR
MW-3	11-23-92	28.57	14.02	14.55	ND	NR	NR
MW-3	12-16-92	28.57	11.73	16.84	ND	NR	NR
MW-3	01-14-93	28.57	9.17	19.40	ND	NR	NR
MW-3	02-26-93	28.57	9.30	19.27	ND	NR	NR
MW-3	03-26-93	28.57	9.83	18.74	ND	NR	NR
MW-3	04-09-93	28.57	10.22	18.35	ND	NR	NR
MW-3	05-19-93	28.57	10.91	17.66	ND	NR	NR
MW-3	06-17-93	28.57	10.74	17.83	ND	NR	NR
MW-3	07-28-93	28.57	11.60	16.97	ND	NR	NR
MW-3	08-23-93	28.57	11.93	16.64	ND	NR	NR
MW-3	09-28-93	28.57	12.13	16.44	ND	NR	NR
MW-3	10-11-93	28.57	12.26	16.31	ND	NR	NR
MW-3	11-16-93	28.57	12.48	16.09	ND	NR	NR
MW-3	12-16-93	28.57	11.26	17.31	ND	NR	NR
MW-3	02-08-94	28.57	10.93	17.64	ND	NR	NR
MW-3	03-04-94	28.57	10.33	18.24	ND	NR	NR
MW-3	05-10-94	28.57	10.77	17.80	ND	NR	NR
MW-3	08-12-94	28.57	12.07	16.50	ND	SW	0.004
MW-3	09-23-94	28.57	10.94	17.63	ND	NR	NR
MW-3	11-22-94	28.57	10.76	17.81	ND	SW	0.003
MW-3	03-15-95	28.57	8.47	20.10	ND	NW	0.01
MW-3	05-30-95	28.57	10.03	18.54	ND	SW	0.005
MW-3	09-20-95	28.57	11.30	17.27	ND	WSW	0.005

Table 2  
Historical Groundwater Elevation Data

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-4	07-24-92	29.21	13.68	15.53	ND	NR	NR
MW-4	08-26-92	29.21	14.12	15.09	ND	NR	NR
MW-4	09-22-92	29.21	14.46	14.75	ND	NR	NR
MW-4	10-19-92	29.21	14.74	14.47	ND	NR	NR
MW-4	11-23-92	29.21	14.75	14.46	ND	NR	NR
MW-4	12-16-92	29.21	12.45	16.76	ND	NR	NR
MW-4	01-14-93	29.21	9.46	19.75	ND	NR	NR
MW-4	02-26-93	29.21	9.54	19.67	ND	NR	NR
MW-4	03-26-93	29.21	10.19	19.02	ND	NR	NR
MW-4	04-09-93	29.21	10.67	18.54	ND	NR	NR
MW-4	05-19-93	29.21	11.52	17.69	ND	NR	NR
MW-4	06-17-93	29.21	11.79	17.42	ND	NR	NR
MW-4	07-28-93	29.21	12.30	16.91	ND	NR	NR
MW-4	08-23-93	29.21	12.60	16.61	ND	NR	NR
MW-4	09-28-93	29.21	12.88	16.33	ND	NR	NR
MW-4	10-11-93	29.21	13.03	16.18	ND	NR	NR
MW-4	11-16-93	29.21	13.24	15.97	ND	NR	NR
MW-4	12-16-93	29.21	11.96	17.25	ND	NR	NR
MW-4	02-08-94	29.21	11.54	17.67	ND	NR	NR
MW-4	03-04-94	29.21	10.84	18.37	ND	NR	NR
MW-4	05-10-94	29.21	11.38	17.83	ND	NR	NR
MW-4	08-12-94	29.21	12.82	16.39	ND	SW	0.004
MW-4	09-23-94	29.21	11.54	17.67	ND	NR	NR
MW-4	11-22-94	29.21	11.35	17.86	ND	SW	0.003
MW-4	03-15-95	29.21	8.69	20.52	ND	NW	0.01
MW-4	05-30-95	29.21	10.57	18.64	ND	SW	0.005
MW-4	09-20-95	29.21	12.02	17.19	ND	WSW	0.005

Table 2  
Historical Groundwater Elevation Data

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing	Depth	Groundwater	Floating Product	Groundwater	Hydraulic Gradient
		Elevation	to Water	Elevation	Thickness	Flow Direction	
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
MW-5	02-26-93	28.12	9.00	19.12	ND	NR	NR
MW-5	03-26-93	28.12	9.41	18.71	ND	NR	NR
MW-5	04-09-93	28.12	9.80	18.32	ND	NR	NR
MW-5	05-19-93	28.12	10.50	17.62	ND	NR	NR
MW-5	06-17-93	28.12	10.73	17.39	ND	NR	NR
MW-5	07-28-93	28.12	11.15	16.97	ND	NR	NR
MW-5	08-23-93	28.12	11.43	16.69	ND	NR	NR
MW-5	09-28-93	28.12	11.66	16.46	ND	NR	NR
MW-5	10-11-93	28.12	11.80	16.32	ND	NR	NR
MW-5	11-16-93	28.12	12.00	16.12	ND	NR	NR
MW-5	12-16-93	28.12	10.81	17.31	ND	NR	NR
MW-5	02-08-94	28.12	10.53	17.59	ND	NR	NR
MW-5	03-04-94	28.12	9.89	18.23	ND	NR	NR
MW-5	05-10-94	28.12	10.37	17.75	ND	NR	NR
MW-5	08-12-94	28.12	11.60	16.52	ND	SW	0.004
MW-5	09-23-94	28.12	10.52	17.60	ND	NR	NR
MW-5	11-22-94	28.12	10.29	17.83	ND	SW	0.003
MW-5	03-15-95	28.12	8.47	19.65	ND	NW	0.01
MW-5	05-30-95	28.12	9.69	18.43	ND	SW	0.005
MW-5	09-20-95	28.12	10.90	17.22	ND	WSW	0.005
MW-6	02-26-93	27.79	8.47	19.32	ND	NR	NR
MW-6	03-26-93	27.79	9.07	18.72	ND	NR	NR
MW-6	04-09-93	27.79	9.53	18.26	ND	NR	NR
MW-6	05-19-93	27.79	10.23	17.56	ND	NR	NR
MW-6	06-17-93	27.79	10.51	17.28	ND	NR	NR
MW-6	07-28-93	27.79	10.98	16.81	ND	NR	NR
MW-6	08-23-93	27.79	11.28	16.51	ND	NR	NR
MW-6	09-28-93	27.79	11.50	16.29	ND	NR	NR
MW-6	10-11-93	27.79	11.65	16.14	ND	NR	NR
MW-6	11-16-93	27.79	11.87	15.92	ND	NR	NR
MW-6	12-16-93	27.79	10.63	17.16	ND	NR	NR
MW-6	02-08-94	27.79	10.28	17.51	ND	NR	NR
MW-6	03-04-94	27.79	9.67	18.12	ND	NR	NR
MW-6	05-10-94	27.79	10.13	17.66	ND	NR	NR
MW-6	08-12-94	27.79	11.44	16.35	ND	SW	0.004
MW-6	09-23-94	27.79	10.27	17.52	ND	NR	NR
MW-6	11-22-94	27.79	10.10	17.69	ND	SW	0.003
MW-6	03-15-95	27.79	7.75	20.04	ND	NW	0.01
MW-6	05-30-95	27.79	9.48	18.31	ND	SW	0.005
MW-6	09-20-95	27.79	10.75	17.04	ND	WSW	0.005

**Table 2**  
**Historical Groundwater Elevation Data**

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-7	07-28-93	27.88	11.67	16.21	ND	NR	NR
MW-7	08-23-93	27.88	12.00	15.88	ND	NR	NR
MW-7	09-28-93	27.88	12.17	15.71	ND	NR	NR
MW-7	10-11-93	27.88	12.33	15.55	ND	NR	NR
MW-7	11-16-93	27.88	12.46	15.42	ND	NR	NR
MW-7	12-16-93	27.88	11.23	16.65	ND	NR	NR
MW-7	02-08-94	27.88	10.83	17.05	ND	NR	NR
MW-7	03-04-94	27.88	10.13	17.75	ND	NR	NR
MW-7	05-10-94	27.88	10.68	17.20	ND	NR	NR
MW-7	08-12-94	27.88	12.05	15.83	ND	SW	0.004
MW-7	09-23-94	27.88	10.85	17.03	ND	NR	NR
MW-7	11-22-94	27.88	10.60	17.28	ND	SW	0.003
MW-7	03-15-95	27.88	8.13	19.75	ND	NW	0.01
MW-7	05-30-95	27.88	10.14	17.74	ND	SW	0.005
MW-7	09-20-95	27.88	11.52	16.36	ND	WSW	0.005
MW-8	08-12-94	NR	11.43	NR	ND	NR	NR
MW-8	09-23-94	NR	10.99	NR	ND	NR	NR
MW-8	11-22-94	NR	10.42	NR	ND	NR	NR
MW-8	03-15-95	NR	8.43	NR	ND	NR	NR
MW-8	05-30-95	NR	9.86	NR	ND	NR	NR
MW-8	09-20-95	28.08	11.07	17.01	ND	WSW	0.005
MW-9	09-20-95	27.73	11.67	16.06	ND	WSW	0.005
MW-10	09-20-95	27.55	10.65	16.90	ND	WSW	0.005

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 or not measurable  
SW: southwest  
NW: northwest  
WSW: west-southwest

Table 3  
 Historical Groundwater Analytical Data  
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHC LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L
MW-1	07-24-92	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	10-19-92	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	01-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	04-09-93	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	08-23-93	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	10-11-93	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	03-04-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	05-10-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	08-12-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	11-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	05-30-95	Not sampled; not scheduled for chemical analysis						
MW-1	09-20-95	Not sampled; not scheduled for chemical analysis						
MW-2	07-24-92	5900	510	<10	370	430	--	--
MW-2	10-19-92	4100	110	<10	100	62	--	--
MW-2	01-14-93	12000	700	10	720	680	--	--
MW-2	04-09-93	8400	220	<10	480	320	--	--
MW-2	08-23-93	3700	89	<5	230	150	--	--
MW-2	10-11-93	2700	50	<2.5	<140	68	--	--
MW-2	03-04-94	3100	49	<2.5	180	98	--	--
MW-2	05-10-94	3100	39	<2.5	220	99	--	--
MW-2	08-12-94	1800	13	<2.5	120	35	--	--
MW-2	11-22-94	2300	45	<0.5	190	93	--	--
MW-2	03-15-95	2100	7.4	<2.5	130	39	--	--
MW-2	05-30-95	1700	3.3	<2.5	120	31	--	--
MW-2	09-21-95	1200	1	<1	68	16	<5	--
MW-3	07-24-92	Not sampled: well contained floating product						
MW-3	10-19-92	42000	740	1100	1500	5700	--	--
MW-3	01-14-93	44000	1100	840	2200	9600	--	--
MW-3	04-09-93	21000	33	69	350	1600	--	--
MW-3	08-23-93	13000	63	21	530	1300	--	--
MW-3	10-11-93	11000	56	13	530	1200	--	--
MW-3	03-04-94	17000	50	<10	790	1600	--	--
MW-3	05-10-94	14000	32	<10	710	1200	--	--
MW-3	08-12-94	13000	37	<10	640	970	--	--
MW-3	11-22-94	15000	150	<10	1300	2000	--	--
MW-3	03-15-95	2000	<2.5	<2.5	88	82	--	--
MW-3	05-30-95	2000	3.2	<2.5	70	46	--	--
MW-3	09-21-95	2100	12	<3	77	38	280	--

