the IT group

2201 Broadway, Suite 101
Oakland, CA 94612-3023
Tel. 510.740.5800
Fax. 510.663.3315

June 9, 2000
Project 803906

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

Re: Quarterly Groundwater Monitoring Report, First Quarter 2000, for ARCO Service Station No. 2111, Located at 1156 Davis Street, San Leandro, California

Dear Mr. Supple:

IT Corporation (IT) is submitting the attached report, which presents the results of the first quarter 2000 groundwater monitoring program at ARCO Products Company (ARCO) Service Station No. 2111, located at 1156 Davis Street, San Leandro, California. The monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

Please call if you have questions.

Sincerely,

IT Corporation

Stephen Lofholm, R.G. 4793
Technical Coordinator

Attachment: Quarterly Groundwater Monitoring Report, First Quarter 2000

cc: Amir Gholami, ACHCSA
Mike Bakaldin, San Leandro Fire Department, Hazardous Materials Program

OAK\S:\ARCO\2111\QTRLY\2111Q100.DOC\uh:1

Date: June 9, 2000

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 2111 Address: 1156 Davis Street, San Leandro, California

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

Consulting Co./Contact Person: IT Corporation/Stephen Lofholm

Consultant Project No.: 803906

Primary Agency/Regulatory ID No.: ACHCSA

WORK PERFORMED THIS QUARTER (FIRST - 2000):

1. Prepared and submitted quarterly groundwater monitoring report for fourth quarter 1999.
2. Performed quarterly groundwater monitoring and sampling for first quarter 2000.
3. Analyzed groundwater samples for fuel oxygenates, as requested by ACHCSA.

WORK PROPOSED FOR NEXT QUARTER (SECOND - 2000):

1. Prepare and submit quarterly groundwater monitoring report for first quarter 2000.
2. Perform quarterly groundwater monitoring and sampling for second quarter 2000.
3. Perform monthly free product check and removal until product thickness diminishes to a sheen.
4. Submit report of High Vacuum Extraction Pilot Test.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring
Frequency of Sampling:	Quarterly: MW-1 through MW-7
Frequency of Monitoring:	Quarterly (groundwater)
Is Floating Product (FP) Present On-site:	☒ Yes ☐ No (0.03 ft in MW-7)
FP Recovered This Quarter:	None
Cumulative FP Recovered to Date:	0.381 gallons
Bulk Soil Removed to Date :	Unknown
Bulk Soil Removed This Quarter :	None
Water Wells or Surface Waters, within 2000 ft., impacted by site:	None
Current Remediation Techniques:	Free Product Bailing
Average Depth to Groundwater:	14.7 feet
Groundwater Flow Direction and Gradient (Average):	0.015 ft/ft toward West-Northwest

DISCUSSION:

- Free product was first observed in well MW-2 on June 25, 1999 and in well MW-7 on February 9, 2000. Free product is bailed on a regular basis when recoverable amounts accumulate in the wells (see Table 4).

- ARCO will transfer this project to another consultant. The new consultant will begin providing services during the second quarter 2000.

ATTACHMENTS:

- Table 1 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 2 - Groundwater Flow Direction and Gradient
- Table 3 - Fuel Oxygenates
- Table 4 - Approximate Cumulative Floating Product Recovered
- Figure 1 - Groundwater Analytical Summary Map
- Figure 2 - Groundwater Elevation Contour Map
- Appendix A - Sampling and Analysis Procedures
- Appendix B - Certified Analytical Reports and Chain-of-Custody Documentation
- Appendix C - Field Data Sheets

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Oakland, CA 94612-3023
Tel. 510.740.5800
Fax. 510.663.3315

the igroup

June 9, 2000
Project 803906

744

Reverend Sura D. Phoenix
First Christian Church
1190 Davis Street
San Leandro, California 94577

Re: Quarterly Groundwater Monitoring Results, First Quarter 2000, for
First Christian Church, Located at 1190 Davis Street, San Leandro, California

Dear Reverend Phoenix:

IT Corporation (IT) is submitting the attached laboratory analytical results on behalf of ARCO Products Company (ARCO) for the groundwater sample collected from well MW-5 during the first quarter of 2000. This well is located at the First Christian Church, 1190 Davis Street, San Leandro, California. The groundwater sample was collected during quarterly sampling of ARCO Service Station No. 2111, located at 1156 Davis Street, San Leandro, California.

Please call if you have questions.

Sincerely,

IT Corporation

Stephen Lofholm, R.G. 4793
Technical Coordinator

Attachments: Figure 1 - Generalized Site Plan
Appendix A - Copy of Certified Analytical Report and Chain-of-Custody Documentation

cc: Amir Gholami, ACHCSA
Paul Supple, ARCO Products Company
File

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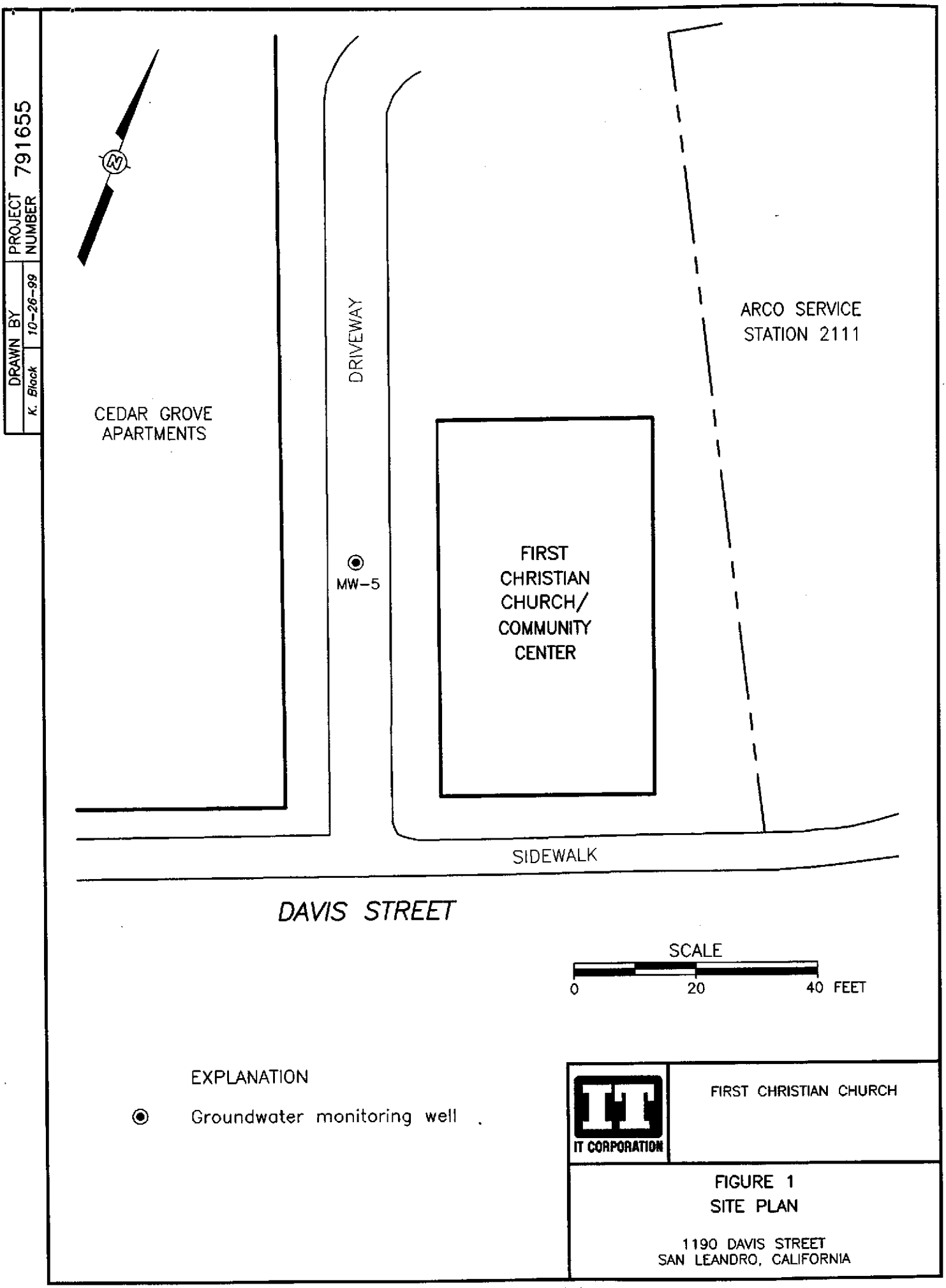

SANJOSE/CADD: N:\cad\DWG\PINACL\2111\Sjchurch.dwg Tue, 26/Oct/99 01:29pm kblack

APPENDIX A

COPY OF CERTIFIED ANALYTICAL REPORT, AND CHAIN-OF-CUSTODY DOCUMENTATION

Columbia Analytical Services INC.
An Employee-Owned Company

February 16, 2000

Service Request No.: S2000480

Mr. Glen Vanderveen
IT/EMCON
2201 Broadway, Suite 101
Oakland, CA 94612

RE: TO#24118.00/RAT#8/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on February 9, 2000. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 8, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 2352, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director

RECEIVED
FEB 2 2 2000
BY:_____

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	02/09/00
Sample Matrix:	Water	**Date Received:**	02/09/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-5(15')	Units:	ug/L (ppb)
Lab Code:	S2000480-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/09/00	92	
Benzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/09/00	0.8	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/09/00	1.0	
Methyl tert-Butyl Ether	EPA 5030	8021B	3	20	NA	02/10/00	7900	

