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

ENVIRONMENTAL PROTECTION
96 OCT -1 PM 1:39

Date September 26, 1996
Project 20805-131.008

To:

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

We are enclosing:

Copies	Description
1	Second quarter 1996 groundwater monitoring program results and Intrinsic Bioremediation Study, for ARCO service station 6002, Oakland, California

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

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.

John C. Young
Project Manager

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

ARCO Products Company

Date: September 26, 1996

Re: ARCO Station #

6002 • 6235 Seminary Avenue • Oakland, CA
Second Quarter 1996 Groundwater Monitoring Program
Results and Intrinsic Bioremediation Study

"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:

Paul Supple
Environmental Engineer

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

September 25, 1996
Project 20805-131.008

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

Re: Second quarter 1996 groundwater monitoring program results and Intrinsic Bioremediation Study, ARCO service station 6002, Oakland, California

Dear Mr. Supple:

This letter presents the results of the second quarter 1996 groundwater monitoring program at ARCO Products Company (ARCO) service station 6002, 6235 Seminary Avenue, Oakland, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

As requested by ARCO, additional samples were collected from select monitoring wells and analyzed for bioremediation indicator parameters. Groundwater samples were collected from monitoring wells MW-4, MW-5, VW-1, and VW-4.

LIMITATIONS

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

Please call if you have questions.

Sincerely,

EMCON

REGISTERED GEOLOGIST
JOHN CHARLES YOUNG
7/98
NO. 6407
STATE OF CALIFORNIA

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

I:\ARCO\6002\IMI01629.DOC-96 ljt:1

September 25, 1996

ARCO QUARTERLY REPORT

Station No.: 6002	Address: 6235 Seminary Avenue, Oakland, California
EMCON Project No.:	20805-131.008
ARCO Environmental Engineer/Phone No.:	Paul Supple /(510) 299-8891
EMCON Project Manager/Phone No.:	John C. Young /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Juliet Shin

WORK PERFORMED THIS QUARTER (Second- 1996):

1. Performed quarterly groundwater monitoring and sampling for second quarter 1996.
2. Prepared and submitted quarterly groundwater monitoring report for first quarter 1996.
3. Pursued off-site access to install groundwater monitoring wells.
4. Prepared and submitted *Underground Storage Tank Removal Report, ARCO Service Station 6002, Oakland, California* (EMCON, April 25, 1996).
5. Prepared and submitted *Onsite Tier 2 Risk-Based Corrective Action Evaluation for ARCO Station 6002, Oakland, California* (EMCON, June 3, 1996).
6. Received a letter from ACHCSA on June 21, 1996, recommending no further corrective action onsite.

WORK PROPOSED FOR NEXT QUARTER (Third- 1996):

1. Perform quarterly groundwater monitoring and sampling for third quarter 1996.
2. Prepare and submit quarterly groundwater monitoring report for second quarter 1996.
3. Install off-site monitoring wells.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring
Frequency of Sampling:	Quarterly (groundwater)
Frequency of Monitoring:	Quarterly (groundwater)
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Bulk Soil Removed to Date :	approximately 370 cubic yards of TPH impacted soil
Bulk Soil Removed This Quarter :	None
Water Wells or Surface Waters, within 2000 ft., impacted by site:	None
Current Remediation Techniques:	None
Approximate Depth to Groundwater:	7.95 feet
Groundwater Gradient (Average):	0.08 ft/ft toward west-southwest (consistent with past events)

DISCUSSION:

In March 1996 source removal was performed, underground storage tanks (USTs), piping, and impacted soil were excavated and removed from the site. EMCON recommended a long-term monitoring program to monitor decreasing concentrations of residual hydrocarbons. This program was based on a Tier 2 evaluation that residual hydrocarbons were below site specific target levels. In the second quarter of 1996, several bioremediation indicator parameters were evaluated to measure the presence of intrinsic biodegradation. These parameters were methane, hydrocarbon-utilizing bacteria, dissolved oxygen, redox potential, ferrous iron, nitrate as nitrogen, sulfate, and pH. The results are summarized in Table 3.

A review of these results indicates that biodegradation is occurring in the center of the plume. Well VW-4, located in the center of the plume, contains 13,000 micrograms per liter (µg/L) of total petroleum hydrocarbons as gasoline (TPHG) and 4,100,000 hydrocarbon-utilizing colony forming units per milliliter (CFUs/ml), the highest number of hydrocarbon-utilizing bacteria detected at the site. Well VW-1, 40 feet from the center of the plume, has relatively moderate concentrations of TPHG and hydrocarbon utilizing bacteria, 3,700 µg/L and 390,000 CFUs/ml respectively. At well MW-4, 80 feet downgradient and crossgradient from the center of the plume, no TPHG and only 56,000 CFUs/ml were detected. The presence of bacterial activity and hydrocarbon concentrations decreasing away from the center of the plume is consistent with the presence of biodegradation and suggests the decreasing trend in TPHG and benzene concentrations can be expected to continue.

In addition to the presence of hydrocarbon utilizing bacteria, the results for other bioremediation indicator parameters; such as, dissolved oxygen, nitrate, and sulfate, indicate biodegradation is taking place at the site. Dissolved oxygen levels above 2.0 milligrams per liter (mg/L) suggest that sufficient dissolved oxygen is present in TPHG impacted wells VW-1 and VW-4 to support aerobic biodegradation. When the dissolved oxygen level is low, nitrate can be used by hydrocarbon utilizing bacteria for anaerobic degradation. The concentration of nitrate was lower in wells VW-1 and VW-4 than in well MW-4, which suggests that nitrate is being reduced as the hydrocarbons are degraded. The differences in the concentrations of these parameters between impacted and non-impacted wells indicates that biodegradation is occurring at the site.

Well MW-5, which had the highest TPHG concentration, also had the lowest concentration of hydrocarbon degrading organisms. Although this location had the highest dissolved oxygen level, the relatively low levels of nitrate and sulfate are indicative of anaerobic conditions. Biodegradation may be occurring under anaerobic conditions at well MW-5; however, this is expected to be a slower biodegradation process than the aerobic biodegradation apparently occurring in VW-1 and VW-4. Despite reduced rates of decomposition in well MW-5, the concentration of TPHG and related compounds continue to decrease. This downward trend of decreasing TPHG concentrations may be a result of physical attenuation processes; such as, dispersion and adsorption. The presence of these processes and intrinsic biodegradation suggest the decreasing trend in TPHG concentrations will continue at the site.

