even though there is dilution of sample, still need to quantify TPHg BTEX concentrations

Pinnacle
ENVIRONMENTAL SOLUTIONS

a division of EMCON

June 22, 1999
Project 20805-132.007

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

Re: Semi-Annual Groundwater Monitoring Report, First Quarter 1999, for ARCO Service Station No. 6041, located at 7249 Village Parkway, Dublin, California

Dear Mr. Supple:

Pinnacle Environmental Solutions, a division of EMCON (Pinnacle), is submitting the attached report which presents the results of the first quarter 1999 groundwater monitoring program at ARCO Products Company (ARCO) Service Station No. 6041, located at 7249 Village Parkway, Dublin, California. The monitoring program complies with the Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

LIMITATIONS

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

Please call if you have questions.

Sincerely,

Pinnacle

Glen VanderVeen
Project Manager

Jay R. Johnson, R.G.
Senior Project Supervisor

'99 JUN 23 PM 2:52
ENVIRONMENTAL PROTECTION

Attachment: Semi-Annual Groundwater Monitoring Report, First Quarter 1999

cc: Eva Chu, ACHCSA

OAK\S:\ARCO\6041\QTRLY\6041Q199.DOC\uh:1

Date: June 22, 1999

ARCO SEMI-ANNUAL GROUNDWATER MONITORING REPORT

Station No.: 6041 Address: 7249 Village Parkway, Dublin, California

Pinnacle Project No. 20805-132.007

ARCO Environmental Engineer/Phone No.: Paul Supple /(925) 299-8891

Pinnacle Project Manager/Phone No.: Glen VanderVeen/(510) 740-5807

Primary Agency/Regulatory ID No.: ACHCSA /Eva Chu

WORK PERFORMED THIS QUARTER (FIRST - 1999):

1. Prepared and submitted status report for fourth quarter 1998.
2. Performed semi-annual groundwater monitoring and sampling for first quarter 1999.

WORK PROPOSED FOR NEXT QUARTER (SECOND - 1999):

1. Prepare and submit semi-annual groundwater monitoring report for first quarter 1999.
2. Repair well boxes to be water tight and slightly above grade.
3. Conduct survey of sewer and storm drain lines at and around site.
4. Prepare cross section including the ARCO site and the BP site, across the street.

MONITORING:

Current Phase of Project:	Monitoring
Frequency of Groundwater Sampling	Semi-annual (1st/3rd quarter): MW-1, MW-2, MW-3
Frequency of Groundwater Monitoring	Semi-annual
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Bulk Soil Removed to Date :	15 cubic yards of TPH impacted soil
Bulk Soil Removed This Quarter :	None
Water Wells or Surface Waters, within 2000 ft., impacted by site:	None
Current Remediation Techniques:	None
Average Depth to Groundwater:	7.9 feet
Groundwater Gradient (Average):	0.007 ft/ft toward Southeast

ATTACHMENTS:

- Table 1 - Historical Groundwater Elevation and Analytical Data (Petroleum Hydrocarbons and Their Constituents)
- Figure 1 - Groundwater Analytical Summary Map
- Figure 2 - Groundwater Elevation Contour Map
- Appendix A - Sampling and Analysis Procedures
- Appendix B - Certified Analytical Reports and Chain-of-Custody Documentation
- Appendix C - Field Data Sheets

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6041
7249 Village Parkway, Dublin, California

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	02-15-95	336.56	8.53	328.03	ND	NR	NR	02-15-95	820	15	<1	5.2	1.4	--	--
MW-1	05-24-95	336.56	9.00	327.56	ND	ESE	0.002	05-24-95	640	12	<1	7.3	<1	--	--
MW-1	08-25-95	336.56	10.30	326.26	ND	NW	0.006	08-25-95	780	2	<1	2	2	2500	--
MW-1	11-28-95	336.56	11.01	325.55	ND	N	0.006	11-28-95	570	2.2	<0.5	1.4	0.9	--	--
MW-1	02-26-96	336.56	7.35	329.21	ND	E	0.012	03-13-96	1100	28	<7	13	7	3400	--
MW-1	05-23-96	336.56	8.73	327.83	ND	FG	FG	05-23-96	560	8.5	<1	1.1	<1	3900	--
MW-1	08-23-96	336.56	10.25	326.31	ND	FG	FG	08-23-96	860	<1	<1	<4	2	5600	--
MW-1	03-21-97	336.56	9.35	327.21	ND	SSE	0.005	03-21-97	520	12	<0.5	2.7	1.5	6200	--
MW-1	08-20-97	336.56	10.75	325.81	ND	SSW	0.001	08-20-97	<5000	<50	<50	<50	<50	7400	--
MW-1	11-21-97	336.56	11.10	325.46	ND	SSW	0.002	11-21-97	<5000	<50	<50	<50	<50	8500	--
MW-1	02-12-98	336.56	7.05	329.51	ND	E	0.024	02-12-98	210	<0.5	<0.5	<0.5	<0.5	8900	--
MW-1	07-31-98	336.56	10.04	326.52	ND	NW	0.01	07-31-98	<20000	<200	<200	<200	<200	18000	--
MW-1	02-17-99	336.56	8.50	328.06	ND	SE	0.007	02-17-99	<20000	<200	<200	<200	<200	16000	--
MW-2	02-15-95	334.80	6.75	328.05	ND	NR	NR	02-15-95	730	110	1.7	25	66	--	--
MW-2	05-24-95	334.80	6.88	327.92	ND	ESE	0.002	05-24-95	370	110	<1	17	1.9	--	--
MW-2	08-25-95	334.80	7.91	326.89	ND	NW	0.006	08-25-95	150	6	<1	<1	<1	2700	--
MW-2	11-28-95	334.80	9.06	325.74	ND	N	0.006	11-28-95	<50	<0.5	<0.5	<0.5	0.8	--	--
MW-2	02-26-96	334.80	6.65	328.15	ND	E	0.012	03-13-96	350	66	<0.5	11	1.7	<3	--
MW-2	05-23-96	334.80	6.90	327.90	ND	FG	FG	05-23-96	540	140	<2.5	13	<2.5	4600	--
MW-2	08-23-96	334.80	8.45	326.35	ND	FG	FG	08-23-96	180	0.8	2	0.7	2.6	4000	--
MW-2	03-21-97	334.80	7.28	327.52	ND	SSE	0.005	03-21-97	410	90	<1	14	4	3800	--
MW-2	08-20-97	334.80	8.87	325.93	ND	SSW	0.001	08-20-97	<5000	<50	<50	<50	<50	3100	--
MW-2	11-21-97	334.80	9.28	325.52	ND	SSW	0.002	11-21-97	<2000	<20	<20	<20	<20	2600	--
MW-2	02-12-98	334.80	5.90	328.90	ND	E	0.024	02-12-98	310	54	<0.5	6.2	1.1	3800	--
MW-2	07-31-98	334.80	8.12	326.68	ND	NW	0.01	07-31-98	6100	52	220	110	1100	7700	--
MW-2	02-17-99	334.80	7.18	327.62	ND	SE	0.007	02-17-99	<5000	<50	<50	<50	<50	4200	--