Approved By: _____ Date: 02/17/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200209-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/09/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/09/00	ND	
Methyl *tert* -Butyl Ether	EPA 5030	8021B	3	1	NA	02/09/00	ND	

Approved By: _____ Date: 02/17/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200210-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/10/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/10/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	02/10/00	ND	

Approved By: _____ Date: 02/17/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000480
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8021B CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery a,a,a-Trifluorotoluene	Percent Recovery a,a,a-Trifluorotoluene
MW-5(15')	S2000480-001		99	96
BATCH QC	S2000472-001MS		97	105
BATCH QC	S2000472-001DMS		98	103
Lab Control Sample	S200209-LCS		97	94
Method Blank	S200209-WB1		99	99
Method Blank	S200210-WB1		100	104
CAS Acceptance Limits:			70-130%	70-130%

Approved By: _____ Date: 02/17/00

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	02/09/00

Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline

Sample Name:	BATCH QC	Units:	ug/L (ppb)
Lab Code:	S2000472-001MS, S2000472-001DMS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	EPA 5030	8021B	0.5	50	50	0.6	53	54	105	107	75-135	2
Toluene	EPA 5030	8021B	0.5	50	50	0.6	61	63	121	125	73-136	3
Ethylbenzene	EPA 5030	8021B	0.5	50	50	ND	54	56	108	112	69-142	4
Gasoline	EPA 5030	CA/LUFT	50	500	500	ND	490	520	98	104	75-135	6

Approved By: _____ Date: 02/17/00

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	02/09/00

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name:	Lab Control Sample	Units:	ug/L (ppb)
Lab Code:	S200209-LCS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	EPA 5030	8021B	50	49	98	75-135	
Toluene	EPA 5030	8021B	50	56	112	73-136	
Ethylbenzene	EPA 5030	8021B	50	50	100	69-142	
Gasoline	EPA 5030	CA/LUFT	500	430	86	75-135	

Approved By: _____ Date: 02/17/

LCS/020597p

ARCO Products Company Division of AtlanticRichfieldCompany — S2000480 — **Task Order No.** 24118.00 — **Chain of Custody**

ARCO Facility no. 2111	City (Facility) San Leandro	Project manager (Consultant) Glenn VanderVeen	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON/IT	Address (Consultant)		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 Enclose matrix	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
mw-5 (95')	2			X	(1)	X	HCL	2/9/00	1135		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest possible

Special QA/QC: As Normal. Please perform undiluted runs to maintain method detection limits for All wells.

Remarks: RAF 8 2-40 mL HCL VOAs mw- H803906

Lab number

Turnaround time

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

Condition of sample:

Temperature received: Due: 2/24/00 R11/D3-Y

	Date	Time		Date	Time
Relinquished by sampler	2/9/00	3:00	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APC-3292 (2-91)

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8021B* µg/L	Toluene EPA 8021B* µg/L	Ethylbenzene EPA 8021B* µg/L	Total Xylenes EPA 8021B* µg/L	MTBE EPA 8021B* µg/L	MTBE EPA 8260 µg/L	TRPH EPA 418.1 µg/L	TPHD LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-1	08-01-95	39.60	17.45	ND	22.15	08-01-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--		
MW-1	12-14-95	39.60	17.09	ND	22.51	12-14-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	03-21-96	39.60	14.72	ND	24.88	03-21-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	05-24-96	39.60	15.94	ND	23.66	05-24-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	08-09-96	39.60	17.89	ND	21.71	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	11-06-96	39.60	18.66	ND	20.94	11-06-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	03-24-97	39.60	16.13	ND	23.47	03-24-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	05-27-97	39.60	17.23	ND	22.37	05-28-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	08-07-97	39.60	18.68	ND	20.92	08-07-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	11-10-97	39.60	19.19	ND	20.41	11-10-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	02-16-98	39.60	12.61	ND	26.99	02-16-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	04-15-98	39.60	14.30	ND	25.30	04-15-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	07-24-98	39.60	16.40	ND	23.20	07-24-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	10-19-98	39.60	17.90	ND	21.70	10-19-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-1	01-28-99	39.60	16.85	ND	22.75	01-28-99	<20,000	580	<200	<200	320	14,000	--	--	--		
MW-1	06-25-99	39.60	17.35	ND	22.25	06-25-99	730	140	5	3	2	7,700	--	--	--	0.79	NP
MW-1	08-25-99	39.60	18.20	ND	21.40	08-25-99	390	66	8.5	<2.5	8.6	3,700	--	--	--	1.56	NP
MW-1	11-10-99	39.60	17.77	ND	21.83	11-10-99	360	70	13	2.2	13	980	--	--	--	0.30	NP
MW-1	02-09-00	39.60	16.25	ND	23.35	02-09-00	190	4.5	0.9	<0.5	12	3,500	--	--	--	0.53	NP
MW-2	08-01-95	37.99	15.67	ND	22.32	08-01-95	23,000	1,300	310	500	3,500	--	--	--	--		
MW-2	12-14-95	37.99	15.36	ND	22.63	12-14-95	7,300	900	25	180	1,000	<200	--	--	--		
MW-2	03-21-96	37.99	12.84	ND	25.15	03-21-96	9,600	850	30	280	1,400	250	--	--	--		
MW-2	05-24-96	37.99	14.03	ND	23.96	05-24-96	2,300	300	<5	73	310	<25	--	--	--		
MW-2	08-09-96	37.99	16.10	ND	21.89	08-09-96	2,800	290	6	75	320	50	--	--	--		

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8021B* µg/L	Toluene EPA 8021B* µg/L	Ethylbenzene EPA 8021B* µg/L	Total Xylenes EPA 8021B* µg/L	MTBE EPA 8021B* µg/L	[redacted] EPA 8260 µg/L	TRPH EPA 418.1 µg/L	TPHD LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-2	11-06-96	37.99	16.98	ND	21.01	11-06-96	750	76	<1	15	51	110	--	--	--		
MW-2	03-24-97	37.99	14.22	ND	23.77	03-24-97	790	18	<1	2	6	280	--	--	--		
MW-2	05-27-97	37.99	15.42	ND	22.57	05-28-97	750	14	<1	<1	10	150	--	--	--		
MW-2	08-07-97	37.99	16.92	ND	21.07	08-07-97	360	31	<2.5	<2.5	15	260	--	--	--		
MW-2	11-10-97	37.99	17.52	ND	20.47	11-10-97	1,300	82	<5	14	49	550	--	--	--		
MW-2	02-16-98	37.99	12.04	ND	25.95	02-16-98	<2,500	<25	<25	<25	<25	4,200	--	--	--		
MW-2	04-15-98	37.99	12.34	ND	25.65	04-15-98	<10,000	<100	<100	<100	<100	7,300	--	--	--		
MW-2	07-24-98	37.99	14.45	ND	23.54	07-24-98	<2,500	<25	<25	<25	<25	1,500	--	--	--		
MW-2	10-19-98	37.99	16.08	ND	21.91	10-19-98	<1,000	18	<10	<10	<10	1,100	--	--	--		
MW-2	01-28-99	37.99	15.59	0.02	22.41 [1]	01-28-99	160,000	3,000	24,000	4,400	31,000	23,000	--	--	--		
MW-2	06-25-99	37.99	19.20	3.73[4]	21.51 [1]	06-25-99	120,000	6,900	21,000	2,600	19,000	18,000	17,000[3]	--	--	0.49	NP
MW-2	08-25-99	37.99	16.49	0.02	21.51 [1]	08-25-99	92,000	2,200	16,000	3,200	19,000	11,000	9,400[3]	--	--	0.84	NP
MW-2	11-10-99	37.99	16.08	ND	21.91	11-10-99	56,000	2,400	5,900	1,500	10,000	17,000	21,000[3]	--	--	0.41	NP
MW-2	02-09-00	37.99	14.85	ND	23.14	02-09-00	1,700	270	14	17	21	70,000	55,000[3]	--	--	0.97	NP
MW-3	08-01-95	39.32	17.00	ND	22.32	08-01-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	600	76[2]		
MW-3	12-14-95	39.32	16.70	ND	22.62	12-14-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	<500	<50		
MW-3	03-21-96	39.32	14.17	ND	25.15	03-21-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	<500	<50		
MW-3	05-24-96	39.32	15.30	ND	24.02	05-24-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	<500	<50		
MW-3	08-09-96	39.32	17.58	ND	21.74	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	<500	--		
MW-3	11-06-96	39.32	18.33	ND	20.99	11-06-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	03-24-97	39.32	15.44	ND	23.88	03-24-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	05-27-97	39.32	16.75	ND	22.57	05-28-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	08-07-97	39.32	18.35	ND	20.97	08-07-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	11-10-97	39.32	18.83	ND	20.49	11-10-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	**TPHG** LUFT Method µg/L	**Benzene** EPA 8021B* µg/L	**Toluene** EPA 8021B* µg/L	**Ethylbenzene** EPA 8021B* µg/L	**Total Xylenes** EPA 8021B* µg/L	**MTBE** EPA 8021B* µg/L	**MTBE** EPA 8260 µg/L	**TRPH** EPA 418.1 µg/L	**TPHD** LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-3	02-16-98	39.32	11.99	ND	27.33	02-16-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	04-15-98	39.32	13.75	ND	25.57	04-15-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	07-24-98	39.32	15.90	ND	23.42	07-24-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	10-19-98	39.32	17.45	ND	21.87	10-19-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-3	01-28-99	39.32	16.40	ND	22.92	01-28-99	<100	14	4	<1	6	100	--	--	--		
MW-3	06-25-99	39.32	17.92	ND	21.40	06-25-99	83	9.0	1.4	<0.5	2.5	220	--	--	--	1.11	NP
MW-3	08-25-99	39.32	17.79	ND	21.53	08-25-99	240	41	12	3.7	9.9	160	--	--	--	1.13	NP
MW-3	11-10-99	39.32	17.37	ND	21.95	11-10-99	620	100	9.7	4.1	21	150	--	--	--	0.24	NP
MW-3	02-09-00	39.32	15.77	ND	23.55	02-09-00	<50	<0.5	0.7	<0.5	<1	180	--	--	--	0.62	NP
MW-4	08-01-95	38.10	15.65	ND	22.45	08-01-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--		
MW-4	12-14-95	38.10	15.35	ND	22.75	12-14-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	03-21-96	38.10	12.74	ND	25.36	03-21-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	05-24-96	38.10	14.03	ND	24.07	05-24-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	08-09-96	38.10	16.10	ND	22.00	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	11-06-96	38.10	17.00	ND	21.10	11-06-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	03-24-97	38.10	14.21	ND	23.89	03-24-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	05-27-97	38.10	15.38	ND	22.72	05-28-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	08-07-97	38.10	16.95	ND	21.15	08-07-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	11-10-97	38.10	17.53	ND	20.57	11-10-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	02-16-98	38.10	10.65	ND	27.45	02-16-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	04-15-98	38.10	12.20	ND	25.90	04-15-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	07-24-98	38.10	14.47	ND	23.63	07-24-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	10-19-98	38.10	16.20	ND	21.90	10-19-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-4	01-28-99	38.10	15.02	ND	23.08	01-28-99	340	52	5.5	<0.5	74	31	--	--	--		