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Second Quarter 1996
- Table 2 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 3 - Bioremediation Indicator Parameters, Second Quarter 1996
- Figure 1 - Site Location
- Figure 2 - Groundwater Data, Second Quarter 1996
- Appendix A - Field Data Sheets, Second Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, Second Quarter 1996 Groundwater Monitoring Event

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

Table 1
Groundwater Monitoring Data
Second Quarter 1996

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 07-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	05-10-96	248.35	7.95	ND	ND	WSW	0.08	05-10-96	Not sampled: not scheduled for chemical analysis						
MW-4	05-10-96	242.91	11.35	ND	ND	WSW	0.08	05-10-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	05-10-96	244.82	13.05	ND	ND	WSW	0.08	05-10-96	17000	460	21	760	480	1000	--
MW-6	05-10-96	NR	15.25	ND	ND	WSW	0.08	05-10-96	Not sampled: not scheduled for chemical analysis						
VW-1	05-10-96	NR	6.80	ND	ND	WSW	0.08	05-10-96	3700	61	<5	100	50	200	--
VW-2	05-10-96	NR	Not surveyed: not scheduled for monitoring					05-10-96	Not sampled: not part of sampling program						
VW-4	05-10-96	NR	8.58	ND	ND	WSW	0.08	05-10-96	13000	2500	41	420	660	43000	--

Sampled annually for Feb 23-96 report

ft-MSL: elevation in feet, relative to mean sea level
MWN: groundwater flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter
EPA: United States Environmental Protection Agency
MTBE: Methyl-tert-butyl ether
WSW: west-southwest
- - : not analyzed
ND: none detected
NR: not reported; data not available or not measurable
- -: not analyzed or not applicable

esj/h:\6002\6002mdb.xls\Table 1:imi
20805-131.008

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-23-96

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	01-21-94	247.06	7.82	239.24	ND	NR	NR	01-21-94	18000	1300	1600	250	1900	--	--
MW-1	07-08-94	247.06	8.32	238.74	ND	W	0.08	07-08-94	21000	5200	<50	1000	1500	--	--
MW-1	09-24-94	247.06	8.84	238.22	ND	WSW	0.08	09-24-94	13000	2900	37	830	640	--	--
MW-1	11-21-94	247.06	7.27	239.79	ND	SW	0.07	11-21-94	12000	2800	160	640	1300	--	--
MW-1	03-15-95	247.06	7.37	239.69	ND	WSW	0.08	03-15-95	13000	1200	44	770	1100	--	--
MW-1	05-30-95	247.06	8.48	238.58	ND	WSW	0.08	05-30-95	19000	1600	30	890	1400	--	--
MW-1	09-01-95	247.06	9.47	237.59	ND	WSW	0.09	09-01-95	14000	1300	28	480	780	24000	--
MW-1	11-13-95	247.06	8.78	** 238.29	0.01	WSW	0.08	11-13-95	11000	570	17	260	410	--	25000
MW-1	02-23-96	247.06	Well was decommisioned on 2-12-96					03-01-96	Well was decommisioned on 2-12-96						
MW-2	07-08-94	249.30	9.51	239.79	ND	W	0.08	07-08-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	09-24-94	249.30	10.02	239.28	ND	WSW	0.08	09-24-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	11-21-94	249.30	7.83	241.47	ND	SW	0.07	11-21-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	03-15-95	249.30	8.25	241.05	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	05-30-95	249.30	9.93	239.37	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	09-01-95	249.30	10.69	238.61	ND	WSW	0.09	09-01-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	11-13-95	249.30	10.32	238.98	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	02-23-96	249.30	Well was decommisioned on 2-12-96					03-01-96	Well was decommisioned on 2-12-96						

MW-1 and MW-2 will substitute for those destroyed wells

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-23-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	07-08-94	248.35	7.75	240.60	ND	W	0.08	07-08-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	09-24-94	248.35	8.14	240.21	ND	WSW	0.08	09-24-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	11-21-94	248.35	6.80	241.55	ND	SW	0.07	11-21-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	03-15-95	248.35	6.76	241.59	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	05-30-95	248.35	7.81	240.54	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	09-01-95	248.35	8.65	239.70	ND	WSW	0.09	09-01-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	11-13-95	248.35	8.25	240.10	ND	WSW	0.08	11-13-95	120	45	0.7	<0.5	6.2	--	--
MW-3	02-23-96	248.35	6.64	241.71	ND	WSW	0.08	03-01-96	<50	<0.5	<0.5	0.6	1.9	<3	--
MW-3	05-10-96	248.35	7.95	ND	ND	WSW	0.08	05-10-96	Not sampled: not scheduled for chemical analysis → annually monitored						
MW-4	07-08-94	242.91	10.97	231.94	ND	W	0.08	07-08-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	09-24-94	242.91	11.81	231.10	ND	WSW	0.08	09-24-94	140	<0.5	<0.5	<0.9	<0.5	--	--
MW-4	11-21-94	242.91	9.14	233.77	ND	SW	0.07	11-21-94	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	03-15-95	242.91	9.37	233.54	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	05-30-95	242.91	11.47	231.44	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	09-01-95	242.91	12.28	230.63	ND	WSW	0.09	09-01-95	78	<0.5	0.7	<0.5	<0.5	<3	--
MW-4	11-13-95	242.91	11.75	231.16	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	02-23-96	242.91	8.51	234.40	ND	WSW	0.08	03-01-96	59	1.2	7.4	1.6	9.3	3	--
MW-4	05-10-96	242.91	~~11.35~~ 11.45	ND	ND	WSW	0.08	05-10-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--

↑ refer to field data sheet

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Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-23-96

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-5	07-08-94	244.82	12.94	231.88	ND	W	0.08	07-08-94	41000	3300	<50	2200	2900	--	--
MW-5	09-24-94	244.82	13.60	231.22	ND	WSW	0.08	09-24-94	28000	4000	<50	2400	2100	--	--
MW-5	11-21-94	244.82	12.45	232.37	ND	SW	0.07	11-21-94	38000	3100	<50	3100	4100	--	--
MW-5	03-15-95	244.82	11.99	232.83	ND	WSW	0.08	03-15-95	21000	870	22	1600	1900	--	--
MW-5	05-30-95	244.82	12.97	231.85	ND	WSW	0.08	05-30-95	17000	2100	250	1000	520	--	--
MW-5	09-01-95	244.82	14.03	230.79	ND	WSW	0.09	09-01-95	19000	1500	25	1600	880	8300	--
MW-5	11-13-95	244.82	13.65	231.17	ND	WSW	0.08	11-13-95	21000	1300	22	1400	630	--	--
MW-5	02-23-96	244.82	11.93	232.89	ND	WSW	0.08	03-01-96	27000	1300	<50	1600	1500	730	--
MW-5	05-10-96	244.82	~~13.05~~ 13.13? according to Well Field Data Sheet	ND	ND	WSW	0.08	05-10-96	17000	460	21	760	480	1000	--
MW-6	06-29-95	NR	6.63	NR	ND	NR	NR	06-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-6	09-01-95	NR	Not surveyed:					09-01-95	Not sampled:						
MW-6	11-13-95	NR	7.70	NR	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	02-23-96	NR	9.82	NR	ND	WSW	0.08	03-01-96	<50	<0.5	0.8	<0.5	0.6	<3	--
MW-6	05-10-96	NR	15.25	ND	ND	WSW	0.08	05-10-96	Not sampled: not scheduled for chemical analysis → Annually Sampled						
AS-1	06-29-95	NR	9.20	NR	ND	NR	NR	06-30-95	<50	1.6	<0.5	0.9	0.9	--	--
VW-1	02-23-96	NR	5.29	NR	ND	WSW	0.08	03-01-96	21000	490	57	520	1500	240	--
VW-1	05-10-96	NR	6.80 6.87 according to Field Data Sheet	ND	ND	WSW	0.08	05-10-96	3700	61	<5	100	50	200	--
VW-2	02-23-96	NR	6.92	NR	ND	WSW	0.08	03-01-96	Not sampled: not part of sampling program						
VW-2	05-10-96	NR	Not surveyed: not scheduled for monitoring					05-10-96	Not sampled: not part of sampling program						
VW-4	05-10-96	NR	8.58	ND	ND	WSW	0.08	05-10-96	13000	2500	41	420	660	43000	--