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6041
7249 Village Parkway, Dublin, California

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	02-15-95	335.53	8.55	326.98	ND	NR	NR	02-15-95	100	14	<0.5	6.3	<0.5	--	--
MW-3	05-24-95	335.53	8.17	327.36	ND	ESE	0.002	05-24-95	110	8	<0.5	2.7	<0.5	--	--
MW-3	08-25-95	335.53	9.27	326.26	ND	NW	0.006	08-25-95	210	3.6	<0.5	2.9	0.6	20000	--
MW-3	11-28-95	335.53	9.91	325.62	ND	N	0.006	11-28-95	81	1.5	<0.5	1.4	<0.5	--	15000
MW-3	02-26-96	335.53	8.42	327.11	ND	E	0.012	03-13-96	16000	1600	1200	300	2000	9500	--
MW-3	05-23-96	335.53	7.70	327.83	ND	FG	FG	05-23-96	6500	690	<10	120	14	8600	--
MW-3	08-23-96	335.53	9.25	326.28	ND	FG	FG	08-23-96	1700	85	2.1	61	5.3	11000	--
MW-3	03-21-97	335.53	8.72	326.81	ND	SSE	0.005	03-21-97	100	2	<1	1	<1	6600	--
MW-3	08-20-97	335.53	9.73	325.80	ND	SSW	0.001	08-20-97	<5000	<50	<50	<50	<50	7700	--
MW-3	11-21-97	335.53	10.10	325.43	ND	SSW	0.002	11-21-97	<5000	<50	<50	<50	<50	9700	--
MW-3	02-12-98	335.53	6.68	328.85	ND	E	0.024	02-12-98	110	11	<0.5	<0.5	1.9	10000	--
MW-3	07-31-98	335.53	7.98	327.55	ND	NW	0.01	07-31-98	<10000	<100	<100	<100	<100	13000	--
MW-3	02-17-99	335.53	8.40	327.13	ND	SE	0.007	02-17-99	<20000	<200	<200	<200	<200	23000	--
MW-4	02-15-95	334.22	7.85	326.37	ND	NR	NR	02-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	05-24-95	334.22	6.68	327.54	ND	ESE	0.002	05-24-95	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-4	08-25-95	334.22	6.93	327.29	ND	NW	0.006	08-25-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	11-28-95	334.22	8.21	326.01	ND	N	0.006	11-28-95	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-4	02-26-96	334.22	6.65	327.57	ND	E	0.012	03-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	05-23-96	334.22	6.47	327.75	ND	FG	FG	05-23-96	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-4	08-23-96	334.22	7.66	326.56	ND	FG	FG	08-23-96	Not sampled: well not part of sampling program						
MW-4	03-21-97	334.22	6.84	327.38	ND	SSE	0.005	03-21-97	Not sampled: well not part of sampling program						
MW-4	08-20-97	334.22	8.32	325.90	ND	SSW	0.001	08-20-97	Not sampled: well not part of sampling program						
MW-4	11-21-97	334.22	8.65	325.57	ND	SSW	0.002	11-21-97	Not sampled: well not part of sampling program						
MW-4	02-12-98	334.22	6.35	327.87	ND	E	0.024	02-12-98	Not sampled: well not part of sampling program						
MW-4	07-31-98	334.22	6.84	327.38	ND	NW	0.01	07-31-98	Not sampled: well not part of sampling program						
MW-4	02-17-99	334.22	7.50	326.72	ND	SE	0.007	02-17-99	Not sampled: well not part of sampling program						

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6041
7249 Village Parkway, Dublin, California

