



3164 Gold Camp Drive
Suite 200
Rancho Cordova, CA 95670-6021
U S A
916/638-2085
FAX. 916/638-8385

June 29, 2001

RO # 77

JUL 03 2001

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

Subject: *Quarterly Groundwater Monitoring Report, First Quarter 2001*
Quarterly Soil Vapor Extraction Operation and Performance, First Quarter 2001
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 first quarter 2001 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



TLA (LRP005.315.doc)
Enclosures

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

Date: June 29, 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 first quarter 2001.
2. Visited site to assess status of remediation system.
3. Performed soil sampling during UST, product lines and dispenser upgrade in first quarter 2001.

WORK PROPOSED FOR NEXT QUARTER

1. Prepare and submit quarterly groundwater monitoring report for first quarter 2001.
2. Perform quarterly groundwater monitoring and sampling for second quarter 2001.
3. Repair and evaluate operation of remediation system.

QUARTERLY MONITORING:

Current Phase of Project	<u>Monitoring/Remediation</u>
Frequency of Groundwater Sampling:	<u>Annual (1st Quarter): MW-6, MW-7</u>
	<u>Semi-Annual (1st/3rd Quarter): MW-4</u>
	<u>Quarterly: MW-1, MW-2, MW-3, MW-5</u>
Frequency of Groundwater Monitoring:	<u>Quarterly (Groundwater)</u>
	<u>Monthly (SVE and Air-sparge systems)</u>
Is Free Product (FP) Present On-Site:	<u>No</u>
FP Recovered this Quarter:	<u>N/A</u>
Cumulative FP Recovered to Date:	<u>None</u>
Bulk Soil Removed This Quarter:	<u>None</u>
Bulk Soil Removed to Date:	<u>560 cubic yards of TPH-impacted soil</u>
Current Remediation Techniques:	<u>SVE, Air-Sparge and Air-Bubbling Systems</u>
Approximate Depth to Groundwater:	<u>15.16 ft</u>
Groundwater Gradient:	<u>0.020 South-Southwest</u>
Cumulative TPHg/Benzene Removed:	<u>929 / 7.0 gallons</u>

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-3 and MW-5 at concentrations ranging from 9.1 micrograms per liter ($\mu\text{g/L}$) in MW-1 to 163 $\mu\text{g/L}$ in MW-5.
- TPH was reported in MW-2, MW-3, MW-5 and MW-7 at concentrations ranging from 71.4 $\mu\text{g/L}$ (MW-1) to 8490 $\mu\text{g/L}$ (MW-2).
- Benzene was reported in MW-2, MW-3 and MW-5 at concentrations ranging from 6.29 $\mu\text{g/L}$ (MW-3) to 333 $\mu\text{g/L}$ (MW-2).
- The remediation systems were non-operational during the first quarter 2001 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
	03/26/01		16.6	91.20	<0.5	<0.5	<0.5	<0.5	<50	9.1
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
	03/26/01		16.45	90.83	333	148	495	1,660	8,490	<250
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
	03/26/01		16.79	90.82	6.29	1.58	6.47	12.1	287	24.2
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
	03/26/01		15.05	91.66	<0.5	<0.5	<0.5	<0.5	<50	<2.5
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
	03/26/00		15.45	91.15	12.4	<5.0	<5.0	<5.0	767	163

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-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
	03/26/01		12.59	92.54	<0.5	<0.5	<0.5	<0.5	<50	<2.5
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
	03/26/01		13.18	93.87	<0.5	<0.5	<0.5	<0.5	71.4	<2.5