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20805-131.008

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-23-96

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

ft-MSL: elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter
EPA: United States Environmental Protection Agency
MTBE: Methyl-tert-butyl ether
ND: none detected
NR: not reported; data not available or not measurable
W: west
WSW: west-southwest
SW: southwest
- - : not analyzed
*: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6002, Oakland, California,* (EMCON, February 23, 1996).
** [corrected elevation (Z')] = Z + (h * 0.73) where: Z: measured elevation, h: floating product thickness, 0.73: density ratio of oil to water

Table 3
Bioremediation Indicator Parameters
Second Quarter 1996

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

Date: 08-20-96

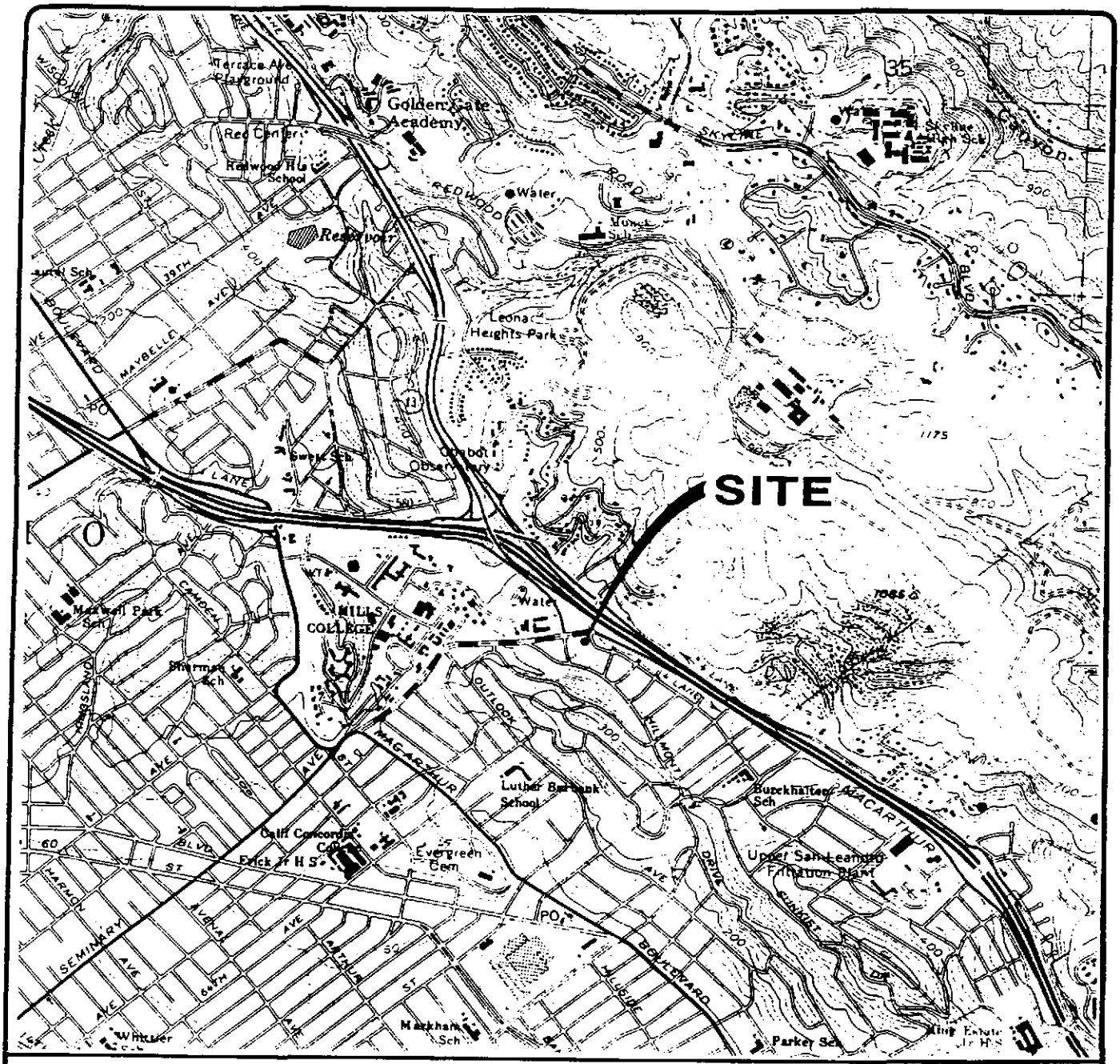
Well Designation	Water Sample Field Date	TPHG Concentration	Methane Concentration	Hydrocarbon-Utilizing Bacteria	Field Dissolved Oxygen	Field Redox Potential	Ferrous Iron	Nitrate as Nitrogen	Sulfate	pH
		µg/L	µg/L	CFUs/ml	mg/L	millivolts	mg/L	mg/L	mg/L	std. units
MW-4	05-10-96	<50	--	--	1.5	215	<0.1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

Looks like poss. ply aerobic degradation (high sulfates) + sufficient DO

aerobic + anaerobic?

