PACIFIC
ENVIRONMENTAL
GROUP, INC.

March 21, 1995
Project 330-041.2A

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

Re: Quarterly Report - Fourth Quarter 1994
ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Dear Mr. Whelan:

This letter, prepared by Pacific Environmental Group, Inc. (PACIFIC) on behalf of ARCO Products Company, presents the results of the fourth quarter 1994 groundwater monitoring at the site referenced above. In addition, a summary of work completed and anticipated at the site is included.

QUARTERLY GROUNDWATER MONITORING RESULTS

Groundwater samples were collected by Integrated Wastestream Management (IWM) on November 17, 1994, and analyzed for the presence of total petroleum hydrocarbons calculated as gasoline (TPH-g), benzene, toluene, ethylbenzene, and xylenes (BTEX compounds). Certified analytical reports, chain-of-custody documentation, and field data sheets are presented as Attachment A. IWM's sampling procedures are presented as Attachment B.

Depth to water data collected on November 17, 1994 indicate that groundwater levels across the site have risen an average of 0.69 foot since August 12, 1994. Groundwater flow was to the northwest with an approximate gradient of 0.01. This flow direction and gradient are consistent with historical data. Groundwater elevation data are presented in Table 1. A groundwater elevation contour map based on the November 17, 1994 data is shown on Figure 1.

The result of groundwater monitoring this quarter were generally consistent with previous results. Wells MW-1 through MW-7 were non-detectable for TPH-g and benzene. TPH-g and benzene were only detected in Well RW-1 at concentrations of 1,400 and 56 parts per billion, respectively. Separate-phase hydrocarbons were not observed in any site well this quarter. Groundwater analytical data are presented in Table 2. A TPH-g and benzene concentration map is shown on Figure 2.

Groundwater analytical results indicate non-detectable levels of TPH-g and benzene in Wells MW-1, and MW-3 through MW-7 since at least August 1992. Therefore beginning in 1995, PACIFIC will decrease the frequency of groundwater sampling at these wells from a quarterly to annual basis. The annual groundwater sampling event for 1995 will be performed during the second quarter. Well RW-1 will continue to be sampled quarterly. Additionally, depth to water data will continue to be collected quarterly. All groundwater samples will continue to be analyzed for the presence of TPH-g and BTEX compounds. A groundwater sampling schedule is presented in Table 3.

SUMMARY OF WORK

Work Completed Fourth Quarter 1994

- Performed fourth quarter 1994 groundwater monitoring event. Groundwater sampling was performed by IWM.
- Preparation and submittal of third quarter 1994 groundwater monitoring report.

Work Anticipated First Quarter 1995

- Preparation and submittal of fourth quarter 1994 groundwater monitoring report.
- Perform first quarter 1995 groundwater monitoring event. Groundwater sampling to be performed by PACIFIC.
- Preparation of first quarter 1995 groundwater monitoring report.

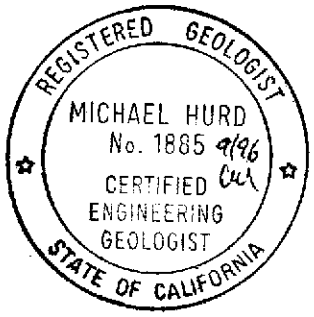
If there are any questions regarding the contents of this letter, please call.

Sincerely,

Pacific Environmental Group, Inc.

Edward Buskirk
Project Scientist

Michael Hurd
Senior Geologist
CEG 1885



Attachments:
- Table 1 - Liquid Surface Elevation Data
- Table 2 - Groundwater Analytical Data - Total Petroleum Hydrocarbons (TPH as Gasoline and BTEX Compounds)
- Table 3 - Groundwater Sampling Schedule
- Figure 1 - Liquid Surface Elevation Contour Map
- Figure 2 - TPH-g/Benzene Concentration Map
- Attachment A - Certified Analytical Reports, Chain-of-Custody Documentation, and Field Data Sheets
- Attachment B - Groundwater Sampling Procedures

cc: Mr. Kevin Graves, Regional Water Quality Control Board - S.F. Bay Region
Mr. Barney Chan, Alameda County Health Care Services Agency

Table 1
Liquid Surface Elevation Data

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Gauged	Well Elevation (feet, MSL)	Depth to Water (feet, TOC)	Depth to Liquid (feet, TOC)	SPH Thickness (feet)	Liquid Surface Elevation (feet, MSL)
MW-1	06/06/90	105.31	6.65	6.05	0.00	98.66
	08/16/90		7.00	7.00	0.00	98.31
	08/21/90		7.05	7.05	0.00	98.26
	09/07/90		7.24	7.24	0.00	98.07
	11/20/90		7.46	7.46	0.00	97.85
	11/29/90		7.40	7.40	0.00	97.91
	12/19/90		6.99	6.99	0.00	98.32
	01/29/91		7.23	7.23	0.00	98.08
	02/27/91		7.45	7.45	0.00	97.86
	03/07/91		6.96	6.96	0.00	98.35
	03/26/91		6.02	6.02	0.00	99.29
	05/02/91		7.04	7.04	0.00	98.27
	06/27/91		6.71	6.71	0.00	98.60
	07/24/91		6.91	6.91	0.00	98.40
	08/22/91		6.85	6.85	0.00	98.46
	09/30/91		7.04	7.04	0.00	98.27
	10/17/91		7.22	7.22	0.00	98.09
	11/21/91		7.17	7.17	0.00	98.14
	12/18/91		7.46	7.46	0.00	97.85
	01/19/92		7.44	7.44	0.00	97.87
	02/20/92		6.25	6.25	0.00	99.06
	03/20/92		6.40	6.40	0.00	98.91
	04/20/92		6.88	6.88	0.00	98.43
	05/19/92		7.10	7.10	0.00	98.21
	06/08/92		7.22	7.22	0.00	98.09
	07/15/92		7.92	7.92	0.00	97.39
	08/06/92	106.10	7.29	7.29	0.00	98.81
	10/29/92		7.34	7.34	0.00	98.76
	11/23/92		8.15	8.15	0.00	97.95
	08/16/93		7.23	7.23	0.00	98.87
	11/17/93		7.51	7.51	0.00	98.59
	02/21/94		6.56	6.56	0.00	99.54
	05/11/94		6.57	6.57	0.00	99.53
	08/12/94		7.12	7.12	0.00	98.98
	11/17/94		6.85	6.85	0.00	99.25
MW-2	06/06/90	105.78	9.92 *	9.00	0.92	95.86
	08/16/90		NM	NM	0.17	NM
	08/21/90		NM	NM	0.17	NM
	09/07/90		9.34 *	9.17	0.17	96.44
	11/20/90		9.20 *	9.20	Sheen	96.58
	11/29/90		9.92 *	9.92	Sheen	95.86
	12/19/90		8.95	8.95	0.00	96.83
	01/29/91		9.01	9.01	Sheen	96.77
	02/27/91		9.14	9.14	Sheen	96.64
	03/07/91		8.94	8.94	Sheen	96.84
	03/26/91		8.11	8.11	Sheen	97.67
	05/02/91		8.72	8.72	0.00	97.06
	06/27/91		9.20	9.20	Sheen	96.58
	07/24/91		9.25	9.25	0.00	96.53
	08/22/91		9.20	9.20	0.00	96.58
	09/30/91		9.31	9.31	Sheen	96.47
	10/17/91		9.39	9.39	Sheen	96.39
	11/21/91		9.20	9.20	0.00	96.58
	12/18/91		9.23	9.23	Sheen	96.55