Table 3  
 Historical Groundwater Analytical Data  
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG LUFT Method	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE
			EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-4	07-24-92		<50	<0.5	<0.5	<0.5	--	--
MW-4	10-19-92		<50	<0.5	<0.5	<0.5	--	--
MW-4	01-14-93		<50	<0.5	<0.5	<0.5	--	--
MW-4	04-09-93		<50	<0.5	<0.5	<0.5	--	--
MW-4	08-23-93		<50	<0.5	<0.5	<0.5	--	--
MW-4	10-11-93		<50	<0.5	<0.5	<0.5	--	--
MW-4	03-04-94		<50	<0.5	<0.5	<0.5	--	--
MW-4	05-10-94		<50	<0.5	<0.5	<0.5	--	--
MW-4	08-12-94		<50	<0.5	<0.5	<0.5	--	--
MW-4	11-22-94		<50	<0.5	<0.5	<0.5	--	--
MW-4	03-15-95		<50	<0.5	<0.5	<0.5	--	--
MW-4	05-30-95	Not sampled: not scheduled for chemical analysis						
MW-4	09-20-95	Not sampled: not scheduled for chemical analysis						
MW-5	02-11-93		9300	620	<50	890	2200	--
MW-5	04-09-93		960	29	<1	100	96	--
MW-5	08-23-93		2700	50	<2.5	260	250	--
MW-5	10-11-93		840	9	<1	87	41	--
MW-5	03-04-94		540	0.9	0.6	16	6.3	--
MW-5	05-10-94		1300	11	<2.5	110	68	--
MW-5	08-12-94		1500	10	<2.5	110	30	--
MW-5	11-22-94		84	1	<0.5	5	2	--
MW-5	03-15-95		170	5.6	<0.5	17	11	--
MW-5	05-30-95		53	0.6	<0.5	4.8	2.8	--
MW-5	09-21-95		1500	47	2	120	86	70
MW-6	02-11-93		4800	630	<10	490	460	--
MW-6	04-09-93		13000	880	<10	1000	1000	--
MW-6	08-23-93		6300	390	<20	450	390	--
MW-6	10-11-93		2900	150	3.4	190	140	--
MW-6	03-04-94		5800	320	<5	510	360	--
MW-6	05-10-94		11000	470	<10	880	650	--
MW-6	08-12-94		4400	170	<10	390	210	--
MW-6	11-22-94		7300	390	<5	940	640	--
MW-6	03-15-95		3600	77	<5	420	180	--
MW-6	05-30-95		5000	68	<5	530	250	--
MW-6	09-21-95		3300	36	<5	360	120	<30



**Table 3**  
**Historical Groundwater Analytical Data**  
**Petroleum Hydrocarbons and Their Constituents**

ARCO Service Station 2185  
 9800 East 14th Street, Oakland, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L
MW-7	05-14-93	350	0.83	<0.5	<0.5	<0.5	--	--
MW-7	08-23-93	630*	7.3	<1	<1	<1	--	--
MW-7	10-11-93	620*	3.5	<0.5	<0.5	<0.5	--	--
MW-7	03-04-94	320*	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	05-10-94	330*	0.6	<0.5	<0.5	<0.5	--	--
MW-7	08-12-94	360*	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	11-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	03-15-95	150*	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	05-30-95	110*	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	09-20-95	<400*	<0.8	<0.5	<0.5	<0.5	<7	--
MW-8	08-12-94	5100	12	<5	470	53	--	--
MW-8	11-22-94	2300	16	<0.5	140	4	--	--
MW-8	03-15-95	280	<0.5	<0.5	0.7	0.7	--	--
MW-8	05-30-95	390	<0.5	<0.5	<2	1.6	--	--
MW-8	09-21-95	470	<0.5	<0.5	3	1.2	52	--
MW-9	09-20-95	<50	<0.5	<0.5	<0.5	<0.5	<4	--
MW-10	09-21-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl-tert-butyl ether

-- : not analyzed

\*: chromatogram does not match the typical gasoline fingerprint

Table 4  
Bioremediation Indicator Parameters  
Third Quarter 1995

ARCO Service Station 2185  
9800 East 14th Street, Oakland, California

Date: 11-30-95

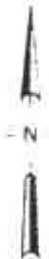
Well Designation	Water Sample Field Date	Relative Distance from Well MW-3 feet	TPHG Concentration µg/L	Gasoline-Utilizing Bacteria CFUs/ml	Heterotrophic Organisms CFUs/ml	Dissolved Oxygen mg/L	Laboratory Redox Potential millivolts	Field Redox Potential millivolts	Ammonia as Nitrogen mg/L	Total Kjeldahl Nitrogen mg/L	pH std. units	Ortho-phosphate mg/L	Dissolved Potassium µg/L
MW-3	09-21-95	0	2,100	420	5,500	2.5	118	25	<0.1	<1	6.76	0.17	<2,000
MW-5	09-21-95	23	1,500	100	8,500	3.5	328	280	<0.1	<1	6.82	0.22	<2,000
MW-8	09-21-95	30	470	110	89,000	3.5	327	25	<0.1	<1	6.84	0.21	<2,000
MW-6	09-21-95	42	3,300	330	13,400	3.5	150	-35	<0.1	<1	6.72	0.34	<2,000
MW-2	09-21-95	62	1,200	200	9,400	1.5	138	-60	<0.1	<1	6.78	0.36	<2,000

µg/L: micrograms per liter  
CFUs/ml: colony forming units per milliliter  
mg/L: milligrams per liter  
std. units: standard pH units



Base map from USGS 7.5' Quad. Maps:  
Oakland East and San Leandro, California  
Photorevised 1980.

Scale : 0 2000 4000 Feet



**emcon**

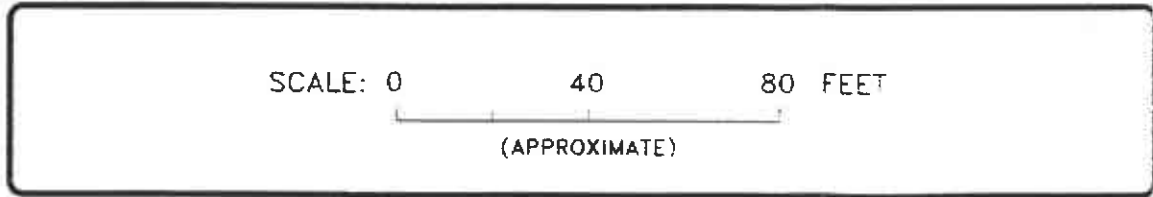
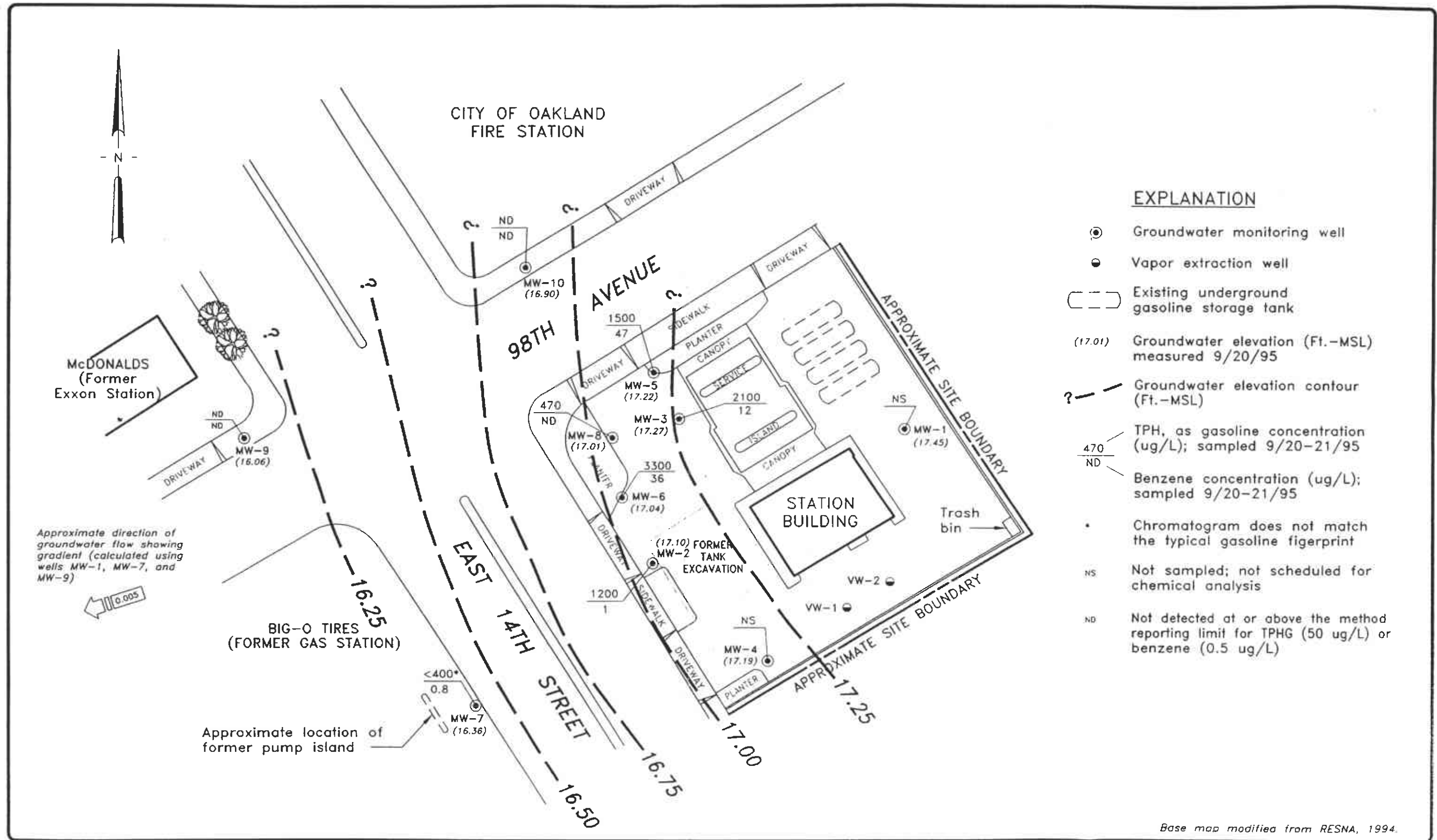
**ARCO PRODUCTS COMPANY  
SERVICE STATION 2185, 9800 E. 14TH STREET  
QUARTERLY GROUNDWATER MONITORING  
OAKLAND, CALIFORNIA**