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

152753

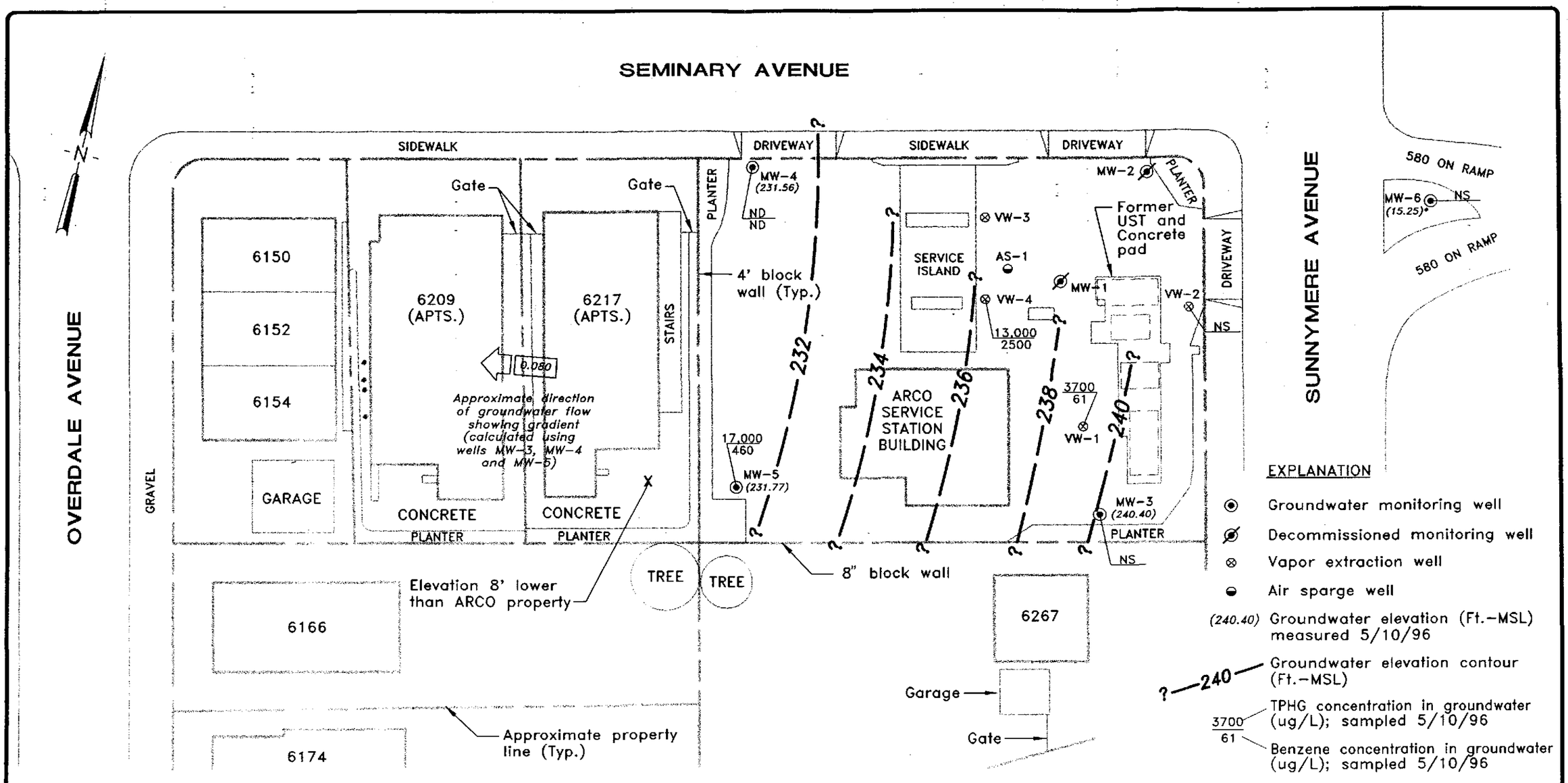


EMCON

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-131.08



Base map modified from GSI, 1994.

EMCON

SCALE: 0 30 60 FEET

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

GROUNDWATER DATA
SECOND QUARTER 1996

FIGURE NO.
2
PROJECT NO.
805-131.008

G:\805-131\GWCHEM REV 0 07/12/96 09:54:10 DD DJ

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 21775-241.002 STATION ADDRESS : 6235 Seminary Avenue, Oakland DATE : 5-10-96

ARCO STATION # : 6002 FIELD TECHNICIAN : M. Ross DAY : FRIDAY

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket Present	Lock Number	Type Of 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-6	OK	Yes	Yes	Duplicate ARCO	Locking	15.25	15.25	NA	NA	32.0	~~32.0~~ WATER IN BOX / ~~15.25~~ UNDER PRESSURE
2	MW-3	OK	Yes	Yes	ARCO	Locking	7.95	7.95	NA	NA	24.6	
3	MW-4	OK	Yes	Yes	ARCO	Locking	11.35	11.35	NA	NA	24.2	
4	MW-5	OK	Yes	Yes	ARCO	Locking	13.05	13.05	NA	NA	24.6	STRONG ODOR
5	VW-1	OK	Yes	Yes	~~ARCO~~ 3616	Locking	6.22	6.20	NA	NA	14.0	
6	VW-4	OK	Yes	Yes	~~ARCO~~ 3616	Locking	8.58	8.58	NA	NA	15.0	WATER IN BOX / Changed LOCK TO 3616 T.O.C.
							11.45	← 24 hrs	No Field Data Sheet			
							13.13					

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-241.002 SAMPLE ID: MW-4(24)

PURGED BY: M. ROSS CLIENT NAME: ARCO 6002

SAMPLED BY: M. ROSS LOCATION: OAKLAND, CA

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

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 1.96 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 8.39

DEPTH TO WATER (feet): 11.35 ✓ CALCULATED PURGE (gal.): 25.18

DEPTH OF WELL (feet): 24.2 ACTUAL PURGE VOL. (gal.): 22.0 ✓

DATE PURGED: 5-10-96 Start (2400 Hr) 1118 End (2400 Hr) 1124

DATE SAMPLED: 5-10-96 Start (2400 Hr) 1145 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1116	8.5	6.00	323	69.9	Light Brn	Turbid
1120	17.0	6.22	315	68.3	1	1
1124	~~DRY~~	WELL DRIED AT		22.0	Gallons	
1155	Recharge	6.38	303	69.0	Light Brn	Turbid

D. O. (ppm): ~~1-2~~ ODOR: NONE

COLOR: NA (COBALT 0 - 500) TURBIDITY: NA (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	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ 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

REMARKS: REDOX → 215 mv

WELL DRIED AT 22.0 GALLONS

Meter Calibration: Date: 5-10-96 Time: 1100 Meter Serial #: 9210 Temperature °F: 73.4

(EC 1000 1033 / 1000) (DI —) (pH 7 704 / 709) (pH 10 995 / 1010) (pH 4 402 —)

Location of previous calibration: —

Signature: Mike Ross Reviewed By: SA Page 1 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-241.002 SAMPLE ID: MW-5(24)

PURGED BY: M. Ross CLIENT NAME: ARCO 6202

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):	NA	VOLUME IN CASING (gal.):	2.54
DEPTH TO WATER (feet):	13.05	CALCULATED PURGE (gal.):	22.63
DEPTH OF WELL (feet):	24.6	ACTUAL PURGE VOL. (gal.):	10.0