Table 1 (continued)
Liquid Surface Elevation Data

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Gauged	Well Elevation (feet, MSL)	Depth to Water (feet, TOC)	Depth to Liquid (feet, TOC)	SPH Thickness (feet)	Liquid Surface Elevation (feet, MSL)
MW-2	01/19/92		9.96 **	9.96	Skimmer	95.82
(cont.)	02/20/92		9.13 **	9.13	Skimmer	96.65
	03/20/92		9.31 **	9.31	Skimmer	96.47
	04/20/92		9.69	9.69	Skimmer	96.09
	05/19/92		9.92	9.92	Skimmer	95.86
	06/08/92		9.84	9.84	Skimmer	95.94
	07/15/92		10.19	10.19	Skimmer	95.59
	08/06/92	106.57	10.05	10.05	Skimmer	96.52
	10/29/92		10.00	10.00	Skimmer	96.57
	11/23/92		9.88	9.87	0.01	96.69
	12/08/92	----------	----------	Well Destoyed	----------	----------
MW-3	08/16/90	105.51	8.87	8.87	0.00	96.64
	08/21/90		8.85	8.85	0.00	96.66
	09/07/90		8.98	8.98	0.00	96.53
	11/20/90		9.10	9.10	0.00	96.41
	11/29/90		9.05	9.05	0.00	96.46
	12/19/90		8.67	8.67	0.00	96.84
	01/29/91		8.96	8.96	0.00	96.55
	02/27/91		8.71	8.71	0.00	96.80
	03/07/91		8.49	8.49	0.00	97.02
	03/26/91		7.65	7.65	0.00	97.86
	05/02/91		8.62	8.62	0.00	96.89
	06/27/91		8.94	8.94	0.00	96.57
	07/24/91		8.96	8.96	0.00	96.55
	08/22/91		8.92	8.92	0.00	96.59
	09/30/91		9.04	9.04	0.00	96.47
	10/17/91		9.12	9.12	0.00	96.39
	11/21/91		8.92	8.92	0.00	96.59
	12/18/91		8.97	8.97	0.00	96.54
	01/19/92		8.69	8.69	0.00	96.82
	02/20/92		7.78	7.78	0.00	97.73
	03/20/92		8.15	8.15	0.00	97.36
	04/20/92		8.57	8.57	0.00	96.94
	05/19/92		8.76	8.76	0.00	96.75
	06/08/92		8.74	8.74	0.00	96.77
	07/15/92		9.12	9.12	0.00	96.39
	08/06/92	106.29	8.95	8.95	0.00	97.34
	10/29/92		8.78	8.78	0.00	97.51
	11/23/92		9.91	9.91	0.00	96.38
	08/16/93		8.62	8.62	0.00	97.67
	11/17/93		8.72	8.72	0.00	97.57
	02/21/94		7.91	7.91	0.00	98.38
	05/11/94		8.09	8.09	0.00	98.20
	08/12/94		8.78	8.78	0.00	97.51
	11/17/94		8.45	8.45	0.00	97.84
MW-4	08/16/90	106.61	8.16	8.16	0.00	98.45
	08/21/90		8.22	8.22	0.00	98.39
	09/07/90		8.39	8.39	0.00	98.22
	11/20/90		8.57	8.57	0.00	98.04
	11/29/90		8.53	8.53	0.00	98.08
	12/19/90		8.13	8.13	0.00	98.48
	01/29/91		8.66	8.66	0.00	97.95
	02/27/91		8.44	8.44	0.00	98.17