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

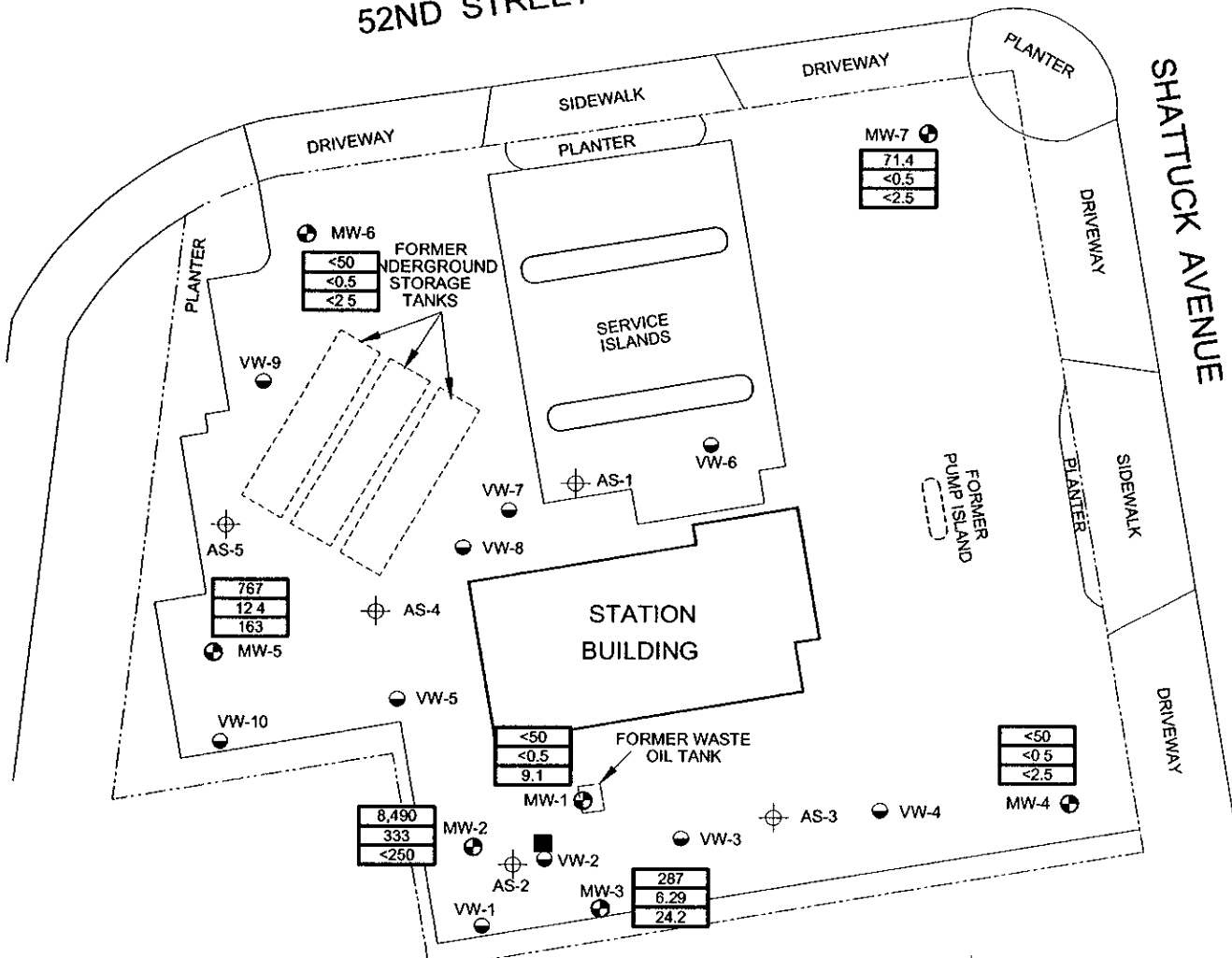
ARCO Service Station No. 6148
5131 Shattuck Avenue
Oakland, California

<u>Date Measured</u>	<u>Average Flow Direction</u>	<u>Average Hydraulic Gradient</u>
06/21/00	South-Southwest	0.02
09/20/00	South-Southwest	0.017
12/22/00	South-Southwest	0.022
03/26/01	South-Southwest	0.02