Table 1
Historical Groundwater Elevation and Analytical Data
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ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	**TPHG** LUFT Method µg/L	**Benzene** EPA 8021B* µg/L	**Toluene** EPA 8021B* µg/L	**Ethylbenzene** EPA 8021B* µg/L	**Total Xylenes** EPA 8021B* µg/L	**MTBE** EPA 8021B* µg/L	MTBE EPA 8260 µg/L	**TRPH** EPA 418.1 µg/L	**TPHD** LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-4	06-25-99	38.10	15.57	ND	22.53	06-25-99	510	78	4.1	0.5	18	94	--	--	--	0.90	NP
MW-4	08-25-99	38.10	16.43	ND	21.67	08-25-99	660	130	21	6.4	39	110	--	--	--	1.01	NP
MW-4	11-10-99	38.10	16.02	ND	22.08	11-10-99	510	98	5.1	3.1	15	69	--	--	--	0.28	NP
MW-4	02-09-00	38.10	14.30	ND	23.80	02-09-00	<50	<0.5	0.9	<0.5	<1	55	--	--	--	0.67	NP
MW-5	03-21-96	37.21	12.60	ND	24.61	03-22-96	<50	<0.5	<0.5	<0.5	<0.5	82	--	--	--		
MW-5	05-24-96	37.21	13.71	ND	23.50	05-24-96	<50	<0.5	<0.5	<0.5	<0.5	7	--	--	--		
MW-5	08-09-96	37.21	15.60	ND	21.61	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	8	--	--	--		
MW-5	11-06-96	37.21	16.36	ND	20.85	11-06-96	<50	<0.5	<0.5	<0.5	<0.5	100	--	--	--		
MW-5	03-24-97	37.21	13.87	ND	23.34	03-24-97	<50	<0.5	<0.5	<0.5	<0.5	460	--	--	--		
MW-5	05-27-97	37.21	14.71	ND	22.50	05-28-97	<100	<1	<1	<1	<1	120	--	--	--		
MW-5	08-07-97	37.21	16.90	ND	20.31	08-07-97	<250	<2.5	<2.5	<2.5	<2.5	250	--	--	--		
MW-5	11-10-97	37.21	16.88	ND	20.33	11-10-97	<1,000	<10	<10	<10	<10	770	--	--	--		
MW-5	02-16-98	37.21	10.56	ND	26.65	02-16-98	<200	<2	<2	<2	<2	230	--	--	--		
MW-5	04-15-98	37.21	12.20	ND	25.01	04-15-98	<500	<5	<5	<5	<5	900	--	--	--		
MW-5	07-24-98	37.21	14.20	ND	23.01	07-24-98	<500	<5	<5	<5	<5	570	--	--	--		
MW-5	10-19-98	37.21	15.74	ND	21.47	10-19-98	<250	<2.5	<2.5	<2.5	<2.5	300	--	--	--		
MW-5	01-28-99	37.21	14.60	ND	22.61	01-28-99	<500	8	<5	<5	<5	290	--	--	--		
MW-5	06-25-99	37.21	15.10	ND	22.11	06-25-99	<50	<0.5	<0.5	<0.5	<0.5	1,300	--	--	--	0.76	NP
MW-5	08-25-99	37.21	15.91	ND	21.30	08-25-99	<50	<0.5	<0.5	<0.5	<0.5	6,700	--	--	--	0.98	NP
MW-5	11-10-99	37.21	15.52	ND	21.69	11-10-99	130	2.0	7.0	1.3	21	5,000	--	--	--	0.21	NP
MW-5	02-09-00	37.21	14.03	ND	23.18	02-09-00	92	<0.5	0.8	<0.5	1.0	7,900	--	--	--	0.51	NP
MW-6	03-21-96	37.11	11.55	ND	25.56	03-22-96	<50	<0.5	1.9	<0.5	<0.5	<3	--	--	--		
MW-6	05-24-96	37.11	12.80	ND	24.31	05-24-96	<50	<0.5	<0.5	<0.5	<0.5	6	--	--	--		

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Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	**TPHG** LUFT Method µg/L	**Benzene** EPA 8021B* µg/L	**Toluene** EPA 8021B* µg/L	**Ethylbenzene** EPA 8021B* µg/L	**Total Xylenes** EPA 8021B* µg/L	**MTBE** EPA 8021B* µg/L	**MTBE** EPA 8260 µg/L	**TRPH** EPA 418.1 µg/L	**TPHD** LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-6	08-09-96	37.11	Not surveyed			08-09-96	Not sampled: Car parked on well										
MW-6	11-06-96	37.11	Not surveyed			11-06-96	Not sampled: Car parked on well										
MW-6	03-24-97	37.11	13.06	ND	24.05	03-24-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	05-27-97	37.11	14.30	ND	22.81	05-28-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	08-07-97	37.11	16.40	ND	20.71	08-07-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	11-10-97	37.11	16.53	ND	20.58	11-10-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	02-16-98	37.11	Not surveyed			02-16-98	Not sampled: Car parked on well										
MW-6	04-15-98	37.11	10.95	ND	26.16	04-15-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	07-24-98	37.11	13.30	ND	23.81	07-24-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	10-19-98	37.11	Not surveyed			10-19-98	Not sampled: Car parked on well										
MW-6	01-28-99	37.11	13.92	ND	23.19	01-28-99	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--		
MW-6	06-25-99	37.11	15.47	ND	21.64	06-25-99	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	0.74	NP
MW-6	08-25-99	37.11	15.39	ND	21.72	08-25-99	<50	<0.5	3.4	0.6	3.7	<3	--	--	--	0.92	NP
MW-6	11-10-99	37.11	14.92	ND	22.19	11-10-99	<50	<0.5	<0.5	<0.5	<1	<3	--	--	--	0.31	NP
MW-6	02-09-00	37.11	13.30	ND	23.81	02-09-00	<50	<0.5	0.9	<0.5	1.3	<3	--	--	--	0.79	NP
MW-7	03-21-96	38.68	13.32	ND	25.36	03-22-96	32,000	870	450	970	4,900	280	--	--	--		
MW-7	05-24-96	38.68	14.58	ND	24.10	05-24-96	22,000	570	40	42	1,900	<200[2]	--	--	--		
MW-7	08-09-96	38.68	15.33	ND	23.35	08-09-96	14,000	390	<10	180	470	<200[2]	--	--	--		
MW-7	11-06-96	38.68	16.95	ND	21.73	11-06-96	9,500	440	<10	210	150	<100[2]	--	--	--		
MW-7	03-24-97	38.68	14.65	ND	24.03	03-24-97	6,400	420	<10	260	13	480	--	--	--		
MW-7	05-27-97	38.68	15.58	ND	23.10	05-28-97	5,000	420	<5	230	10	460	--	--	--		
MW-7	08-07-97	38.68	17.10	ND	21.58	08-07-97	3,900	350	<5	200	10	330	--	--	--		
MW-7	11-10-97	38.68	18.05	ND	20.63	11-10-97	5,600	590	10	370	43	540	--	--	--		
MW-7	02-16-98	38.68	12.03	ND	26.65	02-16-98	<5,000	390	<50	<50	61	4,300	--	--	--		