Table 1 (continued)
Liquid Surface Elevation Data

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Gauged	Well Elevation (feet, MSL)	Depth to Water (feet, TOC)	Depth to Liquid (feet, TOC)	SPH Thickness (feet)	Liquid Surface Elevation (feet, MSL)
MW-4	03/07/91		8.18	8.18	0.00	98.43
(cont.)	03/26/91		7.56	7.56	0.00	99.05
	05/02/91		8.25	8.25	0.00	98.36
	06/27/91		7.75	7.75	0.00	98.86
	07/24/91		8.12	8.12	0.00	98.49
	08/22/91		7.98	7.98	0.00	98.63
	09/30/91		8.26	8.26	0.00	98.35
	10/17/91		8.42	8.42	0.00	98.19
	11/21/91		8.65	8.65	0.00	97.96
	12/18/91		8.77	8.77	0.00	97.84
	01/19/92		8.42	8.42	0.00	98.19
	02/20/92		7.60	7.60	0.00	99.01
	03/20/92		7.61	7.61	0.00	99.00
	04/20/92		8.15	8.15	0.00	98.46
	05/19/92		8.14	8.14	0.00	98.47
	06/08/92		8.40	8.40	0.00	98.21
	07/15/92		8.72	8.72	0.00	97.89
	08/06/92	107.40	8.52	8.52	0.00	98.88
	10/29/92		8.63	8.63	0.00	98.77
	11/23/92		8.75	8.75	0.00	98.65
	08/16/93		8.69	8.69	0.00	98.71
	11/17/93		9.11	9.11	0.00	98.29
	02/21/94		8.16	8.16	0.00	99.24
	05/11/94		8.29	8.29	0.00	99.11
	08/12/94		8.75	8.75	0.00	98.65
	11/17/94		8.40	8.40	0.00	99.00
MW-5	08/06/92	105.19	7.19	7.19	0.00	98.00
	10/29/92		6.99	6.99	0.00	98.20
	11/23/92		6.90	6.90	0.00	98.29
	08/16/93		7.06	7.06	0.00	98.13
	11/17/93		6.91	6.91	0.00	98.28
	02/21/94		5.52	5.52	0.00	99.67
	05/11/94		6.18	6.18	0.00	99.01
	08/12/94		6.81	6.81	0.00	98.38
	11/17/94		5.38	5.38	0.00	99.81
MW-6	08/06/92	105.07	7.01	7.01	0.00	98.06
	10/29/92		6.70	6.70	0.00	98.37
	11/23/92		6.75	6.75	0.00	98.32
	08/16/93		6.71	6.71	0.00	98.36
	11/17/93		6.67	6.67	0.00	98.40
	02/21/94		5.31	5.31	0.00	99.76
	05/11/94		5.98	5.98	0.00	99.09
	08/12/94		6.60	6.60	0.00	98.47
	11/17/94		5.09	5.09	0.00	99.98
MW-7	08/06/92	105.52	8.28	8.28	0.00	97.24
	10/29/92		8.62	8.62	0.00	96.90
	11/23/92		8.21	8.21	0.00	97.31
	08/16/93		8.11	8.11	0.00	97.41
	11/17/93		8.11	8.11	0.00	97.41
	02/21/94		7.34	7.34	0.00	98.18

Table 1 (continued)
Liquid Surface Elevation Data

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Gauged	Well Elevation (feet, MSL)	Depth to Water (feet, TOC)	Depth to Liquid (feet, TOC)	SPH Thickness (feet)	Liquid Surface Elevation (feet, MSL)
MW-7	05/11/94		7.45	7.45	0.00	98.07
(cont.)	08/12/94		8.13	8.13	0.00	97.39
	11/17/94		7.90	7.90	0.00	97.62
RW-1	08/16/93	NM	---------- Well Dry ----------			
	11/17/93		---------- Well Dry ----------			
	02/21/94		7.69	7.69	0.00	NM
	05/11/94		7.96	7.96	0.00	NM
	08/12/94		7.58	7.58	0.00	NM
	11/17/94		7.66	7.66	0.00	NM

MSL = Mean sea level
TOC = Top of casing
* = Separate-phase hydrocarbons present in well.
** = Skimmer installed (12/24/91).
NM = Not measured

Table 2
Groundwater Analytical Data
Total Petroleum Hydrocarbons
(TPH as Gasoline, BTEX Compounds, TPH as Diesel, and Oil and Grease)

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TPH as Diesel (ppb)	Total Oil and Grease (ppm)
MW-1	06/19/90	<50	<0.50	<0.50	<0.50	<0.50	<0.50	<5,000
	08/16/90	<20	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	09/07/90	N/A	N/A	N/A	N/A	N/A	N/A	<5,000
	11/29/90	<50	<0.50	0.7	<0.50	<0.50	N/A	N/A
	03/07/91	<50	<0.30	<0.30	<0.30	<0.50	N/A	N/A
	06/27/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	09/30/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	12/18/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	03/20/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	06/08/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
MW-2	06/19/90	0.92 foot of Separate-Phase Hydrocarbons						
	08/16/90	0.17 foot of Separate-Phase Hydrocarbons						
	09/07/90	0.17 foot of Separate-Phase Hydrocarbons						
	11/29/90	Separate-Phase Hydrocarbon Sheen						
	03/07/91	Separate-Phase Hydrocarbon Sheen						
	06/27/91	Separate-Phase Hydrocarbon Sheen						
	09/30/91	Separate-Phase Hydrocarbon Sheen						
	12/18/91	Separate-Phase Hydrocarbon Sheen						
	03/20/92	48,000	2,000	580	2,300	7,000	N/A	N/A
	06/08/92	43,000	2,900	940	2,400	5,100	N/A	N/A
	08/06/92	78,000	2,500	6,700	2,900	16,000	N/A	N/A
	10/29/92	NS	NS	NS	NS	NS	NS	NS
	12/08/92	Well Destroyed						
MW-3	06/19/90	<20	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	08/16/90	N/A	N/A	N/A	N/A	N/A	N/A	<5,000
	09/07/90	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	11/29/90	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	03/07/91	<50	<0.30	<0.30	<0.30	<0.50	N/A	N/A
	06/27/91	<30	<0.30	<0.30	<0.50	<0.30	N/A	N/A
	09/30/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	12/18/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	03/20/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	06/08/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A

Table 2 (continued)
Groundwater Analytical Data
Total Petroleum Hydrocarbons
(TPH as Gasoline, BTEX Compounds, TPH as Diesel, and Oil and Grease)

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	Date Sampled	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	TPH as Diesel (ppb)	Total Oil and Grease (ppm)
MW-4	08/16/90	<20	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	09/07/90	N/A	N/A	N/A	N/A	N/A	N/A	<5,000
	11/29/90	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	03/07/91	<50	<0.30	<0.30	<0.30	<0.50	N/A	N/A
	06/27/91	<30	0.75	1.1	<0.30	1.6	N/A	N/A
	09/30/91	<30	<0.30	<0.30	<0.30	<0.30	N/A	N/A
	12/18/91	<30	0.83	1.2	<0.30	0.58	N/A	N/A
	03/20/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	06/08/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
MW-5	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	0.6	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
MW-6	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
MW-7	08/06/92	<50	<0.50	<0.50	<0.50	<0.50	N/A	N/A
	10/29/92	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/16/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/93	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	02/22/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	05/11/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	08/12/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
	11/17/94	<50	<0.5	<0.5	<0.5	<0.5	N/A	N/A
RW-1	08/16/93	NS	NS	NS	NS	NS	NS	NS
	11/17/93	NS	NS	NS	NS	NS	NS	NS
	02/22/94	2,100	280	19	40	66	N/A	N/A
	05/11/94	3,300	32	28	87	310	N/A	N/A
	08/12/94	4,600	42	59	190	400	N/A	N/A
	11/17/94	1,400	56	21	28	210	N/A	N/A