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

52ND STREET

SHATTUCK AVENUE



North



SCALE

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

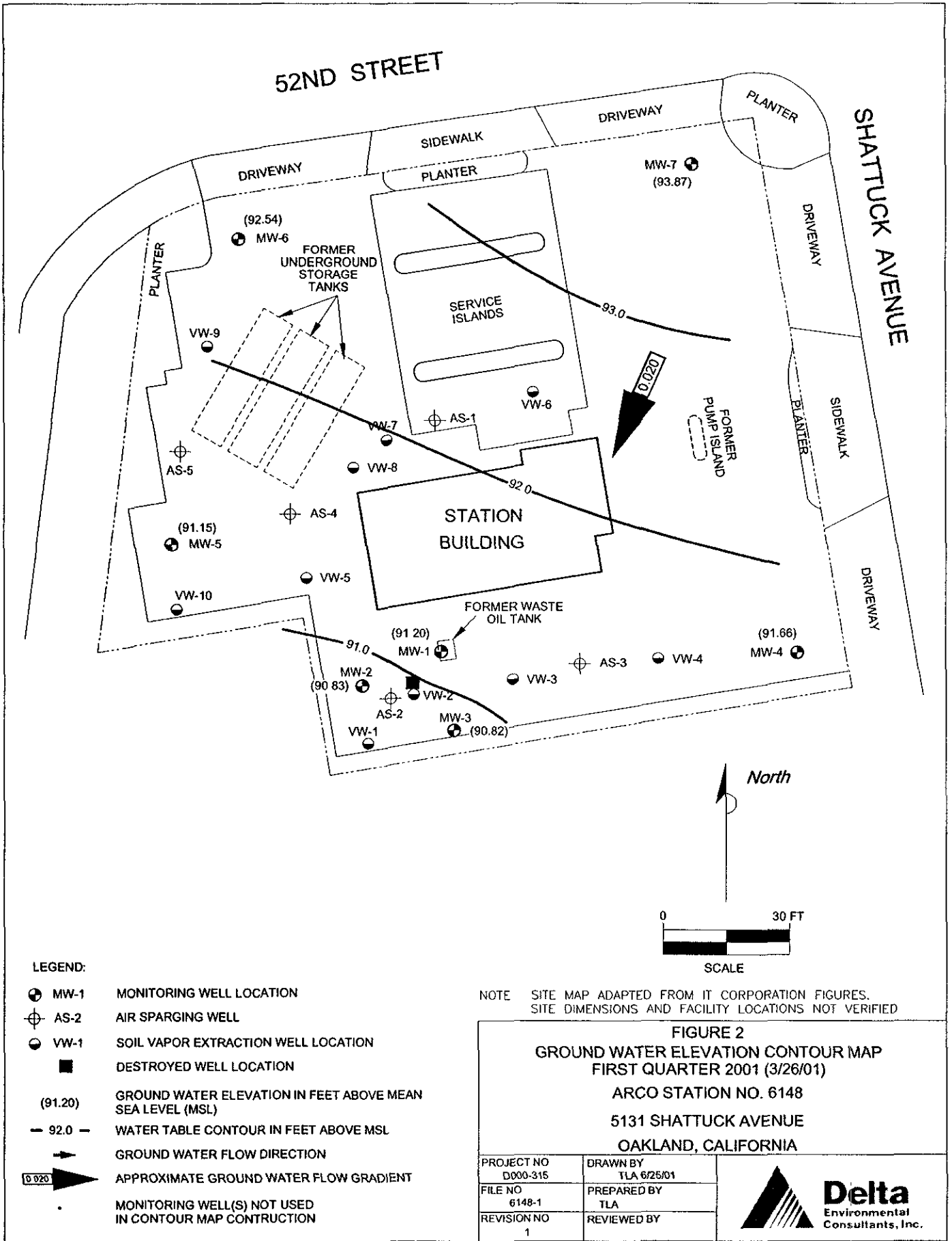
NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES. SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FIGURE 1
GROUND WATER ANALYTICAL SUMMARY
 FIRST QUARTER 2001 (3/26/01)
 ARCO STATION NO. 6148
 5131 SHATTUCK AVENUE
 OAKLAND, CALIFORNIA

PROJECT NO D000-315	DRAWN BY TLA 6/25/01
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
- (91.20) GROUND WATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)
- 92.0 - WATER TABLE CONTOUR IN FEET ABOVE MSL
- GROUND WATER FLOW DIRECTION
- 0.020 → APPROXIMATE GROUND WATER FLOW GRADIENT
- MONITORING WELL(S) NOT USED IN CONTOUR MAP CONSTRUCTION

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

FIGURE 2
GROUND WATER ELEVATION CONTOUR MAP
FIRST QUARTER 2001 (3/26/01)
ARCO STATION NO. 6148
5131 SHATTUCK AVENUE
OAKLAND, CALIFORNIA

PROJECT NO D000-315	DRAWN BY TLA 6/25/01
FILE NO 6148-1	PREPARED BY TLA
REVISION NO 1	REVIEWED BY



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.									
MW-4	02-02-00	106.71	14.32	ND	92.39	<50	<0.5	<0.5	<0.5	<1	<3	--	1.72	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								
MW-6	02-02-00	105.13	12.03	ND	93.10	<50	<0.5	<0.5	<0.5	<1	<3	--	3.94 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	--		

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-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								
MW-7	02-02-00	107.05	12.57	ND	94.48	<50	<0.5	<0.5	<0.5	<1	<3	--	1.97 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%

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(6148o100.xls)

Recreated from electronic data provided by IT Corporation.