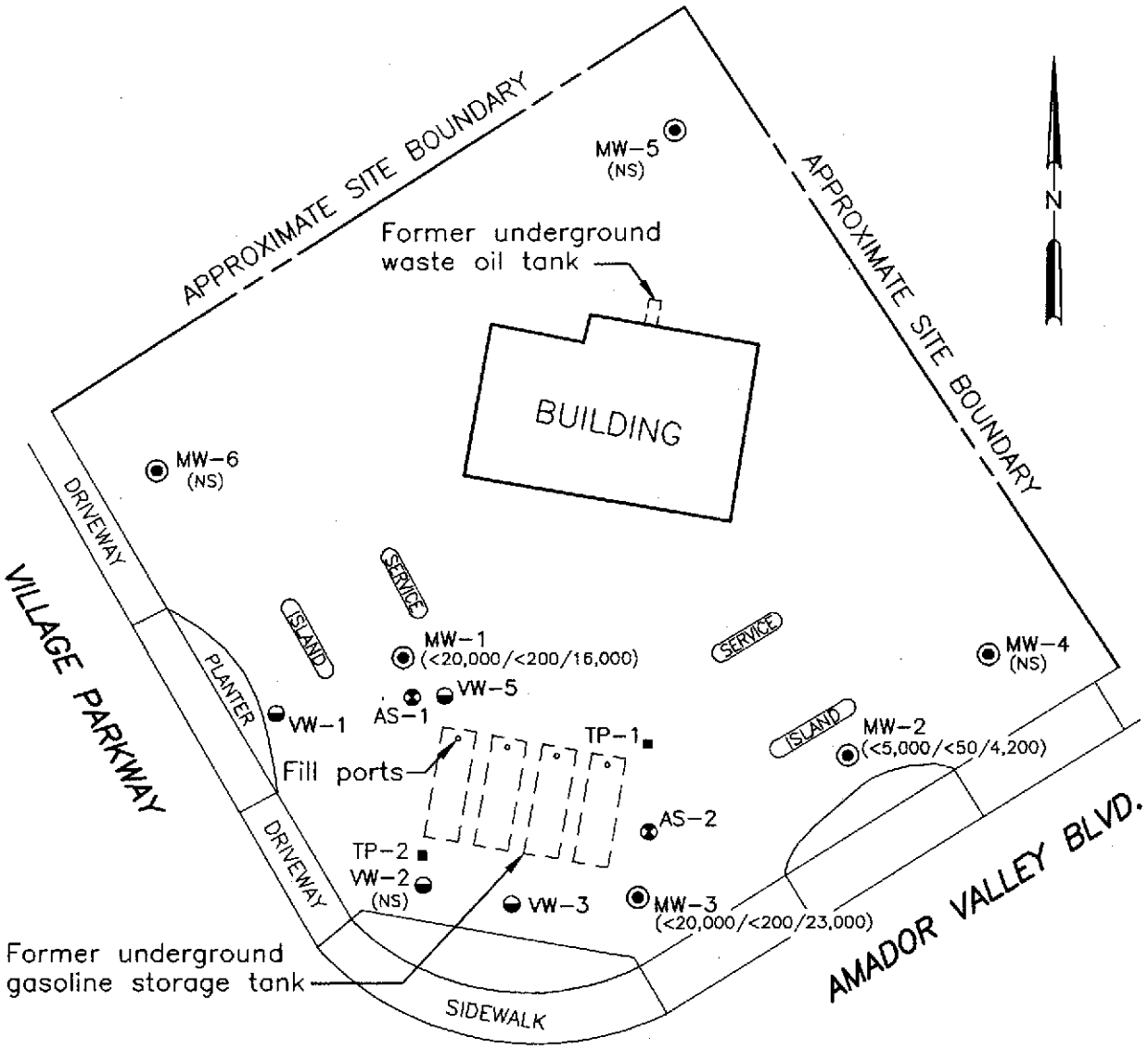
Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 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	02-15-95	335.87	7.80	328.07	ND	NR	NR	02-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-5	05-24-95	335.87	8.10	327.77	ND	ESE	0.002	05-24-95	Not sampled: well sampled annually, during the first quarter						
MW-5	08-25-95	335.87	9.43	326.44	ND	NW	0.006	08-25-95	Not sampled: well sampled annually, during the first quarter						
MW-5	11-28-95	335.87	10.12	325.75	ND	N	0.006	11-28-95	Not sampled: well sampled annually, during the first quarter						
MW-5	02-26-96	335.87	6.73	329.14	ND	E	0.012	03-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	05-23-96	335.87	7.87	328.00	ND	FG	FG	05-23-96	Not sampled: well sampled annually, during the first quarter						
MW-5	08-23-96	335.87	9.46	326.41	ND	FG	FG	08-23-96	Not sampled: well not part of sampling program						
MW-5	03-21-97	335.87	8.23	327.64	ND	SSE	0.005	03-21-97	Not sampled: well not part of sampling program						
MW-5	08-20-97	335.87	9.92	325.95	ND	SSW	0.001	08-20-97	Not sampled: well not part of sampling program						
MW-5	11-21-97	335.87	10.18	325.69	ND	SSW	0.002	11-21-97	Not sampled: well not part of sampling program						
MW-5	02-12-98	335.87	6.45	329.42	ND	E	0.024	02-12-98	Not sampled: well not part of sampling program						
MW-5	07-31-98	335.87	8.98	326.89	ND	NW	0.01	07-31-98	Not sampled: well not part of sampling program						
MW-5	02-17-99	335.87	7.65	328.22	ND	SE	0.007	02-17-99	Not sampled: well not part of sampling program						
MW-6	02-15-95	335.84	7.81	328.03	ND	NR	NR	02-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-6	05-24-95	335.84	8.35	327.49	ND	ESE	0.002	05-24-95	Not sampled: well sampled annually, during the first quarter						
MW-6	08-25-95	335.84	9.71	326.13	ND	NW	0.006	08-25-95	Not sampled: well sampled annually, during the first quarter						
MW-6	11-28-95	335.84	10.28	325.56	ND	N	0.006	11-28-95	Not sampled: well sampled annually, during the first quarter						
MW-6	02-26-96	335.84	6.60	329.24	ND	E	0.012	03-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	05-23-96	335.84	8.05	327.79	ND	FG	FG	05-23-96	Not sampled: well sampled annually, during the first quarter						
MW-6	08-23-96	335.84	9.58	326.26	ND	FG	FG	08-23-96	Not sampled: well not part of sampling program						
MW-6	03-21-97	335.84	8.39	327.45	ND	SSE	0.005	03-21-97	Not sampled: well not part of sampling program						
MW-6	08-20-97	335.84	9.98	325.86	ND	SSW	0.001	08-20-97	Not sampled: well not part of sampling program						
MW-6	11-21-97	335.84	10.31	325.53	ND	SSW	0.002	11-21-97	Not sampled: well not part of sampling program						
MW-6	02-12-98	335.84	3.15	332.69	ND	E	0.024	02-12-98	Not sampled: well not part of sampling program						
MW-6	07-31-98	335.84	9.29	326.55	ND	NW	0.01	07-31-98	Not sampled: well not part of sampling program						
MW-6	02-17-99	335.84	7.72	328.12	ND	SE	0.007	02-17-99	Not sampled: well not part of sampling program						

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6041
7249 Village Parkway, Dublin, California

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
VW-2	03-21-97	NR	8.22	NR	ND	SSE	0.005	03-21-97	150	8.9	<0.5	<0.5	0.6	270	- -
VW-2	08-20-97	NR	9.16	NR	ND	SSW	0.001	08-20-97	Not sampled: well not part of sampling program						
VW-2	11-21-97	NR	8.27	NR	ND	SSW	0.002	11-21-97	<200	3	<2	<2	<2	180	- -
VW-2	02-12-98	NR	6.65	NR	ND	E	0.024	02-12-98	200	19	<0.5	0.6	<0.5	2200	- -
VW-2	07-31-98	NR	7.01	NR	ND	NW	0.01	07-31-98	Not sampled: well not part of sampling program						
VW-2	02-17-99	NR	8.47	NR	ND	SE	0.007	02-17-99	Not sampled: well not part of sampling program						

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
NR: not reported; data not available or not measurable
SE: southeast
- -: not analyzed or not applicable
*: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6041, Dublin, California,* (EMCON, February 26, 1996).