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1156 Davis Street, San Leandro, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Free Product Thickness feet	Groundwater Elevation ft-MSL	Water Sample Field Date	**TPHG** LUFT Method µg/L	**Benzene** EPA 8021B* µg/L	**Toluene** EPA 8021B* µg/L	**Ethylbenzene** EPA 8021B* µg/L	**Total Xylenes** EPA 8021B* µg/L	**MTBE** EPA 8021B* µg/L	**MTBE** EPA 8260 µg/L	**TRPH** EPA 418.1 µg/L	**TPHD** LUFT Method µg/L	Dissolved Oxygen mg/L	Purged/ Not Purged P/NP
MW-7	04-15-98	38.68	13.02	ND	25.66	04-15-98	<10,000	<100	<100	<100	<100	8,900	--	--	--		
MW-7	07-24-98	38.68	14.18	ND	24.50	07-24-98	5,800	180	<50	74	<50	4,200	--	--	--		
MW-7	10-19-98	38.68	15.99	ND	22.69	10-19-98	<2,500	54	<25	72	<25	3,000	--	--	--		
MW-7	01-28-99	38.68	15.69	ND	22.99	01-28-99	4,500	560	250	<50	94	6,200	--	--	--		
MW-7	06-25-99	38.68	15.36	ND	23.32	06-25-99	3,900	520	160	46	100	45,000	63,000[3]	--	--	0.56	NP
MW-7	08-25-99	38.68	16.71	ND	21.97	08-25-99	3,400	730	77	51	110	62,000	76,000[3]	--	--	0.90	NP
MW-7	11-10-99	38.68	16.76	ND	21.92	11-10-99	15,000	340	19	13	20	55,000	91,000[3]	--	--	0.37	NP
MW-7	02-09-00	38.68	14.45	0.03	24.25 [1]	02-09-00	Not sampled: free product present										

ft-MSL: elevation in feet, relative to mean sea level
TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
MTBE: Methyl tert-butyl ether
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
*: EPA method 8020 prior to 11/10/99
EPA: United States Environmental Protection Agency
µg/L: micrograms per liter
mg/L: milligrams per liter
ND: none detected
- -: not available or not analyzed
<: less than laboratory detection limit stated to the right
[1]: [corrected elevation (Z')] = Z + (h * 0.73) where: Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water
[2]: chromatogram fingerprint is not characteristic of diesel
[3]: also analyzed for fuel oxygenates
[4]: this value is suspected to be erroneous based on subsequent check by bailer (following day). See discussion

Table 2
Groundwater Flow Direction and Gradient

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Date Measured	Average Flow Direction	Average Hydraulic Gradient
08-01-95	NR	NR
12-14-95	West	0.002
03-21-96	West-Southwest	0.005
05-24-96	West	0.003
08-09-96	West-Northwest	0.01
11-06-96	West-Northwest	0.007
03-24-97	West	0.005
05-27-97	North-Northwest	0.006
08-07-97	West	0.009
11-10-97	West	0.002
02-16-98	South-Southwest	0.013
04-15-98	West-Southwest	0.014
07-24-98	Northwest	0.01
10-19-98	West	0.008
01-28-99	Southwest	0.01
06-25-99	North-Northwest	0.017
08-25-99	West-Northwest	0.005
11-10-99	West-Southwest	0.002
02-09-00	**West-Northwest**	**0.015**

NR: not recorded

Table 3
Fuel Oxygenates

ARCO Service Station 2111
1156 Davis Street, San Leandro, California

Well I.D. Number	Field Date	TBA EPA 8260 ug/L	MTBE EPA 8260 ug/L	DIPE EPA 8260 ug/L	ETBE EPA 8260 ug/L	TAME EPA 8260 ug/L
MW-2	06-25-99	<25,000	17,000	<2,500	<2,500	<2,500
MW-2	08-25-99	<10,000	9,400	<1,000	<1,000	<1,000
MW-2	11-10-99	<25,000	21,000	<2,500	<2,500	<2,500
MW-2	02-09-00	<50,000	55,000	<5,000	<5,000	<5,000
MW-7	06-25-99	<50,000	63,000	<5,000	<5,000	<5,000
MW-7	08-25-99	<50,000	76,000	<5,000	<5,000	<5,000
MW-7	11-10-99	<50,000	91,000	<5,000	<5,000	<5,000
MW-7	02-09-00	Not sampled: free product present				

TBA = Tert-butyl alcohol
MTBE = Methyl-tert-Butyl Ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tert-butyl ether
TAME = Tert-amyl methyl ether
EPA = Environmental Protection Agency
ug/L = Microgram per liter
< = less than laboratory detection limit to the right

Table 4
Approximate Cumulative Floating Product Recovered

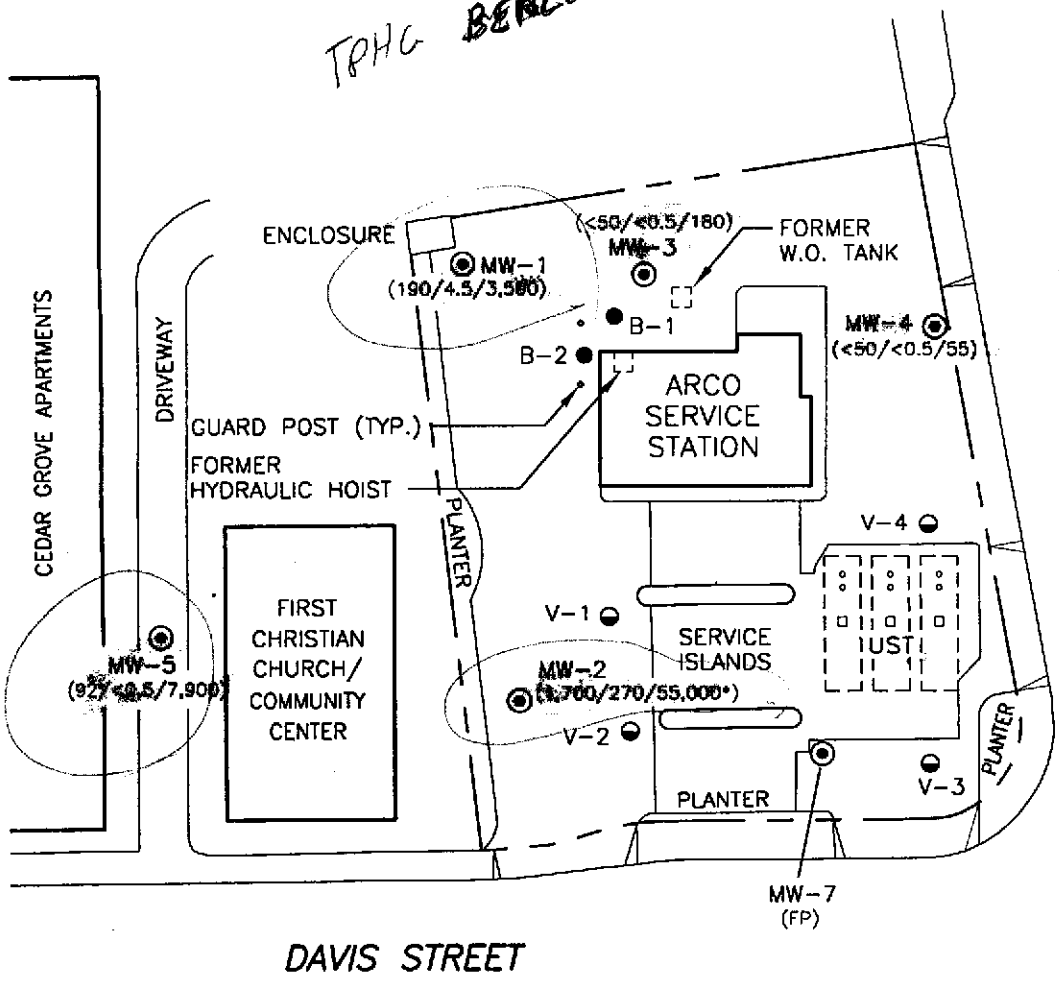
ARCO Service Station 2111
1156 Davis Street, San Leandro, California

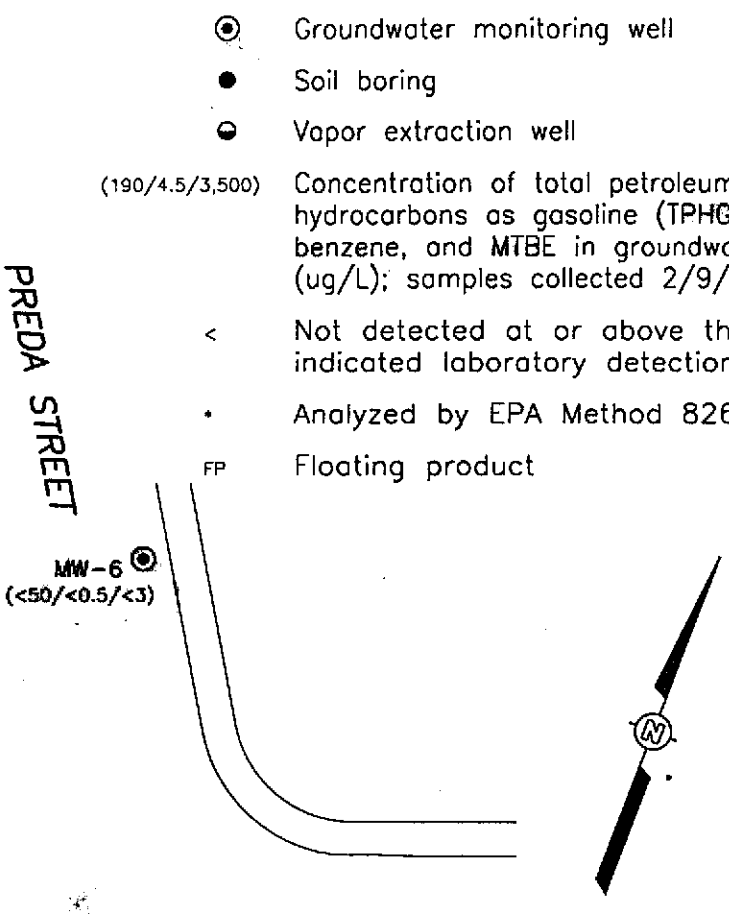
Well Desig-nation	Product Recovery Field Date	Floating Product Thickness (feet)	Floating Product Recovered (gallons)
MW-2	06/28/99	0.45	0.3
MW-2	06/30/99	0.015	0.01
MW-2	07/07/99	0.06	0.04
MW-2	07/23/99	0.008	0.005
MW-2	08/25/99	0.02	0.013
MW-2	09/21/99	0.01	0.013
MW-2	11/10/99	ND	0.00
MW-2	02/09/00	ND	0.00
MW-7	02/09/00	0.03	0.00
Cumulative Floating Product recoverd (gallons):			**0.381**

