Delta
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Consultants, Inc.

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March 27, 2001

R077

MAR 3 0 2001

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

Subject: *Quarterly Groundwater Monitoring Report, Fourth Quarter 2000*
Quarterly Soil Vapor Extraction Operation and Performance, Fourth Quarter 2000
ARCO Service Station No. 6148
5131 Shattuck Avenue
Oakland, California
Delta Project No. D000-315

Dear Mr. Supple:

Delta Environmental Consultants, Inc. is submitting the attached report that presents the results of the fourth quarter 2000 ground water monitoring and soil vapor extraction operation and performance programs at ARCO Products Company Service Station No. 6148, located at 5131 Shattuck Avenue, Oakland, California. The monitoring program complies with the Alameda County Health Care Services Agency requirements regarding underground tank investigations.

The interpretations contained in this report represent our professional opinions and are based, in part, on information supplied by the client. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeological and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions concerning this project, please contact Steven W. Meeks at (916) 536-2613.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Trevor L. Atkinson
Project Engineer

Steven W. Meeks, P.E.
Project Manager
California Registered Civil Engineer No. C057461

3/28/01

TLA (LRP004.315.doc)
Enclosures

cc: Ms. Susan Hugo – Alameda County Health Care Services Agency

Date: March 27, 2001

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 6148 Address:	5131 Shattuck Avenue, Oakland, California
ARCO Environmental Engineer/Phone No.:	Paul Supple 925-299-8891
Consulting Co./Contact Person	Delta Environmental Consultants, Inc. Steven W. Meeks, P.E.
Consultant Project No.:	D000-315
Primary Agency/Regulatory ID No.	Alameda County Health Care Services Agency

WORK PERFORMED THIS QUARTER

1. Performed quarterly groundwater monitoring for fourth quarter 2000.
2. Visited site to assess status of remediation system.
3. Performed soil sampling during UST, product lines and dispenser upgrade in fourth quarter 2000.

WORK PROPOSED FOR NEXT QUARTER

1. Prepare and submit quarterly groundwater monitoring report for fourth quarter 2000.
2. Perform quarterly groundwater monitoring and sampling for first quarter 2001.
3. Continue operation and maintenance of remediation system.

QUARTERLY MONITORING:

Current Phase of Project	Monitoring/Remediation
Frequency of Groundwater Sampling:	Annual (1st Quarter): MW-6, MW-7 Semi-Annual (1st/3rd Quarter): MW-4 Quarterly: MW-1, MW-2, MW-3, MW-5
Frequency of Groundwater Monitoring:	Quarterly (Groundwater) Monthly (SVE and Air-sparge systems)
Is Free Product (FP) Present On–Site:	No
FP Recovered this Quarter:	N/A
Cumulative FP Recovered to Date:	None
Bulk Soil Removed This Quarter:	None
Bulk Soil Removed to Date:	560 cubic yards of TPH-impacted soil
Current Remediation Techniques:	SVE, Air-Sparge and Air-Bubbling Systems
Approximate Depth to Groundwater:	15.74 ft
Groundwater Gradient:	0.022 South-Southwest
Cumulative TPHg/Benzene Removed:	929 / 7.0 gallons

SVE QUARTERLY OPERATION & PERFORMANCE:

Equipment Inventory:	Therm Tech model CATVAC-10E, Electric/CatOx
Operating Mode:	Catalytic Oxidation
Agency/Permit No.:	BAAQMD/25126
TPH Concentration at end of period:	N/A
Benzene Concentration at End of Period:	NA
Flow Rate at End of Period:	N/A
Hydrocarbons Removed This Period:	None
Hydrocarbons Removed to Date:	1,894.1 pounds
Utility Usage Electric (kWh):	N/A
Hours Operated This Period:	None
Percent Operational:	0%
Total Hours Operated to Date:	2,470.77 hours
Unit Maintenance Schedule:	Routine monthly maintenance when operational
Number of Auto Shut Downs:	None
Destruction of Efficiency Permit: Requirements:	95% (POC>1,000 ppmv); 90% (POC <1,000 ppmv) waived (<1.0 lb/day TPH & <0.02 lb/day benzene)
Percent TPH Conversion:	Waived
Average Source Flow Rate	0
Average Process Flow Rate:	0
Average Source Vacuum:	0

DISCUSSION:

- Methyl tertiary butyl ether was reported in MW-1,MW-2, MW-3 and MW-5 at concentrations ranging from 8.91 micrograms per liter (µg/L) in MW-1 to 146 µg/L in MW-5.
- TPH was reported in MW-1, MW-2, MW-3 and MW-5 at concentrations ranging from 186 µg/L (MW-1) to 2,140 µg/L (MW-2).
- Benzene was reported in MW-1, MW-2, MW-3 and MW-5 at concentrations ranging from 4.73 µg/L (MW-3) to 174 µg/L (MW-2).
- The remediation systems were non-operational during the fourth quarter 2000 and are being evaluated to assess operation and repair status. No current tables of operational data have been provided due to the non-operational status of the system. Please refer to Appendix B for historical operational data of the remediation system

ATTACHMENTS:

- Table 1 Groundwater Elevation and Analytical Data
- Table 2 Groundwater Flow Direction and Gradient
- Figure 1 Groundwater Analytical Summary Map
- Figure 2 Groundwater Elevation Contour Map
- Appendix A Sampling and Analysis Procedures
- Appendix B Historical Data Tables (IT Corporation)
- Appendix C Groundwater Sampling Information
- Appendix D Certified Analytical Reports with Chain–of–Custody Documentation

TABLE 1

GROUNDWATER ANALYTICAL DATA

ARCO Service Station No. 6148
5131 Shattuck Avenue
Oakland, California

Well Number	Date Sampled	Top of Riser Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	TPH as Gasoline (µg/L)	MTBE (µg/L)
MW-1	06/21/00	107.80	17.49	90.31	<0.5	<0.5	<0.5	<1.0	<50	<3.0
	09/20/00		17.64	90.16	<0.5	0.677	<0.5	0.969	<50	<2.5
	12/22/00		16.87	90.93	5.38	0.522	9.52	30.2	186	8.91
MW-2	06/21/00	107.28	17.19	90.09	<0.5	<0.5	<0.5	<1.0	69	12
	09/20/00		17.31	89.97	0.964	<0.5	<0.5	<.05	<50	5.05
	12/22/00		16.58	90.70	174	60.2	118	438	2,140	123
MW-3	06/21/00	107.61	17.52	90.09	<0.5	<0.5	<0.5	2.1	200	24
	09/20/00		17.61	90.00	<0.5	<0.5	<0.5	<0.5	<50	20
	12/22/00		16.85	90.76	4.73	1.06	2.58	5.22	227	27.3
MW-4	06/21/00	106.71	16.00	90.71	5.3	7.3	36	85	1,400	4
	09/20/00		16.03	90.68	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	12/22/00		NM	NC	NS	NS	NS	NS	NS	NS
MW-5	06/21/00	106.60	16.52	90.08	<0.5	<0.5	<0.5	<1.0	67	10
	09/20/00		16.34	90.26	<0.5	<0.5	<0.5	<0.5	<50	3.48
	12/22/00		15.58	91.02	11.5	2.53	4.02	6.25	341	146
MW-6	06/21/00	105.13	13.91	91.22	NS	NS	NS	NS	NS	NS
	09/20/00		14.03	91.10	NS	NS	NS	NS	NS	NS
	12/22/00		NM	NC	NS	NS	NS	NS	NS	NS

TABLE 1

GROUNDWATER ANALYTICAL DATA

ARCO Service Station No. 6148
5131 Shattuck Avenue
Oakland, California

Well Number	Date Sampled	Top of Riser Elevation (ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	TPH as Gasoline (µg/L)	MTBE (µg/L)
MW-7	06/21/00	107.05	14.57	92.48	NS	NS	NS	NS	NS	NS
	09/20/00		14.58	92.47	NS	NS	NS	NS	NS	NS
	12/22/00		13.21	93.84	NS	NS	NS	NS	NS	NS