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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 (%)
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. H2O)	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. H2O)	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.H2O - Vacuum, in.H2O) / (406.8 in.H2O)
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) / (10⁶)(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) / (10⁶)(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

APPENDIX C

Groundwater Sampling Information



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

Arco Site Address: 5131 Shattuck Avenue

Arco Site Number: Arco 6148

Oakland, California

Delta Project No.: D000-315

Arco Project Manager: Paul Supple

Delta Project PM: Steve Meeks

Site Sampled By: Stratus

Date Sampled: 03/26/01

Site Contact & Phone Number: _____

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 Frequency (A, S, Q)	Sample I.D.	Sample Time
MW-1	6:12	16.60	11.5	25.7	<input checked="" type="checkbox"/>	9.10	4 inch	2.0	18.2	NP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2.70	Q/5,8,11	MW-1	6:24
MW-2	6:15	16.45	12.0	25.8	<input type="checkbox"/>	9.35	4 inch	2.0	18.7	17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.10	Q/5,8,11	MW-2	7:34
MW-3	6:14	16.79	10.0	25.9	<input type="checkbox"/>	9.11	4 inch	2.0	18.2	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.50	Q/5,8,11	MW-3	7:28
MW-4	5:45	15.05	13.0	26.0	<input checked="" type="checkbox"/>	10.95	4 inch	2.0	21.9	NP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.30	S/2,8	MW-4	5:51
MW-5	6:16	15.45	12.0	25.0	<input type="checkbox"/>	9.55	4 inch	2.0	19.1	19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3.30	Q/5,8,11	MW-5	7:23
MW-6	5:59	12.59	14.0	26.6	<input type="checkbox"/>	14.01	4 inch	2.0	28.0	26	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.80	A/2	MW-6	6:58
MW-7	5:55	13.18	14.0	27.0	<input type="checkbox"/>	13.82	4 inch	2.0	27.6	27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.70	A/2	MW-7	6:42
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3164 Gold Camp Drive, Suite 200
 Rancho Cordova, California 95670
 Direct: (916) 638-2085
 Fax: (916) 638-8385

Arco Site Address: 5131 Shattuck Avenue

Arco Site Number: Arco 6148

Oakland, California

Delta Project No.: D000-315

Arco Project Manager: Paul Supple

Delta Project PM: Steve Meeks

Site Sampled By: Stratus

Date Sampled: 03/26/01

Site Contact & Phone Number: _____

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	No Odor	17.0	6.3	444	NP												
MW-2	Odor	12.2	7.0	532	0												
	Odor	18.9	6.3	492	17												
MW-3		19.3	6.7	643	0												
	No Odor	18.6	6.3	563	16												
MW-4	No Odor	15.9	6.3	464	NP												
MW-5		18.1	6.3	532	0												
	No Odor	18.1	6.4	468	19												
MW-6		18.7	6.3	454	0												
	Odor	18.4	6.3	437	26												
MW-7		17.0	6.4	439	0												
	No Odor	18.0	6.3	413	27												

Notes: NP = NO PURGE

Original Copies of Field Sampling Sheets are Located in Project File

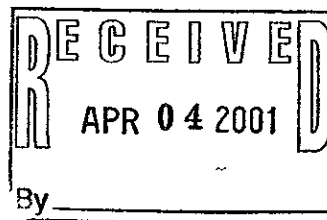
APPENDIX D

Certified Analytical Reports
And
Chain-of-Custody Documentation



March 30 , 2001

Steven Meeks
Delta Environmental Consultants(Rancho Cordova
3164 Gold Camp Drive Ste. 200
Rancho Cordova, CA 95670
RE: ARCO 6148, Oakland, CA / S103456



Enclosed are the results of analyses for samples received by the laboratory on 03/26/01. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sandra R Hansaw
for

Ron Chew
Client Services Representative

R L Bobel
For

Lito Diaz
Laboratory Director

CA ELAP Certificate Number 1624





Delta Environmental Consultants(Rancho Cordova
3164 Gold Camp Drive Ste. 200
Rancho Cordova CA, 95670

Project: ARCO 6148, Oakland, CA
Project Number: N/A
Project Manager: Steven Meeks