ND: not detected

DRAWN BY		PROJECT NUMBER
K. Block	3-29-00	803906

TPHG BENZENE MTBE





EXPLANATION

- ⊙ Groundwater monitoring well
- ● Soil boring
- ◒ Vapor extraction well
- (190/4.5/3,500) Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 2/9/00
- < Not detected at or above the indicated laboratory detection limit
- * Analyzed by EPA Method 8260
- FP Floating product

SCALE

0 40 80 FEET

IT CORPORATION

ARCO PRODUCTS COMPANY
SERVICE STATION 2111

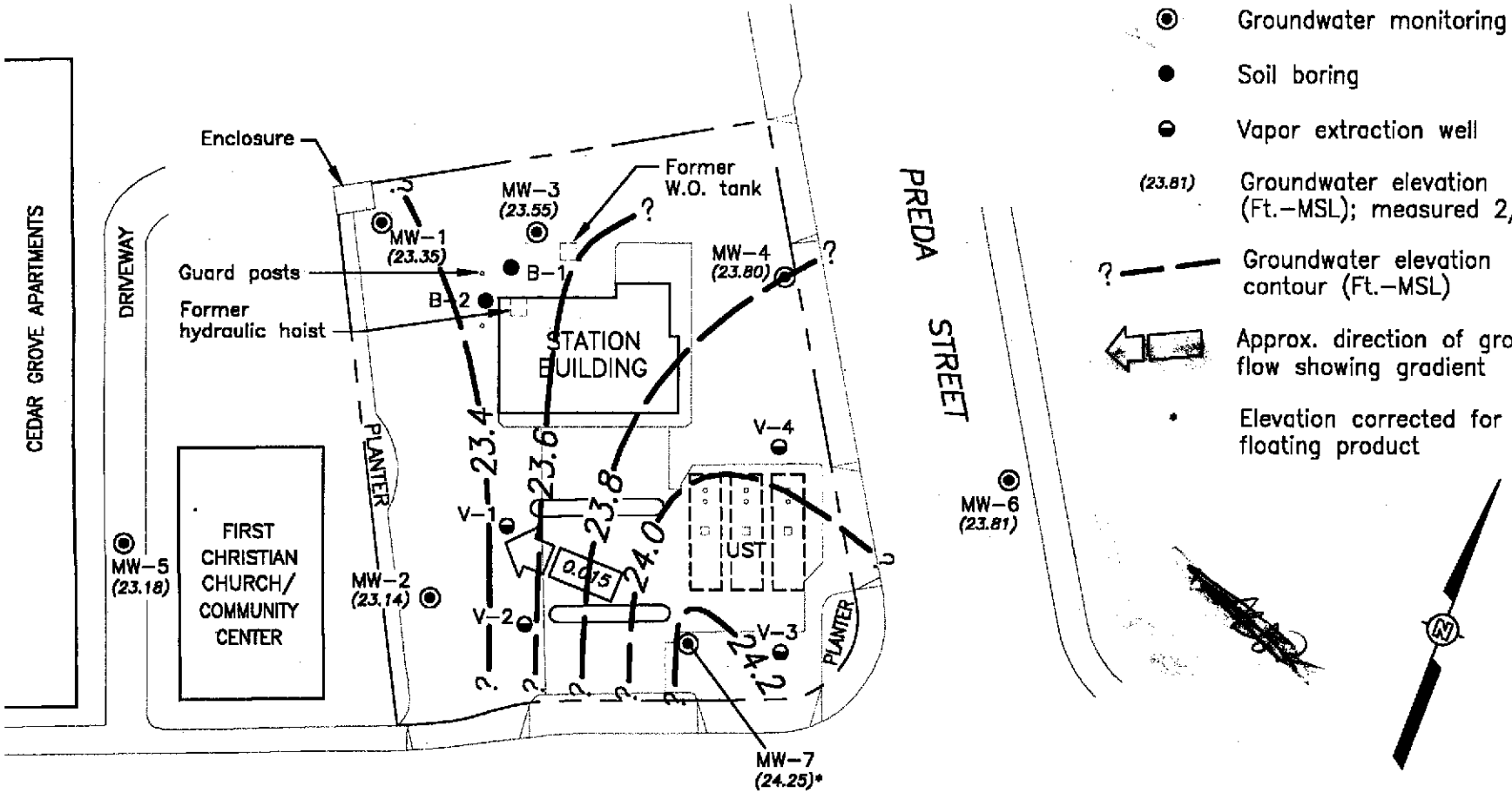
FIGURE 1

GROUNDWATER ANALYTICAL SUMMARY
FIRST QUARTER 2000

1156 DAVIS STREET
SAN LEANDRO, CALIFORNIA

/ N:\cad\DWG\PINACL\2111\2111chem.dwg Wed, 29/Mar/00 11:26am kblack

DRAWN BY		PROJECT NUMBER
K. Black	3-29-00	803906



EXPLANATION

- Groundwater monitoring well
- Soil boring
- Vapor extraction well
- (23.81) Groundwater elevation (Ft.–MSL); measured 2/9/00
- ? Groundwater elevation contour (Ft.–MSL)
- Approx. direction of groundwater flow showing gradient
- * Elevation corrected for floating product

SCALE

0 40 80 FEET

IT CORPORATION

ARCO PRODUCTS COMPANY
SERVICE STATION 2111

FIGURE 2
GROUNDWATER ELEVATION CONTOURS
FIRST QUARTER 2000
1156 DAVIS STREET
SAN LEANDRO, CALIFORNIA

N:\cad\DWC\PINACL\2111\2111qwc.dwg Wed, 29/Mar/00 11:42am kblack

APPENDIX A

SAMPLING AND ANALYSIS PROCEDURES

APPENDIX A

SAMPLING AND ANALYSIS PROCEDURES

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

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

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

Sample Collection

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

Equipment Cleaning

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

Water Level, Floating Hydrocarbon, and Total Well Depth Measurements

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

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

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

Well Purging

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

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

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

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

Well Sampling

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

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

Sample Preservation and Handling

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

Sample Containers and Preservation

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

Sample Handling

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

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

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

Sample Documentation

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

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

Field Logbook

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

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

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

Labels

Sample labels contained the following information:

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

Sampling and Analysis Chain-of-Custody Record

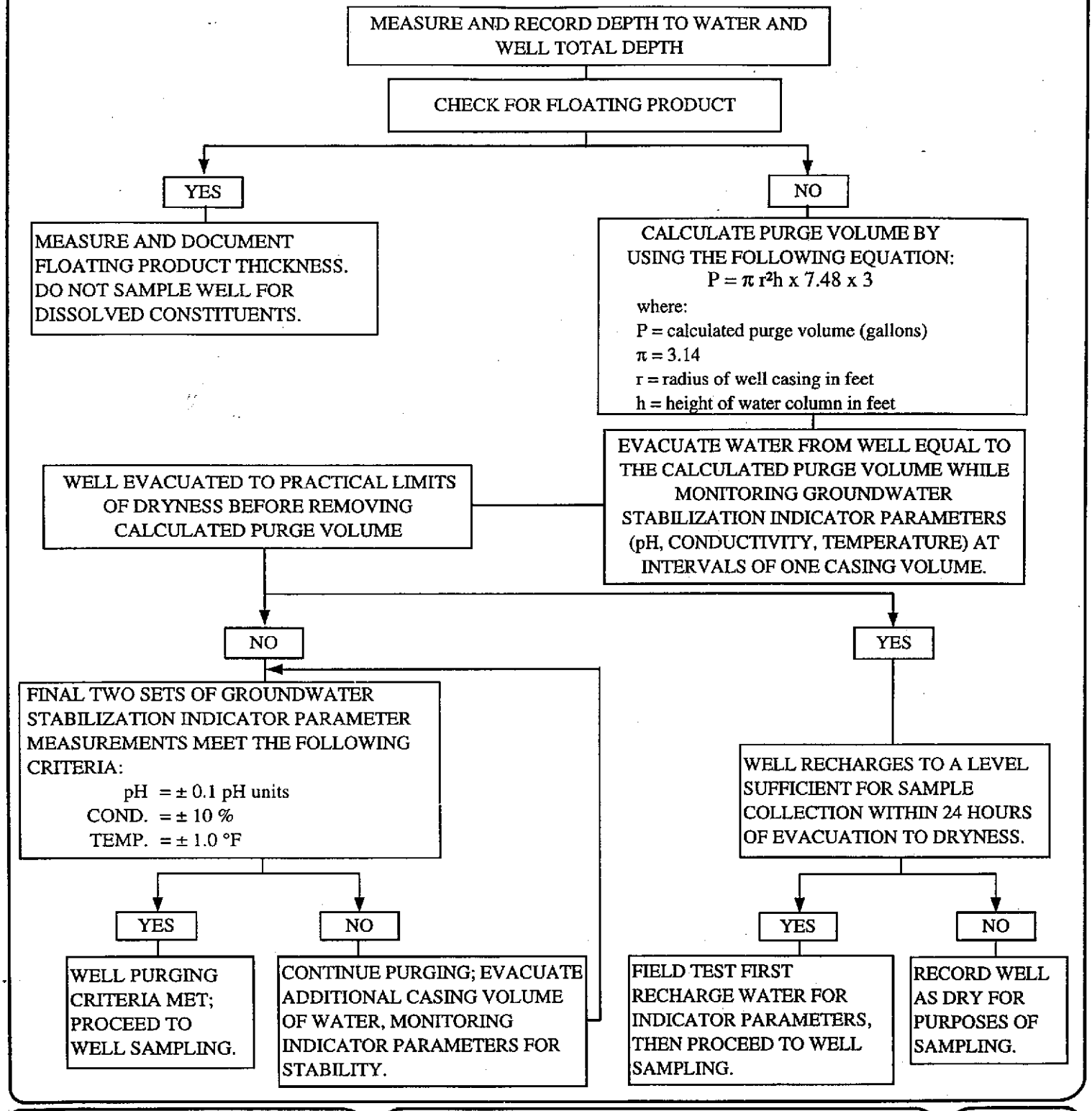
The ARCO chain-of-custody record initiated at the time of sampling contained, at a minimum, the sample designation (including the depth at which the sample was collected), sample type, analytical request, date of sampling, and the name of the sampler. The record sheet was signed, timed, and dated by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