TPH = Total Petroleum Hydrocarbons

MTBE = Methyl tertiary butyl ether analyzed by EPA Method 8021B unless otherwise noted

µg/L = Micrograms per liter

NM = Not measured

NC = Not calculated

Note: Please refer to Appendix B for Historical Groundwater Elevation and Analytical Data Tables developed by IT Corporation

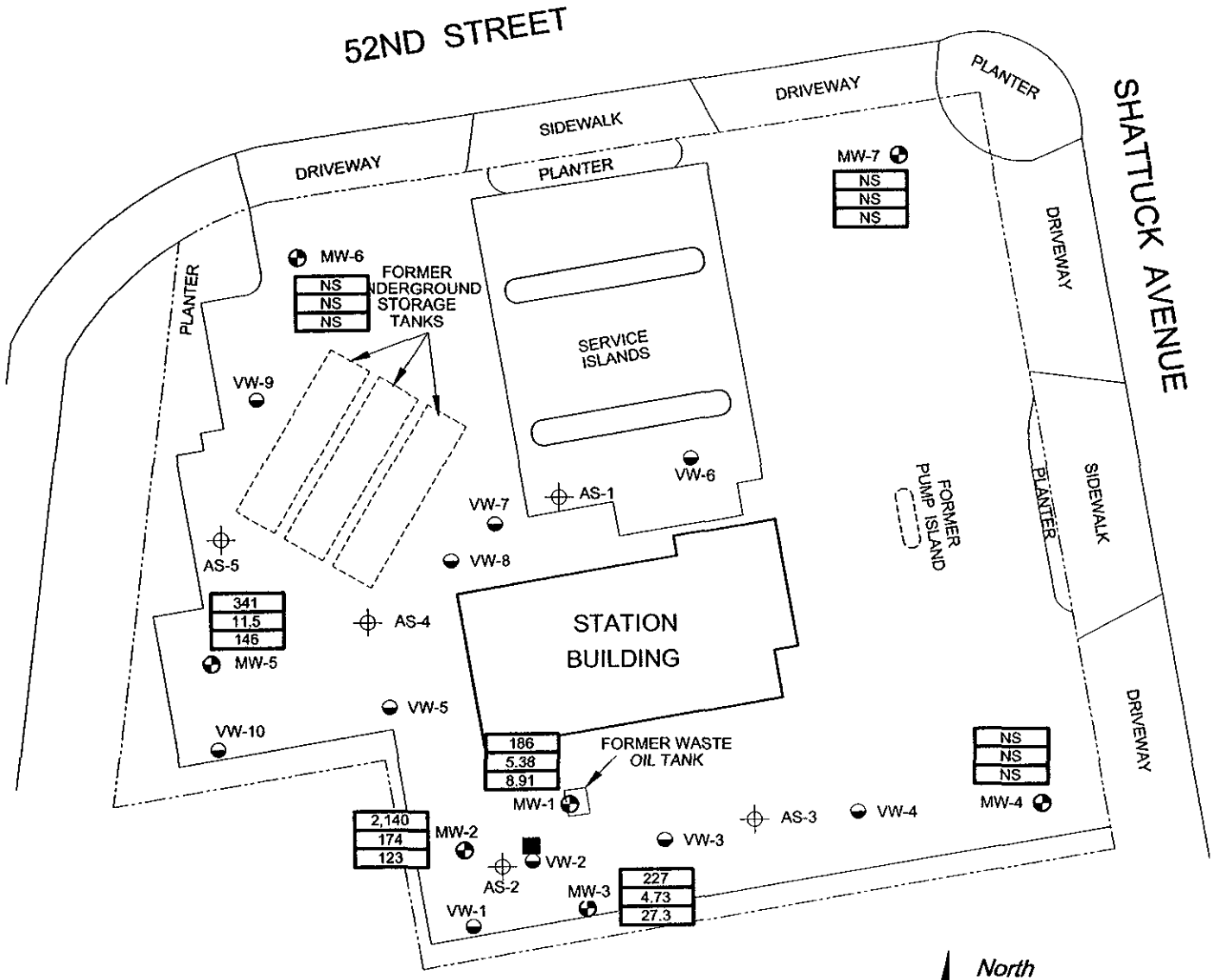
TABLE 2

GROUNDWATER FLOW DIRECTION AND GRADIENT

ARCO Service Station No. 6148
5131 Shattuck Avenue
Oakland, California

Date Measured	Average Flow Direction	Average Hydraulic Gradient
06/21/00	South-Southwest	0.02
09/20/00	South-Southwest	0.017
12/22/00	South-Southwest	0.022

Note: Please refer to Appendix B for Historical Groundwater Elevation and Analytical Data Tables developed by IT Corporation



LEGEND:

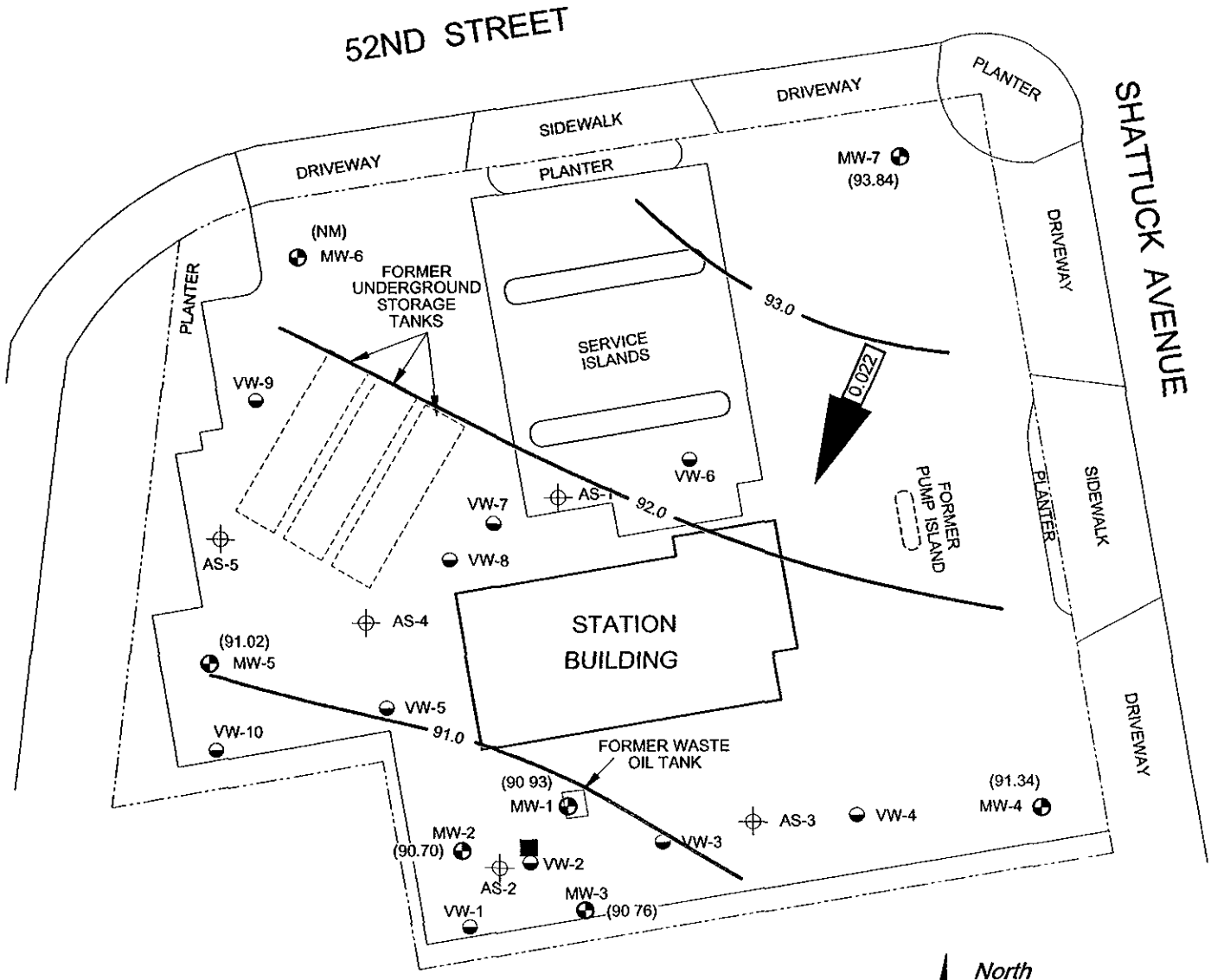
MW-1	MONITORING WELL LOCATION
AS-2	AIR SPARGING WELL
VW-1	SOIL VAPOR EXTRACTION WELL LOCATION
■	DESTROYED WELL LOCATION
<50 <0.5 <2.5	TPH AS GASOLINE IN MICROGRAMS PER LITER BENZENE IN MICROGRAMS PER LITER MTBE IN MICROGRAMS PER LITER
NS	NOT SAMPLED

NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FIGURE 1
GROUND WATER ANALYTICAL SUMMARY
FOURTH QUARTER 2000 (12/22/00)
ARCO STATION NO. 6148
5131 SHATTUCK AVENUE
OAKLAND, CALIFORNIA

PROJECT NO D000-315	DRAWN BY TLA 3/13/01
FILE NO. 6148-1	PREPARED BY TLA
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.



LEGEND:

MW-1	MONITORING WELL LOCATION
AS-2	AIR SPARGING WELL
VW-1	SOIL VAPOR EXTRACTION WELL LOCATION
■	DESTROYED WELL LOCATION
(90.93)	GROUND WATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)
— 91.0 —	WATER TABLE CONTOUR IN FEET ABOVE MSL
→	GROUND WATER FLOW DIRECTION
0.022	APPROXIMATE GROUND WATER FLOW GRADIENT
•	MONITORING WELL(S) NOT USED IN CONTOUR MAP CONTRUCTION

NOTE SITE MAP ADAPTED FROM IT CORPORATION FIGURES.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FIGURE 2
GROUND WATER ELEVATION CONTOUR MAP
FOURTH QUARTER 2000 (12/22/00)
ARCO STATION NO. 6148
5131 SHATTUCK AVENUE
OAKLAND, CALIFORNIA

PROJECT NO. D000-315	DRAWN BY TLA 3/13/01
FILE NO. 6148-1	PREPARED BY TLA
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.

APPENDIX A

Sampling and Analysis Procedures

FIELD METHODS AND PROCEDURES

1.0 GROUND WATER AND LIQUID-PHASE HYDROCARBON DEPTH ASSESSMENT

A water/liquid-phase hydrocarbon (LPH) interface probe was used to assess the thickness of LPH, if present, and a water level indicator was used to measure ground water depth in monitoring wells that did not contain LPH. Depth to ground water was measured from the top of each monitoring well casing. The tip of the water level indicator was subjectively analyzed for LPH sheen. All measurements and physical observations were recorded in the field.

2.0 SUBJECTIVE ANALYSIS OF GROUND WATER

Prior to purging, a water sample was collected from the monitoring well for subjective analysis. The sample was retrieved by gently lowering a clean, disposable bailer to approximately one-half the bailer length past the air/liquid interface. The bailer was then retrieved and the sample contained within the bailer was examined for LPH and the appearance of a LPH sheen.

3.0 MONITORING WELL PURGING AND SAMPLING

Monitoring wells were purged using a centrifugal pump or disposable bailers until pH, temperature, and conductivity of the purge water had stabilized and a minimum of three to four well volumes of water had been removed. Ground water removed from the wells was stored in 55-gallon barrels at the site. The barrels were labeled with corresponding monitoring well numbers and the date of purging. After purging, ground water levels were allowed to stabilize. A ground water sample was then removed from each of the wells using a dedicated disposable bailer. If the well was purged dry, it was allowed to sufficiently recharge and a sample was collected. Samples were collected in air-tight vials, appropriately labeled, and stored on ice from the time of collection through the time of delivery to the laboratory. A chain-of-custody form was completed to document possession of the samples. Ground water samples were transported to the laboratory and analyzed within the EPA-specified holding times for the requested analyses. Purge water will be collected from the storage barrels in a vacuum truck and transported to an appropriate facility for treatment and/or disposal.

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 previously stated in the first paragraph of this sub-section. 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.

APPENDIX B

Historical Data Tables
IT Corporation

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-1	03-20-95	108.03	15.75	ND	92.28	830	140	5	41	110	--	--		
MW-1	06-06-95	108.03	17.68	ND	90.35	210	30	<0.5	7.3	16	--	--		
MW-1	08-24-95	107.80	17.45	ND	90.35	Not sampled: well was inaccessible due to construction								
MW-1	11-16-95	107.80	17.64	ND	90.16	<50	5.6	<0.5	1.4	1.2	55	--		
MW-1	02-27-96	107.80	15.21	ND	92.59	1,400	240	88	44	110	200	--		
MW-1	05-15-96	107.80	17.53	ND	90.27	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-1	08-14-96	107.80	17.15	ND	90.65	98	18	<0.5	1.9	1	45	--		
MW-1	11-11-96	107.80	17.78	ND	90.02	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-1	03-25-97	107.80	17.68	ND	90.12	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-1	05-15-97	107.80	17.91	ND	89.89	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-1	10-26-97	107.80	18.85	ND	88.95	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-1	11-10-97	107.80	18.10	ND	89.70	<50	<0.5	<0.5	<0.5	<0.5	4	--		
MW-1	02-13-98	107.80	13.15	ND	94.65	<100	8.4	<1	<1	14	130	--		
MW-1	05-12-98	107.80	12.30	ND	95.50	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-1	07-28-98	107.80	17.04	ND	90.76	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-1	10-28-98	107.80	18.10	ND	89.70	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-1	02-12-99	107.80	15.84	ND	91.96	72	<0.5	<0.5	<0.5	<0.5	23	--		
MW-1	06-03-99	107.80	17.62	ND	90.18	890	33	1.5	12	2.8	250	--	1.44	NP
MW-1	10-26-99	107.80	16.92	ND	90.88	<50	<0.5	<0.5	<0.5	<1	9	--	9.58	NP
MW-1	02-02-00	107.80	15.70	ND	92.10	<50	<0.5	<0.5	<0.5	<1	<3	--	8.9	NP
MW-2	03-20-95	107.43	15.50	ND#	91.93	Not sampled: floating product entered well during purging								
MW-2	06-06-95	107.43	17.43	ND	90.00	1,200	60	21	35	140	--	--		
MW-2	08-24-95	107.28	17.22	ND	90.06	Not sampled: well was inaccessible due to construction								
MW-2	11-16-95	107.28	17.36	ND	89.92	360	45	1.3	7.1	7.5	210	--		
MW-2	02-27-96	107.28	14.82	ND	92.46	8,900	1,400	980	150	550	940	--		
MW-2	05-15-96	107.28	17.40	ND	89.88	480	82	48	8	48	87	--		