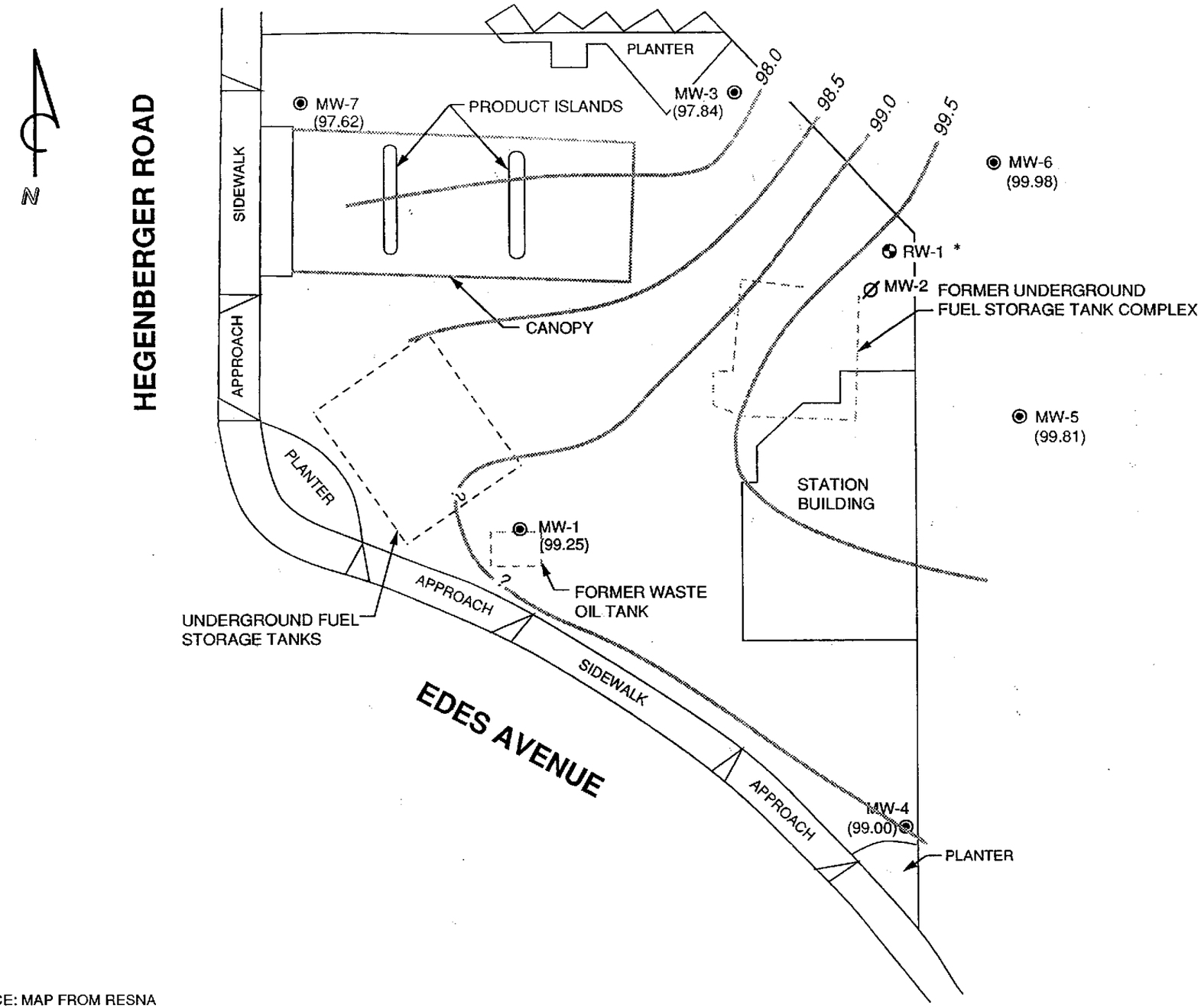
ppb = Parts per billion
ppm = Parts per million
N/A = Not applicable
NS = Not sampled

Table 3
Liquid Surface Elevation Data

ARCO Service Station 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

Well Number	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Sample Frequency
MW-1		a			Annually
MW-2	b	b	b	b	
MW-3		a			Annually
MW-4		a			Annually
MW-5		a			Annually
MW-6		a			Annually
MW-7		a			Annually
RW-1	a	a	a	a	Quarterly

a. Samples analyzed for TPH-g and BTEX compounds according to EPA Methods 8015 (modified), 8020, and 5030.
b. Well destroyed.



LEGEND

- MW-6 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- MW-2 Ø DESTROYED WELL LOCATION AND DESIGNATION
- RW-1 ⊕ GROUNDWATER EXTRACTION WELL LOCATION AND DESIGNATION
- (99.81) LIQUID SURFACE ELEVATION IN FEET - MSL, 11-17-94
- 99.5 LIQUID SURFACE ELEVATION CONTOUR IN FEET - 11-17-94
- * WELL NOT SURVEYED