**SITE LOCATION**

**FIGURE**

**1**

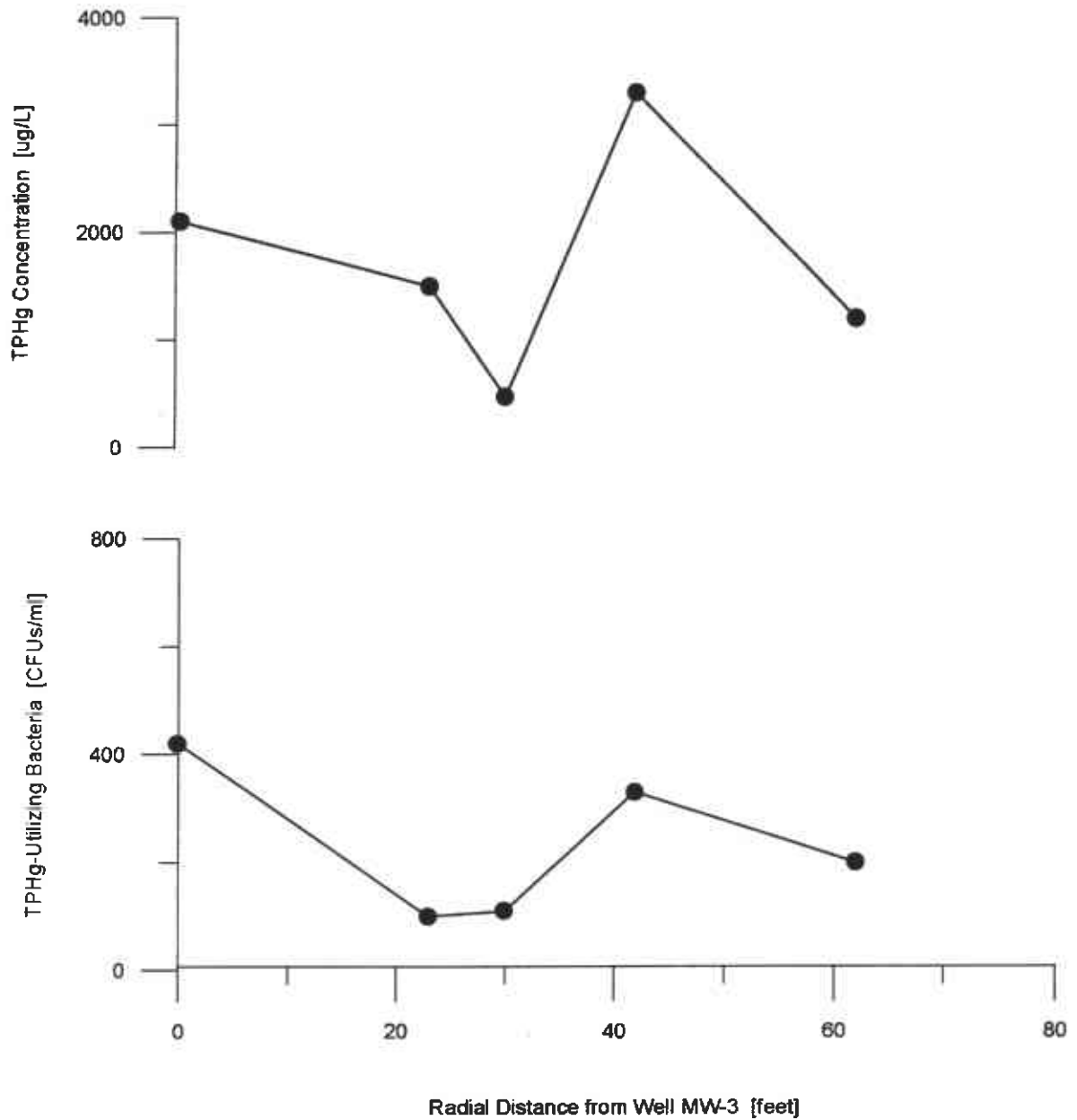
**PROJECT NO.  
805-130.03**



ARCO PRODUCTS COMPANY  
SERVICE STATION 2185, 9800 E. 14TH STREET  
QUARTERLY GROUNDWATER MONITORING  
OAKLAND, CALIFORNIA

GROUNDWATER DATA  
THIRD QUARTER 1995

FIGURE NO.  
**2**  
PROJECT NO.  
805-130.03

**EMCON**

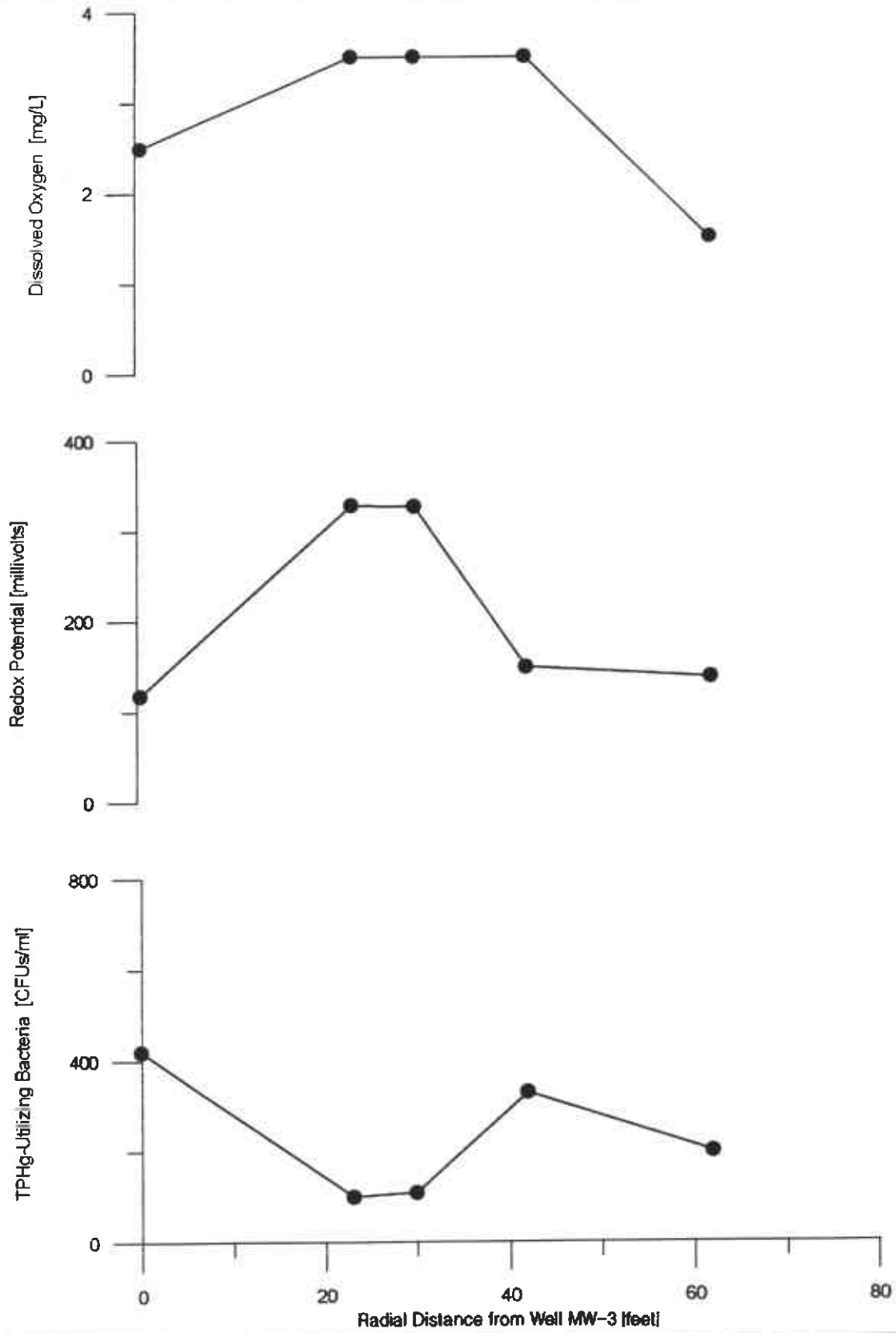
ARCO PRODUCTS COMPANY  
SERVICE STATION 2185, 9800 E. 14TH STREET  
QUARTERLY GROUNDWATER MONITORING  
OAKLAND, CALIFORNIA

INTRINSIC BIOREMEDIATION PARAMETERS  
(TPHG, TPHG-UTILIZING BACTERIA)

FIGURE

**3**

PROJECT NO.  
805-130.003



**EMCON**

ARCO PRODUCTS COMPANY  
SERVICE STATION 2185, 9800 E. 14TH STREET  
QUARTERLY GROUNDWATER MONITORING  
OAKLAND, CALIFORNIA

INTRINSIC BIOREMEDIATION PARAMETERS  
(OXYGEN, REDOX, TPHG-UTILIZING BACTERIA)

FIGURE

**4**

PROJECT NO.  
805-130.003

**APPENDIX A**

**FIELD DATA SHEETS, THIRD QUARTER 1995  
GROUNDWATER MONITORING EVENT**

**FIELD REPORT  
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : 1775-236.01

STATION ADDRESS : 9800 East 14th Street

DATE : 9-20-95

ARCO STATION # : 2185

FIELD TECHNICIAN : M. Callegos

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-9	good	good	good	good	good	11.67	11.67	ND	NA	22.4	
2	<del>MW-8</del>						11.07	11.07			22.5	
3	MW-1						11.70	11.70			23.5	
4	MW-4						12.02	12.02	N		23.7	
5	MW-7						10.52	11.52			25.1	
6	MW-5						10.90	10.90			26.8	
7	MW-10						10.65	10.65			23.0	
8	MW-2						11.37	11.37			23.5	
9	MW-6						10.75	10.75			27.7	
10	MW-3	✓	✓	✓	✓	✓	11.30	11.30	✓	✓	23.2	
<b>SURVEY POINTS ARE TOP OF WELL CASINGS</b>												





EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

1.96

PROJECT NO: 1775-236.01

SAMPLE ID: MW-1(23)

PURGED BY: M. ROSS

CLIENT NAME: ARCO 2185

SAMPLED BY: M. ROSS

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): <u>NA</u>	VOLUME IN CASING (gal.): <u>7.70</u>
DEPTH TO WATER (feet): <u>11.70</u>	CALCULATED PURGE (gal.): <u>23.10</u>
DEPTH OF WELL (feet): <u>23.5</u>	ACTUAL PURGE VOL. (gal.): <u>23.5</u>