Groundwater Sampling and Analysis Request Form

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

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

MONITORING WELL PURGING PROTOCOL



MONITORING WELL PURGING PROTOCOL

FIGURE
A-1

WATER SAMPLE FIELD DATA SHEET

PROJECT NO : _____ SAMPLE ID : _____

PURGED BY : _____ CLIENT NAME : _____

SAMPLED BY : _____ LOCATION : _____

TYPE: Groundwater _____ Surface Water _____ Leachate _____ Other _____

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

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

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

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

DATE PURGED : _____ END PURGE : _____

DATE SAMPLED : _____ SAMPLING TIME : _____

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

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

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

PURGING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Centrifugal Pump _____ Bailer (PVC)

_____ Submersible Pump _____ Bailer (Stainless Steel)

_____ Well Wizard™ _____ Dedicated

Other: _____

SAMPLING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Bomb Sampler _____ Bailer (Stainless Steel)

_____ Dipper _____ Submersible Pump

_____ Well Wizard™ _____ Dedicated

Other: _____

WELL INTEGRITY: _____ LOCK: _____

REMARKS: _____

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

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

Temperature °F _____

SIGNATURE: _____ REVIEWED BY: _____ PAGE _____ OF _____

WATER SAMPLE FIELD DATA SHEET

FIGURE A-2

IT - SACRAMENTO
GROUNDWATER SAMPLING AND ANALYSIS REQUEST FORM

PROJECT NAME :

SCHEDULED DATE :

SPECIAL INSTRUCTIONS / CONSIDERATIONS :

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

Well Lock Number (s)

☐ CHECK BOX TO AUTHORIZE DATA ENTRY

Site Contact: _____ Name _____ Phone #

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

Laboratory and Lab QC Istructions:

SAMPLING AND ANALYSIS REQUEST FORM

FIGURE A-3

APPENDIX B

CERTIFIED ANALYTICAL REPORTS, AND CHAIN-OF-CUSTODY DOCUMENTATION

Columbia Analytical Services INC.
An Employee-Owned Company

February 24, 2000

Service Request No.: S2000481

Mr. Glen Vanderveen
IT/EMCON
2201 Broadway, Suite 101
Oakland, CA 94612

RE: **TO#24118.00/RAT#8/2111 SAN LEANDRO**

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on February 9, 2000. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 16, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 2352, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-1(17)	Units:	ug/L (ppb)
Lab Code:	S2000481-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/10/00	190	
Benzene	EPA 5030	8021B	0.5	1	NA	2/10/00	4.5	
Toluene	EPA 5030	8021B	0.5	1	NA	2/10/00	0.9	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/10/00	12	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	20	NA	2/10/00	3500	

Approved By: _____ Date: 02/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-4(15)	Units:	ug/L (ppb)
Lab Code:	S2000481-002	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/9/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	2/9/00	0.9	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/9/00	ND	
Methyl *tert* -Butyl Ether	EPA 5030	8021B	3	1	NA	2/9/00	55	

Approved By: _____ Date: 02/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-3(16)	Units:	ug/L (ppb)
Lab Code:	S2000481-003	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/10/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	2/10/00	0.7	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/10/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	2/10/00	180	

Approved By: _____ Date: 02/24/00

1822/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-6(14)	Units:	ug/L (ppb)
Lab Code:	S2000481-004	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/9/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	2/9/00	0.9	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/9/00	1.3	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	2/9/00	ND	

Approved By: _____ Date: 02/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-2(15)	Units:	ug/L (ppb)
Lab Code:	S2000481-005	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	2	NA	2/10/00	1700	
Benzene	EPA 5030	8021B	0.5	2	NA	2/10/00	270	
Toluene	EPA 5030	8021B	0.5	2	NA	2/10/00	14	
Ethylbenzene	EPA 5030	8021B	0.5	2	NA	2/10/00	17	
Xylenes, Total	EPA 5030	8021B	1	2	NA	2/10/00	21	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	500	NA	2/10/00	70000	

Approved By: _____ Date: 02/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200209-WB2	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/9/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/9/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/9/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	2/9/00	ND	

Approved By: _____ Date: 2/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200210-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/10/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	2/10/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	2/10/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	2/10/00	ND	

Approved By: _____ Date: 12/24/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000481
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8021B CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery a,a,a-Trifluorotoluene	Percent Recovery a,a,a-Trifluorotoluene
MW-1(17)	S2000481-001		98	104
MW-4(15)	S2000481-002		102	88
MW-3(16)	S2000481-003		99	104
MW-6(14)	S2000481-004		101	88
MW-2(15)	S2000481-005		83	82
BATCH QC	S2000472-001MS		97	105
BATCH QC	S2000472-001DMS		98	103
Lab Control Sample	S200209-LCS		97	94
Method Blank	S200209-WB2		99	99
Method Blank	S200210-WB1		100	104
CAS Acceptance Limits:			70-130%	70-130%

Approved By: _____ Date: 02/24/00

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000481
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/9/00

Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S2000472-001MS, S2000472-001DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	EPA 5030	8021B	0.5	50	50	0.6	53	54	105	107	75-135	2
Toluene	EPA 5030	8021B	0.5	50	50	0.6	61	63	121	125	73-136	3
Ethylbenzene	EPA 5030	8021B	0.5	50	50	ND	54	56	108	112	69-142	4
Gasoline	EPA 5030	CA/LUFT	50	500	500	ND	490	520	98	104	75-135	6

Approved By: _____ Date: 02/24/00

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	2/9/00

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name:	Lab Control Sample	Units:	ug/L (ppb)
Lab Code:	S200209-LCS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	EPA 5030	8021B	50	49	98	75-135	
Toluene	EPA 5030	8021B	50	56	112	73-136	
Ethylbenzene	EPA 5030	8021B	50	50	100	69-142	
Gasoline	EPA 5030	CA/LUFT	500	430	86	75-135	

Approved By: _____ Date: 02/24/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	2/9/00
Sample Matrix:	Water	**Date Received:**	2/9/00

Fuel Oxygenates

Sample Name:	MW-2(15)	Units:	ug/L (ppb)
Lab Code:	S2000481-005	Basis:	NA
Test Notes:	C1		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
tert-Butyl Alcohol	EPA 5030A	8260	50	1000	NA	2/20/00	<50000	
Methyl *tert*-Butyl Ether	EPA 5030A	8260	0.5	1000	NA	2/20/00	55000	
Diisopropyl Ether	EPA 5030A	8260	5	1000	NA	2/20/00	<5000	
Ethyl *tert*-Butyl Ether	EPA 5030A	8260	5	1000	NA	2/20/00	<5000	
tert-Amyl Methyl Ether	EPA 5030A	8260	5	1000	NA	2/20/00	<5000	

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

Approved By: RT Date: 02/24/00

1S44/021397p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000481
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Fuel Oxygenates

Sample Name:	Method Blank (MS01)	Units:	ug/L (ppb)
Lab Code:	S200219-WB2	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
tert-Butyl Alcohol	EPA 5030A	8260	50	1	NA	2/19/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030A	8260	0.5	1	NA	2/19/00	ND	
Diisopropyl Ether	EPA 5030A	8260	5	1	NA	2/19/00	ND	
Ethyl *tert*-Butyl Ether	EPA 5030A	8260	5	1	NA	2/19/00	ND	
tert-Amyl Methyl Ether	EPA 5030A	8260	5	1	NA	2/19/00	ND	

Approved By: _____ Date: 12/24/00

1S44/021397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO=24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000481
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
Fuel Oxygenates