APPROXIMATE DIRECTION
OF GROUNDWATER FLOW

APPROXIMATE GRADIENT = 0.01

SOURCE: MAP FROM RESNA

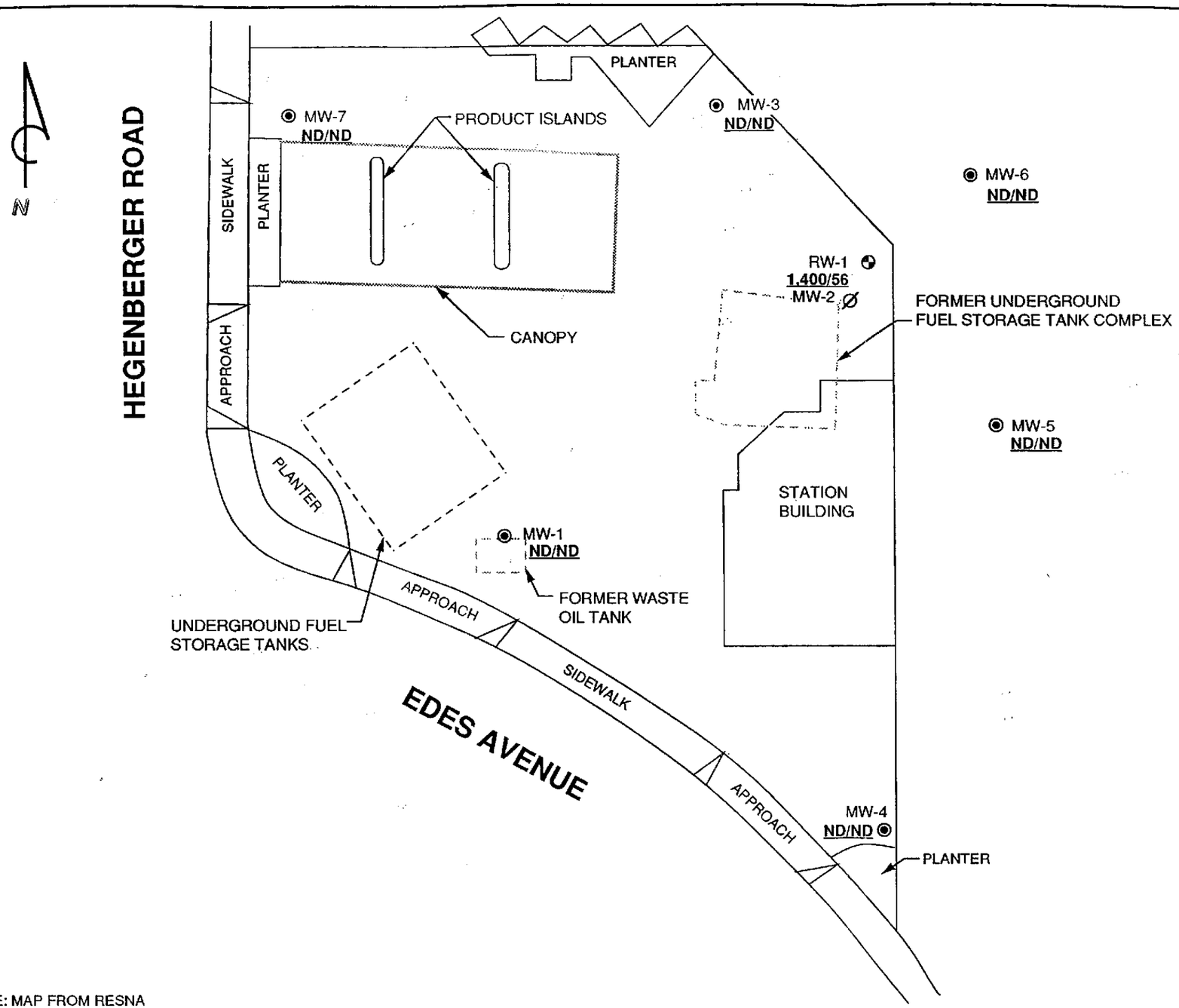
PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE
0 30 60 FEET

ARCO SERVICE STATION 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

LIQUID SURFACE ELEVATION CONTOUR MAP

FIGURE:
1
PROJECT:
330-041.2A



LEGEND

- MW-6 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- MW-2 Ø DESTROYED WELL LOCATION AND DESIGNATION
- RW-1 ◓ GROUNDWATER EXTRACTION WELL LOCATION AND DESIGNATION
- 1,400/56 TPH-g/BENZENE CONCENTRATION IN GROUNDWATER, IN PARTS PER BILLION, 11-17-94
- ND NOT DETECTED

APPROXIMATE DIRECTION
OF GROUNDWATER FLOW

SOURCE: MAP FROM RESNA

PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE
0 30 60 FEET

ARCO SERVICE STATION 4494
566 Hegenberger Road at Edes Avenue
Oakland, California

TPH-g/BENZENE CONCENTRATION MAP

FIGURE:
2
PROJECT:
330-041.2A

ATTACHMENT A

CERTIFIED ANALYTICAL REPORT, CHAIN-OF-CUSTODY DOCUMENTATION, AND FIELD DATA SHEETS

330-041.2A

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

December 16, 1994

Kelly Brown
Pacific Environmental Group
2025 Gateway Place, Ste# 440
San Jose, CA 95110

Dear Mr. Brown:

Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. 4494 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on November 17, 1994.

Sampling was carried out in accordance with the protocols described in the "Request for Bid for Quarterly Sampling at ARCO Facilities in Northern California".

Please call us if you have any questions.

Sincerely,
Integrated Wastestream Management

Tom DeLon
Project Manager

Walter H. Howe
Registered Geologist

REGISTERED GEOLOGIST
WALTER H. HOWE
No. 730
Exp. 4/'96
STATE OF CALIFORNIA

950 AMES AVENUE MILPITAS, CA 95035 (408) 942-8955

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

A4494Q4.XLS

Summary of Ground Water Sample Analyses for ARCO Facility A-4494, Oakland, California

WELL NUMBER	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	RW-1
DATE SAMPLED	11/17/94	11/17/94	11/17/94	11/17/94	11/17/94	11/17/94	11/17/94
DEPTH TO WATER	6.85	8.45	8.40	5.38	5.09	7.90	7.66
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA
TPHg	ND	ND	ND	ND	ND	ND	1,400
BTEX							
BENZENE	ND	ND	ND	ND	ND	ND	56
TOLUENE	ND	ND	ND	ND	ND	ND	21
ETHLYBENZENE	ND	ND	ND	ND	ND	ND	28
XYLENES	ND	ND	ND	ND	ND	ND	210

FOOTNOTES:

Concentrations reported in ug/L (ppb)

TPHg = Total Purgeable Petroleum Hydrocarbons (USEPA Method 8015 Modified)

BTEX Distinction (USEPA Method 8020)

PCE = Tetrachloroethene (USEPA Method 8010)

* = Well inaccessible

** = Not sampled per consultant request

DCE = cis-1, 2-Dichloroethene (USEPA Method 8010)

TCE = Trichloroethene (USEAP Method 8010)

ND = Not Detected

NA = Not applicable

FP = Floating product

= See laboratory analytical report

950 AMES AVENUE MILPITAS, CA 95035 (408) 942-8955

FIELD REPORT

Depth To Water / Floating Product Survey

Site Arrival Time: 1520
Site Departure Time: 1745
Weather Conditions: Cloudy Partly Sunny

DTW: Well Box or Well Casing (circle one) [Well Casing circled]