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-2	08-14-96	107.28	17.00	ND	90.28	130	22	4	2	9	120	--		
MW-2	11-11-96	107.28	17.55	ND	89.73	1,200	150	120	21	160	110	--		
MW-2	03-25-97	107.28	17.32	ND	89.96	670	23	58	13	120	28	--		
MW-2	05-15-97	107.28	17.61	ND	89.67	<50	<0.5	<0.5	<0.5	<0.5	23	--		
MW-2	10-26-97	107.28	18.43	ND	88.85	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-2	11-10-97	107.28	17.84	ND	89.44	<100	<1	<1	<1	1	74	--		
MW-2	02-13-98	107.28	12.75	ND	94.53	220	9.5	3.9	3.7	48	84	--		
MW-2	05-12-98	107.28	17.02	ND	90.26	3,900	210	280	86	910	35	--		
MW-2	07-28-98	107.28	17.30	ND	89.98	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-2	10-28-98	107.28	17.80	ND	89.48	170	17	<0.5	1.7	5.0	24	--		
MW-2	02-12-99	107.28	15.55	ND	91.73	12,000	620	95	490	2,200	270	--		
MW-2	06-03-99	107.28	17.31	ND	89.97	<50	<0.5	<0.5	<0.5	1.1	8	--	2.53	NP
MW-2	10-26-99	107.28	16.58	ND	90.70	<50	1.0	<0.5	<0.5	3	<3	--	8.17	NP
MW-2	02-02-00	107.28	15.30	ND	91.98	<50	<0.5	<0.5	<0.5	<1	<3	--	9.1	NP
MW-3	03-20-95	107.77	15.60	ND	92.17	29,000	880	190	760	2,000	--	16		
MW-3	06-06-95	107.77	17.54	ND	90.23	22,000	450	54	380	1,300	--	7.1		
MW-3	08-24-95	107.61	17.42	ND	90.19	Not sampled: well was inaccessible due to construction								
MW-3	11-16-95	107.61	17.58	ND	90.03	13,000	210	<20	320	1,000	790	8.3		
MW-3	02-27-96	107.61	15.03	ND	92.58	9,700	94	15	290	720	430	10		
MW-3	05-15-96	107.61	17.35	ND	90.26	5,600	66	12	37	67	230	--		
MW-3	08-14-96	107.61	17.10	ND	90.51	830	17	<1*	8	7	110	--		
MW-3	11-11-96	107.61	17.73	ND	89.88	500	28	3	12	13	150	--		
MW-3	03-25-97	107.61	17.99	ND	89.62	<50	<0.5	<0.5	<0.5	<0.5	94	--		
MW-3	05-15-97	107.61	17.84	ND	89.77	<50	<0.5	<0.5	<0.5	<0.5	65	--		
MW-3	10-26-97	107.61	18.50	ND	89.11	220	4	<1	<1	<1	160	--		
MW-3	11-10-97	107.61	18.00	ND	89.61	350	8	<2	3	3	230	--		

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-3	02-13-98	107.61	13.00	ND	94.61	<50	1.3	<0.5	<0.5	1	21	--		
MW-3	05-12-98	107.61	17.20	ND	90.41	120	<0.5	<0.5	<0.5	<0.9	71	--		
MW-3	07-28-98	107.61	17.46	ND	90.15	<50	1.4	<0.5	<0.5	<0.5	52	--		
MW-3	10-28-98	107.61	18.00	ND	89.61	170	<0.5	<0.5	<0.5	0.7	35	--		
MW-3	02-12-99	107.61	15.76	ND	91.85	120	2.0	0.6	<0.5	1.3	37	--		
MW-3	06-03-99	107.61	Well inaccessible: Surveyed well VW-1 as an alternative ----------											
MW-3	10-26-99	107.61	16.69	ND	90.92	630	14	0.7	13	2	38	--	1.24	NP
MW-3	02-02-00	107.61	15.65	ND	91.96	290	18	0.5	45	56	46	--	0.4	NP
MW-4	03-20-95	106.58	13.85	ND	92.73	88	1	<0.5	<0.5	0.7	--	--		
MW-4	06-06-95	106.58	15.70	ND	90.88	<50	<0.5	<0.5	<0.5	<0.5	--	--		
MW-4	08-24-95	106.71	15.86	ND	90.85	Not sampled: well was inaccessible due to construction								
MW-4	11-16-95	106.71	16.10	ND	90.61	<50	<0.5	<0.5	<0.5	<0.5	6	--		
MW-4	02-27-96	106.71	13.72	ND	92.99	<50	<0.5	<0.5	<0.5	<0.5	10	--		
MW-4	05-15-96	106.71	15.90	ND	90.81	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	08-14-96	106.71	15.68	ND	91.03	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-4	11-11-96	106.71	16.19	ND	90.52	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	03-25-97	106.71	16.10	ND	90.61	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-4	05-15-97	106.71	16.38	ND	90.33	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	10-26-97	106.71	17.78	ND	88.93	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-4	11-10-97	106.71	16.43	ND	90.28	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	02-13-98	106.71	13.05	ND	93.66	<50	1.3	0.7	<0.5	2.3	19	--		
MW-4	05-12-98	106.71	15.69	ND	91.02	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	07-28-98	106.71	15.93	ND	90.78	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-4	10-28-98	106.71	16.40	ND	90.31	Not sampled: well sampled semi-annually, during the first and third quarter								
MW-4	02-12-99	106.71	14.13	ND	92.58	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-4	06-03-99	106.71	16.00	ND	90.71	Not sampled: well sampled semi-annually, during the first and third quarter								

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-4	10-26-99	106.71	15.76	ND	90.95	Not sampled: well sampled semi-annually, during the first and third qtr.							1.72	
MW-4	02-02-00	106.71	14.32	ND	92.39	<50	<0.5	<0.5	<0.5	<1	<3	--	0.7	NP
MW-5	03-20-95	106.68	14.92	ND	91.76	21,000	6,900	450	800	1,300	--	--		
MW-5	06-06-95	106.68	16.61	ND	90.07	6,500	1,700	<20	120	69	--	--		
MW-5	08-24-95	106.60	16.47	ND	90.13	Not sampled: well was inaccessible due to construction								
MW-5	11-16-95	106.60	16.69	ND	89.91	1,800	470	<5	17	5	1,000	--		
MW-5	02-27-96	106.60	14.35	ND	92.25	10,000	1,000	71	690	1,000	440/450*	--		
MW-5	05-15-96	106.60	16.58	ND	90.02	3,400	350	6	72	20	220	--		
MW-5	08-14-96	106.60	17.26	ND	89.34	2,100	130	2.7	47	4.7	220	--		
MW-5	11-11-96	106.60	16.62	ND	89.98	1,200	31	1	8	2	130	--		
MW-5	03-25-97	106.60	16.38	ND	90.22	<50	<0.5	<0.5	<0.5	<0.5	5	--		
MW-5	05-15-97	106.60	16.54	ND	90.06	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-5	10-26-97	106.60	17.60	ND	89.00	<50	<0.5	<0.5	<0.5	<0.5	7	--		
MW-5	11-10-97	106.60	16.78	ND	89.82	<50	<0.5	<0.5	<0.5	<0.5	24	--		
MW-5	02-13-98	106.60	12.21	ND	94.39	11,200	51	<10	<10	<10	2,000	--		
MW-5	05-12-98	106.60	NR	ND	NR	Not sampled: well inaccessible								
MW-5	07-28-98	106.60	16.47	ND	90.13	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-5	10-28-98	106.60	16.80	ND	89.80	<50	0.8	<0.5	<0.5	<0.5	99	--		
MW-5	02-12-99	106.60	14.88	ND	91.72	<1,000	<10	<10	<10	<10	1,100	--		
MW-5	06-03-99	106.60	16.65	ND	89.95	290	10	<0.5	<0.5	0.6	200	--	2.45	NP
MW-5	10-26-99	106.60	16.10	ND	90.50	<50	<0.5	<0.5	<0.5	<1	11	--	NM	NP
MW-5	02-02-00	106.60	14.65	ND	91.95	<50	<0.5	<0.5	<0.5	<1	39	--	8.6	NP
MW-6	03-20-95	105.16	12.13	ND	93.03	<50	<0.5	<0.5	<0.5	<0.5	--	--		
MW-6	06-06-95	105.16	13.95	ND	91.21	<50	<0.5	<0.5	<0.5	<0.5	--	--		
MW-6	08-24-95	105.13	14.07	ND	91.06	<50	<0.5	<0.5	<0.5	<0.5	<3	--		