DATE PURGED: <u>9-21-95</u>	Start (2400 Hr) <u>0944</u>	End (2400 Hr) <u>0953</u>
DATE SAMPLED: <u>9-21-95</u>	Start (2400 Hr) <u>1010</u>	End (2400 Hr) <u>—</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>0947</u>	<u>3.0</u>	<u>6.13</u>	<u>525</u>	<u>67.1</u>	<u>LIGHT BROWN</u>	<u>MOD</u>
<u>0950</u>	<u>16.0</u>	<u>6.46</u>	<u>514</u>	<u>66.1</u>	<u>"</u>	<u>TRACE</u>
<u>0953</u>	<u>23.5</u>	<u>6.52</u>	<u>517</u>	<u>66.3</u>	<u>"</u>	<u>"</u>

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

Field QC samples collected at this well: NA      Parameters field filtered at this well: NA

- | PURGING EQUIPMENT                                    |   | SAMPLING EQUIPMENT                       |  |
|--|---|--|--|
| <input type="checkbox"/> 2' Bladder Pump             | <input type="checkbox"/> Bailor (Teflon®)         | <input type="checkbox"/> 2' Bladder Pump | <input checked="" type="checkbox"/> Bailor (Teflon®) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailor (PVC)             | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailor (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump            | <input type="checkbox"/> Bailor (Stainless Steel) | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™                | <input type="checkbox"/> Dedicated                | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |
| Other: _____   |   | Other: _____                             |  |

WELL INTEGRITY: Good      LOCK #: ARCO

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Meter Calibration: Date: 9-01-95 Time: 0945 Meter Serial #: 9210 Temperature °F: 71.5  
 (EC 1000/1000) (DI —) (pH 7.00/7.00) (pH 10/1000) (pH 4.398/—)

Location of previous calibration: \_\_\_\_\_

Signature: M. Ross      Reviewed By: SR      Page 1 of 9



EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

1.96

PROJECT NO: 1775-236.01

SAMPLE ID: MW-2(23)

PURGED BY: M. Ross / M. Gallegos

CLIENT NAME: ARCO 2135

SAMPLED BY: M. Ross / M. Gallegos

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): <u>NA</u>	VOLUME IN CASING (gal.): <u>7.92</u>
DEPTH TO WATER (feet): <u>11.37</u>	CALCULATED PURGE (gal.): <u>23.77</u>
DEPTH OF WELL (feet): <u>23.5</u>	ACTUAL PURGE VOL. (gal.): <u>24.0</u>

DATE PURGED: <u>9-21-95</u>	Start (2400 Hr) <u>1204</u>	End (2400 Hr) <u>1213</u>
DATE SAMPLED: <u>9-21-95</u>	Start (2400 Hr) <u>1305</u>	End (2400 Hr) <u>---</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1206</u>	<u>8.0</u>	<u>6.55</u>	<u>1672</u>	<u>70.2</u>	<u>dy</u>	<u>Trace</u>
<u>1209</u>	<u>16.0</u>	<u>6.56</u>	<u>649</u>	<u>69.7</u>	<u>"</u>	<u>"</u>
<u>1213</u>	<u>24.0</u>	<u>6.56</u>	<u>666</u>	<u>69.6</u>	<u>"</u>	<u>dy</u>
---	---	---	---	---	---	---

D. O. (ppm): 1-2      ODOR: NONE      COLOR: NA      TURBIDITY: NA

Field QC samples collected at this well: NA      Parameters field filtered at this well: DISSOLVED POTASSIUM

### PURGING EQUIPMENT

### SAMPLING EQUIPMENT

- |  |   |  |  |
|--|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump             | <input type="checkbox"/> Bailor (Teflon®)         | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailor (Teflon®) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailor (PVC)             | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailor (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump            | <input type="checkbox"/> Bailor (Stainless Steel) | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™                | <input type="checkbox"/> Dedicated                | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |

Other: \_\_\_\_\_

WELL INTEGRITY: Good      LOCK #: ARCO

REMARKS: Redox -60

Meter Calibration: Date: 9-21-95 Time: 0945 Meter Serial #: 9210 Temperature °F: \_\_\_\_\_

( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )

Location of previous calibration: MW-1

Signature: M. Ross      Reviewed By: SG      Page 2 of 9



# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

1.96

EMCON ASSOCIATES

PROJECT NO: 1775-236.01  
PURGED BY: M. ROSS / M. CALVOSS  
SAMPLED BY: M. ROSS / M. CALVOSS

SAMPLE ID: RAW-3(23)  
CLIENT NAME: ARC0 2175  
LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other   
CASING DIAMETER (inches): 2  3  4  4.5  6  Other

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 7.77  
DEPTH TO WATER (feet): 11.30 CALCULATED PURGE (gal.): 23.32  
DEPTH OF WELL (feet): 23.2 ACTUAL PURGE VOL. (gal.): 23.5

DATE PURGED: 9-21-95 Start (2400 Hr) 1327 End (2400 Hr) 1332  
DATE SAMPLED: 9-21-95 Start (2400 Hr) 1355 End (2400 Hr) ---

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1327</u>	<u>8.0</u>	<u>6.74</u>	<u>558</u>	<u>68.4</u>	<u>Light green</u>	<u>MOD</u>
<u>1330</u>	<u>16.0</u>	<u>6.65</u>	<u>593</u>	<u>69.2</u>	<u>1</u>	<u>11</u>
<u>1332</u>	<u>23.5</u>	<u>6.59</u>	<u>591</u>	<u>69.2</u>	<u>11</u>	<u>TRACE</u>
---	---	---	---	---	---	---

D. O. (ppm): 2-3 ODOR: NONE NA NA  
Field QC samples collected at this well: NA Parameters field filtered at this well: DISSOLVE BRASSUM  
(COBALT 0 - 500) (NTU 0 - 200 or 0 - 1000)

- | PURGING EQUIPMENT                                    |   | SAMPLING EQUIPMENT                       |  |
|--|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump             | <input type="checkbox"/> Bailer (Teflon®)         | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC)             | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailer (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump            | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™                | <input type="checkbox"/> Dedicated                | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |
| Other: _____   |   | Other: _____                             |  |

WELL INTEGRITY: Good LOCK #: ARC0

REMARKS: Redox -> 25

Meter Calibration: Date: 9-21-95 Time: 0945 Meter Serial #: 9210 Temperature °F: \_\_\_\_\_  
( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )  
Location of previous calibration: MW-1

Signature: M. Ross Reviewed By: SJR Page 3 of 9



EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

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PROJECT NO: 1775-236.01  
PURGED BY: M. ROSS  
SAMPLED BY: M. ROSS

SAMPLE ID: MW-5(26)  
CLIENT NAME: ARCO 2135  
LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL):	<u>NA</u>	VOLUME IN CASING (gal.):	<u>10.38</u>
DEPTH TO WATER (feet):	<u>10.90</u>	CALCULATED PURGE (gal.):	<u>31.16</u>
DEPTH OF WELL (feet):	<u>26.8</u>	ACTUAL PURGE VOL. (gal.):	<u>31.5</u>

DATE PURGED:	<u>9-21-95</u>	Start (2400 Hr)	<u>1025</u>	End (2400 Hr)	<u>1039</u>
DATE SAMPLED:	<u>9-25-95</u>	Start (2400 Hr)	<u>1100</u>	End (2400 Hr)	<u>—</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1027</u>	<u>10.5</u>	<u>7.08</u>	<u>501</u>	<u>68.6</u>	<u>Light Blue</u>	<u>MUD</u>
<u>1035</u>	<u>21.0</u>	<u>6.89</u>	<u>521</u>	<u>68.7</u>	<u>U</u>	<u>U</u>
<u>1039</u>	<u>31.5</u>	<u>6.80</u>	<u>532</u>	<u>68.1</u>	<u>U</u>	<u>TRACE</u>

D. O. (ppm): 3-4      ODOR: NONE      COLOR: NA      TURBIDITY: NA  
(COBALT 0 - 500)      (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA      Parameters field filtered at this well: DISSOLVED POTASSIUM

- | PURGING EQUIPMENT                                    |   | SAMPLING EQUIPMENT                       |  |
|--|---|--|--|
| <input type="checkbox"/> 2' Bladder Pump             | <input type="checkbox"/> Bailer (Teflon®)         | <input type="checkbox"/> 2' Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC)             | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailer (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump            | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™                | <input type="checkbox"/> Dedicated                | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |
| Other: _____   |   | Other: _____                             |  |

WELL INTEGRITY: Good      LOCK #: ARCO

REMARKS: Redox - 280

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Meter Calibration: Date: 9-21-95 Time: 0945 Meter Serial #: 9210 Temperature °F: \_\_\_\_\_  
 ( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )  
 Location of previous calibration: MW-1

Signature: Mike Ross      Reviewed By: [Signature]      Page 4 of 9



EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

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PROJECT NO: 1775-236.01

SAMPLE ID: MW-6(27)

PURGED BY: M. Ross / M. Gollyos

CLIENT NAME: ARC 2185

SAMPLED BY: M. Ross / M. Gollyos

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): <u>NA</u>	VOLUME IN CASING (gal.): <u>11.07</u>
DEPTH TO WATER (feet): <u>10.75</u>	CALCULATED PURGE (gal.): <u>33.22</u>
DEPTH OF WELL (feet): <u>22.7</u>	ACTUAL PURGE VOL. (gal.): <u>33.5</u>

DATE PURGED: <u>9-21-95</u>	Start (2400 Hr) <u>1257</u>	End (2400 Hr) <u>1304</u>
DATE SAMPLED: <u>9-21-95</u>	Start (2400 Hr) <u>1325</u>	End (2400 Hr) <u>-</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1300</u>	<u>11.5</u>	<u>6.72</u>	<u>674</u>	<u>69.9</u>	<u>Light Brown</u>	<u>ND</u>
<u>1302</u>	<u>22.5</u>	<u>6.70</u>	<u>683</u>	<u>70.7</u>	<u>11</u>	<u>11</u>
<u>1304</u>	<u>33.5</u>	<u>6.72</u>	<u>676</u>	<u>71.1</u>	<u>11</u>	<u>11</u>

D. O. (ppm): 3-4      ODOR: NONE      COLOR: NA      TURBIDITY: NA

Field QC samples collected at this well: NA      Parameters field filtered at this well: Dissolved Potassium

### PURGING EQUIPMENT

### SAMPLING EQUIPMENT

- |   |   |  |  |
|---|---|--|--|
| <input checked="" type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®)         | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump           | <input type="checkbox"/> Bailer (PVC)             | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailer (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump           | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™               | <input type="checkbox"/> Dedicated                | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |

Other: \_\_\_\_\_

Other: \_\_\_\_\_

WELL INTEGRITY: Good      LOCK #: ARC

REMARKS: Reflux - 35

Meter Calibration: Date: 9-21-95 Time: 2948 Meter Serial #: 9210 Temperature °F: \_\_\_\_\_

( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )

Location of previous calibration: MW-1

Signature: [Signature]      Reviewed By: [Signature]      Page 5 of 9



**EMCON**  
ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-236-01

SAMPLE ID: MW-7 (251)

PURGED BY: M. P. Hayes

CLIENT NAME: ARCO# 2185

SAMPLED BY: ↓

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): <u>NR</u>	VOLUME IN CASING (gal.): <u>2.21</u>
DEPTH TO WATER (feet): <u>11.52</u>	CALCULATED PURGE (gal.): <u>6.65</u>
DEPTH OF WELL (feet): <u>25.1</u>	ACTUAL PURGE VOL. (gal.): <u>7.0</u>

DATE PURGED: <u>9-20-95</u>	Start (2400 Hr) <u>1312</u>	End (2400 Hr) <u>1321</u>
DATE SAMPLED: <u>↓</u>	Start (2400 Hr) <u>1327</u>	End (2400 Hr) <u>---</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1315</u>	<u>2.5</u>	<u>6.65</u>	<u>567</u>	<u>68.7</u>	<u>BRN</u>	<u>HEAVY</u>
<u>1318</u>	<u>5.0</u>	<u>6.59</u>	<u>568</u>	<u>68.3</u>	<u>↓</u>	<u>↓</u>
<u>1321</u>	<u>7.0</u>	<u>6.64</u>	<u>564</u>	<u>64.1</u>	<u>↓</u>	<u>↓</u>

D. O. (ppm): NR      ODOR: none      NR      NR  
(COBALT 0 - 500)      (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	
<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)
<input type="checkbox"/> Centrifugal Pump	<input checked="" type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____		Other: _____	

WELL INTEGRITY: Good      LOCK #: ARCO

REMARKS: All samples taken

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Meter Calibration: Date: 9-20-98 Time: \_\_\_\_\_ Meter Serial #: 9311 Temperature °F: \_\_\_\_\_  
 ( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )

Location of previous calibration: MW-10

Signature: [Signature]      Reviewed By: [Signature]      Page 6 of 9



EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

1.96

PROJECT NO: 1775-236.01

SAMPLE ID: MW-8(22)

PURGED BY: M. Ross / M. Gallegos

CLIENT NAME: ARCO 2135

SAMPLED BY: M. Ross / M. Gallegos

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): NA

VOLUME IN CASING (gal.): 7.46

DEPTH TO WATER (feet): 11.07

CALCULATED PURGE (gal.): 22.40

DEPTH OF WELL (feet): 22.5

ACTUAL PURGE VOL. (gal.): 22.5

DATE PURGED: 9-21-95

Start (2400 Hr) 1141

End (2400 Hr) 1154

DATE SAMPLED: 9-21-95

Start (2400 Hr) 1235

End (2400 Hr)     

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1144</u>	<u>7.5</u>	<u>6.91</u>	<u>534</u>	<u>70.2</u>	<u>GREY</u>	<u>MOD</u>
<u>1149</u>	<u>15.0</u>	<u>6.68</u>	<u>541</u>	<u>69.5</u>	<u>"</u>	<u>Heavy</u>
<u>1154</u>	<u>22.5</u>	<u>6.71</u>	<u>545</u>	<u>70.1</u>	<u>"</u>	<u>"</u>

D. O. (ppm): 3-4

ODOR: NONE

NA  
(COBALT 0 - 500)

NA  
(NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NA

Parameters field filtered at this well: DISSOLVED POTASSIUM

### 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
- Bailer (Teflon®)
- DDL Sampler
- Dipper
- Well Wizard™
- Bailer (Stainless Steel)
- Submersible Pump
- Dedicated

Other: \_\_\_\_\_

WELL INTEGRITY: GOOD LOCK #: ARCO

REMARKS: Re-purge -> 25

Meter Calibration: Date: 9-21-95 Time: 0945 Meter Serial #: 9210 Temperature °F: \_\_\_\_\_

( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )

Location of previous calibration: MW-1

Signature: Mike Ross

Reviewed By: [Signature] Page 7 of 9



**EMCON**  
ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1275-2360 D/ SAMPLE ID: MW-9 (22')  
 PURGED BY: M. Gallegos CLIENT NAME: ARCO # 2185  
 SAMPLED BY: ✓ LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): MR VOLUME IN CASING (gal.): 1.78  
 DEPTH TO WATER (feet): 11.67 CALCULATED PURGE (gal.): 5.35  
 DEPTH OF WELL (feet): 22.6 ACTUAL PURGE VOL. (gal.): 5.5

DATE PURGED: 9-20-95 Start (2400 Hr) 1240 End (2400 Hr) 1246  
 DATE SAMPLED: ✓ Start (2400 Hr) 1253 End (2400 Hr) ---

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1242</u>	<u>2.0</u>	<u>6.79</u>	<u>827</u>	<u>70.7</u>	<u>BRN</u>	<u>Heavy</u>
<u>1244</u>	<u>4.0</u>	<u>6.75</u>	<u>782</u>	<u>70.1</u>	<u>↓</u>	<u>↓</u>
<u>1246</u>	<u>5.5</u>	<u>6.69</u>	<u>782</u>	<u>70.7</u>	<u>↓</u>	<u>↓</u>

D. O. (ppm): MR ODOR: None MR MR  
(COBALT 0 - 500) (NTU 0 - 200 or 0 - 1000)  
 Field QC samples collected at this well: MR Parameters field filtered at this well: MR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)
<input type="checkbox"/> Centrifugal Pump	<input checked="" type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____		Other: _____	

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: 5.11 Samples taken

Meter Calibration: Date: 9-20-95 Time: \_\_\_\_\_ Meter Serial #: 9011 Temperature °F: \_\_\_\_\_  
 ( EC 1000 \_\_\_\_\_ / \_\_\_\_\_ ) ( DI \_\_\_\_\_ ) ( pH 7 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 10 \_\_\_\_\_ / \_\_\_\_\_ ) ( pH 4 \_\_\_\_\_ / \_\_\_\_\_ )  
 Location of previous calibration: MW-10

Signature: [Signature] Reviewed By: [Signature] Page 8 of 9





EMCON ASSOCIATES

# WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-236.01

SAMPLE ID: MW-10 (23)

PURGED BY: M. Gallegos

CLIENT NAME: ACIO #

SAMPLED BY: [Signature]

LOCATION: OAKLAND, CA

TYPE: Ground Water  Surface Water  Treatment Effluent  Other

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

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 2.01  
 DEPTH TO WATER (feet): 10.65 CALCULATED PURGE (gal.): 6.05  
 DEPTH OF WELL (feet): 23.0 ACTUAL PURGE VOL. (gal.): 6.5

DATE PURGED: 9-21-95 Start (2400 Hr) 1155 End (2400 Hr) 1204  
 DATE SAMPLED: [Signature] Start (2400 Hr) 1210 End (2400 Hr) ---

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1158</u>	<u>2.0</u>	<u>6.75</u>	<u>590</u>	<u>73.0</u>	<u>BSW</u>	<u>Heavy</u>
<u>1201</u>	<u>4.0</u>	<u>6.77</u>	<u>595</u>	<u>73.4</u>	<u>[Signature]</u>	<u>[Signature]</u>
<u>1204</u>	<u>6.5</u>	<u>6.78</u>	<u>594</u>	<u>73.1</u>	<u>[Signature]</u>	<u>[Signature]</u>

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

Field QC samples collected at this well: NA Parameters field filtered at this well: NA

### PURGING EQUIPMENT

### SAMPLING EQUIPMENT

- |   |  |  |  |
|---|--|--|--|
| <input type="checkbox"/> 2" Bladder Pump  | <input checked="" type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC)                | <input type="checkbox"/> DDL Sampler     | <input type="checkbox"/> Bailer (Stainless Steel)    |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel)    | <input type="checkbox"/> Dipper          | <input type="checkbox"/> Submersible Pump            |
| <input type="checkbox"/> Well Wizard™     | <input type="checkbox"/> Dedicated                   | <input type="checkbox"/> Well Wizard™    | <input type="checkbox"/> Dedicated                   |

Other: \_\_\_\_\_ Other: \_\_\_\_\_

WELL INTEGRITY: Good LOCK #: 4210

REMARKS: all samples taken

Meter Calibration: Date: 9-21-95 Time: \_\_\_\_\_ Meter Serial #: 9011 Temperature °F: 71.8  
 (EC 1000 969/1000) (DI \_\_\_\_\_) (pH 7 704/700) (pH 10 1000/1000) (pH 4 400/400)

Location of previous calibration: \_\_\_\_\_

Signature: [Signature] Reviewed By: [Signature] Page 9 of 9

# WELL DEVELOPMENT FIELD DATA SHEET

Project Number: 0805-130-02

Performed By: J WILLIAMS

Client: ARCO 2185

Date: 09-13-95

Location: OAKLAND, CA

Well ID: MW-9

Casing Diameter:  2 inch  3 inch  4 inch  4.5 inch  6 inch Other \_\_\_\_\_

Depth to Water (feet): Start 11.78 End 11.71

Well Total Depth (feet): Start 17.91 End 22.6

One Casing Volume at Start (gal): 1 Total Volume Purged (gal): 50

### DEVELOPMENT METHOD

Centrifugal Pump     Bailer (Teflon®)     Surge Block (Swab)  
 Submersible Pump     Bailer (PVC)     Other \_\_\_\_\_

### FIELD INSTRUMENTS

pH, EC, Temp. Meter     NTU Meter     Imhoff Cone     Colorimeter    Other \_\_\_\_\_

Purge Water Disposal Method: DRUM

Date	Time	Cumulative Discharge (gal)	Temp. (°F)	E.C. @ 25° C (µmho/cm)	pH (Std)	Turbidity		Color		Odor	Settleable Solids (%)
						Visual Heavy Moderate Light Trace	NTU Scale = 0-200 or 0-1000	Visual Clear Cloudy Yellow Brown...	Cobalt Scale = 0 to 500		
9-13	1135	25	73.9	704	6.49	HEAVY	7100	1300	7500	None	40%
	1139	30	70.8	726	6.49	↓	↓	↓	↓	L	0-5
	1144	35	70.2	713	6.49	MOD	↓	L	↓	L	0-5
	1149	40	69.1	712	6.45	MOD	L	L	L	L	0-5
	1153	45	69.1	677	6.44	MOD	↓	L	↓	L	0
	1200	50	70.0	670	6.40	MOD	535	↓	↓	L	0

WELL INTEGRITY: GOOD 9/16 LOCK #: 3426

REMARKS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

SIGNATURE: [Signature] REVIEWED BY: [Signature] Page 1 of 2

# WELL DEVELOPMENT FIELD DATA SHEET

Project Number: 0805-130-02  
 Client: ARCO 2185  
 Location: DAKLAND C.A.