EXPLANATION

- ◉ Groundwater monitoring well
- ■ Tank pit observation well
- ◒ Vapor extraction well
- ◓ Air sparge well

(<5,000/<50/4,200) Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 2/17/99

< Not detected at or above the indicated laboratory detection limit

NS Not sampled

0 40 80

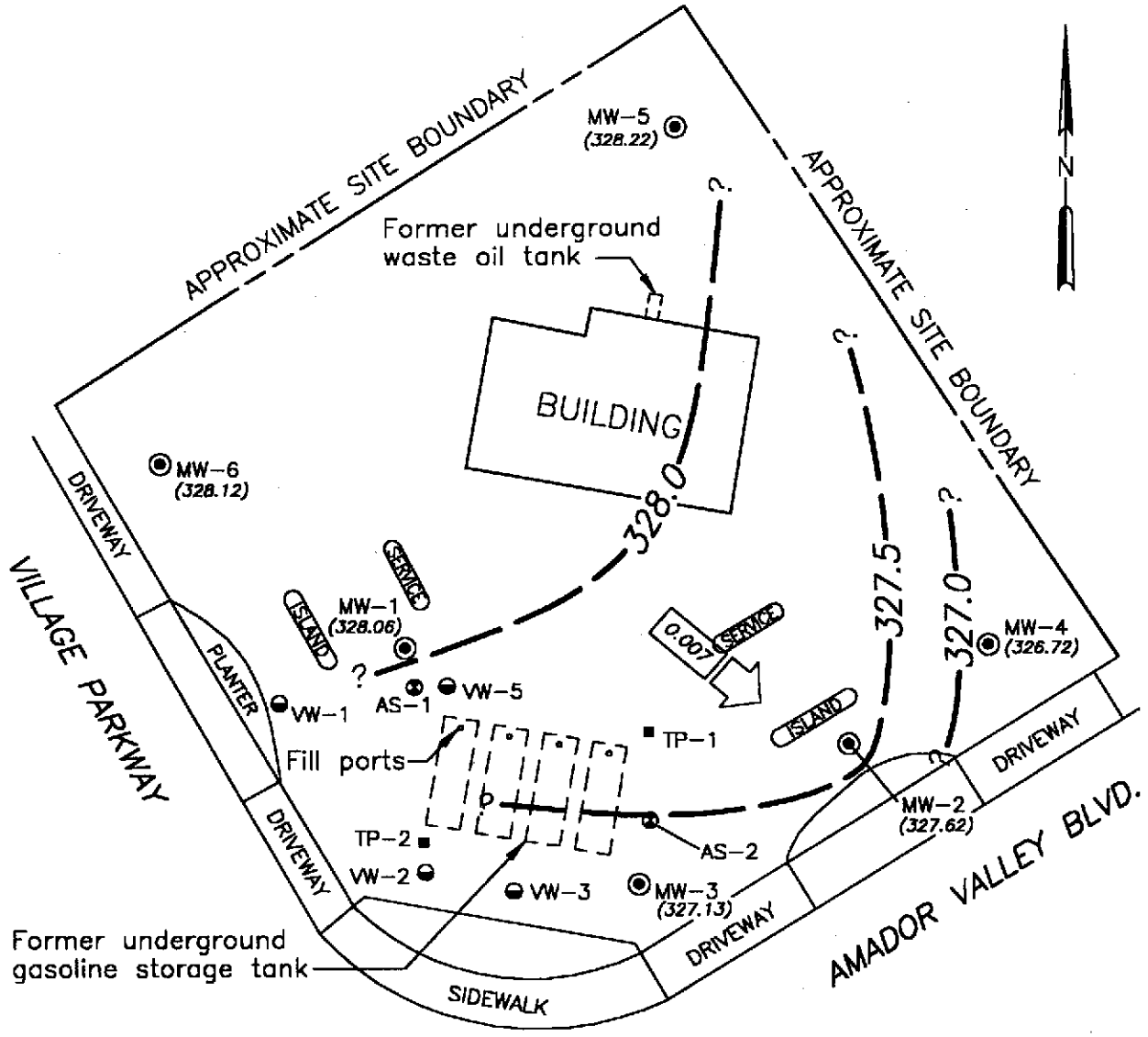
SCALE IN FEET

Pinnacle
ENVIRONMENTAL SOLUTIONS
A DIVISION OF EMCON

DATE MAY 1999
DWN KAB
APP
REV
PROJECT NO.
20805-132.007

FIGURE 1
ARCO PRODUCTS COMPANY
SERVICE STATION 6041, 7249 VILLAGE PKWY
DUBLIN, CALIFORNIA
GROUNDWATER ANALYTICAL SUMMARY
FIRST QUARTER 1999

IMAGE Files: <No Images>
XREF Files: <No Xrefs>
Dimscale: 40 Ltscale: 40 Pltscale: 0
SANJOSE/CADD: N:\DWG\PINACL\6041\6041CHEM.DWG Thu, 20/May/99 02:05pm kblack
1" 1/2" 0" 1"



EXPLANATION

- ◉ Groundwater monitoring well
- ■ Tank pit observation well
- ◒ Vapor extraction well
- ◉ Air sparge well
- (327.13) Groundwater elevation (Ft.–MSL); measured 2/17/99
- Approx. direction of groundwater flow showing gradient
- ? — — Groundwater elevation contour (Ft.–MSL)

0 40 80

SCALE IN FEET

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ENVIRONMENTAL SOLUTIONS
A DIVISION OF EMCON

DATE MAY 1999
DWN KAB
APP
REV
PROJECT NO.
20805-132.007

FIGURE 2
ARCO PRODUCTS COMPANY
SERVICE STATION 6041, 7249 VILLAGE PKWY
DUBLIN, CALIFORNIA
GROUNDWATER ELEVATION CONTOURS
FIRST QUARTER 1999

1" 1/2" 0" 1"
Dimscale: 40 Ltscale: 40 Pstscale: 0 IMAGE Files: <No Images>
SANJOSE/CADD: N:\DWG\PINACL\6041\6041GWC.DWG Mon, 07/Jun/99 12:54pm kblack XREF Files: <No Xrefs>

APPENDIX A

SAMPLING AND ANALYSIS PROCEDURES

APPENDIX A

SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis procedures for water quality monitoring programs are contained in this appendix. The procedures provided for consistent and reproducible sampling methods, proper application of analytical methods, and accurate and precise analytical results. Finally, these procedures provided guidelines so that the overall objectives of the monitoring program were achieved.

The following documents have been used as guidelines for developing these procedures:

- Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities, Environmental Protection Agency (EPA)-530/SW-611, August 1977
- Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document, Office of Solid Waste and Emergency Response (OSWER) 9950.1, September 1986
- Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, 3rd edition, November 1986
- Methods for Organic Chemical Analysis of Municipal and Industrial Waste Water, EPA-600/4-82-057, July 1982
- Methods for Organic Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised March 1983
- Leaking Underground Fuel Tank (LUFT) Field Manual, California State Water Resources Control Board, revised October 1989

Sample Collection

Sample collection procedures include equipment cleaning, water level and total well depth measurements, and well purging and sampling.