DATE PURGED: 5-10-96 Start (2400 Hr) 1200 End (2400 Hr) 1206

DATE SAMPLED: 5-10-96 Start (2400 Hr) 1225 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1204	8.0	6.47	494	72.7	Light Brn	Trace
1206	[redacted]	Dry	at 10.0	Gallons		
1225	Recharge	6.51	478	67.7	Light Brn	Trace

D. O. (ppm): 5-6 ODOR: STRONG

COLOR (visual): NA (COBALT 0 - 500)

TURBIDITY (visual): NA (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	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ 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

REMARKS: ReDox → -80 mV

Dry at 10.0 gallons

Heavy sheen noticed

Meter Calibration: Date: 5-10-96 Time: 1120 Meter Serial #: 9210 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: Matthew Ross Reviewed By: SA Page 2 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-241.002 SAMPLE ID: VW-1(14)

PURGED BY: M. ROSS CLIENT NAME: ARCO

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):	NA	VOLUME IN CASING (gal.):	4.70 ✓
DEPTH TO WATER (feet):	6.80 ✓	CALCULATED PURGE (gal.):	14.11
DEPTH OF WELL (feet):	14.0	ACTUAL PURGE VOL. (gal.):	8.0

DATE PURGED: 5-10-96 Start (2400 Hr) 1242 End (2400 Hr) 1247

DATE SAMPLED: 5-10-96 Start (2400 Hr) 1305 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1244	5.0	6.64	617	70.6	DARK GREY	HEAVY
1247	DRY	@	8.0	GALLONS		
1310	RECHARGE	6.64	595	69.5	DARK GREY	HEAVY
					NA	NA

D. O. (ppm): 2-3 ODOR: SLIGHT

(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	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ 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~~ 3616

REMARKS: REDOX ⟹ ~~MW~~ OUT OF RANGE

SLIGHT SHEEN NOTICED

DRY at 8.0 GALLONS

Meter Calibration: Date: 5-10-96 Time: 1100 Meter Serial #: 9210 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: Mike Ross Reviewed By: SLB Page 3 of 4

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21725-241.002 SAMPLE ID: VW-4 (15)

PURGED BY: M. Ross CLIENT NAME: ARCO 6002

SAMPLED BY: M. Ross LOCATION: OAKLAND, CA

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

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 1.56 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA ✓ VOLUME IN CASING (gal.): 4.19

DEPTH TO WATER (feet): 8.58 ✓ CALCULATED PURGE (gal.): 12.58 ✓

DEPTH OF WELL (feet): 15.0 ACTUAL PURGE VOL. (gal.): 10.0

DATE PURGED: 5-10-96 Start (2400 Hr) 1321 End (2400 Hr) 1325

DATE SAMPLED: 5-10-96 Start (2400 Hr) 1345 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1322	4.5	6.55	1080	68.9	Light Brn	TRACE
1324	9.0	6.62	1108	67.2	clr	clr
1325	DRY at 10.0 Gallons					
1350	Recharge	6.86	1044	78.9	Light Brn	TRACE

D. O. (ppm): 2-3 ODOR: SLIGHT

COLOR: NA (COBALT 0 - 500)

TURBIDITY: NA (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	
✓ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ 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 #: 3616

REMARKS: ReDox → OUT of RANGE

DRY at 10.0 Gallons

PVC SHAVINGS FOUND ON BOTTOM OF WELL

Meter Calibration: Date: 5-10-96 Time: 1100 Meter Serial #: 9210 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: Mike Ross Reviewed By: SH Page 4 of 4

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WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-241.002 | SAMPLE ID: MW-4(24) ✓

PURGED BY: M. Gallegos | CLIENT NAME: ARCO #6002

SAMPLED BY: ✓ | LOCATION: OAKLAND, 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.): 8.24

DEPTH TO WATER (feet): 11.45 | CALCULATED PURGE (gal.): 24.79

DEPTH OF WELL (feet): 24.1 | ACTUAL PURGE VOL. (gal.): 19.0

DATE PURGED: 5-14-96 | Start (2400 Hr) 0953 | End (2400 Hr) 0958

DATE SAMPLED: ✓ | Start (2400 Hr) 1005 | End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0955	8.5	5.78	303	68.4	BRN	Heavy
0957	17.0	6.00	307	68.1		
	~~recharge~~ well dried at			19.0 gallons		
1008	recharge	6.19	301	67.5	✓	✓

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

- ___ 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-1624

REMARKS: All Samples taken

Meter Calibration: Date: 5/14/96 | Time: 0950 | Meter Serial #: 9204 | Temperature °F: 69.7

(EC 1000 981 / 1000) (DI ___) (pH 7 700 / 700) (pH 10 1000 / 1000) (pH 4 400 / 400)

Location of previous calibration: ___

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

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2177-24L-002 SAMPLE ID: MW-5 (24')

PURGED BY: M.C. Gilbert CLIENT NAME: ARCO 6002

SAMPLED BY: ↓ LOCATION: OAKLAND, 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):	N/R	VOLUME IN CASING (gal.):	7.36
DEPTH TO WATER (feet):	13.13'	CALCULATED PURGE (gal.):	22.08
DEPTH OF WELL (feet):	24.4	ACTUAL PURGE VOL. (gal.):	17.0

DATE PURGED: 5-14-96 Start (2400 Hr) 1026 End (2400 Hr) 1032

DATE SAMPLED: ↓ Start (2400 Hr) 1040 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1028	7.5	6.33	480	67.1	Cloudy	Mod
1030	15.0	6.34	475	67.1	"	"
	well dried at		17.0	Gallons.		
1042	recharge	6.36	483	67.3	↓	↓

D. O. (ppm): N/R ODOR: Strong

COLOR: N/R (COBALT 0 - 500) TURBIDITY: N/R (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: N/R

Parameters field filtered at this well: N/R

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-108

REMARKS: Sheen on top of purge water, all samples taken.