Project No.:
Location: 566 Hegenberger Rd
Date: November 17, 1994
Client / Station#: Arco 4494
Field Technician: Vince / Cisco
Day of Week: Thursday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y=YES, N=NO) FP=FLOATING PRODUCT	COMMENTS	MATERIALS
5	mw-1	OK	yes	OK	OK	None ~~OK~~	23.20	6.85	6.85	N/A	N/A	N	4" Missing bolts EX. CAP won't fit inside box	Hole in box
3	mw-3	OK	yes	OK	OK	OK	18.30	8.45	8.45	N/A	N/A	N	4" H2O in around box	7/16
6	mw-4	OK	yes	none	OK	OK	16.80	8.40	8.40	N/A	N/A	N	4"	Lost off
1	mw-5	OK	yes	OK	OK	OK	17.80	5.38	5.38	N/A	N/A	N	2"	15/16
2	mw-6	OK	yes	OK	OK	OK	18.77	5.09	5.09	N/A	N/A	N	2"	15/16
4	mw-7	OK	yes	OK	OK	OK	14.70	7.90	7.90	N/A	N/A	N	4"	15/16
7	RW-1	OK	yes	OK	OK	OK	11.60	7.66	7.66	N/A	N/A	N	2"	7/16

AGE 2 OF 3 DATE: 11-17-94 CLIENT/STATION #: Arco 4494 ADDRESS: 566 Hegenberger Rd. OAK.

WELL ID: MW-1 TD 23.20 DTW 6.85 X 0.66 (Gal. / Linear Ft.) X 3 (Casing Volume) = 32.37 (Calculated Purge)

DATE PURGED: 11-17-94 START (2400 HR): 1630 END (2400 HR) 1640
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1649 DTW: 21.5

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1633	2	7.18	0.11	66.8	clear
1634	5	7.28	5.02	67.5	clear
1637	16	7.25	7.69	67.2	clear
1640	17	7.25	7.81	67.0	clear

Total purge: 17
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: Well pumped dry at 17 gallons.

WELL ID: MW-4 TD 16.80 DTW 8.40 X 0.66 (Gal. / Linear Ft.) X 3 (Casing Volume) = 16.63 (Calculated Purge)

DATE PURGED: 11-17-94 START (2400 HR): 1705 END (2400 HR) 1712
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1716 DTW: 14.60

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1709	2	7.31	7.32	68.0	clear
1710	5	7.28	8.40	67.5	clear
1712	7	7.27	8.16	67.3	clear

Total purge: 7
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS: Well pumped dry at 7 gallons.

WELL ID: RW-1 TD 11.60 DTW 7.66 X 0.17 (Gal. / Linear Ft.) X 3 (Casing Volume) = 2.00 (Calculated Purge)

DATE PURGED: 11-17-94 START (2400 HR): 1719 END (2400 HR) 1727
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1730 DTW: 8.1

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1721	.75	6.89	7.16	64.9	cloudy
1724	1.5	6.91	7.66	63.9	clear
1727	2	6.93	7.61	63.9	clear

Total purge: 2
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: ____ TD ____ DTW ____ X ____ (Gal. / Linear Ft.) X ____ (Casing Volume) = ____ (Calculated Purge)

DATE PURGED: ____ START (2400 HR): ____ END (2400 HR) ____
DATE SAMPLED: ____ TIME (2400 HR): ____ DTW: ____

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: ____
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: Vince Valdes SIGNATURE: Vince Valdes

CASING DIAMETER (inches): 2 3 4 6 8 12 Other: ____
GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other: ____

 DATE: 11-17-94 CLIENT/STATION #: arco 4494 ADDRESS: 566 Hegenberger Rd. OAK

WELL ID: MW-5 TD 17.80 DTW 5.38 x 0.17 Gal. Linear Ft. x 3 Casing Volume = 6.33 Calculated Purge

DATE PURGED: 11-17-94 START (2400 HR): 1643 END (2400 HR) 1644
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1647 DTW: 5.4

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
43	1	7.04	3.68	58.4	CLEAR
44	3	7.09	5.02	58.0	CLEAR
44	6.5	7.10	4.67	57.7	CLEAR

Total purge: 6.5
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-6 TD 18.77 DTW 5.09 x 0.17 Gal. Linear Ft. x 3 Casing Volume = 6.97 Calculated Purge

DATE PURGED: 11-17-94 START (2400 HR): 1655 END (2400 HR) 1657
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1700 DTW: 5.2

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1656	1	7.10	3.95	65.2	CLEAR
1656	4	7.10	3.41	64.7	CLEAR
1657	7	7.11	3.16	64.2	CLEAR

Total purge: 7
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-3 TD 18.30 DTW 8.45 x 0.66 Gal. Linear Ft. x 3 Casing Volume = 19.50 Calculated Purge

DATE PURGED: 11-17-94 START (2400 HR): 1705 END (2400 HR) 1709
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1711 DTW: 8.7

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
706	5	7.07	2.24	68.7	CLOUDY
707	10	7.07	3.32	67.8	CLEAR
708	15	7.06	3.78	67.4	CLEAR
709	20	7.06	4.13	67.0	CLEAR

Total purge: 20
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

WELL ID: MW-7 TD 14.70 DTW 7.90 x 0.66 Gal. Linear Ft. x 3 Casing Volume = 13.46 Calculated Purge

DATE PURGED: 11-17-94 START (2400 HR): 1719 END (2400 HR) 1723
DATE SAMPLED: 11-17-94 TIME (2400 HR): 1727 DTW: 9.5

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	(E.C. X 1,000) (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
1721	5	7.08	3.20	70.4	CLOUDY
1721	8	7.06	4.16	69.7	CLOUDY
1723	14	7.06	3.91	68.8	CLOUDY

Total purge: 14
PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP: Bailer Disp.
REMARKS:

PRINT NAME: Francisco Alvergan SIGNATURE: Francisco Alvergan

CASING DIAMETER (inches):	2	3	4	6	8	12	Other:
GALLON/LINEAR FOOT:	0.17	0.38	0.66	1.5	2.6	5.8	Other:

Columbia Analytical Services inc.