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ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-6	11-16-95	105.13	14.34	ND	90.79	<60	<0.5	<0.5	<0.5	<0.5	--	--		
MW-6	02-27-96	105.13	12.00	ND	93.13	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-6	05-15-96	105.13	14.10	ND	91.03	Not sampled: well sampled annually, during the first quarter								
MW-6	08-14-96	105.13	13.70	ND	91.43	Not sampled: well sampled annually, during the first quarter								
MW-6	11-11-96	105.13	14.11	ND	91.02	Not sampled: well sampled annually, during the first quarter								
MW-6	03-25-97	105.13	14.15	ND	90.98	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-6	05-15-97	105.13	14.44	ND	90.69	Not sampled: well sampled annually, during the first quarter								
MW-6	10-26-97	105.13	16.02	ND	89.11	Not sampled: well sampled annually, during the first quarter								
MW-6	11-10-97	105.13	14.52	ND	90.61	Not sampled: well sampled annually, during the first quarter								
MW-6	02-13-98	105.13	10.06	ND	95.07	<50	<0.5	<0.5	<0.5	<0.5	8	--		
MW-6	05-12-98	105.13	13.75	ND	91.38	Not sampled: well sampled annually, during the first quarter								
MW-6	07-28-98	105.13	14.06	ND	91.07	Not sampled: well sampled annually, during the first quarter								
MW-6	10-28-98	105.13	14.71	ND	90.42	Not sampled: well sampled annually, during the first quarter								
MW-6	02-12-99	105.13	12.22	ND	92.91	<100	<1	<1	<1	<1	110	--		
MW-6	06-03-99	105.13	13.95	ND	91.18	Not sampled: well sampled annually, during the first quarter								
MW-6	10-26-99	105.13	14.06	ND	91.07	Not sampled: well sampled annually, during the first quarter							3.94	
MW-6	02-02-00	105.13	12.03	ND	93.10	<50	<0.5	<0.5	<0.5	<1	<3	--	1.2	NP
MW-7	03-20-95	107.08	12.32	ND	94.76	<50	<0.5	<0.5	<0.5	<0.5	--	--		
MW-7	06-06-95	107.08	14.59	ND	92.49	Not sampled: well sampled semi-annually, during the first and third quarters								
MW-7	08-24-95	107.05	14.64	ND	92.41	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-7	11-16-95	107.05	15.30	ND	91.75	Not sampled: well sampled semi-annually, during the first and third quarters								
MW-7	02-27-96	107.05	12.24	ND	94.81	<50	<0.5	<0.5	<0.5	<0.5	<3	--		
MW-7	05-15-96	107.05	14.65	ND	92.40	Not sampled: well sampled annually, during the first quarter								
MW-7	08-14-96	107.05	14.35	ND	92.70	Not sampled: well sampled annually, during the first quarter								
MW-7	11-11-96	107.05	14.92	ND	92.13	Not sampled: well sampled annually, during the first quarter								
MW-7	03-25-97	107.05	14.80	ND	92.25	<50	<0.5	<0.5	<0.5	<0.5	<3	--		

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Historical Groundwater Elevation and Analytical Data
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1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Well Number	Date Gauged/ Sampled	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	FP Thickness (feet)	Groundwater Elevation (ft-MSL)	TPH Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TRPH (mg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
MW-7	05-15-97	107.05	15.27	ND	91.78	Not sampled: well sampled annually, during the first quarter								
MW-7	10-26-97	107.05	16.68	ND	90.37	Not sampled: well sampled annually, during the first quarter								
MW-7	11-10-97	107.05	15.37	ND	91.68	Not sampled: well sampled annually, during the first quarter								
MW-7	02-13-98	107.05	10.80	ND	96.25	<50	<0.5	<0.5	<0.5	<0.5	<3	- -		
MW-7	05-12-98	107.05	14.32	ND	92.73	Not sampled: well sampled annually, during the first quarter								
MW-7	07-28-98	107.05	14.79	ND	92.26	Not sampled: well sampled annually, during the first quarter								
MW-7	10-28-98	107.05	15.57	ND	91.48	Not sampled: well sampled annually, during the first quarter								
MW-7	02-12-99	107.05	12.46	ND	94.59	<50	<0.5	<0.5	<0.5	<0.5	<3	- -		
MW-7	06-03-99	107.05	14.53	ND	92.52	Not sampled: well sampled annually, during the first quarter								
MW-7	10-26-99	107.05	14.74	ND	92.31	Not sampled: well sampled annually, during the first quarter							1.97	
MW-7	02-02-00	107.05	12.57	ND	94.48	<50	<0.5	<0.5	<0.5	<1	<3	- -	0.7	NP
VW-1	06-03-99	NR	17.51	ND	NR	420	2.3	0.6	2.0	2.2	74	- -	1.28	P

ft-MSL: elevation in feet, relative to mean sea level
TPH: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
BTEX: Benzene, toluene, ethylbenzene, total xylenes by EPA method 8021B. (EPA method 8020 prior to 10/26/99)
MTBE: Methyl tert-butyl ether by EPA method 8021B. (EPA method 8020 prior to 10/26/99).
TRPH: total recoverable petroleum hydrocarbons
µg/L: micrograms per liter
mg/L: milligrams per liter
NR: not reported; data not available
ND: none detected
#: floating product entered the well during purging
- -: not analyzed or not applicable
*: confirmed by EPA 8240
**: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 6148, Oakland, California,* (EMCON, March 4, 1996).

Table 2
Groundwater Flow Direction and Gradient

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date Measured	Average Flow Direction	Average Hydraulic Gradient
03-20-95	Southwest	0.02
06-06-95	Southwest	0.016
08-24-95	Southwest	0.014
11-16-95	Southwest	0.012
02-27-96	Southwest	0.016
05-15-96	Southwest	0.015
08-14-96	Southwest	0.021
11-11-96	Southwest	0.015
03-25-97	South-Southwest	0.018
05-15-97	South-Southwest	0.014
10-26-97	Southwest	0.009
11-10-97	South-Southwest	0.014
02-13-98	South-Southwest	0.012
05-12-98	Southwest	0.02
07-28-98	Southwest	0.02
10-28-98	Southwest	0.01
02-12-99	Southwest	0.02
06-03-99	Southwest	0.02
10-26-99	Southwest	0.01
02-02-00	**South-Southwest**	**0.017**

Table 3
Soil Vapor Extraction System
Operational Uptime Information (1998 - present)