Equipment Cleaning

Before the sampling event was started, equipment that was used to sample groundwater was disassembled and cleaned with detergent water and then rinsed with deionized water. During field sampling, equipment surfaces that were placed in the well or came into contact with groundwater during field sampling were steam cleaned with deionized water before the next well was purged or sampled.

Water Level, Floating Hydrocarbon, and Total Well Depth Measurements

Before purging and sampling occurred, the depth to water, floating hydrocarbon thickness, and total well depth were measured using an oil/water interface measuring system. The oil/water interface measuring system consists of a probe that emits a continuous audible tone when immersed in a nonconductive fluid, such as oil or gasoline, and an intermittent tone when immersed in a conductive fluid, such as water. The floating hydrocarbon thickness and water level were measured by lowering the probe into the well. Liquid levels were recorded relative to the tone emitted at the groundwater surface. The sonic probe was decontaminated by being rinsed with deionized water or steam cleaned after each use. A bottom-filling, clear Teflon® bailer was used to verify floating hydrocarbon thickness measurements of less than 0.02 foot. Alternatively, an electric sounder and a bottom-filling Teflon bailer may have been used to record floating hydrocarbon thickness and depth to water.

The electric sounder is a transistorized instrument that uses a reel-mounted, two-conductor, coaxial cable that connects the control panel to the sensor. Cable markings are stamped at 1-foot intervals. The water level was measured by lowering the sensor into the monitoring well. A low-current circuit was completed when the sensor contacted the water, which served as an electrolyte. The current was amplified and fed into an indicator light and audible buzzer, signaling when water had been contacted. A sensitivity control compensated for highly saline or conductive water. The electric sounder was decontaminated by being rinsed with deionized water after each use. The bailer was lowered to a point just below the liquid level, retrieved, and observed for floating hydrocarbon.

Liquid measurements were recorded to the nearest 0.01 foot on the depth to water/floating product survey form. The groundwater elevation at each monitoring well was calculated by subtracting the measured depth to water from the surveyed elevation of the top of the well casing. (Every attempt was made to measure depth to water for all wells on the same day.) Total well depth was then measured by lowering the sensor to the bottom of the well. Total well depth, used to calculate purge volumes and to determine whether the well screen was partially obstructed by silt, was recorded to the nearest 0.1 foot on the depth to water/floating product survey form.

Well Purging

If the depth to groundwater was above the top of screens of the monitoring wells, then the wells were purged. Before sampling occurred, a polyvinyl chloride (PVC) bailer, centrifugal pump, low-flow submersible pump, or Teflon bailer was used to purge standing water in the casing and gravel pack from the monitoring well. Monitoring wells were purged according to the protocol presented in Figure A-1. In most monitoring wells, the amount of water purged before sampling was greater than or equal to three casing volumes. Some monitoring wells were expected to be evacuated to dryness after removing fewer than three casing volumes. These low-yield monitoring wells were allowed to recharge for up to 24 hours. Samples were obtained as soon as the monitoring wells recharged to a level sufficient for sample collection. If insufficient water recharged after 24 hours, the monitoring well was recorded as dry for the sampling event.

Groundwater purged from the monitoring wells was transported in a 500-gallon water trailer, 55-gallon drum, or a 325-gallon truck-mounted tank to EMCON's San Jose or Sacramento office location for temporary storage. EMCON arranged for transport and disposal of the purged groundwater through Integrated Waste Stream Management, Inc.

Field measurements of pH, specific conductance, and temperature were recorded in a waterproof field logbook. Figure A-2 shows an example of the water sample field data sheet on which field data are recorded. Field data sheets were reviewed for completeness by the sampling coordinator after the sampling event was completed.

The pH, specific conductance, and temperature meter were calibrated each day before field activities were begun. The calibration was checked once each day to verify meter performance. Field meter calibrations were recorded on the water sample field data sheet.

Well Sampling

A Teflon bailer was the only equipment acceptable for well sampling. When samples for volatile organic analysis were being collected, the flow of groundwater from the bailer was regulated to minimize turbulence and aeration. Glass bottles of at least 40-milliliters volume and fitted with Teflon-lined septa were used in sampling for volatile organics. These bottles were filled completely to prevent air from remaining in the bottle. A positive meniscus formed when the bottle was completely full. A convex Teflon septum was placed over the positive meniscus to eliminate air. After the bottle was capped, it was inverted and tapped to verify that it contained no air bubbles. The sample containers for other parameters were filled, filtered as required, and capped.

When required, dissolved concentrations of metals were determined using appropriate field filtration techniques. The sample was filtered by emptying the contents of the Teflon bailer into a pressure transfer vessel. A disposable 0.45-micron acrylic copolymer filter was threaded onto the transfer vessel at the discharge point, and the vessel was sealed. Pressure was applied to the vessel with a hand pump and the filtrate directed into the appropriate containers. Each filter was used once and discarded.

Sample Preservation and Handling

The following section specifies sample containers, preservation methods, and sample handling procedures.

Sample Containers and Preservation

Sample containers vary with each type of analytical parameter. Container types and materials were selected to be nonreactive with the particular analytical parameter tested.

Sample Handling

Sample containers were labeled immediately prior to sample collection. Samples were kept cool with cold packs until received by the laboratory. At the time of sampling, each sample was logged on an ARCO chain-of-custody record that accompanied the sample to the laboratory.

Samples that required overnight storage prior to shipping to the laboratory were kept cool (4° C) in a refrigerator. The refrigerator was kept in a warehouse, which was locked when not occupied by an EMCON employee. A sample/refrigerator log was kept to record the date and time that samples were placed into and removed from the refrigerator.

Samples were transferred from EMCON to an ARCO-approved laboratory by courier or taken directly to the laboratory by the environmental sampler. Sample shipments from EMCON to laboratories performing the selected analyses routinely occurred within 24 hours of sample collection.

Sample Documentation

The following procedures were used during sampling and analysis to provide chain-of-custody control during sample handling from collection through storage. Sample documentation included the use of the following:

- Water sample field data sheets to document sampling activities in the field
- Labels to identify individual samples
- Chain-of-custody record sheets for documenting possession and transfer of samples
- Laboratory analysis request sheets for documenting analyses to be performed

Field Logbook

In the field, the sampler recorded the following information on the water sample field data sheet (see Figure A-2) for each sample collected:

- Project number
- Client's name
- Location
- Name of sampler
- Date and time
- Well accessibility and integrity
- Pertinent well data (e.g., casing diameter, depth to water, well depth)
- Calculated and actual purge volumes
- Purging equipment used
- Sampling equipment used
- Appearance of each sample (e.g., color, turbidity, sediment)
- Results of field analyses (temperature, pH, specific conductance)
- General comments

The water sample field data sheet was signed by the sampler and reviewed by the sampling coordinator.