Performed By: J WILLIAMS  
 Date: 9-13-95  
 Well ID: MW-10

Casing Diameter:  2 inch    \_\_\_ 3 inch    \_\_\_ 4 inch    \_\_\_ 4.5 inch    \_\_\_ 6 inch    Other: \_\_\_  
 Depth to Water (feet): Start 10.60    End 12.40  
 Well Total Depth (feet): Start 21.20    End 23.0  
 One Casing Volume at Start (gal): 1.73    Total Volume Purged (gal): 55

### DEVELOPMENT METHOD

Centrifugal Pump    \_\_\_ Bailer (Teflon ®)     Surge Block (Swab)  
 \_\_\_ Submersible Pump    \_\_\_ Bailer (PVC)    \_\_\_ Other: \_\_\_\_\_

### FIELD INSTRUMENTS

pH, EC, Temp. Meter     NTU Meter     Imhoff Cone    \_\_\_ Colorimeter    Other: \_\_\_\_\_

Purge Water Disposal Method: Rein

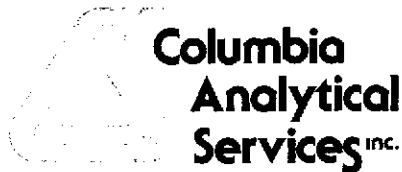
Date	Time	Cumulative Discharge (gal)	Temp. (° F)	E.C. @ 25° C (µmho/cm)	pH (Std)	Turbidity		Color		Odor	Settleable Solids (%)
						Visual Scale - Heavy Moderate Light Trace	NTU Scale - 0 - 200 or 0 - 1000	Visual Scale - Clear Cloudy Yellow Brown...	Cobalt Scale - 0 to 500		
9-13-95	1255	25	71.2	558	7.20	HEAVY	71000	BROWN	7500	Slight	10-20
	1300	30	71.8	558	6.72	L	L	L	L	L	0-5
	1303	35	71.4	569	6.86	L	L	L	L	L	0-5
	1305	40	71.2	568	6.72	L	L	L	L	L	0
	1307	45	71.1	565	6.71	L	L	L	L	L	0
9/13	1311	50	71.2	566	6.68	L	L	L	L	L	0

WELL INTEGRITY: GOOD    9/16    LOCK #: 3496  
 REMARKS: SHEEN

SIGNATURE: [Signature]    REVIEWED BY: [Signature]    Page 2 of 2

**APPENDIX B**

**ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY  
DOCUMENTATION, THIRD QUARTER 1995**



October 6, 1995

Service Request No: S951180

John Young  
EMCON  
1921 Ringwood Avenue  
San Jose, CA 95131

Re: **0805-130.03 / TO# 17075.00 / 2185 Oakland**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on September 21, 1995. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above -to help expedite our service please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 17, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

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

Sincerely:

A handwritten signature in black ink, appearing to read "Steven L. Green".

Steven L. Green  
Project Chemist

A handwritten signature in black ink, appearing to read "Annelise J. Bazar".

Annelise J. Bazar  
Regional QA Coordinator

SLG/ajb

**COLUMBIA ANALYTICAL SERVICES, Inc.**

**Acronyms**

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA

BTEX, MTBE and TPH as Gasoline  
 EPA Methods 5030/8020/California DHS LUFT Method  
 Units: ug/L (ppb)

Sample Name:	<b>MW-9 (22)</b>	<b>MW-10 (23)</b>	<b>MW-7 (25)</b>
Lab Code:	S951180-002	S951180-003	S951180-004
Date Analyzed:	9/27/95	9/27/95	9/27/95

Analyte	MRL			
TPH as Gasoline	50	ND	ND	<400 **
Benzene	0.5	ND	ND	0.8
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
Methyl-tert-butyl ether	3	<4 *	ND	<10 *

\* Raised MRL due to matrix interference.

\*\* Raised MRL due to matrix interference. The sample contains discrete components eluting in the gasoline range quantified as gasoline. The chromatogram does not match the typical gasoline fingerprint.

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA

BTEX, MTBE and TPH as Gasoline  
 EPA Methods 5030/8020/California DHS LUFT Method  
 Units: ug/L (ppb)

Sample Name:	<b>MW-5 (26)</b>	<b>MW-8 (22)</b>	<b>MW-2 (23)</b>
Lab Code:	S951180-005	S951180-006	S951180-007
Date Analyzed:	9/27/95	10/2/95	9/28/95

<b>Analyte</b>	<b>MRL</b>			
TPH as Gasoline	50	1,500	470	1,200
Benzene	0.5	47	ND	1
Toluene	0.5	2	ND	<1 *
Ethylbenzene	0.5	120	3.0	68
Total Xylenes	0.5	86	1.2	16
Methyl-tert-butyl ether	3	70	52	<5 *

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



COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA

BTEX, MTBE and TPH as Gasoline  
EPA Methods 5030/8020/California DHS LUFT Method  
Units: ug/L (ppb)

Sample Name:	MW-6 (27)	MW-3 (23)	Method Blank
Lab Code:	S951180-008	S951180-009	S950927-WB
Date Analyzed:	9/28/95	9/28/95	9/27/95

Analyte	MRL			
TPH as Gasoline	50	3,300	2,100	ND
Benzene	0.5	36	12	ND
Toluene	0.5	<5 *	<3 *	ND
Ethylbenzene	0.5	360	77	ND
Total Xylenes	0.5	120	38	ND
Methyl-tert-butyl ether	3	<30 *	280	ND

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

**COLUMBIA ANALYTICAL SERVICES, INC.**

**Analytical Report**

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA

BTEX, MTBE and TPH as Gasoline  
EPA Methods 5030/8020/California DHS LUFT Method  
Units: ug/L (ppb)

**Sample Name:** Method Blank  
**Lab Code:** S951002-WB  
**Date Analyzed:** 10/2/95

<b>Analyte</b>	<b>MRL</b>	
TPH as Gasoline	50	ND
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
Methyl-tert-butyl ether	3	ND

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/21-10/2/95

Inorganic Parameters <sup>1</sup>  
 Units: mg/L (ppm)

Analyte:	Ammonia - as N	Total Kjeldahl Nitrogen	pH ( units)	Ortho- phosphate
EPA Method:	350.3	351.4	150.1	365.2
Method Reporting Limit:	0.1	1	--	0.02

Sample Name	Lab Code	Ammonia - as N	Total Kjeldahl Nitrogen	pH ( units)	Ortho- phosphate
MW-5 (26)	S951180-005	ND	ND	6.82	0.22
MW-8 (22)	S951180-006	ND	ND	6.84	0.21
MW-2 (23)	S951180-007	ND	ND	6.78	0.36
MW-6 (27)	S951180-008	ND	ND	6.72	0.34
MW-3 (23)	S951180-009	ND	ND	6.76	0.17
Method Blank	S951180-WB	ND	ND	--	ND

<sup>1</sup> Unless otherwise noted, all analyses were performed within EPA recommended maximum holding times specified in *Test Methods for Evaluating Solid Waste*, (SW-846, 3rd Edition) and *Methods for Chemical Analysis of Water and Waste* (EPA-600/4-79-020, revised March 1983).

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** ARCO Products Company  
**Project:** TO#2185-94-2A/0805-130.03 / #2185 Oakland  
**Sample Matrix:** Water

**Service Request:** K9505940  
**Date Collected:** 9/21/95  
**Date Received:** 9/22/95  
**Date Extracted:** 9/26/95  
**Date Analyzed:** 9/27/95

Dissolved Potassium  
EPA Method 6010A  
Units: µg/L (ppb)

<b>Sample Name</b>	<b>Lab Code</b>	<b>MRL</b>	<b>Result</b>
MW-1(23)	K9505940-001	2000	ND
MW-5(26)	K9505940-002	2000	ND
MW-8(22)	K9505940-003	2000	ND
MW-2(23)	K9505940-004	2000	ND
MW-6(27)	K9505940-005	2000	ND
MW-3(23)	K9505940-006	2000	ND
Method Blank	K9505940-MB	2000	ND

**COLUMBIA ANALYTICAL SERVICES, INC.**

**Analytical Report**

**Client:** ARCO Products Company  
**Project:** TO#2185-94-2A/0805-130.03/#2185 OAKLAND  
**Sample Matrix:** Water

**Service Request:** K9505940  
**Date Collected:** 9/21/95  
**Date Received:** 9/22/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/22/95

Oxidation-Reduction Potential  
ASTM Method D 1498-76  
Units: mV

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>
MW-5(26)	K9505940-002	328
MW-8(22)	K9505940-003	327
MW-2(23)	K9505940-004	138
MW-6(27)	K9505940-005	150
MW-3(23)	K9505940-006	118

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

**Client:** ARCO Products Company  
**Project:** TO#2185-94-2A/0805-130.03/#2185 OAKLAND  
**Sample Matrix:** Water

**Service Request:** K9505940  
**Date Collected:** 9/21/95  
**Date Received:** 9/22/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/22/95

Heterotrophic Plate Count  
SM Method 9215B  
Units: CFU/ml

Sample Name	Lab Code	MRL	Time Test Started		Result
MW-1(23)	K9505940-001	2	1130	hrs	380
MW-5(26)	K9505940-002	2	1130	hrs	8500
MW-8(22)	K9505940-003	2	1130	hrs	89000
MW-2(23)	K9505940-004	2	1130	hrs	9400
MW-6(27)	K9505940-005	2	1130	hrs	13400
MW-3(23)	K9505940-006	2	1130	hrs	5500

SM

*Standard Methods for the Examination of Water and Wastewater, 17th Ed., 1989.*

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/27-10/2/95

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

Sample Name	Lab Code	PID Detector	FID Detector
		Percent Recovery 4-Bromofluorobenzene	Percent Recovery $\alpha,\alpha,\alpha$ -Trifluorotoluene
MW-9 (22)	S951180-002	92	96
MW-10 (23)	S951180-003	95	99
MW-7 (25)	S951180-004	86	104
MW-5 (26)	S951180-005	94	99
MW-8 (22)	S951180-006	89	110
MW-2 (23)	S951180-007	84	107 *
MW-6 (27)	S951180-008	92	104
MW-3 (23)	S951180-009	91	106
MW-7 (25) MS	S951180-004MS	87	101
MW-7 (25) DMS	S951180-004DMS	86	104
Method Blank	S950927-WB	93	99
Method Blank	S951002-WB	97	94

CAS Acceptance Limits:                      69-116                      69-116

\* The FID surrogate reported for this sample is 4-bromofluorobenzene.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland

**Service Request:** S951180  
**Date Analyzed:** 9/27/95

Initial Calibration Verification (ICV) Summary  
BTEX, MTBE 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	23.5	94	85-115
Toluene	25	23.5	94	85-115
Ethylbenzene	25	23.1	92	85-115
Xylenes, Total	75	70.6	94	85-115
Gasoline	250	242	97	90-110
Methyl-tert-butyl Ether	50	47.7	95	85-115



**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/27-10/2/95

Matrix Spike/Duplicate Matrix Spike Summary

BTE

EPA Methods 5030/8020

Units: ug/L (ppb)

**Sample Name:** MW-7 (25)  
**Lab Code:** S951180-004

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery				Relative Percent Difference
	MS	DMS		MS	DMS	CAS		Acceptance Limits		
						MS	DMS			
Benzene	25	25	0.8	22.4	22.4	86	86	75-135	<1	
Toluene	25	25	ND	22.0	21.9	88	88	73-136	<1	
Ethylbenzene	25	25	ND	21.7	21.6	87	86	69-142	<1	

**COLUMBIA ANALYTICAL SERVICES, INC.**

**QA/QC Report**

**Client:** ARCO Products Company  
**Project:** 0805-130.03 / TO# 17075.00 / 2185 Oakland  
**Sample Matrix:** Water

**Service Request:** S951180  
**Date Collected:** 9/20,21/95  
**Date Received:** 9/21/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/21-10/2/95

**Matrix Spike/Duplicate Matrix Spike Summary  
 Inorganic Parameters**

Units: mg/L (ppm)

**Sample Name:** Batch QC, MW-5 (26), MW-3 (23)  
**Lab Code:** S951161-001, 1180-005, 1180-009

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery			
	MS	DMS		MS	DMS	MS	DMS	CAS	Relative
								Acceptance Limits	
Ammonia-N	200	200	120	320	310	100	95	51-133	3
Kjeldahl-N, Total	4.0	4.0	ND	2.4	2.3	60 *	58 *	62-127	4
Phosphate-P, Ortho-	0.40	0.40	0.17	0.51	0.50	85	83	65-135	2

\* MS/DMS recoveries for TKN are below CAS acceptance limits. The laboratory control sample for TKN met the acceptance criteria, so the data was accepted. LCS spike amount 5.0 ppm, LCS result 4.5 ppm, LCS recovery 90%.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** ARCO Products Company  
**Project:** TO#2185-94-2A/0805-130.03/#2185 OAKLAND  
**Sample Matrix:** Water

**Service Request:** K9505940  
**Date Collected:** 9/21/95  
**Date Received:** 9/22/95  
**Date Extracted:** NA  
**Date Analyzed:** 9/22/95

Duplicate Summary  
Oxidation-Reduction Potential  
ASTM Method D 1498-76  
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
MW-5(26)	K9505940-002	-	328	329	328	< 1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** ARCO Products Company  
**Project:** TO#2185-94-2A/0805-130.03 / #2185 Oakland  
**Sample Matrix:** Water

**Service Request:** K9505940  
**Date Collected:** 9/21/95  
**Date Received:** 9/22/95  
**Date Extracted:** 9/26/95  
**Date Analyzed:** 9/27/95

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

**Sample Name:** Batch QC  
**Lab Code:** K9505965-004

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Potassium	6010A	2000	3600	3600	3600	<1

**ARCO Products Company**

Division of Atlantic Richfield Company

Task Order No. 17075.00

**Chain of Custody**

ARCO Facility no. 2185 City (Facility) Oakland 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 Contract number \_\_\_\_\_  
 Consultant name EMCON Address (Consultant) 1921 Ringwood Avenue San Jose CA 95131

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX EPA 801	CATEX EPA 802	TPH Modified 801 Gas Clean	Oil and Grease 813.1 419.2	TPH EPA 418.1/348.06	EPA 801.8010	Dispersed Petroleum	Ammoniacal Nitrogen	Total Kjeldahl Nitrogen	Redox Potential	TCLP Metals VOCs VOA	CMI Metals EPA 8210/7000 TLIC STLC	Lead Cadmium EPA 7460/7421	Hexachlorocyclopentadiene	Orthophosphate	pH	
			Soil	Water	Other	Ice	Acid																			
MW-1(23)	1	1		X		X		9-21-95	1010																	
MW-2(23)	2	2		X		X	HCL	9-20-95	1253	X																
MW-1(23)	3	2		X		X	HCL	9-21-95	1210	X																
MW-7(25)	4	2		X		X	HCL	9-20-95	1327	X																
MW-5(20)	5	9		X		X	HCL	9-21-95	1100	X					XXXX								XXX			
MW-8(20)	6	9		X		X	HCL		1235	X					XXXX								XXX			
MW-2(23)	7	9		X		X	HCL		1305	X					XXXX								XXX			
MW-6(27)	8	9		X		X	HCL		1325	X					XXXX								XXX			
MW-3(23)	9	9		X		X	HCL		1355	X					XXXX								XXX			

Laboratory name CAS  
 Contract number \_\_\_\_\_

Method of shipment \_\_\_\_\_

Special detection Limit/reporting Sampler will deliver

Special QA/QC Lowest Possible

Remarks As Normal  
 TPHG } EPA 9020  
 BTEX }  
 H7BE }

#0905-130.03  
 Lab number 895-5940  
89501180  
 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 [Signature] Date 9-21-95 Time 1522 Received by Josue Brown CAS-ST

Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ Received by \_\_\_\_\_

Relinquished by Josue Brown Date 9-21-95 Time 1840 Received by laboratory Mike H Date 092295 Time 1030

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant CAS-K: Redox Potential, Het. Plate Count  
 APPC 3292 (2-91) Dis. K/ICP Due 10/5

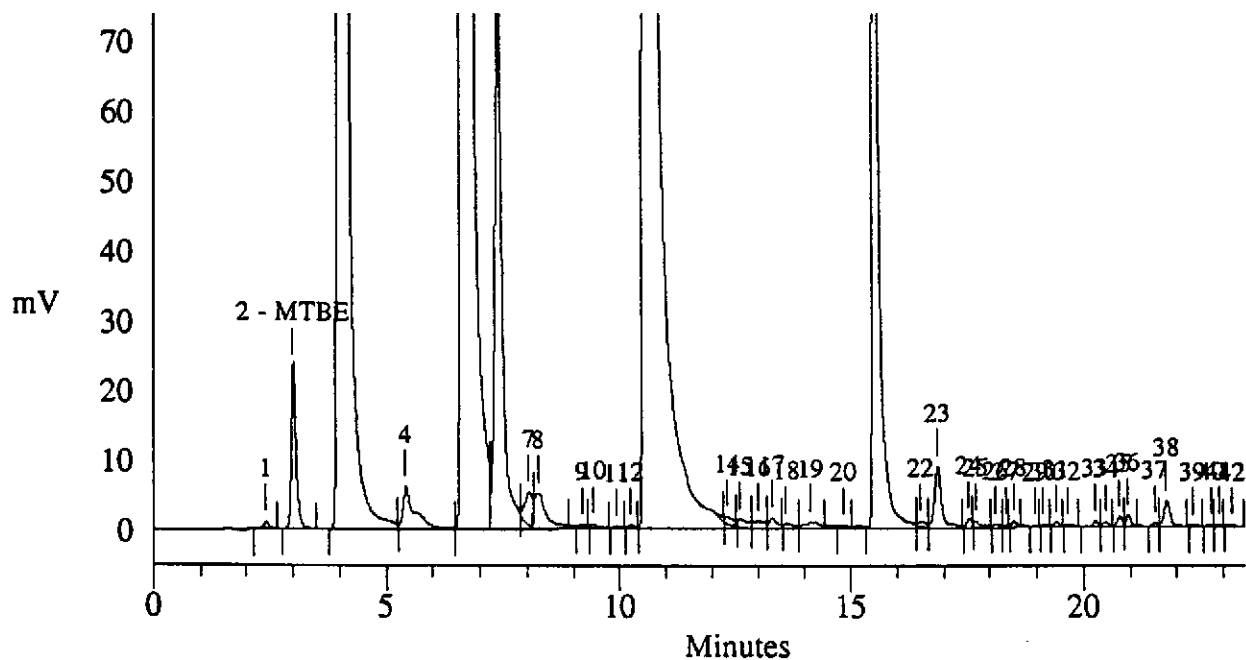
TOTAL P. 02

OCT-06-1995 10:09 FROM CAS TO CAS SAN JOSE P.02

35	20.77	0.000	0.00	1434	10738
36	20.95	0.000	0.00	1590	12118
37	21.53	0.000	0.00	495	3821
38	21.78	0.000	0.00	3647	35795
39	22.35	0.000	0.00	133	1611
40	22.75	0.000	0.00	216	1824
41	22.90	0.000	0.00	282	2215
42	23.20	0.000	0.00	165	2397
-----					
Totals		0.000	0.00	2649922	29478065

#	Group Name	Amount	Area	Area%
1	TOTAL XYLENES	0.0000	0	0.00%

File: 20927001.D16 Sample: S951180-004 MW-7(25)



35	16.28	2.14	21.4	9243	68898
36	16.57	11.20	112.0	48109	360164
37	16.80	4.87	48.7	20951	156533
38	17.08	0.35	3.5	2015	11143
39	17.25	2.83	28.3	13014	91059
40	17.72	12.70	127.0	61253	408332
41	18.08	0.56	5.6	1447	17992
42	18.50	0.54	5.4	1549	17355
43	18.75	2.82	28.2	12931	90675
44	19.17	2.16	21.6	10165	69612
45	19.47	2.52	25.2	10031	80927
46	19.68	3.80	38.0	13761	122251
47	20.07	0.60	6.0	2793	19271
48	20.38	2.47	24.7	8574	79522
49	20.62	3.62	36.2	10893	116298
50	21.02	0.32	3.2	1218	10145
51	21.35	0.49	4.9	2148	15838
52	21.63	0.87	8.7	4839	27927
53	21.77	1.64	16.4	7443	52801
54	22.08	0.28	2.8	1464	9013
55	22.35	2.18	21.8	7494	70062
56	22.57	0.28	2.8	1609	8912
57	22.75	2.74	27.4	9669	88232
58	23.08	0.52	5.2	1937	16694
59	23.25	0.37	3.7	1685	11755