Arco Service Station No. 6148
5131 Shattuck Avenue, Oakland, California

Date	Meter (hrs.)	Operation[1] (hrs.)	Period Operation				Cumulative Operation			
			Total (days)	Uptime (days)	Downtime (days)	Uptime (%)	Total (days)	Uptime (days)	Downtime (days)	Uptime (%)
01/01/98		2697.50					827	112.4	714.6	14%
01/27/98	2702.01	2697.50	26	0.0	26.0	0%	853	112.4	740.6	13%
02/10/98	2704.73	2700.22	14	0.1	13.9	1%	867	112.5	754.5	13%
02/16/98	2704.73	2700.22	6	0.0	6.0	0%	873	112.5	760.5	13%
03/23/98	2704.73	2700.22	35	0.0	35.0	0%	908	112.5	795.5	12%
05/06/98	2704.73	2700.22	44	0.0	44.0	0%	952	112.5	839.5	12%
05/13/98	2704.73	2700.22	7	0.0	7.0	0%	959	112.5	846.5	12%
06/22/98	2704.73	2700.22	40	0.0	40.0	0%	999	112.5	886.5	11%
08/20/98	2704.73	2700.22	59	0.0	59.0	0%	1058	112.5	945.5	11%
08/27/98	2707.40	2702.89	7	0.1	6.9	2%	1065	112.6	952.4	11%
09/01/98	2709.55	2705.04	5	0.1	4.9	2%	1070	112.7	957.3	11%
09/02/98	2711.93	2707.42	1	0.1	0.9	10%	1071	112.8	958.2	11%
11/10/98	2712.40	2707.89	69	0.0	69.0	0%	1140	112.8	1027.2	10%
12/18/98	2714.81	2710.3	38	0.1	37.9	0%	1178	112.9	1065.1	10%
01/15/99	2714.18	2709.67	28	0.0	28.0	0%	1206	112.9	1093.1	9%
04/27/99	2717.29	2712.78	102	0.1	101.9	0%	1308	113.0	1195.0	9%
05/26/99	2717.29	2712.78	29	0.0	29.0	0%	1337	113.0	1224.0	8%
07/30/99	2718.05	2713.54	65	0.0	65.0	0%	1402	113.1	1288.9	8%
08/11/99	2718.05	2713.54	12	0.0	12.0	0%	1414	113.1	1300.9	8%
08/25/99	2718.05	2713.54	14	0.0	14.0	0%	1428	113.1	1314.9	8%
09/09/99	2718.45	2713.94	15	0.0	15.0	0%	1443	113.1	1329.9	8%
09/21/99	2720.63	2716.12	12	0.1	11.9	1%	1455	113.2	1341.8	8%
10/06/99	2723.11	2718.6	15	0.1	14.9	1%	1470	113.3	1356.7	8%
10/20/99	2725.62	2721.11	14	0.1	13.9	1%	1484	113.4	1370.6	8%

Table 3
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Operational Uptime Information (1998 - present)

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Date	Meter (hrs.)	Operation[1] (hrs.)	Period Operation				Cumulative Operation			
			Total (days)	Uptime (days)	Downtime (days)	Uptime (%)	Total (days)	Uptime (days)	Downtime (days)	Uptime (%)
11/03/99	2728.21	2723.7	14	0.1	13.9	1%	1498	113.5	1384.5	8%
11/18/99	2730.66	2726.15	15	0.1	14.9	1%	1513	113.6	1399.4	8%
12/02/99	2732.80	2728.29	14	0.1	13.9	1%	1527	113.7	1413.3	7%
12/16/99	2735.22	2730.71	14	0.1	13.9	1%	1541	113.8	1427.2	7%
01/06/00	2735.22	2730.71	21	0.0	21.0	0%	1562	113.8	1448.2	7%
01/19/00	2737.83	2733.32	13	0.1	12.9	1%	1575	113.9	1461.1	7%
02/02/00	2740.27	2735.76	14	0.1	13.9	1%	1589	114.0	1475.0	7%
03/23/00	2740.77	2736.26	50	0.0	50.0	0%	1639	114.0	1525.0	7%

[1] Operational data through 01/01/98 from First Quarter 1998 Quarterly Monitoring Report

Table 4
Soil Vapor Extraction System
Flow Rates and Analytical Results of Air Samples (1998 - present)

Arco Service Station No. 6148
5131 Shattuck Avenue, Oakland, California

Date	Sample Location	Vacuum (in. H20)	Velocity (fpm)	Flowrate[1] (scfm)	Analyses (ppmv)					
					TPHG	Benzene	Toulene	Ethylbenzene	Xylene	MTBE
01/27/98	Influent	21	1100	51	39	<0.1	0.7	0.1	<0.2	
	Effluent[2]		1100	83.1	<5	<0.1	<0.1	<0.1	<0.2	
08/20/98	Influent	10	1100	53	610	<2	<2	<2	<4	
	Effluent		1100	83.1	7	<0.1	<0.1	<0.1	<0.2	
11/10/98	Influent	Not Recorded			830	<2	14	<2	<4	
	Effluent	Not Recorded			20	<0.1	0.2	<0.1	<0.2	
01/15/99	Influent	21.8	1500	70	340	3	5	<2	<4	44
	Effluent		900	63.9	15	<0.1	0.3	<0.1	0.2	<0.8
09/09/99	Influent	10	1400	67	140	0.3	1	0.2	0.5	6.3
	Effluent		975	69.2	<5	<0.1	<0.1	<0.1	<0.2	<0.8
10/06/99	Influent	8	1400	67	220	<0.5	1.4	0.65	3	11
	Effluent		975	69.2	7.1	<0.1	<0.1	<0.1	<0.2	<0.8
11/03/99	Influent	8	1200	58	44	0.3	3.1	0.1	0.6	21
	Effluent		1050	74.5	<5	<0.1	<0.1	<0.1	<0.2	<0.8
12/02/99	Influent	10	1000	48	24	<0.1	0.1	<0.1	<0.2	<0.8
	Effluent		900	64.4	<5	<0.1	<0.1	<0.1	<0.2	<0.8
01/06/00	Influent	6.2	1000	48	270	0.3	0.8	0.6	0.6	6
	Effluent		925	66.1	22.0	<0.1	<0.1	<0.1	<0.2	1.6

Table 4
Soil Vapor Extraction System
Flow Rates and Analytical Results of Air Samples (1998 - present)

Arco Service Station No. 6148
5131 Shattuck Avenue, Oakland, California

Date	Sample Location	Vacuum (in. H20)	Velocity (fpm)	Flowrate[1] (scfm)	Analyses (ppmv)					
					TPHG	Benzene	Toulene	Ethylbenzene	Xylene	MTBE
02/02/00	Influent	12	850	40	<5	<0.1	0.5	<0.1	0.2	
	Effluent		900	64.4	<5	<0.1	0.3	<0.1	<0.2	

[1] Influent Flow Rate, cfm = (Velocity, fpm)(Influent Pipe Area, sq. ft.)(406.8 in.H20 - Vacuum, in.H20) / (406.8 in.H20)
where Influent Pipe Diameter = 3"
Effluent Flow Rate, cfm = (Velocity, fpm)(Effluent Pipe Area, sq.ft.)[(460° R + 77° F)/(460° R + Vapor Temp F)]
where Effluent (after blower) Pipe Diameter = 4"

[2] Dilution air only

Table 5
Soil Vapor Extraction System
Extraction Rates, Emission Rates, Destruction Efficiency, and Mass Removed
(1998 - present)

Arco Service Station No. 6148
5131 Shattuck Avenue, Oakland, California

Date End	Extraction Rate from Wellfield[1]		Emission Rate to Atmosphere[2]		Destruction Efficiency[3]		Period Removal[4]		Cumulative Removal	
	TPHG (lbs/day)	Benzene (lbs/day)	TPHG (lbs/day)	Benzene (lbs/day)	TPHG (%)	Benzene (%)	TPHG (lbs)	Benzene (lbs)	TPHG (lbs)	Benzene (lbs)
01/01/98[5]									1885.6	0
01/28/98	0.7335	0	<0.1527	<0.0024	Waived		0.0831	0.0000	1885.7	0.0000
08/20/98	11.7994	0	<0.2137	<0.0024	Waived		4.956	0.0000	1890.6	0.0000
11/10/98	Not Calculated		Not Calculated		Not Calculated		Not Calculated		Not Calculated	
01/15/99	8.702	0.0768	0.3520	<0.0018	Waived		1.175	0.0104	1891.8	0.0104
09/09/99	3.447	0.0074	<0.1271	<0.0020	Waived		0.3705	0.0008	1892.2	0.0112
10/06/99	5.443	0	0.1805	<0.0020	Waived		1.132	0.0000	1893.3	0.0112
11/03/99	0.933	0.0064	<0.1369	<0.0021	Waived		0.1960	0.0013	1893.5	0.0125
12/02/99	0.422	0	<0.1182	<0.0018	Waived		0.0802	0.0000	1893.6	0.0125
01/06/00	4.793[6]	0.0053	<0.5347	<0.0019	Waived		0.5213	0.0006	1894.1	0.0131
02/02/00	0	0	<0.1182	<0.0018	Waived		0.0000	0.0000	1894.1	0.0131