Meter Calibration: Date: 5/14/96 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-4

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

Rev. 3, 2/94

EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 21775-241.002 SAMPLE ID: MW-1 (13')

PURGED BY: M. Callison CLIENT NAME: ARCO# 6002

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): N/A VOLUME IN CASING (gal.): 4.59

DEPTH TO WATER (feet): 6.87 CALCULATED PURGE (gal.): 13.77

DEPTH OF WELL (feet): 13.9 ACTUAL PURGE VOL. (gal.): 14.0

DATE PURGED: 5-14-96 Start (2400 Hr) 1107 End (2400 Hr) 1112

DATE SAMPLED: ✓ Start (2400 Hr) 1120 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1109	4.5	6.60	605	67.3	Grey	Heavy
1110	9.0	6.53	554	67.0	"	"
1112	14.0	6.55	559	66.4	"	"

D. O. (ppm): NA ODOR: Strong N/A (COBALT 0 - 500) N/A (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: N/A

Parameters field filtered at this well: N/A

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™
- X Bailer (Teflon®)
- ____ Bailer (Stainless Steel)
- ____ Submersible Pump
- ____ Dedicated

Other: ____

WELL INTEGRITY: Good LOCK #: ARCO-key

REMARKS: Sheen on top of purge water
all sample taken

Meter Calibration: Date: 5/14/96 Time: ____ Meter Serial #: 9204 Temperature °F: ____

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

Location of previous calibration: MW-4

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

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-241.002 SAMPLE ID: VW-4 (14')

PURGED BY: M. GALLEGOS CLIENT NAME: ARCO # 6002

SAMPLED BY: V LOCATION: OAKLAND, CA

TYPE: Ground Water 1 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.): 4.11

DEPTH TO WATER (feet): 8.60 CALCULATED PURGE (gal.): 12.34

DEPTH OF WELL (feet): 14.9 ACTUAL PURGE VOL. (gal.): 12.5

DATE PURGED: 5-14-96 Start (2400 Hr) 1142 End (2400 Hr) 1146

DATE SAMPLED: V Start (2400 Hr) 1155 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1144	4.0	6.67	700	67.2	Cloudy	Mod
1145	8.0	6.68	770	66.4	"	"
1146	12.5	6.72	767	66.7	"	Light

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

NR (COBALT 0 - 500)

NR (NTU 0 - 200 or 0 - 1000)

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

Other: ____

WELL INTEGRITY: Good LOCK #: ARCO key

REMARKS: all Samples taken

Meter Calibration: Date: 5/14/96 Time: ____ Meter Serial #: 9204 Temperature °F: ____

(EC 1000 ____ / [redacted]) (DI ____) (pH 7 ____ / ____) (pH 10 ____ / ____) (pH 4 ____ / ____)

Location of previous calibration: MW-4

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

Columbia Analytical Services inc.

May 23, 1996 Service Request No: S9600750

Mr. John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: 6002 Oakland/20805-131.008/TO#19350.00

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on May 10, 1996. 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 12, 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,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

SLG/jk

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

ACRONLST.DOC 7/14/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600750
Project:	6002 Oakland/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample *Matrix*:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA

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

	Sample Name:	**VW-1 (14)**	**VW-4 (15)**	**Method Blank**
	Lab Code:	S9600750-001	S9600750-002	S960516-WB1
	Date Analyzed:	5/17/96	5/16-17/96	5/16/96
Analyte	**MRL**			
TPH as Gasoline	50	3,700	13,000	ND
Benzene	0.5	61	2,500	ND
Toluene	0.5	<5*	41	ND
Ethylbenzene	0.5	100	420	ND
Total Xylenes	0.5	50	660	ND
Methyl *tert*-Butyl Ether	3	200	43,000	ND

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

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600750
Project:	6002 OAKLAND/20805-131.008	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/20/96

Ferrous Iron
Standard Method 3500D
Units: mg/L

Sample Name	Lab Code	MRL	Result
VW-1 (14)	S9600750-001	0.1	42
VW-4 (15)	S9600750-002	0.1	13
Method Blank	S9600750-WB	0.1	ND

1AMRL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600750
Project:	6002 Oakland/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		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:	S960517-WB1
Date Analyzed:	5/17/96

Analyte	**MRL**	
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

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	K9602773
Project:	20805-131.008 TO#19350.00/#6002 OAKLAND	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/11/96
		Date Extracted:	NA

Inorganic Parameters
Units: mg/L (ppm)

Analyte:	**Nitrate as Nitrogen**	**Sulfate**
EPA Method:	353.2	300.0
Method Reporting Limit:	0.2	0.2
Date Analyzed:	5/11/96	5/15,16/96

Sample Name	**Lab Code**		
VW-1 (14)	K9602773-001	ND	49
VW-4 (15)	K9602773-002	ND	1.5
Method Blank	K9602773-MB	ND	ND

3ADW/061694

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600750
Project:	6002 Oakland/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/16-17/96

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

Sample Name	**Lab Code**	**PID Detector Percent Recovery** 4-Bromofluorobenzene	**FID Detector Percent Recovery** α,α,α–Trifluorotoluene
VW-1 (14)	S9600750-001	93	113
VW-4 (15)	S9600750-002	97	105
Batch QC (MS)	S9600755-001MS	95	102
Batch QC (DMS)	S9600755-001DMS	94	105
Method Blank	S960516-WB1	96	95
Method Blank	S960517-WB1	98	98
CAS Acceptance Limits:		69-116	69-116

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600750
Project:	6002 Oakland/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/16/96

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

Sample Name: Batch QC
Lab Code: S9600755-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Gasoline	250	250	ND	240	250	96	100	67-121	4

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6002 Oakland/20805-131.008/TO#19350.00

Service Request: S9600750
Date Analyzed: 5/16/96

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	24.2	97	85-115
Toluene	25	24.4	98	85-115
Ethylbenzene	25	24.3	97	85-115
Xylenes, Total	75	72.9	97	85-115
Gasoline	250	247	99	90-110
Methyl *tert*-Butyl Ether	50	45	90	85-115

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.008 TO#19350.00/#6002 OAKLAND
Sample Matrix: Water

Service Request: K9602773
Date Collected: 5/10/96
Date Received: 5/11/96
Date Extracted: NA

Duplicate Summary
Inorganic Parameters
Units: mg/L (ppm)

Sample Name: VW-1 (14)
Lab Code: K9602773-001DUP

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Nitrate as Nitrogen	353.2	0.2	ND	ND	ND	-
Sulfate	300.0	0.2	49	51	50	4

DUP1SEPA/102194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.008 TO#19350.00/#6002 OAKLAND
Sample Matrix: Water

Service Request: K9602773
Date Collected: 5/10/96
Date Received: 5/11/96
Date Extracted: NA

Matrix Spike Summary
Inorganic Parameters
Units: mg/L (ppm)

Sample Name: VW-1 (14)
Lab Code: K9602773-001MS

Analyte	EPA Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Nitrate as Nitrogen	353.2	0.2	2.0	ND	2.0	100	75-125
Sulfate	300.0	0.2	20	49	71	110	75-125

MS1SEPA/102194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6002	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)453-0457
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA 95131
Contract number	Cancelled shipping per [illegible]
Method of shipment	Sampler will deliver; Stone [illegible]

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, acetic, MBE 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 ☐ VOA ☐ Semi VOA ☐	Fe+2 ~~CAM Metals~~ EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Nitrate	Sulfate	Methane*	Hydrocarbon [illegible]
VW-1	(14)	1D		X		X	HCL	5/10/96	1305		X								X		X	X	X	X
VW-4	(15)	1D		X		X	HCL	5/10/96	1345		X								X		X	X	X	X