December 6, 1994

Service Request No. S941484

Gina Austin
Tom DeLon
IWM
950 Ames Avenue
Milpitas, CA 95035

RECEIVED
DEC 07 1994

Re: **ARCO Facility No. 4494**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on November 18, 1994. For your reference, these analyses have been assigned our service request number S941484.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Program Director

Annelise J. Bazar
Regional QA Coordinator

KAM/ajb

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NR	Not Requested
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 4494
Sample Matrix: Water

Service Request: S941484
Date Collected: 11/17/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/30/94

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

Analyte:	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes, Total
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name	**Lab Code**				
MW-1 (21.5)	S941484-001	ND	ND	ND	ND	ND
MW-3 (8.7)	S941484-002	ND	ND	ND	ND	ND
MW-4 (14.6)	S941484-003	ND	ND	ND	ND	ND
MW-5 (5.4)	S941484-004	ND	ND	ND	ND	ND
MW-6 (5.2)	S941484-005	ND	ND	ND	ND	ND
MW-7 (9.5)	S941484-006	ND	ND	ND	ND	ND
RW-1 (8.1)	S941484-007	1,400	56	21	28	210
Method Blank	S941130-WB	ND	ND	ND	ND	ND

Approved By: Kevin A Mayhew Date: December 6 1994

5ABTXGAS/061694

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 4494
Sample Matrix: Water

Service Request: S941484
Date Collected: 11/17/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/30/94

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

Sample Name	Lab Code	Percent Recovery α,α,α-Trifluorotoluene
MW-1 (21.5)	S941484-001	92
MW-3 (8.7)	S941484-002	94
MW-4 (14.6)	S941484-003	93
MW-5 (5.4)	S941484-004	92
MW-6 (5.2)	S941484-005	94
MW-7 (9.5)	S941484-006	93
RW-1 (8.1)	S941484-007	96
MW-1 (21.5)MS	S941484-001MS	92
MW-1 (21.5)DMS	S941484-001DMS	93
Method Blank	S941130-WB	92

CAS Acceptance Limits: 69-116

Approved By: _____ Date: December 6, 1994

SUR1/062994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 4494

Service Request: S941484
Date Analyzed: 11/30/94

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	26.4	106	85-115
Toluene	25	25.5	102	85-115
Ethylbenzene	25	25.8	103	85-115
Xylenes, Total	75	75.4	101	85-115
Gasoline	250	240	96	90-110

Approved By: Thomas Murphy Date: December 6, 1994

ICV25AL/060194

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • F... 408/437-0854

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 4494
Sample Matrix: Water

Service Request: S941484
Date Collected: 11/17/94
Date Received: 11/18/94
Date Extracted: NA
Date Analyzed: 11/30/94

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

Sample Name: MW-1 (21.5)
Lab Code: S941484-001

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	25	25	ND	27.0	27.3	108	109	75-135	1
Toluene	25	25	ND	26.2	26.4	105	106	73-136	<1
Ethylbenzene	25	25	ND	26.6	26.8	106	107	69-142	<1

Approved By: _____ Date: December 6, 1994

DMS1S/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5EC

Chain of Custody

ARCO Facility no. A 4494	City (Facility) OAKland	Project manager (Consultant) TOM De Lon	Laboratory name Columbia
ARCO engineer M.W.	Telephone no. (ARCO) 4155712434	Telephone no. (Consultant) 408/942 8955	Fax no. (Consultant) 408/942 1499
Consultant name IWM	Address (Consultant) 950 Amd ave. Mtn. CA 95035		Contract number 07077

Method of shipment: sampler deliver

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 ☐		
FB-1	8	2		✓		✓	✓	11-17-94	1528		✓	✓										
MW-1	1	2		✓		✓	✓		1649		✓	✓										
MW-3	2	2		✓		✓	✓		1711		✓	✓										
MW-4	3	2		✓		✓	✓		1716		✓	✓										
MW-5	4	2		✓		✓	✓		1647		✓	✓										
MW-6	5	2		✓		✓	✓		1700		✓	✓										
MW-7	6	2		✓		✓	✓		1727		✓	✓										
RW-1	7	2		✓		✓	✓		1730		✓	✓										

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on FB-1

Lab number 5941484

Turnaround time

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

Condition of sample: Okay		Temperature received: cool	
Relinquished by sampler	Date 11/18/94 Time 1230	Received by	
Relinquished by	Date Time	Received by CAS/IS 11/18/94 1230	
Relinquished by	Date Time	Received by laboratory	Date Time

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

ATTACHMENT B

SAMPLING PROCEDURES

FIELD PROCEDURES: GROUNDWATER SAMPLING

PRELIMINARY: SITE SAFETY

IWM SAFETY PRACTICES APPLY AT ALL TIMES! OBSERVE ALL STANDARD PROCEDURES WITH SPECIAL ATTENTION TO THESE HAZARDS:

- **Vehicular traffic: Insure visibility of yourself and your equipment**
- **Pedestrian activity: Anticipate and prevent tripping hazards**

A. WATER-LEVEL MEASUREMENTS

GENERAL

1. Water-level measurements must be taken before disturbing the water in the well in any way. The water in the well should be in an undisturbed state for a minimum of 24 hours before performing this task.
2. To insure consistency in date from event-to-event, the measurement must be taken from the same point on the well top casing. As a general rule, take the measurement from the highest point of the casing. Typically, there is a notch in the casing for this purpose. If no such mark is visible, place one at the highest point of the casing, take measurements from that point, and make a note of this in the field notes.
3. Always work from the cleanest wells (based on past data) to the dirtiest.
4. Keep your equipment CLEAN! Between wells clean the probes, lines and associated attachments with a clean cloth soaked in water containing Alconox (or like cleaning agent). Thoroughly rinse in tap water in a 5 gallon bucket. After each rinsing, empty the bucket into a 55 gallon drum or other purge water containment vessel.
5. Take measurements to the nearest .01 foot.

PROCEDURE (NO FREE PRODUCT ANTICIPATED)

1. Inspect the wellhead for the following: damage of any kind, indications of possible leakage into the well at the wellhead, damaged or missing locks, etc. Remove any standing water in or around the well head. Note all irregularities.
2. Lower the (CLEAN!) water-level indicator slowly down the well until the indicator sounds.
3. Continue lowering the indicator about 2 inches more before very slowly raising the indicator until the sound stops.
4. Take the measurement at the casing.
5. Repeat this procedure. If the next reading is within .01 foot of the first, then record the first measurement. If not, repeat this procedure until two consecutive measurements are within .01 foot.
6. Remove and CLEAN the equipment (probe and tape) before proceding to the next well.