Labels

Sample labels contained the following information:

- Project number
- Sample number (i.e., well designation)
- Sample depth
- Sampler's initials
- Date and time of collection
- Type of preservation used (if any)

Sampling and Analysis Chain-of-Custody Record

The ARCO chain-of-custody record initiated at the time of sampling contained, at a minimum, the sample designation (including the depth at which the sample was collected), sample type, analytical request, date of sampling, and the name of the sampler. The record sheet was signed, timed, and dated by the sampler when transferring the samples. The number of custodians in the chain of possession was minimized. A copy of the ARCO chain-of-custody record was returned to EMCON with the analytical results.

Groundwater Sampling and Analysis Request Form

A groundwater sampling and analysis request form (see Figure A-3) was used to communicate to the environmental sampler the requirements of the monitoring event. At a minimum, the groundwater sampling and analysis request form included the following information:

- Date scheduled
- Site-specific instructions
- Specific analytical parameters
- Well number
- Well specifications (expected total depth, depth of water, and product thickness)

MONITORING WELL PURGING PROTOCOL

OWT

MEASURE AND RECORD DEPTH TO WATER AND WELL TOTAL DEPTH

CHECK FOR FLOATING PRODUCT

YES

MEASURE AND DOCUMENT FLOATING PRODUCT THICKNESS. DO NOT SAMPLE WELL FOR DISSOLVED CONSTITUENTS.

NO

CALCULATE PURGE VOLUME BY USING THE FOLLOWING EQUATION:

$P = \pi r^2 h \times 7.48 \times 3$

where:

P = calculated purge volume (gallons)

$\pi = 3.14$

r = radius of well casing in feet

h = height of water column in feet

EVACUATE WATER FROM WELL EQUAL TO THE CALCULATED PURGE VOLUME WHILE MONITORING GROUNDWATER STABILIZATION INDICATOR PARAMETERS (pH, CONDUCTIVITY, TEMPERATURE) AT INTERVALS OF ONE CASING VOLUME.

WELL EVACUATED TO PRACTICAL LIMITS OF DRYNESS BEFORE REMOVING CALCULATED PURGE VOLUME

NO

FINAL TWO SETS OF GROUNDWATER STABILIZATION INDICATOR PARAMETER MEASUREMENTS MEET THE FOLLOWING CRITERIA:

pH = ± 0.1 pH units

COND. = ± 10 %

TEMP. = ± 1.0 °F

YES

WELL PURGING CRITERIA MET; PROCEED TO WELL SAMPLING.

NO

CONTINUE PURGING; EVACUATE ADDITIONAL CASING VOLUME OF WATER, MONITORING INDICATOR PARAMETERS FOR STABILITY.

YES

WELL RECHARGES TO A LEVEL SUFFICIENT FOR SAMPLE COLLECTION WITHIN 24 HOURS OF EVACUATION TO DRYNESS.

YES

FIELD TEST FIRST RECHARGE WATER FOR INDICATOR PARAMETERS, THEN PROCEED TO WELL SAMPLING.

NO

RECORD WELL AS DRY FOR PURPOSES OF SAMPLING.

EMCON

MONITORING WELL PURGING PROTOCOL

FIGURE

A-1

WATER SAMPLE FIELD DATA SHEET

Rev. 5/96

OWT

PROJECT NO : _____ SAMPLE ID : _____

PURGED BY : _____ CLIENT NAME : _____

SAMPLED BY : _____ LOCATION : _____

TYPE: Groundwater _____ Surface Water _____ Leachate _____ Other _____

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

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

DEPTH OF WELL (feet) : _____ CALCULATED PURGE (gal.) : _____

DEPTH OF WATER (feet) : _____ ACTUAL PURGE VOL. (gal.) : _____

DATE PURGED : _____ END PURGE : _____

DATE SAMPLED : _____ SAMPLING TIME : _____

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	TURBIDITY (visual/NTU)	TIME (2400 HR)

OTHER: _____ ODOR: _____ (COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1) : _____

PURGING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Centrifugal Pump _____ Bailer (PVC)

_____ Submersible Pump _____ Bailer (Stainless Steel)

_____ Well Wizard™ _____ Dedicated

Other: _____

SAMPLING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Bomb Sampler _____ Bailer (Stainless Steel)

_____ Dipper _____ Submersible Pump

_____ Well Wizard™ _____ Dedicated

Other: _____

WELL INTEGRITY: _____ LOCK: _____

REMARKS: _____

pH, E.C., Temp. Meter Calibration: Date: _____ Time: _____ Meter Serial No.: _____

E.C. 1000 _____ / _____ pH 7 _____ / _____ pH 10 _____ / _____ pH 4 _____ / _____

Temperature °F _____

SIGNATURE: _____ REVIEWED BY: _____ PAGE _____ OF _____

EMCON

WATER SAMPLE FIELD DATA SHEET

FIGURE A-2

OWT

EMCON - SACRAMENTO
GROUNDWATER SAMPLING AND ANALYSIS REQUEST FORM

PROJECT NAME :

SCHEDULED DATE :

SPECIAL INSTRUCTIONS / CONSIDERATIONS :

Project Authorization: _____
EMCON Project No.: _____
OWT Project No.: _____
Task Code: _____
Originals To: _____
cc: _____

Well Lock Number (s)

☐ CHECK BOX TO AUTHORIZE DATA ENTRY

Site Contact: _____ Name _____ Phone #

Well Number or Source	Casing Diameter (inches)	Casing Length (feet)	Depth to Water (feet)	ANAYSES REQUESTED

Laboratory and Lab QC Istructions:

EMCON

SAMPLING AND ANALYSIS REQUEST FORM

FIGURE A-3

APPENDIX B

CERTIFIED ANALYTICAL REPORTS, AND CHAIN-OF-CUSTODY DOCUMENTATION

Columbia Analytical Services INC.
An Employee-Owned Company

March 2, 1999 Service Request No.: S9900550

Mr. Glen Vanderveen
PINNACLE
144 A Mayhew Wy.
Walnut Creek, CA 94596

RE: 20805-132.006/TO#24118.00/RAT8/6041 DUBLIN

Dear Mr. Vanderveen:

The following pages contain analytical results for sample(s) received by the laboratory on February 17, 1999. 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 11, 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,