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: *methane bottles have headspace

20805-131.008

Lab number: 59600750

Turnaround time

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

Condition of sample:

Temperature received: cool

Relinquished by	Date	Time	Received by
Relinquished by sampler: Mike [signature]	5-10-96	1450	Received by: [signature]
Relinquished by			Received by
Relinquished by			Received by laboratory: ✓ — Date 5/10/96 — Time 14:50

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

R8, R20/S56

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350

Chain of Custody

ARCO Facility no. 6002 | City (Facility) Oakland | Project manager (Consultant) John Young | Laboratory name CAS

ARCO engineer Mike Whelan | Telephone no. (ARCO) | Telephone no. (Consultant) | Fax no. (Consultant) | Contract number

Consultant name EMCON | Address (Consultant) San Jose

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 ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐	Nitrate (NO3) Sulfate (SO4)	
VW-1 (14)		1		X		X		5/10/96	1305												X	
VW-4 (15)		1		X		X		5/10/96	1345												X	

Method of shipment: Fed Ex

Special detection Limit/reporting: Lowest possible

Special QA/QC: ARCO

Remarks: 20805-131.008

Lab number: 9600750

Turnaround time:
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒ (5/23)

Condition of sample: | Temperature received:

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by sampler			Received by		
Relinquished by			Received by		
Relinquished by (SLAB) Jessie Brown	5-10-96	1900	Received by laboratory (CLAB) Ruth Digby	5/11/96	0800

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

✓ (LSR/Draft Invoice to follow)

Columbia Analytical Services inc.

May 23, 1996

Service Request No: S9600751

Mr. John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: 6002 OAKLAND/20805-131.008/TO#19350.00

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on May 10, 1996. 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 12, 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,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

SLG/jk

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA

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

		Sample Name:	**MW-4 (24)**	**MW-5 (24)**	**Method Blank**
		Lab Code:	S9600751-001	S9600751-002	S960516-WB1
		Date Analyzed:	5/16/96	5/17/96	5/16/96
Analyte	**MRL**				
TPH as Gasoline	50		ND	17,000	ND
Benzene	0.5		ND	460	ND
Toluene	0.5		ND	21	ND
Ethylbenzene	0.5		ND	760	ND
Total Xylenes	0.5		ND	480	ND
Methyl *tert*-Butyl Ether	3		ND	1,000	ND

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		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:	S960517-WB1
Date Analyzed:	5/17/96

Analyte	**MRL**	
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

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/20/96

Ferrous Iron
Standard Method 3500D
Units: mg/L

Sample Name	Lab Code	MRL	Result
MW-4 (24)	S9600751-001	0.1	ND
MW-5 (24)	S9600751-002	0.1	21
Method Blank	S9600751-WB	0.1	ND

1AMRL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	K9602798
Project:	20805-131.008 TO#19350.00/#6002 OAKLAND	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/13/96
		Date Extracted:	NA

Inorganic Parameters
Units: mg/L (ppm)

Analyte:	**Nitrogen as Nitrogen**	**Sulfate**
EPA Method:	353.2	300
Method Reporting Limit:	0.2	0.2
Date Analyzed:	5/11/96	5/15/96

Sample Name	**Lab Code**		
MW-4 (24)	K9602798-001	1.5	33
MW-5 (24)	K9602798-002	ND	0.4
Method Blank	K9602798-MB	ND	ND

3ADW/061694

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/16/96

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

Sample Name	Lab Code	PID Detector Percent Recovery 4-Bromofluorobenzene	FID Detector Percent Recovery α,α,α-Trifluorotoluene
MW-4 (24)	S9600751-001	99	98
MW-5 (24)	S9600751-002	96	114
Batch QC (MS)	S9600755-001MS	95	102
Batch QC (DMS)	S9600755-001DMS	94	104
Method Blank	S960516-WB1	96	95
Method Blank	S060517-WB1	98	98
CAS Acceptance Limits:		69-116	69-116

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/10/96
		Date Extracted:	NA
		Date Analyzed:	5/16/96

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

Sample Name: Batch QC
Lab Code: S9600755-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Gasoline	250	250	ND	240	250	96	100	67-121	4

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600751
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Analyzed:**	5/16/96

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	24.2	97	85-115
Toluene	25	24.4	98	85-115
Ethylbenzene	25	24.3	97	85-115
Xylenes, Total	75	72.9	97	85-115
Gasoline	250	247	99	90-110
Methyl *tert*-Butyl Ether	50	45	90	85-115

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	K9602798
Project:	20805-131.008 TO#19350.00/#6002 OAKLAND	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/13/96
		Date Extracted:	NA

Duplicate Summary
Inorganic Parameters
Units: mg/L (ppm)

Sample Name: MW-4 (24)
Lab Code: K9602798-001

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	*Relative* Percent Difference
Nitrate as Nitrogen	353.2	0.2	ND (L)	ND	ND	--
Sulfate	300.0	0.2	33	33	33	< 1

L Duplicate analysis was performed on Batch QC; Lab Code K9602773-001.

DUP1SEPA/102194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	K9602798
Project:	20805-131.008 TO#19350.00/#6002 OAKLAND	**Date Collected:**	5/10/96
Sample Matrix:	Water	**Date Received:**	5/13/96
		Date Extracted:	NA

Matrix Spike Summary
Inorganic Parameters
Units: mg/L (ppm)

Sample Name: MW-4 (24)
Lab Code: K9602798-001

Analyte	EPA Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Nitrate as Nitrogen	353.2	0.2	2.0 (M)	ND	2.0	100	75-125
Sulfate	300.0	0.2	10	33	45	120	75-125

M Matrix spike analysis was performed on Batch QC; Lab Code K9602773-001.