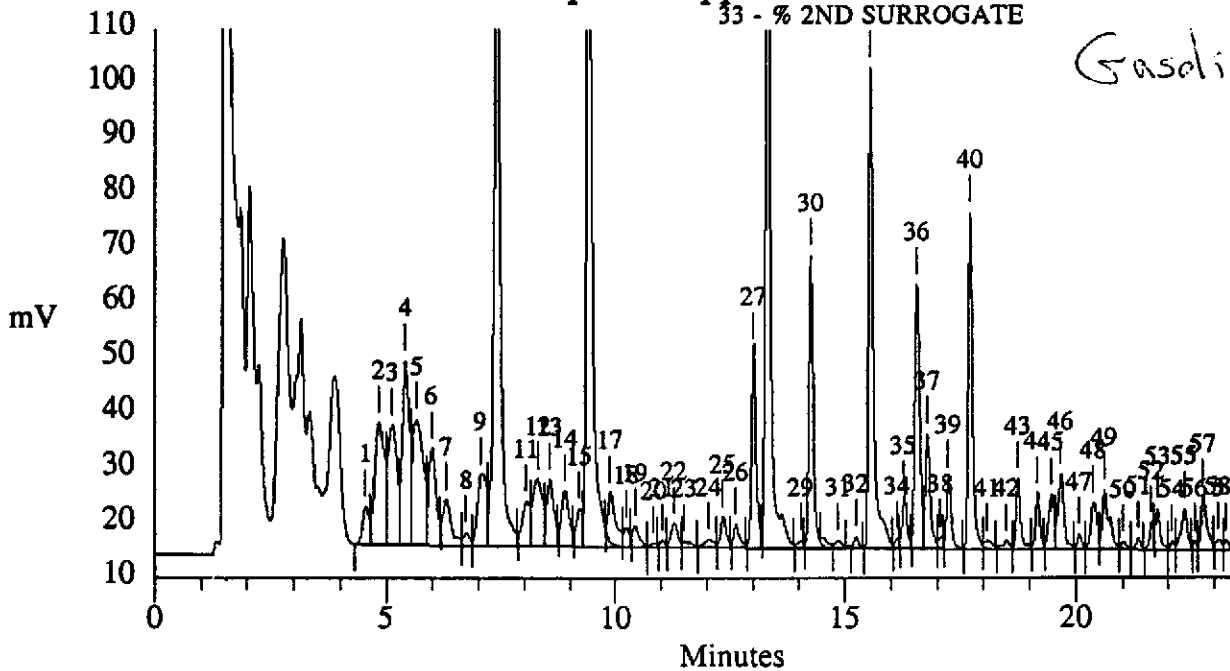
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 Totals 242.16 2421.6 858038 7786550

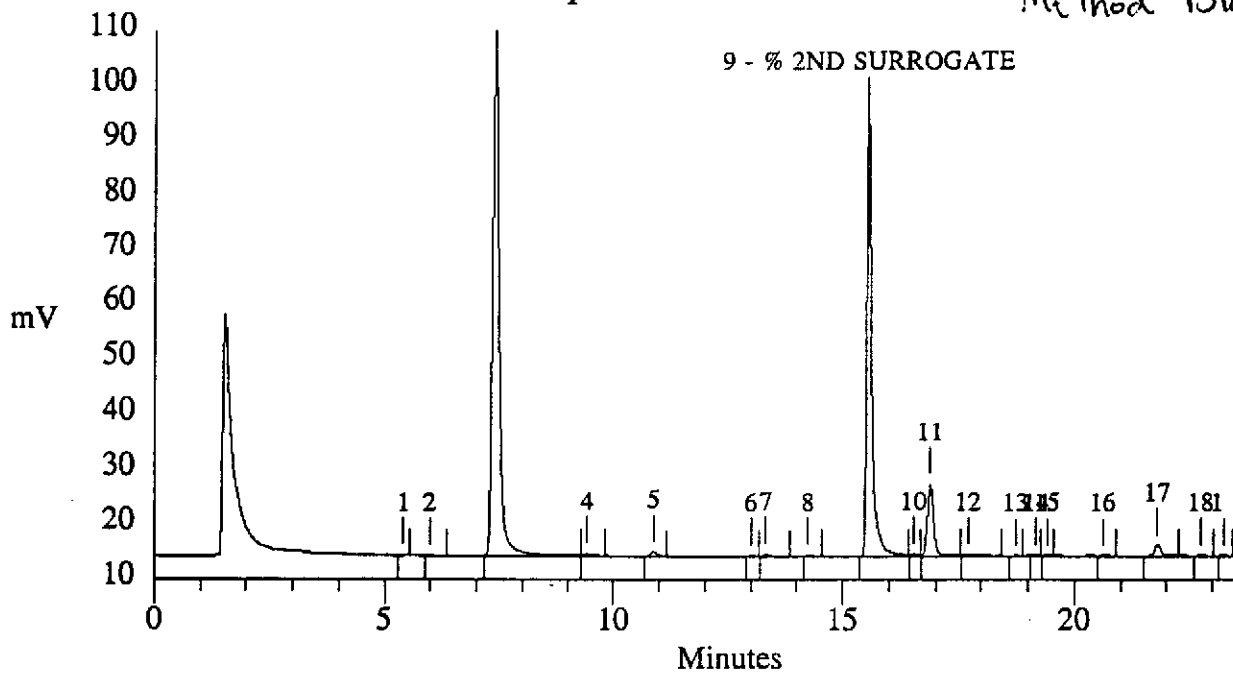
972 ~ 9/22/5

File: 20927002.D12 Sample: 250ppb TPHG

33 - % 2ND SURROGATE

Gasoline







**Columbia  
Analytical  
Services<sup>INC.</sup>**

October 24, 1995

Service Request No: S951179

John Young  
EMCON  
1921 Ringwood Avenue  
San Jose, CA 95131

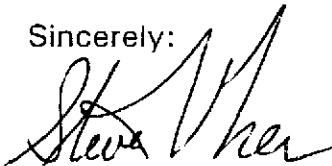
Re: 0805-130.03 / TO# 17075.00 / Oakland 2185

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on September 21, 1995. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above -to help expedite our service please refer to this number when contacting the laboratory.

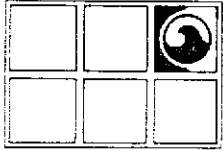
Please feel welcome to contact me should you have questions or further needs.

Sincerely:



Steven L. Green  
Project Chemist

SLG/ajb



**GROUNDWATER  
TECHNOLOGY** ®

**REMEDIATION TECHNOLOGY LABORATORY**

Groundwater Technology, Inc.

4080 Pike Lane, Suite B, Concord, CA 94520 USA  
Tel: (510) 671-2116 Fax: (510) 687-0843

October 20, 1995

Joanne Brown  
Columbia Analytical Services  
1921 Ringwood Avenue  
San Jose, CA 95131

Subject: Bacteria Enumeration Test Results  
Facility #: 2185

Dear Ms. Brown:

Enclosed please find the test results for the sample(s) received by the Remediation Technology Laboratory on 9/22/95.

Analytical work for this project has undergone a rigorous Quality Assurance/Quality Control procedure to ensure quality and accuracy. Your reference number for correspondence regarding these results is R7301.

If you have any questions regarding this analysis, or if we can be of further assistance, please feel free to call us.

Sincerely,  
**Groundwater Technology, Inc.**

David Cacciatore  
Project Manager

Enclosure(s)

# REMEDIATION TECHNOLOGY LABORATORY

4080 Pike Lane Concord, CA 94520 510-671-2116

## Results of Bacteria Enumeration

<b>Consultant Name:</b> EMCON	<b>Sampling Date:</b> 9/21/95
<b>Facility Number:</b> 2185	<b>Date Received:</b> 9/22/95
<b>Facility Location:</b> Oakland, CA	<b>Date Completed:</b> 10/20/95
<b>Project Manager:</b> Joanne Brown	<b>Report Date:</b> 10/20/95
<b>Matrix:</b> water	<b>Log-In Number:</b> R7301

Lab No.	Sample ID	Gasoline Utilizing Bacteria
7301-1	MW-1 (23')	(<10)
7301-2	MW-5 (26')	(1.0 X 10 <sup>2</sup> )
7301-3	MW-8 (22')	(1.1 X 10 <sup>2</sup> )
7301-4	MW-2 (23')	(2.0 X 10 <sup>2</sup> )
7301-5	MW-6 (27')	3.3 X 10 <sup>2</sup>
7301-6	MW-3 (23')	4.2 X 10 <sup>2</sup>

Plate counts reported in colony-forming units per mL of water. Spread plate technique based on Methods of Soil Analysis, Part 2, Chemical and Microbiological Properties, Amer. Soc. of Agronomy, Soil Science Soc. of Amer., 1982, Madison, WI chapter 37; Standard Methods for the Examination of Water and Wastes, 17th edition, AWWA, APHA, WPCF, 1989, Method 9215C. Results in parentheses do not fall within the range of 30-300 colonies per plate and are therefore reported as estimated counts.

**ARCO Products Company**  
Division of AtlanticRichfieldCompany

Task Order No. 17075.00

Chain of Custody

ARCO Facility no. <u>2185</u>	City (Facility) <u>Oakland</u>	Project manager (Consultant) <u>John Young</u>	Laboratory name
ARCO engineer <u>Mike Whelan</u>	Telephone no. (ARCO)	Telephone no. (Consultant) <u>(408)453-7300</u>	Contract number
Consultant name <u>EMCON</u>	Address (Consultant) <u>1921 Ringwood Avenue San Jose, CA 95131</u>		
		Fax no. (Consultant) <u>(408)453-0452</u>	

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/8010	C A 624/8240	EPA 625/8270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/>	Semi: VOA <input type="checkbox"/> VOA <input type="checkbox"/>	CAMS Metals EPA 6010/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>	Hydrocarbon Volatilizing Bacteria *	Method of shipment	
			Soil	Water	Other	Ice	Acid																	
MW-1(23)		2		X		X	NP	9-21-95	1010														X	Special detection Limit/reporting
MW-5(26)		2		X		X	NP		1100														X	
MW-8(27)		2		X		X	NP		1235														X	
MW-2(23)		2		X		X	NP		1305														X	Lowest possible Special QA/QC
MW-6(27)		2		X		X	NP		1325														X	
MW-3(23)		2		X		X	NP		1355														X	
																								As Normal Remarks
																								2-40ml NP VOAs w/ headspace Keep cool + dark (20 day incubation period)
																								#0805-130.03
																								Lab number
																								<u>39501179</u>
																								Turnaround time
																								Priority Rush
																								1 Business Day <input type="checkbox"/>
																								Rush
																								2 Business Days <input type="checkbox"/>
																								Expedited
																								5 Business Days <input type="checkbox"/>
																								Standard
																								10 Business Days <input checked="" type="checkbox"/>

Condition of sample:	Temperature received:
Relinquished by sampler <u>[Signature]</u>	Received by <u>John Brown MAS SJ</u>
Date <u>9-21-95</u> Time <u>1522</u>	Date <u>9-22-95</u> Time <u>9:30</u>
Relinquished by	Received by laboratory
Date <u>9-21-95</u> Time <u>1800</u>	Date <u>9-22-95</u> Time <u>9:30</u>
Relinquished by <u>John Brown</u>	Received by laboratory
Date <u>9-21-95</u> Time <u>1800</u>	Date <u>9-22-95</u> Time <u>9:30</u>