PROCEDURE (FREE PRODUCT ANTICIPATED)

1. Inspect the wellhead for the following: damage of any kind, indications of possible leakage into the well at the wellhead, damaged or missing locks, etc. Remove any standing water in or around the well head. Note all irregularities.
2. Lower the (CLEAN!) oil-water interface probe slowly down the well until the indicator sounds. The presence of product is indicated by a steady sound; its absence by a broken sound. (If there is no evidence of product, follow procedure for water-level measurements where no product is anticipated.)
3. If the presence of product is indicated, lower the probe very slowly until the signal changes to broken pattern.
4. Continue lowering the indicator about 2 inches more before very slowly raising the indicator until the sound becomes steady; note this measurement at the casing as the depth to water. Continue raising the probe until the sound stops; note this measurement at the casing as the depth to product.
5. Repeat this procedure. If the next readings are within .01 foot of the first set, then record the first measurements. If not, repeat this entire procedure until two consecutive measurements sets are within .01 foot.
6. Remove and CLEAN the equipment before using in another well.

B. SUBJECTIVE ANALYSIS

GENERAL

1. Always work from the cleanest wells (based on past data) to the dirtiest.
2. Follow this procedure for cleaning the bailer between wells:
a. Fill and empty the bailer once using tap water.
b. Refill bailer approximately two-thirds full with a mixture of water and Alconox (or like cleaning agent).
c. Clean bailer inside and out with a bottle brush.
d. Empty the bailer then repeat this process at least three times.
e. After each cleaning, empty the cleaning liquids into a 55 gallon drum or other purge water containment vessel.
3. Clean the lines (or wire) and associated attachments with a clean cloth soaked in water containing Alconox (or like cleaning agent). Thoroughly rinse in tap water in a 5 gallon bucket. After each rinsing, empty the bucket into a 55 gallon drum or other purge water containment vessel.

PROCEDURE

1. Gently lower the (CLEAN) bailer into the well until it reaches the water surface.
2. Lower the bailer further about half its length.
3. Remove the bailer and examine the water therein for the following:
a. Presence of Free Product: Note and record thickness to the nearest eighth of an inch.
b. Sheen: Note visual indications of sheen as follows: "Heavy", "Moderate" or "Llight".
c. Emulsion: Record presence of emulsion as "Heavy", "Moderate", or "Light".
d. Color: Record if floating product is present.

C. WELL PURGING: GENERAL

GENERAL

1. To minimize any risk of cross contamination, whenever possible use surface pumps and disposable tubing.
2. If another alternative is used for purging (bailers, submersible pumps, bladder pumps, etc.), follow cleaning procedures outlined for bailers and equipment above.

PROCEDURE

1. **Determine the volume of water in the well.**
2. **If the well recharges, remove three well volumes. If the well doesn't recharge, or does so slowly, continue purging until the recharge water stabilizes with regard to pH, temperature and conductivity, or until the well is empty.**
3. **Contain purged water in labeled 55 gallon drums or other provided containment.**

D. WATER SAMPLE COLLECTION

GENERAL

1. **In general, use disposable bailers for all sampling.**
2. **If a teflon bailer is reused, follow this procedure for cleaning the bailer between wells:**

a. Fill and empty the bailer once using tap water.
b. Refill bailer approximately two-thirds full with a mixture of water and Alconox (or like cleaning agent).
c. Clean bailer inside and out with a bottle brush.
d. Empty the bailer then repeat this process at least three times.
e. After each cleaning, empty the cleaning liquids into a 55 gallon drum or other purge water containment vessel.

3. **Clean the lines (or wire) and associated attachments with a clean cloth soaked in water containing Alconox (or like cleaning agent). Thoroughly rinse in tap water in a 5 gallon bucket. After each rinsing, empty the bucket into a 55 gallon drum or other purge water containment vessel.**
4. **Always work from the cleanest wells (based on past data) to the dirtiest.**
5. **Always keep your samples chilled.**

PROCEDURE

1. **If well recharges, sample may be obtained immediately after purging. If during the course of the sampling day a well does not recharge sufficiently to half fill the bailer, return the next morning to take the sample.**
2. **Review the sampling list to determine which analysis(es) is(are) required for each well during this sampling event. Note any special handling requirements (addition of preservatives, etc.). Complete the sample labels with the following: sample ID number, project ID number and date. Attach the labels to the sample**

containers. Always prepare duplicate samples for analysis and indicate the number of containers on the Chain of Custody. Also, label two sample containers with the project ID number, date and the words "Field Blank"; fill these two containers with distilled water and place in the holders provided for transport (see 5. below).

3. Lower a new disposable bailer into the well and take a sample from below the water's surface. Minimize agitation while removing the bailer.
4. Using the valve at the bottom of the bailer, fill the sample vial very slowly to minimize agitation of the liquid. Cap the vial tightly, then tap it and invert it to check for any air. Top off the vial if there is any air present.
5. Place all sample vials in the holders provided for transport. Place holders inside a cooler containing enough ice to keep the sample temperature below 4 degrees Centigrade. However, do not permit the samples to freeze.
6. After sampling is complete, lock cooler if possible; if not, seal with tape and sign across tape so that any tampering will be evident.
7. Enter the information concerning the collected samples on the field notes and on the Chain of Custody.
8. Before resealing each wellhead, replace any lock or cap, as required.

E. CHAIN OF CUSTODY PROCEDURE

GENERAL

1. Only list on the Chain of Custody those samples that will go to the lab; samples to be held for possible future analysis should only be noted on the field notes.
2. Fill out the Chain of Custody in ink.

PROCEDURE

1. Fill out as much of the form as possible before beginning work on the site.
2. Provide the following:

a. Your name, signature and phone number.
b. The Project Manager's name and phone number.
c. The laboratory.
d. The turnaround time.

3. For each sample, provide the sample ID number, site ID, sample date and analysis(es) requested.
4. After the samples are taken, note the sample condition.
5. The completed Chain of Custody must accompany the shipping container to the laboratory; keep a copy for the Project Manager.
6. Each time the samples change custody the date and time are directely noted on the Chain of Custody which is signed by both the transferor and the transferee.
7. The laboratory will make the final entry upon receipt of the samples. Sample condition will be noted on the Chain of Custody. The original Chain of Custody will be returned with the sample results and a copy will be kept by the laboratory.