[1] Extraction Rate, lbs/day = (Influent Flow, cfm)(Influent conc., ppmv)(g/mole)(60 min/hr)(24 hr/day)(28.3 L/cf) / (10^6)(24.45 moles/L)(453.6 g/lb)
where TPHG = 100 g/mole and Benzene = 78.1 g/mole; Influent conc. = 0, if reported as non-detect

[2] Emission Rate, lbs/day = (Effluent Flow, cfm)(Effluent conc., ppmv)(g/mole)(60 min/hr)(24 hr/day)(28.3 L/cf) / (10^6)(24.45 moles/L)(453.6 g/lb)
where TPHG = 100 g/mole and Benzene = 78.1 g/mole; Effluent conc. = Method Reporting Limit, if reported as non-detect

[3] Destruction Efficiency, % = (Extraction Rate - Emission Rate)(100) / (Extraction Rate); "Waived"= if TPHG emissions <1.0 lbs/day and Benzene emissions <0.02 lbs/day

[4] Period Removal, lbs = (Extraction Rate)(Uptime)

[5] Operational data through 1/1/98 from First Quarter 1998 Quarterly Monitoring Report

[6] Value represents 24 hour per day operation. Refer to Period Removal column for actual quantity

APPPENDIX C

Groundwater Sampling Information

Delta Environmental Consultants, Inc.
3164 Gold Camp Drive, Suite 200
Rancho Cordova, California 95670
Direct: (916) 638-2085
Fax: (916) 638-8385

Site Contact & Phone Number: ______________________

Arco Site Address:	**5131 Shattuck Avenue**
	Oakland, California
Arco Project Manager:	**Paul Supple**
Site Sampled By:	**Stratus**
Arco Site Number:	**Arco 6148**
Delta Project No.:	**D000-315**
Delta Project PM:	**Steve Meeks**
Date Sampled:	**12/22/00**

Water Level Data						**Purge Volume Calculations**					**Sampling Analytes**					**Sample Record**		
Well ID	Time	Depth to Water (feet)	Top of Screen Interval (feet)	Total Depth of Well (feet)	Check if Purge Not Required	Casing Water Column **(A)**	Well Diameter (inches)	Multiplier Value **(B)**	Three Casing Volumes (gallons)	Actual Water Purged (gallons)	BTEX (8020) VOA	TPH-g (8015M) VOA	MTBE (8020) VOA	**Other** ______ ______ ______	Dissolved Oxygen (mg/L)	Sample Freqency (A, S, Q)	Sample I.D.	Sample Time
MW-1	10:44	**16.87**	**11.5**	**25.7**	☐	8.83	**4 inch**	**2.0**			☑	☑	☑	☐	0.90	Q/5,8,11	**MW-1**	11:55
MW-2	10:48	**16.58**	**12.0**	**25.8**	☐	9.22	**4 inch**	**2.0**	17.0	17	☑	☑	☑	☐	5.20	Q/5,8,11	**MW-2**	11:41
MW-3	10:46	**16.85**	**10.0**	**25.9**	☐	9.05	**4 inch**	**2.0**	18.0	18	☑	☑	☑	☐	5.90	Q/5,8,11	**MW-3**	11:36
MW-4	10:41	**15.37**	**13.0**	**26.0**	☐	10.63	**4 inch**	**2.0**			☐	☐	☐	☐		S/2,8		
MW-5	10:50	**15.58**	**12.0**	**25.0**	☐	9.42	**4 inch**	**2.0**	15.0	18	☑	☑	☑	☐	5.70	Q/5,8,11	**MW-5**	11:48
MW-6	Covered		**14.0**	**26.6**	☐		**4 inch**	**2.0**			☐	☐	☐	☐		A/2		
MW-7	10:39	**13.21**	**14.0**	**27.0**	☐	13.79	**4 inch**	**2.0**			☐	☐	☐	☐		A/2		
					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				
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					☐						☐	☐	☐	☐				
					☐						☐	☐	☐	☐				

(A)-Casing Water Column: Depth to Bottom - Depth to Water **(B)-Multiplier Values:** (2" Well: 0.5) (4" Well: 2.0) (6" Well: 4.4)

Sampling Sequence: **Annual:** MW-6, MW-7; **Semi-Annual:** MW-4; **Quarterly:** MW-1, MW-3, MW-2, MW-5

Sampling Notes: List depth of Sample on C.O.C. [i.e. MW-1(30)]. Make Sure to Note on C.O.C. "Provide Lowest Reporting Limit Available." Original Copies of Field Sampling Sheets are Located in Project File

If the water level is below the top of the screen, take a grab sample and check box for NO PURGE (NP). If the water level is above the screen, purge as normal.

Delta Environmental Consultants, Inc.
3164 Gold Camp Drive, Suite 200
Rancho Cordova, California 95670
Direct: (916) 638-2085
Fax: (916) 638-8385

Arco Site Address: **5131 Shattuck Avenue**, **Oakland, California**
Arco Site Number: **Arco 6148**
Delta Project No.: **D000-315**
Arco Project Manager: **Paul Supple**
Delta Project PM: **Steve Meeks**
Site Contact & Phone Number: _____
Site Sampled By: **Stratus**
Date Sampled: **12/22/00**

Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-1		20.0	6.30	450													
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-2		21.1	6.80	609	0												
		21.8	6.70	507	17												
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-3		16.9	6.70	1,011	0												
		18.3	6.90	666	18												
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-4																	
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-5		22.8	6.50	525	0												
		21.8	6.70	473	18												
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-6																	
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons	Well ID	Time	Temp °C	pH Units	Sp. Cond.	Gallons
MW-7																	

Notes: NP = NO PURGE

Original Copies of Field Sampling Sheets are Located in Project File

APPENDIX D

Certified Analytical Reports
And
Chain-of-Custody Documentation

Sequoia Analytical

819 Striker Avenue, Suite 8
Sacramento, CA 95834
(916) 921-9600
FAX (916) 921-0100
www.sequoialabs.com

RECEIVED
JAN 11 2001
By

January 08 , 2001

Steven Meeks
Delta Environmental Consultants(Rancho Cordova
3164 Gold Camp Drive Ste. 200
Rancho Cordova, CA 95670
RE: ARCO 6148, Oakland, CA / S012362

Enclosed are the results of analyses for samples received by the laboratory on 12/22/00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sandra R. Hanson
Client Services Representative

Lito Diaz
Laboratory Director

CA ELAP Certificate Number 1624

Sequoia Analytical

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(916) 921-9600
FAX (916) 921-0100
www.sequoialabs.com

Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1-16	S012362-01	Water	12/22/00 11:55	12/22/00 14:50
MW-2-16	S012362-02	Water	12/22/00 11:41	12/22/00 14:50
MW-3-16	S012362-03	Water	12/22/00 11:36	12/22/00 14:50
MW-5-15	S012362-04	Water	12/22/00 11:48	12/22/00 14:50

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FAX (916) 921-0100
www.sequoialabs.com

Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1-16 (S012362-01) Water Sampled: 12/22/00 11:55 Received: 12/22/00 14:50									
Purgeable Hydrocarbons	**186**	50.0	ug/l	1	1010046	01/04/01	01/04/01	DHS LUFT	P-02
Benzene	**5.38**	0.500	"	"	"	"	"	"	
Toluene	**0.522**	0.500	"	"	"	"	"	"	
Ethylbenzene	**9.52**	0.500	"	"	"	"	"	"	
Xylenes (total)	**30.2**	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	**8.91**	2.50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*109 %*	*60-140*		"	"	"	"	
MW-2-16 (S012362-02) Water Sampled: 12/22/00 11:41 Received: 12/22/00 14:50									
Purgeable Hydrocarbons	**2140**	1000	ug/l	20	1010036	01/05/01	01/05/01	DHS LUFT	P-02
Benzene	**174**	10.0	"	"	"	"	"	"	
Toluene	**60.2**	10.0	"	"	"	"	"	"	
Ethylbenzene	**118**	10.0	"	"	"	"	"	"	
Xylenes (total)	**438**	10.0	"	"	"	"	"	"	
Methyl tert-butyl ether	**123**	50.0	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*85.3 %*	*60-140*		"	"	"	"	
MW-3-16 (S012362-03) Water Sampled: 12/22/00 11:36 Received: 12/22/00 14:50									
Purgeable Hydrocarbons	**227**	50.0	ug/l	1	1010036	01/05/01	01/05/01	DHS LUFT	P-04
Benzene	**4.73**	0.500	"	"	"	"	"	"	
Toluene	**1.06**	0.500	"	"	"	"	"	"	
Ethylbenzene	**2.58**	0.500	"	"	"	"	"	"	
Xylenes (total)	**5.22**	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	**27.3**	2.50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*97.9 %*	*60-140*		"	"	"	"	

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Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-5-15 (S012362-04) Water	**Sampled: 12/22/00 11:48**	**Received: 12/22/00 14:50**							
Purgeable Hydrocarbons	**341**	50.0	ug/l	1	1010046	01/04/01	01/04/01	DHS LUFT	P-02
Benzene	**11.5**	0.500	"	"	"	"	"	"	
Toluene	**2.53**	0.500	"	"	"	"	"	"	
Ethylbenzene	**4.02**	0.500	"	"	"	"	"	"	
Xylenes (total)	**6.25**	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	**146**	2.50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*110 %*		*60-140*	"	"	"	"	

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Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT - Quality Control

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1010036 - EPA 5030B (P/T)										
Blank (1010036-BLK1)				Prepared & Analyzed: 01/05/01						
Purgeable Hydrocarbons	ND	50.0	ug/l							
Benzene	ND	0.500	"							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	0.500	"							
Methyl tert-butyl ether	ND	2.50	"							
Surrogate: a,a,a-Trifluorotoluene	*10.0*		"	*10.0*		*100*	*60-140*			
LCS (1010036-BS1)				Prepared & Analyzed: 01/05/01						
Benzene	10.2	0.500	ug/l	10.0		102	70-130			
Toluene	10.1	0.500	"	10.0		101	70-130			
Ethylbenzene	9.95	0.500	"	10.0		99.5	70-130			
Xylenes (total)	30.7	0.500	"	30 0		102	70-130			
Methyl tert-butyl ether	10.3	2.50	"	10.0		103	70-130			
Surrogate: a,a,a-Trifluorotoluene	*9.58*		"	*10 0*		*95.8*	*60-140*			
Matrix Spike (1010036-MS1)		**Source: S012374-05**		Prepared & Analyzed: 01/05/01						
Benzene	16 0	0.500	ug/l	10 0	3.83	122	60-140			
Toluene	10.8	0.500	"	10.0	ND	108	60-140			
Ethylbenzene	10.9	0.500	"	10 0	ND	109	60-140			
Xylenes (total)	33.1	0.500	"	30.0	0.620	108	60-140			
Methyl tert-butyl ether	331	2.50	"	10.0		NR	60-140			Q-03
Surrogate: a,a,a-Trifluorotoluene	*10.3*		"	*10.0*		*103*	*60-140*			
Matrix Spike Dup (1010036-MSD1)		**Source: S012374-05**		Prepared & Analyzed: 01/05/01						
Benzene	15.9	0.500	ug/l	10.0	3.83	121	60-140	0.627	25	
Toluene	10.6	0.500	"	10.0	ND	106	60-140	1.87	25	
Ethylbenzene	10.7	0 500	"	10.0	ND	107	60-140	1.85	25	
Xylenes (total)	32.6	0.500	"	30.0	0 620	107	60-140	1.52	25	
Methyl tert-butyl ether	335	2.50	"	10.0		NR	60-140	1.20	25	Q-03
Surrogate: a,a,a-Trifluorotoluene	*9.26*		"	*10.0*		*92.6*	*60-140*			

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Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT - Quality Control

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1010046 - EPA 5030B (P/T)										
Blank (1010046-BLK1)				Prepared & Analyzed: 01/04/01						
Purgeable Hydrocarbons	ND	50.0	ug/l							
Benzene	ND	0.500	"							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	0.500	"							
Methyl tert-butyl ether	ND	2.50	"							
Surrogate: a,a,a-Trifluorotoluene	*10.8*		"	*10.0*		*108*	*60-140*			
LCS (1010046-BS1)				Prepared & Analyzed: 01/04/01						
Benzene	10.3	0.500	ug/l	10.0		103	70-130			
Toluene	10.8	0.500	"	10.0		108	70-130			
Ethylbenzene	11.2	0.500	"	10.0		112	70-130			
Xylenes (total)	29.6	0.500	"	30.0		98 7	70-130			
Methyl tert-butyl ether	11.2	2 50	"	10.0		112	70-130			
Surrogate: a,a,a-Trifluorotoluene	*11.4*		"	*10.0*		*114*	*60-140*			
Matrix Spike (1010046-MS1)		**Source: S012373-04**		Prepared: 01/04/01		Analyzed: 01/05/01				
Benzene	9 72	0.500	ug/l	10.0	ND	97.2	60-140			
Toluene	*10.2*	*0.500*	"	*10.0*	ND	*102*	*60-140*			
Ethylbenzene	10.6	0.500	"	10.0	ND	106	60-140			
Xylenes (total)	28.2	0.500	"	30 0	ND	94.0	60-140			
Methyl tert-butyl ether	10.1	2.50	"	10.0	ND	101	60-140			
Surrogate: a,a,a-Trifluorotoluene	*10.5*		"	*10.0*		*105*	*60-140*			
Matrix Spike Dup (1010046-MSD1)		**Source: S012373-04**		Prepared: 01/04/01		Analyzed: 01/05/01				
Benzene	10.3	0.500	ug/l	10.0	ND	103	60-140	5.79	25	
Toluene	10.7	0.500	"	10.0	ND	107	60-140	4.78	25	
Ethylbenzene	11.0	0.500	"	10.0	ND	110	60-140	3.70	25	
Xylenes (total)	29.1	0.500	"	30.0	ND	97.0	60-140	3.14	25	
Methyl tert-butyl ether	10.7	2.50	"	10.0	ND	107	60-140	5.77	25	
Surrogate: a,a,a-Trifluorotoluene	*10.7*		"	*10.0*		*107*	*60-140*			

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Delta Environmental Consultants(Rancho Cordova	Project: ARCO 6148, Oakland, CA	
3164 Gold Camp Drive Ste. 200	Project Number: N/A	**Reported:**
Rancho Cordova CA, 95670	Project Manager: Steven Meeks	01/08/01 16:39

Notes and Definitions

P-02	Chromatogram Pattern: Weathered Gasoline C6-C12
P-04	Chromatogram Pattern: Weathered Gasoline C6-C12 + Unidentified Hydrocarbons C6-C12
Q-03	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte already present in the sample.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No.

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) Steve Meeks	Laboratory name Sequoia
ARCO engineer Paul Supple as per Jay Johnson 12/27/00 @ 1335	Telephone no. (ARCO)	Telephone no. (Consultant) 916-536-2613	Fax no. (Consultant) 916-638-8385
Consultant name Delta	Address (Consultant) 3164 Gold Camp DR Rancho Cordova		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW1-16		6		X		X	X	12-22-00	1155		X			SO12362-01								
MW2-16		6		X		X	X	)	1141		X							-02				
MW3-16		6		X		X	X	)	1136		X							-03				
MW5-15		6		X		X	X	12-22-00	1148		X							-04				

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Condition of sample:

Temperature received:

Relinquished by sampler	Date 12-22-00	Time 1450	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory — Date 12-22-00 — Time 1450

Turnaround time

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

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