Bernadette T. Cox
Project Chemist

Regional QA Coordinator

3334 Victor Court • Santa Clara, CA 95054-2316 • Telephone (408) 748-9700 • Fax (408) 748-9860

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:**	S9900550
Project:	20805-132.006/TO#24118.00/RAT8/6041 DUBLIN	**Date Collected:**	2/17/99
Sample Matrix:	Water	**Date Received:**	2/17/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-2(13)	Units:	ug/L (ppb)
Lab Code:	S9900550-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	100	NA	2/26/99	<5000	C1
Benzene	EPA 5030	8020	0.5	100	NA	2/26/99	<50	C1
Toluene	EPA 5030	8020	0.5	100	NA	2/26/99	<50	C1
Ethylbenzene	EPA 5030	8020	0.5	100	NA	2/26/99	<50	C1
Xylenes, Total	EPA 5030	8020	0.5	100	NA	2/26/99	<50	C1
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	100	NA	2/26/99	4200	

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

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900550
Project:	20805-132.006/TO#24118.00/RAT8/6041 DUBLIN	**Date Collected:**	2/17/99
Sample Matrix:	Water	**Date Received:**	2/17/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-1(17)	Units:	ug/L (ppb)
Lab Code:	S9900550-002	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	400	NA	2/26/99	<20000	C1
Benzene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Toluene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Ethylbenzene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Xylenes, Total	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Methyl *tert* -Butyl Ether	EPA 5030	8020	3	400	NA	2/26/99	16000	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900550
Project:	20805-132.006/TO#24118.00/RAT8/6041 DUBLIN	**Date Collected:**	2/17/99
Sample Matrix:	Water	**Date Received:**	2/17/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-3(14)	Units:	ug/L (ppb)
Lab Code:	S9900550-003	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	400	NA	2/26/99	<20000	C1
Benzene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Toluene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Ethylbenzene	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Xylenes, Total	EPA 5030	8020	0.5	400	NA	2/26/99	<200	C1
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	400	NA	2/26/99	23000	

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

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900550
Project:	20805-132.006/TO#24118.00/RAT8/6041 DUBLIN	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S990226-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/26/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/26/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900550
Project:	20805-132.006/TO#24118.00/RAT8/6041 DUBLIN	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S990226-WB3	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/26/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/26/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/26/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-132.006/TO#24118.00/RAT8/6041 DUBLIN
Sample Matrix: Water

Service Request: S9900550
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

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

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			4-Bromofluorobenzene	a,a,a-Trifluorotoluene
MW-2(13)	S9900550-001		89	86
MW-1(17)	S9900550-002		88	86
MW-3(14)	S9900550-003		88	88
BATCH QC	S9900553-001MS		85	90
BATCH QC	S9900553-001DMS		83	86
Method Blank	S990226-WB1		87	88
Method Blank	S990226-WB3		86	81
CAS Acceptance Limits:			69-116	69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-132.006/TO#24118.00/RAT8/6041 DUBLIN
Sample Matrix Water

Service Request: S9900550
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/27/99

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S9900553-001MS, S9900553-001DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

									Percent Recovery				
				Spike Level		Sample	Spike Result				CAS Acceptance	Relative Percent	Result
Analyte	**Prep Method**	**Analysis Method**	**MRL**	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**	**Notes**
Gasoline	EPA 5030	CA/LUFT	50	250	250	ND	230	230	92	92	75-135	<1	

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-132.006/TO#24118.00/RAT8/6041 DUBLIN

Service Request: S9900550
Date Analyzed: 2/26/99

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

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: ug/L (ppb)
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	CAS Percent Recovery Acceptance Limits	Percent Recovery	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	250	230	90-110	92	
Benzene	EPA 5030	8020	25	24	85-115	96	
Toluene	EPA 5030	8020	25	24	85-115	96	
Ethylbenzene	EPA 5030	8020	25	24	85-115	96	
Xylenes, Total	EPA 5030	8020	75	72	85-115	96	
Methyl *tert*-Butyl Ether	EPA 5030	8020	25	22	85-115	88	

ICV/032196

ARCO Products Company
Division of Atlantic/Richfield Company S9900550 Task Order No. 74118.00

Chain of Custody

ARCO Facility no. 6041	City (Facility) Dublin	Project manager (Consultant) Glen VanderVeen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7500	Fax no. (Consultant) (408)437-9576
Consultant name EMCON	Address (Consultant) 144-A Mayhew Way Walnut Creek, CA 94596		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 incl. MTBE EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM 503E	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 ☐			
MW-2	(13)	2	(1)	X		X	HCL	2/17/99	1305		X												
MW-1	(17)	2	(2)	X		X	HCL	↓	1320		X												
MW-3	(14)	2	(3)	X		X	HCL	↓	1335		X												

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: RAT 8 2-40ml HCL VOAs

Lab Number

Turnaround Time:

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

Condition of sample:		Temperature received: Due: 3/3/99 R11D3	
Relinquished by sampler	Date 2/17/99 Time	Received by Joseph Machado CAS	2/17/99 1435
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant

APPENDIX C

FIELD DATA SHEETS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-244.004** STATION ADDRESS : **7249 Village Parkway, Dublin** DATE : **2/17/99**

ARCO STATION # : **6041** FIELD TECHNICIAN : **Manuel Gallegos** DAY : **Wednesday**

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-4	OK	15/16	YES	ARCO	LWC	7.50	7.50	N/A	N/A	14.4	water in box
2	MW-5	OK	15/16	YES	ARCO	LWC	7.65	7.65			17.3	
3	MW-6	OK	15/16	YES	ARCO	LWC	7.72	7.72			15.6	Box needs to be raised
4	VW-2	OK	15/16	YES	ARCO	LWC	8.47	8.47			8.0	
5	MW-2	OK	15/16	YES	ARCO	LWC	7.18	7.18			13.9	
6	MW-1	OK	15/16	YES	ARCO	LWC	8.50	8.50			17.4	
7	MW-3	OK	15/16	YES	ARCO	LWC	8.40	8.40			14.6	

SURVEY POINTS ARE TOP OF WELL CASINGS

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-244.004 | SAMPLE ID MW-1 (17')
PURGED BY M. Gallegos | CLIENT NAME ARCO# 6047
SAMPLED BY ↓ | LOCATION Dublin, CA

TYPE Groundwater X Surface Water ____ Leachate ____ Other ____

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

CASING ELEVATION (feet/MSL)	NR	VOLUME IN CASING (gal.)	5.81
DEPTH OF WELL (feet)	17.4	CALCULATED PURGE (gal.)	17.44
DEPTH OF WATER (feet)	8.50	ACTUAL PURGE VOL. (gal.)	7.5