Reported:
03/30/01 14:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW1-16'	S103456-01	Water	03/26/01 06:24	03/26/01 10:15
MW2-16'	S103456-02	Water	03/26/01 07:34	03/26/01 10:15
MW3-16'	S103456-03	Water	03/26/01 07:28	03/26/01 10:15
MW4-15'	S103456-04	Water	03/26/01 05:51	03/26/01 10:15
MW5-15'	S103456-05	Water	03/26/01 07:23	03/26/01 10:15
MW6-12'	S103456-06	Water	03/26/01 06:58	03/26/01 10:15
MW7-13'	S103456-07	Water	03/26/01 06:42	03/26/01 10:15





Delta Environmental Consultants(Rancho Cordova
3164 Gold Camp Drive Ste. 200
Rancho Cordova CA, 95670

Project: ARCO 6148, Oakland, CA
Project Number: N/A
Project Manager Steven Meeks

Reported:
03/30/01 14:47

**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
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MW1-16' (S103456-01) Water Sampled: 03/26/01 06:24 Received: 03/26/01 10:15

Purgeable Hydrocarbons	ND	50.0	ug/l	1	1030401	03/28/01	03/28/01	DHS LUFT	
Benzene	ND	0.500	"	"	"	"	"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	9.10	2.50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		100 %	60-140		"	"	"	"	

MW2-16' (S103456-02) Water Sampled: 03/26/01 07:34 Received: 03/26/01 10:15

Purgeable Hydrocarbons	8490	5000	ug/l	100	1030401	03/28/01	03/28/01	DHS LUFT	P-02
Benzene	333	50.0	"	"	"	"	"	"	
Toluene	148	50.0	"	"	"	"	"	"	
Ethylbenzene	495	50.0	"	"	"	"	"	"	
Xylenes (total)	1660	50.0	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	250	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		102 %	60-140		"	"	"	"	

MW3-16' (S103456-03) Water Sampled: 03/26/01 07:28 Received: 03/26/01 10:15

Purgeable Hydrocarbons	287	50.0	ug/l	1	1030401	03/28/01	03/28/01	DHS LUFT	P-02
Benzene	6.29	0.500	"	"	"	"	"	"	
Toluene	1.58	0.500	"	"	"	"	"	"	
Ethylbenzene	6.47	0.500	"	"	"	"	"	"	
Xylenes (total)	12.1	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	24.2	2.50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		99.0 %	60-140		"	"	"	"	





Delta Environmental Consultants(Rancho Cordova
3164 Gold Camp Drive Ste. 200
Rancho Cordova CA, 95670

Project: ARCO 6148, Oakland, CA
Project Number: N/A
Project Manager: Steven Meeks

Reported:
03/30/01 14:47

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
MW4-15' (S103456-04) Water Sampled: 03/26/01 05:51 Received: 03/26/01 10:15									
Purgeable Hydrocarbons	ND	50.0	ug/l	1	1030401	03/28/01	03/28/01	DHS LUFT	
Benzene	ND	0.500	"	"	"	"	"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.50	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		95.0 %	60-140		"	"	"	"	
MW5-15' (S103456-05) Water Sampled: 03/26/01 07:23 Received: 03/26/01 10:15									
Purgeable Hydrocarbons	767	500	ug/l	10	1030460	03/29/01	03/29/01	DHS LUFT	P-02
Benzene	12.4	5.00	"	"	"	"	"	"	
Toluene	ND	5.00	"	"	"	"	"	"	
Ethylbenzene	ND	5.00	"	"	"	"	"	"	
Xylenes (total)	ND	5.00	"	"	"	"	"	"	
Methyl tert-butyl ether	163	25.0	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		92.4 %	60-140		"	"	"	"	
MW6-12' (S103456-06) Water Sampled: 03/26/01 06:58 Received: 03/26/01 10:15									
Purgeable Hydrocarbons	ND	50.0	ug/l	1	1030401	03/28/01	03/28/01	DHS LUFT	
Benzene	ND	0.500	"	"	"	"	"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.50	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		106 %	60-140		"	"	"	"	





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3164 Gold Camp Drive Ste. 200
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Project: ARCO 6148, Oakland, CA
Project Number: N/A
Project Manager: Steven Meeks

Reported:
03/30/01 14:47

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
MW7-13' (S103456-07) Water Sampled: 03/26/01 06:42 Received: 03/26/01 10:15									
Purgeable Hydrocarbons	71.4	50.0	ug/l	1	1030401	03/28/01	03/28/01	DHS LUFT	P-02
Benzene	ND	0.500	"	"	"	"	"	"	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	0.500	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.50	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		<i>101 %</i>	<i>60-140</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	





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 03/30/01 14:47

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
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Batch 1030400 - EPA 5030B (P/T)

Blank (1030400-BLK1)

Prepared & Analyzed: 03/29/01

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	10.2		"	10.0		102	60-140			

LCS (1030400-BS1)

Prepared & Analyzed: 03/29/01

Benzene	10.1	0.500	ug/l	10.0		101	70-130			
Toluene	10.2	0.500	"	10.0		102	70-130			
Ethylbenzene	10.2	0.500	"	10.0		102	70-130			
Xylenes (total)	30.4	0.500	"	30.0		101	70-130			
Methyl tert-butyl ether	9.74	2.50	"	10.0		97.4	70-130			
Surrogate: a,a,a-Trifluorotoluene	9.67		"	10.0		96.7	60-140			

Matrix Spike (1030400-MS1)

Source: S103476-06

Prepared & Analyzed: 03/29/01

Benzene	9.87	0.500	ug/l	10.0	ND	98.7	60-140			
Toluene	9.25	0.500	"	10.0	ND	92.5	60-140			
Ethylbenzene	9.49	0.500	"	10.0	ND	94.9	60-140			
Xylenes (total)	20.0	0.500	"	30.0	ND	66.7	60-140			
Methyl tert-butyl ether	9.75	2.50	"	10.0	ND	97.5	60-140			
Surrogate: a,a,a-Trifluorotoluene	9.18		"	10.0		91.8	60-140			

Matrix Spike Dup (1030400-MSD1)

Source: S103476-06

Prepared & Analyzed: 03/29/01

Benzene	10.3	0.500	ug/l	10.0	ND	103	60-140	4.26	25	
Toluene	9.30	0.500	"	10.0	ND	93.0	60-140	0.539	25	
Ethylbenzene	9.64	0.500	"	10.0	ND	96.4	60-140	1.57	25	
Xylenes (total)	20.1	0.500	"	30.0	ND	67.0	60-140	0.499	25	
Methyl tert-butyl ether	11.1	2.50	"	10.0	ND	111	60-140	12.9	25	
Surrogate: a,a,a-Trifluorotoluene	9.61		"	10.0		96.1	60-140			





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 03/30/01 14:47

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
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Batch 1030401 - EPA 5030B (P/T)

Blank (1030401-BLK1)

Prepared & Analyzed: 03/28/01

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	"							
<i>Surrogate: a,a,a-Trifluorotoluene</i>	10.5		"	10.0		105	60-140			

LCS (1030401-BS1)

Prepared & Analyzed: 03/28/01

Benzene	10.3	0.500	ug/l	10.0		103	70-130			
Toluene	10.3	0.500	"	10.0		103	70-130			
Ethylbenzene	10.4	0.500	"	10.0		104	70-130			
Xylenes (total)	31.7	0.500	"	30.0		106	70-130			
Methyl tert-butyl ether	8.76	2.50	"	10.0		87.6	70-130			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	10.7		"	10.0		107	60-140			

Matrix Spike (1030401-MS1)

Source: S103456-04

Prepared & Analyzed: 03/28/01

Benzene	10.8	0.500	ug/l	10.0	ND	108	60-140			
Toluene	10.4	0.500	"	10.0	ND	104	60-140			
Ethylbenzene	10.6	0.500	"	10.0	ND	106	60-140			
Xylenes (total)	32.3	0.500	"	30.0	ND	108	60-140			
Methyl tert-butyl ether	10.1	2.50	"	10.0	ND	101	60-140			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	10.2		"	10.0		102	60-140			

Matrix Spike Dup (1030401-MSD1)

Source: S103456-04

Prepared & Analyzed: 03/28/01

Benzene	10.7	0.500	ug/l	10.0	ND	107	60-140	0.930	25	
Toluene	10.3	0.500	"	10.0	ND	103	60-140	0.966	25	
Ethylbenzene	10.8	0.500	"	10.0	ND	108	60-140	1.87	25	
Xylenes (total)	32.5	0.500	"	30.0	ND	108	60-140	0.617	25	
Methyl tert-butyl ether	10.4	2.50	"	10.0	ND	104	60-140	2.93	25	
<i>Surrogate: a,a,a-Trifluorotoluene</i>	10.4		"	10.0		104	60-140			





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03/30/01 14:47

Notes and Definitions

P-02 Chromatogram Pattern: Weathered Gasoline C6-C12
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