Prep Method: EPA 5030A
Analysis Method: 8260

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery		
			Dibromofluoromethane	Toluene-D8	4-Bromofluorobenzene
MW-2(15)	S2000481-005		119	104	92
BATCH QC	S2000474-009MS		126	107	92
BATCH QC	S2000474-009DMS		114	103	92
Method Blank (MS01)	S200219-WB2		114	105	95
CAS Acceptance Limits:			57-167	62-138	62-140

Approved By: _____ Date: 02/24/00

SUR3/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000481
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/20/00

Matrix Spike/Duplicate Matrix Spike Summary
Fuel Oxygenates

Sample Name: BATCH QC
Lab Code: S2000474-009MS, S2000474-009DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
1,1-Dichloroethene	EPA 5030A	8260	0.5	10	10	ND	8.1	7.5	81	75	62-145	8	
Benzene	EPA 5030A	8260	0.5	10	10	ND	8.1	8.0	81	80	77-127	1	
Trichloroethene	EPA 5030A	8260	0.5	10	10	ND	7.6	7.3	76	73	71-119	4	
Toluene	EPA 5030A	8260	0.5	10	10	ND	8.3	8.1	83	81	76-124	2	
Chlorobenzene	EPA 5030A	8260	0.5	10	10	ND	9.4	8.8	94	88	75-127	7	

Approved By: _____ Date: 02/24/02

DMS/020597p

ARCO Products Company — Chain of Custody

Division of AtlanticRichfieldCompany

S2000481 **Task Order No.** 24118.00

ARCO Facility no. 2111	City (Facility) San Leandro	Project manager (Consultant) Glenn Vander Veen	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9524
Consultant name EMCON/IT	Address (Consultant) 1921 Ringwood Ave, San Jose, CA 95131		Contract number

Method of shipment: Sampler will deliver

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Oxygenates by EPA 8260
MW-1 (17')		2	(1)	X		X	HCL	2/9/00	1105		X										
MW-4 (15')		2	(2)	X		X	HCL		1035		X										
MW-3 (16')		2	(3)	X		X	HCL		1050		X										
MW-6 (14')		2	(4)	X		X	HCL		1120		X										
MW-2 (15')		4/2	(5)	X		X	HCL	↓	1135		X										X
MW-7 (—)		4		X		X	HCL				X	No samples taken product in well									X

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Please perform undiluted runs to maintain method detection limits for all wells

Remarks: RAT-8

2-40mL HCL VOAs

MW-2 & MW-7 Fill 4-40m HCL

#803904

Lab number

Turnaround time

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

Condition of sample:

Temperature received: Due: 2/24/00 RU | D3-4

	Date	Time		Date	Time
Relinquished by sampler	2/9/00	3:00	Received by	2/9/00	3:00
Relinquished by			Received by		
Relinquished by			Received by laboratory		

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APC-3292 (2-91)

Columbia Analytical Services INC.
An Employee-Owned Company

February 16, 2000

Service Request No.: S2000480

Mr. Glen Vanderveen
IT/EMCON
2201 Broadway, Suite 101
Oakland, CA 94612

RE: **TO#24118.00/RAT#8/2111 SAN LEANDRO**

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on February 9, 2000. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 8, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 2352, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director

RECEIVED
FEB 2 2 2000
BY:

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	02/09/00
Sample Matrix:	Water	**Date Received:**	02/09/00

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-5(15')	Units:	ug/L (ppb)
Lab Code:	S2000480-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/09/00	92	
Benzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/09/00	0.8	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/09/00	1.0	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	20	NA	02/10/00	7900	

Approved By: _____ Date: 02/17/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200209-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/09/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/09/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/09/00	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8021B	3	1	NA	02/09/00	ND	

Approved By: _____ Date: 02/17/00

IS22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S2000480
Project:	TO#24118.00/RAT#8/2111 SAN LEANDRO	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S200210-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	02/10/00	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	02/10/00	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	02/10/00	ND	
Methyl *tert* -Butyl Ether	EPA 5030	8021B	3	1	NA	02/10/00	ND	

Approved By: _____ Date: 02/17/00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000480
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8021B CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery a,a,a-Trifluorotoluene	Percent Recovery a,a,a-Trifluorotoluene
MW-5(15')	S2000480-001		99	96
BATCH QC	S2000472-001MS		97	105
BATCH QC	S2000472-001DMS		98	103
Lab Control Sample	S200209-LCS		97	94
Method Blank	S200209-WB1		99	99
Method Blank	S200210-WB1		100	104
CAS Acceptance Limits:			70-130%	70-130%

Approved By: _____ Date: 02/17/00

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S2000480
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 02/09/00

Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S2000472-001MS, S2000472-001DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
Benzene	EPA 5030	8021B	0.5	50	50	0.6	53	54	105	107	75-135	2
Toluene	EPA 5030	8021B	0.5	50	50	0.6	61	63	121	125	73-136	3
Ethylbenzene	EPA 5030	8021B	0.5	50	50	ND	54	56	108	112	69-142	4
Gasoline	EPA 5030	CA/LUFT	50	500	500	ND	490	520	98	104	75-135	6

Approved By: _____ Date: 02/17/00

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/2111 SAN LEANDRO
LCS Matrix: Water

Service Request: S2000480
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 02/09/00

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S200209-LCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	EPA 5030	8021B	50	49	98	75-135	
Toluene	EPA 5030	8021B	50	56	112	73-136	
Ethylbenzene	EPA 5030	8021B	50	50	100	69-142	
Gasoline	EPA 5030	CA/LUFT	500	430	86	75-135	

Approved By: _____ Date: 02/17/

LCS/020597p

ARCO Products Company Division of AtlanticRichfieldCompany — S2000480 — **Task Order No.** 24118.00 — **Chain of Custody**

ARCO Facility no. 2111	City (Facility) San Leandro	Project manager (Consultant) Glenn VanderVeen	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON/IT	Address (Consultant)		Contract number

Method of shipment: Sampler will deliver

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW-5(45')		2		X	(1)	X	HCL	2/9/00	1135		X											

Special detection Limit/reporting: Lowest possible

Special QA/QC: As Normal (Please perform undiluted runs to maintain method detection Limits for all wells.)

Remarks: RAF 8 2-40 mL HCl VOAs MW-

H803906

Lab number

Turnaround time

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

Condition of sample:

Temperature received: Due: 2/24/00 R11/D3-Y

	Date	Time		Date	Time
Relinquished by sampler	2/9/00	5:00	Received by		
Relinquished by			Received by	2/9/00	5:00
Relinquished by			Received by laboratory		

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APC-3292 (2-91)

APPENDIX C

FIELD DATA SHEETS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 803906 STATION ADDRESS : 1156 Davis Street, San Leandro DATE : 2/9/00

ARCO STATION # : 2111 FIELD TECHNICIAN : John Fernandez DAY : Friday

DTW Order	WELL ID	Well Box Seal Condition	Type Of Well Lid	Gasket Present	Lock Number	Type Of Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-1	OIC	3/4"	YES	~~3490~~	LWC	16.25	16.25	NP	NR	26.0	Needs new Box
2	MW-4	OIC	3/4"	YES	3490	LWC	14.30	14.30			21.3	Needs new Box
3	MW-3	OIC	3/4"	YES	3490	LWC	15.77	15.77			26.5	Needs new Box
4	MW-6	OIC	9/16"	YES	3490	LWC	13.30	13.30			24.8	Needs new Box
5	MW-5	OIC	9/16"	YES	3616	LWC	14.03	14.03			23.0	
6	MW-2	OIC	3/4"	YES	3490	LWC	14.85	14.85	"	"	27.9	Needs new Box
7	MW-7	OIC	9/16"	YES	Dolphin	LWC	14.45	14.45	14.42	.03	26.4	Needs new Box

SURVEY POINTS ARE TOP OF WELL CASINGS

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BY:

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 803906 | SAMPLE ID : MW-1(17')

PURGED BY : ~~John Fernandez~~ MG | CLIENT NAME : ARCO #2111

SAMPLED BY : ~~John Fernandez~~ MG | LOCATION : San Leandro, California

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

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

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : NR

DEPTH OF WELL (feet) : 26.0 | CALCULATED PURGE (gal.) : ____

DEPTH OF WATER (feet) : 16.75 | ACTUAL PURGE VOL. (gal.) : NR

DATE PURGED : — | END PURGE : —

DATE SAMPLED : 2/9/00 | SAMPLING TIME : 1105

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1105	GRAB	6.55	703	65.6	clear	clear

OTHER: Dissolved Oxygen= 0.53 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

____ Submersible Pump ____ Bailer (Stainless Steel)

____ Well WizardÔ ____ Dedicated

Other ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well WizardÔ ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: 3903

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 87m

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 1 O 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 803906 | SAMPLE ID: MW-2(15')

PURGED BY: ~~John Fernandez~~ M.C | CLIENT NAME: ARCO #2111

SAMPLED BY: ~~John Fernandez~~ M.C | LOCATION: San Leandro, California

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

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

CASING ELEVATION (feet/MSL): N/A | VOLUME IN CASING (gal.): NR

DEPTH OF WELL (feet): 27.9 | CALCULATED PURGE (gal.): ____

DEPTH OF WATER (feet): 14.85 | ACTUAL PURGE VOL. (gal.): 0

DATE PURGED: — | END PURGE: —

DATE SAMPLED: 2/9/00 | SAMPLING TIME: 1155

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1155	GRAB	6.57	873	66.4	clear	Light

OTHER: Dissolved Oxygen= 0.97 | ODOR: moderate | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): Extra sample N/A taken @ this well.