DATE PURGED: 2-17-99 | END PURGE: 1315
DATE SAMPLED: ↓ | SAMPLING TIME: 1320

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1314	6.0	6.78	1471	70.9	cloudy	mod
	well	Dry	@ 25	gallons		
~~1320~~					↓	↓
1320	Recharge	6.55	2157	72.5		

OTHER: DO=1 | ODOR: Slight | NR (COBALT 0-100) | NR (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)
____ Centrifugal Pump ✓ Bailer (PVC)
____ Submersible Pump ____ Bailer (Stainless Steel)
____ Well Wizard™ ____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump X Bailer (Teflon)
____ Bomb Sampler ____ Bailer (Stainless Steel)
____ Dipper ____ Submersible Pump
____ Well Wizard™ ____ Dedicated
Other: ____

WELL INTEGRITY: OK | LOCK: New

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date 2/17/99 | Time ____ | Meter Serial No. 87M
E.C. 1000 1000 | pH 7 1700 | pH 10 1000 | pH 4 1400
Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: ZA | PAGE 1 OF 3

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-244.004 | SAMPLE ID MW-2 (13')
PURGED BY M. Gallegos | CLIENT NAME ARCO #6041
SAMPLED BY ↓ | LOCATION Dublin, CA

TYPE Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches) 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL)	NR	VOLUME IN CASING (gal.)	4.39
DEPTH OF WELL (feet)	13.9	CALCULATED PURGE (gal.)	13.17
DEPTH OF WATER (feet)	7.18	ACTUAL PURGE VOL (gal.)	13.5

DATE PURGED 2-17-99 | END PURGE 1256
DATE SAMPLED ↓ | SAMPLING TIME 1305

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1252	4.5	6.47	1352	73.6	BRN	Heavy
1254	9.0	6.65	2342	71.6	↓	↓
1256	13.5	6.67	2424	71.1		

OTHER: DO=1 | ODOR: None | NR (COBALT 0-100) | NR (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1) : NR

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)
____ Centrifugal Pump | ✓ Bailer (PVC)
____ Submersible Pump | ____ Bailer (Stainless Steel)
____ Well Wizard™ | ____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | X Bailer (Teflon)
____ Bomb Sampler | ____ Bailer (Stainless Steel)
____ Dipper | ____ Submersible Pump
____ Well Wizard™ | ____ Dedicated
Other: ____

WELL INTEGRITY: Ok | LOCK: ARCO

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date 2/17/99 | Time 1240 | Meter Serial No 87M
E.C. 1000 1002 / 1000 | pH 7 7.01 / 700 | pH 10 10.01 / 1000 | pH 4 4.01 / 400
Temperature °F 59.7
SIGNATURE ____ | REVIEWED BY: ____ | PAGE 2 OF 3

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-244.004 | SAMPLE ID MW-3 (141)
PURGED BY M. Gallegos | CLIENT NAME ARCO # 6047
SAMPLED BY ↓ | LOCATION Dublin, CA

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

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

CASING ELEVATION (feet/MSL)	NR	VOLUME IN CASING (gal.)	4.05
DEPTH OF WELL (feet)	14.6	CALCULATED PURGE (gal.)	12.15
DEPTH OF WATER (feet)	8.40	ACTUAL PURGE VOL. (gal.)	4.5

DATE PURGED: 2-17-99 | END PURGE: 1330
DATE SAMPLED: ↓ | SAMPLING TIME: 1335

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1330	4.5	6.64	2328	72.0	cloudy	mod
	~~4.05~~					
	well Dry @		4.5 gallons			
1335	Recharge	6.62	2378	71.3		X

OTHER: DO=1 | ODOR: strong | NR (COBALT 0-100) | NR (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

____ 2" Bladder Pump
____ Centrifugal Pump
____ Submersible Pump
____ Well Wizard™
____ Bailer (Teflon)
X Bailer (PVC)
____ Bailer (Stainless Steel)
____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump
____ Bomb Sampler
____ Dipper
____ Well Wizard™
X Bailer (Teflon)
____ Bailer (Stainless Steel)
____ Submersible Pump
____ Dedicated
Other: ____

WELL INTEGRITY: OK | LOCK: [illegible]

REMARKS: all Samples taken

pH, E.C., Temp. Meter Calibration: Date 2/17/99 | Time ____ | Meter Serial No 87M
E.C. 1000 1/1000 | pH 7 1/700 | pH 10 1/1000 | pH 4 1/400
Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 3 OF 3

EMCON Associates - Field Services

1921 Ringwood Avenue

San Jose, California

1999

Historical Monitoring Well Data

ARCO 6041

21775-244.004

	Gallons
First	**30.50**
Second	**0.00**
Third	**39.00**
Fourth	**0.00**

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product
MW-1	First	02/17/99	7.50	YES	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	15.00	NO	NO
	Fourth	NA	0.00	NA	NA
MW-2	First	02/17/99	13.50	NO	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	12.00	NO	NO
	Fourth	NA	0.00	NA	NA
MW-3	First	02/17/99	4.50	YES	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	6.00	YES	NO
	Fourth	NA	0.00	NA	NA
MW-4	First	02/17/99	0.00	NA	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	0.00	NA	NO
	Fourth	NA	0.00	NA	NA
MW-5	First	02/17/99	0.00	NA	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	0.00	NA	NO
	Fourth	NA	0.00	NA	NA
MW-6	First	02/17/99	0.00	NA	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	0.00	NA	NO
	Fourth	NA	0.00	NA	NA
VW-2	First	02/17/99	0.00	NA	NO
	Second	NA	0.00	NA	NA
	Third	07/31/98	0.00	NA	NO
	Fourth	NA	0.00	NA	NA

Steam water (gal) _____

ARCO Products Company
Division of Atlantic/Richfield Company

Chain of Custody

Task Order No. 74118.00

ARCO Facility no. 6041 | City (Facility) Dublin | Project manager (Consultant) Glen Vanderveen | Laboratory Name CAL

ARCO engineer Paul Supple | Telephone no. (ARCO) | Telephone no (Consultant) (408)453-7700 | Fax no. (Consultant) (408)437-9776 | Contract Number

Consultant name ICON | Address (Consultant) 1144-A Mayhew Way Walnut Creek, CA 94596

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 Mod. Gas EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐			
MW-3	(13)	2		X		X	HCL	2/17/99	1305		X												
MW-1	(17)	2		X		X	HCL	↓	1320		X												
MW-2	(14)	2		X		X	HCL	↓	1335		X												

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest possible

Special QA/QC: As Normal

Remarks: RAT 2 40ml VOA's

Lab Number

Turnaround Time:

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

Condition of sample:

Temperature received:

	Date	Time			
Relinquished by sampler	2/17/99		Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory	Date	Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant