

December 21, 2001

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

ARCO P.O. Box 6549 Moraga, CA 94570

Mr. Paul Supple

Subject: Quarterly Groundwater Monitoring Report, Third Quarter 2001

ARCO Service Station No. 2162 15135 Hesperian Boulevard San Leandro, California Project No. D000-310

Dear Mr. Supple:

Delta Environmental Consultants, Inc. is submitting the attached report that presents the results of the third quarter 2001 groundwater monitoring program at ARCO Service Station No. 2162, located at 15135 Hesperian Boulevard, San Leandro, 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 (Lrp006.310.doc) Enclosures

cc: Mr. Scott Seery - Alameda County Health Care Services Agency

Mr. John Jang - California Regional Water Quality Control Board, San Francisco Bay Region

Mr. Mike Bakaldin - City of San Leandro Fire Department

Date: December 21, 2001

#### ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 2162 Address: 15135 Hesperian Boulevard, San Leandro, CA

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.: D000-310

Primary Agency/Regulatory ID No. Alameda County Health Care Services Agency

#### **WORK PERFORMED THIS QUARTER**

1. Performed guarterly groundwater monitoring for third guarter 20001

Prepared quarterly groundwater monitoring report for second quarter 2001.

#### WORK PROPOSED FOR NEXT QUARTER

1. Prepare and submit quarterly groundwater monitoring report for third quarter 2001.

2. Perform quarterly groundwater monitoring and sampling for fourth quarter 2001.

#### **QUARTERLY MONITORING:**

Current Phase of Project	Monitoring
Frequency of Groundwater Sampling:	Quarterly: MW-1, MW-2, MW-3, MW-4
Frequency of Groundwater Monitoring:	Quarterly
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:	None
Current Remediation Techniques:	Natural Attenuation
Approximate Depth to Groundwater:	9.27 feet
Groundwater Gradient:	0.012 ft/ft toward southwest

#### **DISCUSSION:**

- Total petroleum hydrocarbons as gasoline were detected in a sample collected from MW-2 at 190 μg/L.
- Methyl tertiary butyl ether (MTBE) was detected in samples collected from MW-3 and MW-4 at a concentration of 12 and 5.2 μg/L, respectively.
- The travel blank (TB) sample results showed traces of toluene (1.4 μg/L), xylenes (1.0 μg/L) and MTBE (3.4 μg/L) possibly due to cross-contaminated TB source water. However the contaminated TB water should have no bearing on the well sample results.

#### **ATTACHMENTS:**

•	Table 1	Ground	lwater El-	evation ai	nd Anal	ytical Data
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• 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 Certified Analytical Reports with Chain-of-Custody Documentation

Appendix D Field Sampling Data

TABLE 1
GROUNDWATER ANALYTICAL DATA

ARCO Service Station No. 2162 15135 Hesperian Boulevard San Leandro, 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	06/20/00	31.19	8.33	22.86	<0.5	0.8	<0.5	<1.0	<50	<10
	09/29/00		9.07	22.12	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	12/17/00		8.69	22.50	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	03/23/01		8.19	23.00	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	06/20/01		8.97	22.22	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	09/22/01		9.56	21.63	<0.5	<0.5	<0.5	<0.5	<50	<2.5
MW-2	06/20/00	30.38	7.38	23.00	NS	NS	NS	NS	NS	NS
	09/29/00		8.08	22.30	<0.5	< 0.5	<0.5	<0.5	266	<2.5
	12/17/00		7.80	22.58	<0.5	<0.5	0.659	<0.5	175	<2.5
	03/23/01		7.23	23.15	<0.5	<0.5	0.912	<0.5	351	<2.5
	06/20/01		7.98	22.40	<0.5	<0.5	0.74	<0.5	360	<2.5
	09/22/01		8.55	21.83	<0.5	<0.5	<0.5	<0.5	190	<2.5
MW-3	06/20/00	30.30	7.75	22.55	NS	NS	NS	NS	NS	NS
	09/29/00		8.46	21.84	<0.5	<0.5	< 0.5	<0.5	<50	128
	12/17/00		8.01	22.29	<0.5	<0.5	<0.5	<0.5	<50	46.7
	03/23/01		7.70	22.60	<0.5	<0.5	<0.5	<0.5	<50	26.8
	06/20/01		8.23	22.07	<0.5	<0.5	<0.5	<0.5	<50	30
	09/22/01		8.89	21.41	<0.5	<0.5	<0.5	<0.5	<50	12

TABLE 1
GROUNDWATER ANALYTICAL DATA

ARCO Service Station No. 2162 15135 Hesperian Boulevard San Leandro, 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-4	06/20/00	30.39	8.87	21.52	NS	NS	NS	NS	NS	NS
	09/29/00		9.61	20.78	1.02	<0.5	<0.5	<0.5	<50	12,2
	12/17/00		9.17	21.22	<0.5	<0.5	<0.5	<0.5	<50	5.81
	03/23/01		8.70	21.69	< 0.5	<0.5	<0.5	<0.5	<50	3.04
	06/20/01		9.51	20.88	<0.5	<0.5	<0.5	<0.5	<50	<2.5
	09/22/01		10.06	20.33	<0.5	<0.5	<0.5	<0.5	<50 <50	5.2

TPH = Total Petroleum Hydrocarbons

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

μg/L = Micrograms per liter

NS = Not sampled

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

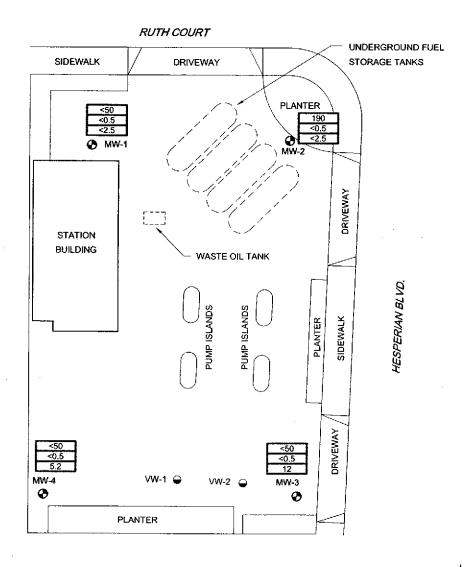
#### TABLE 2

#### **GROUNDWATER FLOW DIRECTION AND GRADIENT**

ARCO Service Station No. 2162 15135 Hesperian Boulevard San Leandro, California

Date Measured	Average Flow Direction	Average Hydraulic Gradient
06/20/00	Southwest	0.010
09/29/00	Southwest	0.010
12/17/00	Southwest	0.010
03/23/01	Southwest	0.011
06/20/01	Southwest	0.013
09/22/01	Southwest	0.012

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





LEGEND:

→ MW-1

MONITORING WELL LOCATION

→ VW-1

SOIL VAPOR EXTRACTION WELL LOCATION

<50 <0.5 <2.5 TPH AS GASOLINE IN MICROGRAMS PER LITER BENZENE IN MICROGRAMS PER LITER MTBE IN MICROGRAMS PER LITER

NŞ

NOT SAMPLED

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

### FIGURE 1 GROUND WATER ANALYTICAL SUMMARY

THIRD QUARTER 2001 (9/22/01)

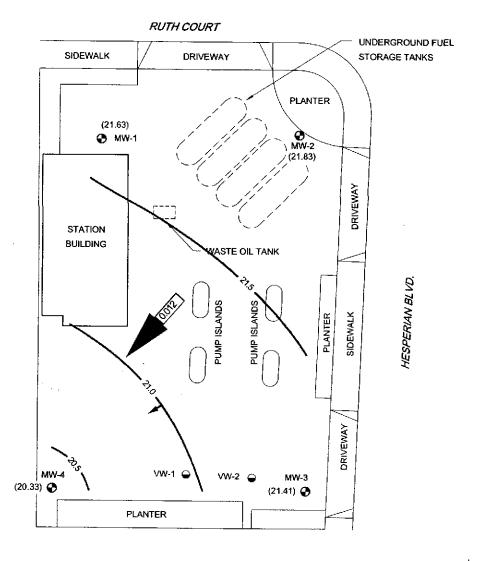
ARCO STATION NO. 2162

15135 HESPERIAN BOULEVARD

SAN LEANDRO, CALIFORNIA

PROJECT NO.	DRAWN BY
D000-310	TLA 12/17/01
FILE NO.	PREPARED BY
2162-1	TLA
REVISION NO.	REVIEWED BY







LEGEND:

→ MW-1 MONITORING WELL LOCATION

W-1 SOIL VAPOR EXTRACTION WELL LOCATION

GROUND WATER ELEVATION IN FEET ABOVE MEAN (21.63)

SEA LEVEL (MSL)

**—** 21.0 **–** WATER TABLE CONTOUR IN FEET ABOVE MSL

GROUND WATER FLOW DIRECTION

APPROXIMATE GROUND WATER FLOW GRADIENT

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

#### FIGURE 2

GROUND WATER ELEVATION CONTOUR MAP THIRD QUARTER 2001 (9/22/01) ARCO STATION NO. 2162 15135 HESPERIAN BOULEVARD

<u></u>	SAN LEANDRO	, CALIFORNIA
PROJECT NO. D000-310	DRAWN BY TLA 12/17/01	<b>A</b>
FILE NO. 2162-1	PREPARED BY TLA	
REVISION NO, 1	REVIEWED BY	<b>A</b>



#### 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.

Table 1
Groundwater Elevation and Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MTBE)

## ARCO Service Station 2162 15135 Hesperian Boulevard, San Leandro, California

Well	Date Gauged/	Well Elevation	Depth to Water	Groundwater Elevation	TPPH as Gasoline	Benzene	Toluene	Ethyl- benzene	Xylenes	MTBE 8021B*	MTBE 8260	Dissolved Oxygen	Purged/ Not Purged
Number	Sampled	(feet, MSL)	(feet, TOC)	(feet, MSL)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppm)	(P/NP)
MW-1	02/26/96	31.19	7.14	24.05	<50	< 0.5	<0.5	<0.5	< 0.5	NA	NA	NA	
MW-1	05/23/96	31.19	7.70	23.49	< 50	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	
MW-1	08/21/96	31.19	8.75	22,44	210	< 0.5	< 0.5	< 0.5	< 0.5	<2.5	NA	NA	
MW-1	11/20/96	31.19	8.62	22.57	91	< 0.5	< 0.5	< 0.5	<0.5	2.6	NA	NA	
MW-1	04/01/97	31.19	8.70	22.49	< 50	< 0.5	< 0.5	< 0.5	<0.5	<2.5	NA	NA	NP
MW-1	06/10/97	31.19	8.45	22.74	94	< 0.5	< 0.5	0.68	0.56	6.4	NA	NA	NP
MW-1	09/17/97	31.19	9.20	21.99	< 50	< 0.5	< 0.5	< 0.5	< 0.5	10	NA	1.0	NP
MW-1	12/12/97	31.19	8.00	23.19	<200	<2	<2	<2	<2	180	NA	2.0	NP
MW-1	03/25/98	31.19	7.00	24.19	<200	<2	<2	3	<2	180	NA	2.0	
MW-1	05/14/98	31.19	7.46	23.73	<50	< 0.5	<0.5	< 0.5	< 0.5	<3	NA	1.17	P
MW-1	07/31/98	31.19	8.10	23.09	<50	< 0.5	< 0.5	< 0.5	< 0.5	<3	NA	2.0	NP
MW-1	10/12/98	31.19	8.60	22.59	<50	< 0.5	< 0.5	< 0.5	< 0.5	9	NA	2.5	NP
MW-1	02/11/99	31.19	7.32	23.87	< 50	< 0.5	< 0.5	< 0.5	< 0.5	25	NA	1.0	P
MW-1	06/23/99	31.19	8.40	22.79	55	< 0.5	< 0.5	< 0.5	< 0.5	<3	NA	1.36	NP
MW-1	08/23/99	31.19	8.85	22.34	<50	< 0.5	0.6	< 0.5	< 0.5	5	NA	1.42	NP
MW-1	10/27/99	31.19	8.50	22.69	< 50	< 0.5	< 0.5	< 0.5	< [	90	NA	0.83	NP
MW-1	02/09/00	31.19	8.11	23.08	<50	<0.5	<0.5	<0.5	<1	9	NA	0.77	NP
MW-2	02/26/96	30.38	6.41	23.97	770	< 0.5	<0.5	45	28	NA	NA	NA	
MW-2	05/23/96	30.38	6.80	23.58	590	0.50	< 0.5	35	18	NA	NA	NA	
MW-2	08/21/96	30.38	7.80	22.58	170	< 0.5	< 0.5	21	6.3	<2.5	NA	NA	
MW-2	11/20/96	30.38	7.73	22.65	88	< 0.5	< 0.5	7.9	1.1	<2.5	NA	ΝA	
MW-2	04/01/97	30.38	7.83	22.55	66	< 0.5	< 0.5	3.6	0.56	33	NA	NA	
MW-2	06/10/97	30.38	7.52	22.86	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5	NA	NA	NP
MW-2	09/17/97	30.38	8.24	22.14	<50	< 0.5	< 0.5	< 0.5	< 0.5	<3.0	NA	0.6	NP
MW-2	12/12/97	30.38	7.10	23.28	<50	< 0.5	< 0.5	< 0.5	< 0.5	<3.0	NA	1.2	NP
MW-2	03/25/98	30.38	6.27	24.11	<50	< 0.5	< 0.5	0.7	0.5	55	NA	1.0	
MW-2	05/14/98	30.38	6.54	23.84	210	< 0.5	<0.5	3.3	<0.5	42	NA	1.47	P
MW-2	07/31/98	30.38	7.14	23.24	230	<0.5	< 0.5	3.9		6	NA	1.0	P

Table 1
Groundwater Elevation and Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MTBE)

# ARCO Service Station 2162 15135 Hesperian Boulevard, San Leandro, California

	Date	Well	Depth to	Groundwater	TPPH as			Ethyl-		MTBE	MTBE	Dissolved	Purged/
Well	Gauged/	Elevation	Water	Elevation	Gasoline	Benzene	Toluene	benzene	Xylenes	8021B*	8260	Oxygen	Not Purged
Number	Sampled	(feet, MSL)	(feet, TOC)	(feet, MSL)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppm)	(P/NP)
MW-2	10/12/98	30.38	7.65	22.73	110	<0.5	<0.5	1.5	<0.5	<3	NA	1.0	P
MW-2	02/11/99	30.38	6.55	23.83	660	< 0.5	< 0.5	6.7	0.7	3	NA		P
MW-2	06/23/99	30.38	7.48	22.90	270	< 0.5	< 0.5	2.2	0.8	<3	NA	NM	P
MW-2	08/23/99	30.38	7.89	22.49	200	<0.5	0.9	1.8	< 0.5	<3	NA	1.17	P
MW-2	10/27/99	30.38	8.30	22.08	2,100	1.0	2.5	14	3	3	NA	0.75	NP
MW-2	02/09/00	30.38	8.02	22.36	<50	<0.5	<0.5	<0.5	<1	5	NA	0.69	NP
MW-3	02/26/96	30.30	6.72	23.58	120	5.0.	<0.5	<0.5	<0.5	NA	NA	NA	
MW-3	05/23/96	30.30	7.18	23.12	140	12	<0.5	<0.5	< 0.5	NA	NA	NA	
MW-3	08/21/96	30.30	8.17	22.13	<50	1.1	<0.5	<0.5	<0.5	130	NA	NA	
MW-3	11/20/96	30.30	8.03	22.27	55	< 0.5	<0.5	<0,5	<0.5	59	NA	NA	
MW-3	04/01/97	30.30	8.09	22.21	<50	< 0.5	<0.5	<0.5	<0.5	180	NA	NA	NP
MW-3	06/10/97	30.30	7.97	22.33	< 50	< 0.5	< 0.5	< 0.5	<0.5	1,900	NA	NA	NP
MW-3	09/17/97	30.30	8.54	21.76	<5,000	<50	< 50	<50	<50	1,100	860	2.2	NP
MW-3	12/12/97	30.30	7.50	22,80	560	<5.0	< 5.0	<5.0	5.0	•	NA	1.4	NP
MW-3	03/25/98	30.30	6.60	23.70	< 500	<5	<5	<5	<5	470	NA	1.0	* 1*
MW-3	05/14/98	30,30	7.13	23.17	750	<5	<5	<5	<5	630	NA	1.97	P
MW-3	07/31/98	30.30	7.58	22.72	< 500	<5	<5	<5	<5	<b>59</b> 0	NA	1.0	P
MW-3	10/12/98	30.30	8.00	22.30	<500	<5	<5	<5	<5	600	NA	2.0	P
MW-3	02/11/99	30.30	6.90	23.40	< 500	<5	<5	<5	<5	280	NA	1.0	P
MW-3	06/23/99	30.30	7.82	22.48	220	< 0.5	3.2	< 0.5	< 0.5	740	NA	1.98	P
MW-3	08/23/99	30.30	8.28	22.02	<50	< 0.5	1.1	<0.5	< 0.5	230	NA	1.20	P
MW-3	10/27/99	30.30	9.27	21.03	<50	< 0.5	< 0.5	< 0.5	<1	<3	NA	0.81	NP
MW-3	02/09/00	30.30	7.45	22.85	<50	<0.5	< 0.5	< 0.5	<1	80	NA	0.81	P
MW-4	02/26/96	30.39	7.59	22.80	110	9.9	<0.5	<0.5	<0.5	NA	NA	NA	
MW-4	05/23/96	30.39	8.22	22.17	69	8.0	<0.5	< 0.5	<0.5	NA	NA	NA	
MW-4	08/21/96	30.39	9.28	21.11	<50	6.8	< 0.5	<0.5	< 0.5	<2.5	NA	NA.	
MW-4	11/20/96	30.39	9.12	21.27	95	10	0.59	<0.5	0.52	3.8	NA	NA	

Table 1
Groundwater Elevation and Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MTBE)

## ARCO Service Station 2162 15135 Hesperian Boulevard, San Leandro, California

	Date	Well	Depth to	Groundwater	TPPH as			Ethyl-		MTBE	MTBE	Dissolved	Purged/
Well	Gauged/	Elevation	Water	Elevation	Gasoline	Benzene	Toluene	benzene	Xylenes	8021B*	8260	Oxygen	Not Purged
Number	Sampled	(feet, MSL)	(feet, TOC)	(feet, MSL)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppm)	(P/NP)
MW-4	04/01/97	30.39	8.45	21,94	73	5.7	<0.5	< 0.5	<0.5	<2.5	NA	NA	•
MW-4	06/10/97	30,39	9.00	21.39	<50	< 0.5	<0.5	< 0.5	< 0.5	<2.5	NA	NA	NP
MW-4	09/17/97	30.39	9.76	20.63	<50	3.2	< 0.5	< 0.5	< 0.5	8.0	NA	0.2	NP
MW-4	12/12/97	30.39	8.45	21.94	< 50	2.9	< 0.5	< 0.5	< 0.5	14	NA	1.0	NP
MW-4	03/25/98	30.39	7.52	22.87	58	2.8	< 0.5	< 0.5	< 0.5	<3	NA	3.0	
MW-4	05/14/98	30.39	8.03	22.36	<50	<0,5	< 0.5	< 0.5	< 0.5	<3	NA	3.24	NP
MW-4	07/31/98	30.39	8.67	21.72	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<3	NA	2.0	NP
MW-4	10/12/98	30.39	9.15	21.24	<50	< 0.5	< 0.5	< 0.5	<0.5	4	NA	1.5	NP
MW-4	02/11/99	30.39	7.80	22.59	61	2.5	< 0.5	< 0.5	< 0.5	6	NA	1.0	P
MW-4	06/23/99	30.39	9.00	21.39	<50	< 0.5	< 0.5	< 0.5	< 0.5	<3	NA	1.42	NP
MW-4	08/23/99	30.39	9.31	21.08	< 50	< 0.5	< 0.5	< 0.5	< 0.5	6	NA	1.53	NP
MW-4	10/27/99	30.39	9.80	20.59	<50	< 0.5	<0.5	< 0.5	<1	6	NA	0.98	NP
MW-4	02/09/00	30.39	8.63	21.76	<50	< 0.5	< 0.5	< 0.5	<1	7	NA	0.74	NP

TPPH = Total purgeable petroleum hydrocarbons by modified EPA method 8015

BTEX = Benzene, toluene, ethylbenzene, total xylenes by EPA method 8021B. (EPA method 8020 prior to 10/27/99).

MTBE = Methyl tert -Butyl Ether

= EPA method 8020 prior to 10/27/99

MSL = Mean sea level

TOC = Top of casing

ppb = Parts per billion

ppm = Parts per million

NA = Not analyzed

NM = Not measured

= Denotes concentration not present above laboratory detection limited stated to the right

## Table 2 Groundwater Flow Direction and Gradient

### ARCO Service Station 2162 15135 Hesperian Boulevard, San Leandro, California

Date	Average	Average
Measured	Flow Direction	Hydraulic Gradient
02/26/96	Southwest	0.009
05/23/96	South-Southwest	0.010
08/21/96	South-Southwest	0.01
11/20/96	South-Southwest	0.011
04/01/97	South-Southwest	0.004
06/10/97	South-Southwest	0.010
09/17/97	South-Southwest	0.01
12/12/97	Southwest	0.01
. 03/25/98	South-Southwest	0.008
05/14/98	Southwest	0.01
07/31/98	Southwest	0.01
10/12/98	Southwest	0.01
02/11/99	Southwest	0.008
06/23/99	Southwest	0.02
08/23/99	Southwest	0.013
10/27/99	South-Southwest	0.02
02/09/00	Southwest	0.01

### APPPENDIX C

Certified Analytical Reports And Chain-of-Custody Documentation



2 October, 2001

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

RE: ARCO 2162, San Leandro, CA Sequoia Report: S109366

Enclosed are the results of analyses for samples received by the laboratory on 09/25/01 09:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Ron Chew

Client Services Representative

Lito Diaz

Laboratory Director

CA ELAP Certificate #1624



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

Delta Environmental Consultants(Rancho Cordova)

3164 Gold Camp Drive Stc. 200 Rancho Cordova CA, 95670 Project: ARCO 2162, San Leandro, CA

Project Number: N/A

Project Manager: Steven Meeks

Reported: 10/02/01 17:44

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1-9	S109366-01	Water	09/22/01 16:51	09/25/01 09:30
MW-2-8	\$109366-02	Water	09/22/01 16:59	09/25/01 09:30
MW-3-8	\$109366-03	Water	09/22/01 17:25	09/25/01 09:30
MW-4-10	S109366-04	Water	09/22/01 17:09	09/25/01 09:30
ТВ	S109366-05	Water	09/22/01 06:00	09/25/01 09:30

Sequoia Analytical - Sacramento

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Delta Environmental Consultants(Rancho Cordova)

3164 Gold Camp Drive Ste. 200 Rancho Cordova CA, 95670 Project: ARCO 2162, San Leandro, CA

Project Number: N/A

Project Manager: Steven Meeks

Reported: 10/02/01 17:44

# Total Purgeable Hydrocarbon, BTEX and MTBE by DHS LUFT Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Markad	N
	<u> </u>					riepaieu	Analyzed	Method	Note
	npled: 09/22/01 16:51	Received:	09/25/0	1 09:30		<del></del> .			
Purgeable Hydrocarbons	ND	50	ug/l	1	1100003	09/28/01	09/28/01	DHS LUFT	
Benzene	ND	0.50	н	н	n	ıı	η	tt .	
Toluene	ND	0.50	"	IJ	**	*	п	II .	
Ethylbenzene	ND	0.50	**	**	*1	n	**	"	
Xylenes (total)	ND	0.50	**	n	**	**	n	H	
Methyl tert-butyl ether	ND	2.5	п	**	и	ч	10	**	
Surrogate: a.a.a-Trifluorotoluene		84.4 %	60-	140	"	'n	Ħ	п	
MW-2-8 (S109366-02) Water San	npled: 09/22/01 16:59	Received:	09/25/01	09:30					
Purgeable Hydrocarbons	190	50	ug/l	1	1100003	09/28/01	09/28/01	DHS LUFT	HC-12
Benzene	ND	0.50	**	"	71	11	н	n	
Toluene	ND	0.50	п	*	н	tt	**	**	
Ethylbenzene	ND	0.50	n	п	n	"	ш	n	
Xylenes (total)	ND	0.50	**	"		**	ŋ	n	
Methyl tert-butyl ether	ND	2.5	7	*	0	ч	**	**	
Surrogate: a.a.a-Trifluorotoluene		84.4 %	60-	140	"	r	"	"	
MW-3-8 (S109366-03) Water San	npled: 09/22/01 17:25	Received:	<u>09/25/01</u>	09:30					
Purgeable Hydrocarbons	ND	50	ug/l	ì	1100003	09/28/01	09/28/01	DHS LUFT	A-01
Benzene	ND	0.50	. 19	**	n	"	**	"	A-01
Toluene	ND	0.50	II	19	ч	**	11	n	A-01
Ethylbenzene	ND	0.50	u	*1	ц	ч	**	**	A-01
Xylenes (total)	ND	0.50	н	o o	11	u .	u	**	A-01
Methyl tert-butyl ether	12	2.5	W	н	**	n	U	п	A-01
Surrogate: a.a.a-Trifluorotoluene		85.0 %	60-	140	"	"	"	"	A-01



Delta Environmental Consultants(Rancho Cordova)

3164 Gold Camp Drive Stc. 200 Rancho Cordova CA, 95670 Project: ARCO 2162, San Leandro, CA

Project Number: N/A

Project Manager: Steven Meeks

Reported: 10/02/01 17:44

### Total Purgeable Hydrocarbon, BTEX and MTBE by DHS LUFT

Sequoia Analytical - Sacramento

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-4-10 (S109366-04) Water_	Sampled: 09/22/01 17:09	Received	: 09/25/01	09:30					
Purgeable Hydrocarbons	ND	50	ug/l	ı	1100003	09/28/01	09/28/01	DHS LUFT	
Benzene	ND	0.50	**	m	**	"	0	"	
Toluene	ND	0.50	n .	"	**	**	D	п	
Ethylbenzene	ND	0.50	II .	4	u	* .	. "	)+	
Xylenes (total)	ND	0.50	"	ij	0	н	17	•	
Methyl tert-butyl ether	5.2	2.5	n	и	19	п	**	10	
Surrogate: a,a,a-Trifluorotoluene		80.1 %	60-14	10	"	,,		n	· · · · · ·
TB (S109366-05) Water Samp	oled: 09/22/01 06:00 Recei	ved: 09/25	5/01 09:30						
Purgeable Hydrocarbons	ND	50	ug/l	1	1100003	09/28/01	09/28/01	DHS LUFT	· · · · · · · · · · · · · · · · · · ·
Велгеле	ND	0.50	н	н	11	IJ	#1	7	
Toluene	1.4	0.50	**	**	o o	,,	н	**	
Ethylbenzene	ND	0.50	п	**	77	*	11	н	
Xylenes (total)	1.0	0.50	IJ		н	"	**	п	
Methyl tert-butyl ether	3.4	2.5	**	"	u u	**	17	97	
Surrogate: a,a,a-Trifluorotoluene		85.7%	60-14	0	"	n	rr	"	



Delta Environmental Consultants(Rancho Cordova)

3164 Gold Camp Drive Ste. 200 Rancho Cordova CA, 95670 Project: ARCO 2162, San Leandro, CA

Project Number: N/A

Project Manager: Steven Meeks

Reported: 10/02/01 17:44

# Total Purgeable Hydrocarbon, 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 1100003 - EPA 5030B (P/T)			•											
Blank (1100003-BLK1)	Prepared & Analyzed: 09/28/01													
Purgeable Hydrocarbons	ND	50	ug/I											
Benzene	ND	0.50	**				•							
Toluene	ND	0.50	**											
Ethylbenzene	ND	0.50	**											
Xylenes (total)	ND	0.50	17											
Methyl tert-butyl ether	ND	2.5	**											
Surrogate: a,a,a-Trifluorotoluene	8.98		"	10.0		89.8	60-140							
LCS (1100003-BS1)		_		Prepared	& Analyze	ed: 09/28/	01							
Benzene	9.93	0.50	ug/l	10.0		99.3	70-130							
Toluene	9.66	0.50	н	10.0		96.6	70-130							
Ethylbenzene	9.75	0.50	**	10.0		97.5	70-130							
Xylenes (total)	29.1	0.50	**	30.0		97.0	70-130							
Methyl tert-butyl ether	12.3	2.5	**	10.0		123	70-130							
Surrogate: a,a,a-Trifluorotoluene	9.20		"	10.0		92.0	60-140							
Matrix Spike (1100003-MS1)	Sou	urce: S10936	6-05	Prepared 4	& Analyze	ed: 09/28/	01							
Велгене	9.70	0.50	ug/l	10.0	ND	97.0	60-140							
Foluene .	10.4	0.50	n	10.0	1.4	90.0	60-140							
Ethylbenzene	9.38	0.50	u	10.0	ND	93.8	60-140							
Xylenes (total)	28.3	0.50	19	30.0	1.0	91.0	60-140							
Methyl tert-butyl ether	13.4	2.5	**	0.01	3.4	100	60-140							
Surrogate: a,a,a-Trifluorotoluene	8.81		и	10.0		88.1	60-140							
Matrix Spike Dup (1100003-MSD1)	Sou	<u>ırce: S10936</u>	6-05	Prepared:	09/28/01	Analyzed	: 09/29/01							
Benzene	9.75	0.50	ug/l	10.0	ND	97.5	60-140	0.514	25					
Coluene	10.5	0.50	u	10.0	1.4	91.0	60-140	0.957	25					
Ethylbenzene	9.18	0.50	ij	10.0	ND	91.8	60-140	2.16	25					
(Ylenes (total)	28.1	0.50	0	30.0	1.0	90.3	60-140	0.709	25					
Methyl tert-butyl ether	13.2	2.5	11	10.0	3.4	98.0	60-140	1.50	25					
Surrogate: a,a,a-Trifluorotoluene	8.27		11	10.0		82.7	60-140							



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Delta Environmental Consultants(Rancho Cordova)

3164 Gold Camp Drive Ste. 200 Rancho Cordova CA, 95670 Project: ARCO 2162, San Leandro, CA

Project Number: N/A

Project Manager: Steven Mecks

Reported:

10/02/01 17:44

#### Notes and Definitions

A-01 Sample confirmed on alternate column on 10/01/01.

HC-12 Hydrocarbon pattern is present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.

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

ARCO Products Company  Division of Atlanticipatione programs  ARCO Facility 10- 162 City 10- 162 City 10- 162 City 10- 162 Consultant name  ARCO argineer P and Supple (ARCO)  Consultant name  Della  Matrix  Preservation  9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9						ody																		
ARCO Facilit	y no. つ	162	_	Cit	iy acility)	lan	Loan	dia	1401 1101	Project	mana(	ger	<del>.</del>	e m	1006	60.			··		<del></del>			
ARCO engine	er p	aul	Lua	rle	<u>17</u>	<del></del>	Telephon	ne no.		Telepho	one no	K38	20	C 5 6	UK KAT	Fax	r no.	n) 62	29	8		- Sea	MOL	<u> </u>
Consultant na	ıme	Q,	ella	·				1 11001000		A	211	nek	<i>y</i> - 1	مد م	do	ر پرسر کیا	,	<u> </u>	LQSQ.	<u>, n</u>		Contrae	number	
						Prese	rvation				1				·			□ Få	2002/			Method	of shipment	
Sample 1.D.	Lab no.	Container no.	Soit	Water	Other	lce	Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEXTPH + A.T.	TPH Modified 8015 Gas Diesel	Oil and Grease 413.1 🗀 413.2 🗆	TPH EPA 418.1/SM503E	EPA 601/8010	0+29/1/29 4G	EPA 625/6270	TCLP Ser Metals   VOA   V	CAN Metals EPA 6010	Lead Org_OHS C Lead EPA 7420/7421 C				
MW-1-9		2		4		4	4	9-22-01	165)		+				S1(	793	30	5-0						
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Condition of	•								<del></del>	Temp	arature	receive	d: [3]	$\mathcal{C}^{\vee}$			<b></b>	ف برجيبيط			<u> </u>	Rush	ess Day	
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Relinquished	by						Date		Time	Receiv	ed by	laborato	ory			C	ate			Time	<del> ,. ,.</del>	Standar 10 Bush	d ness Days	×



Site Contact & Phone Number:

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

A	rco	Site	Add	res

ss: 15135 Hesperian Blvd Arco Site Number:

Arco 2162

San Leandro, California

Delta Project No.: Delta Project PM: D000-310 Steve Meeks

Arco Project Manager: \_

Site Sampled By:

Paul Supple

Doulos

Date Sampled:

09/22/01

		Water Le	evel Data			- 4	ourge Vo	lume Ca	culation	S		Sam	oling An	alytes		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	16:51	9.56	8.0	15.9	$\Box$	6.29	4 inch	2.0	12.6	NP	V	[]	V		1.08	Q/2,5,8,11	MW-1	16:51
MW-2	16:59	8.55	8.0	15.9	$\square$	7.32	4 inch	2.0	14.6	NP	5	<b>V</b>	V		0.69	Q/2,5,8,11	MW-2	16:59
MW-3	17:12	8.89	9.0	14.8		5.87	4 inch	2.0	11.7	11.8	<b>5</b>	V	V		0.71	Q/2,5,8,11	MW-3	17:25
MW-4	17:09	10.06	8.0	17.5	$\square$	7.39	4 inch	2.0	14.8	NP	Image: Control of the		V		1.58	Q/2,5,8,11	MW-4	17:09
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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: Quarterly: MW-3, MW-4, MW-1, MW-2

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.



Site Contact & Phone Number:

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

Arco Site Address: 15135 Hesperian Blvd

Arco Site Number: San Leandro, California

Arco 2162 D000-310 Delta Project No.:

Arco Project Manager: Paul Supple

Site Sampled By:

Steve Meeks Delta Project PM: 09/22/01 Doulos Date Sampled:

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 Purge			1			·										
						Ì											
			,			Ī											
						<u> </u>					~						
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	No Purge													ľ			
Well ID	Time	Temp °C		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	17:15	69.4	7.15	484	3												
	17:18	69.1	7.10	471	8	_											
	17:21	69.1	7.09	469	11										-		
														<u> </u>			
Well ID	Time		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	No Purge																
						,											
LIAL-ILID	Times	T 00	-1111-4-	C- C	Gallons	Well ID	Time	Temp °C	old Limits	Sp. Cond.	Gallons	Well ID	Time	L Tamp °C	o⊎ Hoite	Sp. Cond.	Gallons
Well ID	Time	Temp °C	pH Units	Sp. Cond.	Galions	well ID	IRITE	Leub C	pri Offits	Sp. Coriu.	Gallons	WEILID	IIIIIG	remp C	prionis	op. cond.	Gallons
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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
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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
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Notes: NP = NO PURGE

Original Copies of Field Sampling Sheets are Located in Project File