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)
____ Bomb Sampler ____ Bailer (Stainless Steel)
____ Dipper ____ Submersible Pump
____ Well WizardÔ ____ Dedicated
Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: 3490

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 877

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 2 OF 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 803906 | SAMPLE ID : MW-3 (16')

PURGED BY : ~~John Fernandez~~ M.C | CLIENT NAME : ARCO #2111

SAMPLED BY : ~~John Fernandez~~ M.G | LOCATION : San Leandro, California

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

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

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : N/R

DEPTH OF WELL (feet) : 26.5 | CALCULATED PURGE (gal.) : ____

DEPTH OF WATER (feet) : 15.77 | ACTUAL PURGE VOL. (gal.) : ____

DATE PURGED : — | END PURGE : —

DATE SAMPLED : 2/9/00 | SAMPLING TIME : 1050

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1050	GRAB	6.45	699	66.4	Clear	Clear

OTHER: Dissolved Oxygen= 0.62 | ODOR: None | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
____ 2" Bladder Pump	____ Bailer (Teflon)	____ 2" Bladder Pump	____ Bailer (Teflon)
____ Centrifugal Pump	____ Bailer (PVC)	____ Bomb Sampler	____ Bailer (Stainless Steel)
____ Submersible Pump	____ Bailer (Stainless Steel)	____ Dipper	____ Submersible Pump
____ Well WizardÔ	____ Dedicated	____ Well WizardÔ	____ Dedicated
Other: ____		Other: Disposable Teflon Bailer	

WELL INTEGRITY: OK | LOCK: ~~3495~~

REMARKS: Oil Sample taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 897

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 3 O 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 803906 | SAMPLE ID : MW-4(15')

PURGED BY : ~~John Fernandez~~ MG | CLIENT NAME : ARCO #2111

SAMPLED BY : John Fernandez MG | LOCATION : San Leandro, California

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

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

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : LIR

DEPTH OF WELL (feet) : 21.3 | CALCULATED PURGE (gal.) : ↓

DEPTH OF WATER (feet) : 14.30 | ACTUAL PURGE VOL. (gal.) : ↓

DATE PURGED : — | END PURGE : —

DATE SAMPLED : 2-9-00 | SAMPLING TIME : 1035

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1035	GRAB	5.95	768	65.6	Clear	Clear

OTHER: Dissolved Oxygen=0.67 | ODOR: None | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
____ 2" Bladder Pump	____ Bailer (Teflon)	____ 2" Bladder Pump	____ Bailer (Teflon)
____ Centrifugal Pump	____ Bailer (PVC)	____ Bomb Sampler	____ Bailer (Stainless Steel)
____ Submersible Pump	____ Bailer (Stainless Steel)	____ Dipper	____ Submersible Pump
____ Well WizardÔ	____ Dedicated	____ Well WizardÔ	____ Dedicated
Other: ____		Other: Disposable Teflon Bailer	

WELL INTEGRITY: OK | LOCK: ARCO 3490

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: 1025 | Meter Serial No.: 87m

E.C. 1000 995/1000 | pH 7 738/700 | pH 10 1013/1000 | pH 4 372/400

Temperature °F 60.7

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 4 O 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 803906 | SAMPLE ID: MW-5 (15')

PURGED BY: ~~John Fernandez~~ M.G | CLIENT NAME: ARCO #2111

SAMPLED BY: ~~John Fernandez~~ M.G | LOCATION: San Leandro, California

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

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

CASING ELEVATION (feet/MSL): N/A | VOLUME IN CASING (gal.): N/R

DEPTH OF WELL (feet): 23.0 | CALCULATED PURGE (gal.): ____

DEPTH OF WATER (feet): 14.03 | ACTUAL PURGE VOL. (gal.): ____

DATE PURGED: — | END PURGE: —

DATE SAMPLED: 2/9/00 | SAMPLING TIME: 1135

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1135	6 HAB	6.62	705	66.1	Clear	Clear

OTHER: Dissolved Oxygen= 0.51 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
____ 2" Bladder Pump	____ Bailer (Teflon)	____ 2" Bladder Pump	____ Bailer (Teflon)
____ Centrifugal Pump	____ Bailer (PVC)	____ Bomb Sampler	____ Bailer (Stainless Steel)
____ Submersible Pump	____ Bailer (Stainless Steel)	____ Dipper	____ Submersible Pump
____ Well WizardÔ	____ Dedicated	____ Well WizardÔ	____ Dedicated
Other: ____		Other: Disposable Teflon Bailer	

WELL INTEGRITY: OK | LOCK: 3/50

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 87M

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 5 O 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 803906 | SAMPLE ID : MW-6(14)

PURGED BY : ~~John Fernandez~~ M.G | CLIENT NAME : ARCO #2111

SAMPLED BY : ~~John Fernandez~~ M.G | LOCATION : San Leandro, California

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

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

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 4.8

DEPTH OF WELL (feet) : 24.8 | CALCULATED PURGE (gal.) : ____

DEPTH OF WATER (feet) : 13.30 | ACTUAL PURGE VOL. (gal.) : 5

DATE PURGED : — | END PURGE : —

DATE SAMPLED : 2/9/00 | SAMPLING TIME : 1120

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1120	GRAB	6.57	794	66.9	Clear	Clear

OTHER: Dissolved Oxygen= 0.79 | ODOR: None | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

____ Submersible Pump ____ Bailer (Stainless Steel)

____ Well WizardÔ ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well WizardÔ ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: 3490

REMARKS: All samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 873

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE 6 OF 7

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 803906 | SAMPLE ID: MW-7 ( )
PURGED BY: John Fernandez | CLIENT NAME: ARCO #2111
SAMPLED BY: John Fernandez | LOCATION: San Leandro, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____
CASING DIAMETER (inches): 2 ____ 3 ____ 4 X 4.5 ____ 6 ____ Other ____

CASING ELEVATION (feet/MSL): N/A | VOLUME IN CASING (gal.): NR
DEPTH OF WELL (feet): 26.4 | CALCULATED PURGE (gal.): ____
DEPTH OF WATER (feet): 14.45 | ACTUAL PURGE VOL. (gal.): ✓

DATE PURGED: — | END PURGE: —
DATE SAMPLED: 2/9/00 | SAMPLING TIME: ~~1215~~ 1215

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
~~1215~~	~~NONE~~					
No Samples taken product in well						

OTHER: Dissolved Oxygen= ODOR: Strong | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
____ ~~2" Bladder Pump~~	____ Bailer (Teflon)	____ 2" Bladder Pump	____ Bailer (Teflon)
____ Centrifugal Pump	____ Bailer (PVC)	____ Bomb Sampler	____ Bailer (Stainless Steel)
____ Submersible Pump	____ ~~Bailer (Stainless Steel)~~	____ Dipper	____ Submersible Pump
____ Well WizardÔ	____ Dedicated	____ Well WizardÔ	____ Dedicated
Other:		Other: Disposable Teflon Bailer	

WELL INTEGRITY: OK | LOCK: 3490

REMARKS: All samples taken

pH, E.C., Temp. Meter Calibration: Date: 2/9/00 | Time: ____ | Meter Serial No.: 874
E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____
Temperature °F ____

SIGNATURE: [signature] REVIEWED BY: [signature] PAGE ~~3~~ 1 OF 7

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 24118.00

Chain of Custody

ARCO Facility no. 2119	City (Facility) San Leandro	Project manager (Consultant) Glenn Vander Veen	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON/IT	Address (Consultant) 1921 Ringwood Ave. San Jose. CA 95131		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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Oxygenates by EPA 8260
MW-1 (17')		2		X		X	HCL	2/9/00	1105		X										
MW-4 (15')		2		X		X	HCL		1035		X										
MW-3 (16')		2		X		X	HCL		1050		X										
MW-6 (14')		2		X		X	HCL		1120		X										
MW-2 (15')		4/2		X		X	HCL	↓	1135		X										X
MW-7 (—)		4		X		X	HCL				X	X/O samples taken product in well									X

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Please perform undiluted runs to maintain method detection limits for all wells.

Remarks: RAT-8

2-40ml HCL VOAs

MW-2 & MW-7 Fill 4-40ml HCL

#803906

Lab number

Method of shipment: Sampler will deliver

Turnaround time

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 2/9/00 Time 3:00	Received by	Date 2/9/00 Time 3:00
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APC-3292 (2-91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 24118.00

Chain of Custody

ARCO Facility no.	2111
City (Facility)	San Leandro
Project manager (Consultant)	Glenn VanderVeen
Laboratory name	CAS
ARCO engineer	Paul Supple
Telephone no. (ARCO)	
Telephone no. (Consultant)	(408) 453-7300
Fax no. (Consultant)	(408) 437-9526
Contract number	
Consultant name	Emcon/IT
Address (Consultant)	

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 (Include MTBE)	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 ☐		
mw-5(15')		2		X		X	HCL	2/9/00	1135		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest possible.

Special QA/QC: As Normal (please perform undiluted runs to maintain method detection limits for all analysis.)

Remarks: RAT 8
2-40 mL HCL VOAS
mw-
#803906

Lab number:

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

Condition of sample:			Temperature received:			
Relinquished by sampler: [signature]	Date 2/9/00	Time 3:00	Received by: [signature]	2/9/00	3:00	
Relinquished by	Date	Time	Received by: [signature]			
Relinquished by	Date	Time	Received by laboratory	Date	Time	

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
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