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6002	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
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA 95131
Contract number	Per Steve Horton 5/13/96

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 inc MTBE 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 ☐ VOA ☐ Semi VOA ☐	Fe+2 CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Nitrate	Sulfate	Methane*	Hydrocarbon Utilizing Bacteria
MW-4(24)		10		X		X	HCL	5/10/96	1145		X								X		X	X	X	X
MW-5(24)		10		X		X	HCL	5/10/96	1225		X								X		X	X	X	X

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: * Methane bottles have headspace

20805-131.008

Lab number: S9600751

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

Condition of sample:

Temperature received: Cool

	Date	Time			
Relinquished by sampler: Mike R[illegible]	5-10-95	1450	Received by: Christina V Mayhew		
Relinquished by			Received by		
Relinquished by			Received by laboratory	Date 5/10/96	Time 14:50

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

APC-3292 (2-91)

R8, R20/S56

Subcontract - KLAB

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6002 | City (Facility) Oakland | Project manager (Consultant) John Young | Laboratory name CAS

ARCO engineer Mike Whelan | Telephone no. (ARCO) | Telephone no. (Consultant) | Fax no. (Consultant) | Contract number

Consultant name EMCON | Address (Consultant) San Jose

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 ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Nitrate (NO3) Sulfate (SO4)	
(24) MW-4		1		X		X		5/10/96	1145												X	
(24) MW-5		1		X		X		5/10/96	1225												X	

Method of shipment: Fed Ex

Special detection Limit/reporting: Lowest possible

Special QA/QC: ARCO

Remarks: 20805-131.008

Lab number: K96-02798 / 9600751

Turnaround time
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒ (5/23)

Condition of sample: | Temperature received:

Relinquished by	Date	Time	Received by
Relinquished by sampler			Received by
Relinquished by			Received by
Relinquished by Joanne Brown (SLAB)	5-10-96	1900	Received by laboratory (KLAB) Ruth Higley — Date 5-11-96 Time 0800

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

(Use draft invoice to follow)

Columbia Analytical Services INC.

June 13, 1996 Service Request No: S9600766

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: 6002 OAKLAND/20805-131.008/TO#19350.00

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on May 14, 1996. 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 4, 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,

Steven L. Green
Project Chemist

SLG/cvr

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600766
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/14/96
Sample Matrix:	Water	**Date Received:**	5/14/96
		Date Extracted:	NA
		Date Analyzed:	5/28/96

Methane

Units: ug/L (ppb)

Sample Name	Lab Code	MRL	Result
VW-1 (13)	S9600766-001	4	8.8
VW-4 (14)	S9600766-002	4	6.4

FLUOR DANIEL GTI

REMEDIATION TECHNOLOGY TESTING FACILITY

June 11,1996

Steve Green
Columbia Analytical Services
2059 Junction Ave
San Jose, CA 95131

Subject: Test Results
P.O. # 5165

Dear Mr. Green:

Enclosed please find the test results for the sample(s) received by the Remediation Technology Testing Facility on 5-15-96.

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 R7492.

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

Sincerely,
Fluor Daniel GTI

David Cacciatore
Project Manager

Enclosure(s)

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

REMEDIATION TECHNOLOGY TESTING FACILITY

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

Results of Bacteria Enumeration

Project Name:	CAS	**Sampling Date:**	5-14-96
P.O. Number:	5165	**Date Received:**	5-15-96
Site Location:	Oakland	***Date Completed:***	6-4-96
Project Manager:	Steve Green	**Report Date:**	6-11-96
Matrix:	Water	**Log-In Number:**	R7492

Lab No.	Sample ID	Gasoline Utilizing Bacteria
7492-1	VW-1	3.9×10^5
7492-2	VW-4	4.1×10^6

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.

b: PSA2 7492b.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. P.O.# 5165

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) John Young	Laboratory name RTL
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 ☐	Hydrocarbon identifying chromatogram
VW-1		3		X		X		5.14	1120	R	7492-1										X
VW-4		3		X		X		5.14	1155				-2								X

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks
Send report to:
Steve Green
CAS
2059 Junction Ave
San Jose Ca
95131

Lab number

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

Contaminant GAS per Steve Green 5-15-96 BA

Condition of sample:		Temperature received:	
Relinquished by sampler	Date / Time	Received by	
Relinquished by	Date / Time	Received by	
Relinquished by Robert Peberg CAS-SJ	Date 5-15-96 Time 1120	Received by laboratory Beatriz Villanueva	Date 5-15-96 Time 10:25

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) JohnYoung	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0457
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 ☐	Methane	Hydrocarbon Utilizing Bacteria
VW-1(13)	(1)	5		X		X	H_2SO_4	5-14-96	1120												X	X
VW-4(14)	(2)	5		X		X	H_2SO_4	↓	1155												X	X

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-250ml H_2SO_4 VOAs (No Headspa
3-40ml NP VOAs (w/ Headspace)
#20805-131.00

Lab number: 59600766 (-766)

Turnaround time

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

Condition of sample:

Temperature received:

Relinquished by sampler	Date 5-14-96	Time 1400	Received by KURT ROBY
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CAS-SJ / Date / Time

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

R20/556

Columbia Analytical Services, Inc.

June 13, 1996

Service Request No: S9600767

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: 6002 OAKLAND/20805-131.008/TO#19350.00

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on May 14, 1996. 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 4, 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,

Steven L. Green
Project Chemist

SLG/cvr

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600767
Project:	6002 OAKLAND/20805-131.008/TO#19350.00	**Date Collected:**	5/14/96
Sample Matrix:	Water	**Date Received:**	5/14/96
		Date Extracted:	NA
		Date Analyzed:	5/28/96

Methane

Units: ug/L (ppb)

Sample Name	Lab Code	MRL	Result
MW-4 (24)	S9600767-001	4	*ND*
MW-5 (24)	S9600767-002	4	91

FLUOR DANIEL GTI

REMEDIATION TECHNOLOGY TESTING FACILITY

June 11,1996

Steve Green
Columbia Analytical Services
2059 Junction Ave
San Jose, CA 95131

Subject: Test Results
P.O. # 5166

Dear Mr. Green:

Enclosed please find the test results for the sample(s) received by the Remediation Technology Testing Facility on 5-15-96.

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 R7491.

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

Sincerely,
Fluor Daniel GTI

David Cacciatore
Project Manager

Enclosure(s)

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

REMEDIATION TECHNOLOGY TESTING FACILITY
4080 Pike Lane Concord, CA 94520 510-671-2116

Results of Bacteria Enumeration

Project Name:	CAS	**Sampling Date:**	5-14-96
P.O. Number:	5166	**Date Received:**	5-15-96
Site Location:	Oakland	**Date Completed:**	6-4-96
Project Manager:	Steve Green	**Report Date:**	6-11-96
Matrix:	Water	**Log-In Number:**	R7491

Lab No.	Sample ID	Gasoline Utilizing Bacteria
7491-1	MW-4	5.6×10^4
7491-2	MW-5	1.4×10^4

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.

b: PSA2 7491b.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6002 | 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 Ave San Jose CA 95131

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 ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Methane	Hydrocarbon Utilizing Bacteria
MW-4(24')	(1)	5		X		X	H_2SO_4	5-14-94	1005												X	X
MW-5(24')	(2)	5		X		X	H_2SO_4	↓	1040												X	X

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-250ml H_2SO_4 VOAs (No Headspace) 3-40ml NP VOAs (w/ Headspace) All Wells

#20805-131.008

Lab number 767785 / 5960077

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

Condition of sample: | Temperature received:

Relinquished by sampler	Date	Time	Received by
[signature]	5-14-94	1400	Kurt Roby
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: CAS-SJ

Date | Time

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

R20/556