Pinnacle
ENVIRONMENTAL SOLUTIONS

a division of EMCON

August 6, 1998
Project 20805-118.012

Mr. Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: ARCO Station 276, 10600 Macarthur Boulevard, Oakland, California

Dear Mr. Chan:

This letter is sent by Pinnacle Environmental Solutions, a division of EMCON (Pinnacle), on behalf of ARCO Products Company (ARCO) in response to your June 15, 1998, letter to Kyle Christie of ARCO. In your letter you requested that wells MW-2 and MW-7 at the above-referenced site be sampled and analyzed for methyl tertiary butyl ether (MTBE) using EPA Method 8260 and for total petroleum hydrocarbons as gasoline (EPA Method 8015) and benzene, toluene, ethylbenzene, and total xylenes (EPA Method 8020). The analytical results you requested are provided herein.

Please contact me if you have any questions about the information provided in this letter, or if you require additional information for your site closure proceedings.

Sincerely,

Pinnacle

Glen VanderVeen
Project Manager

Attachment: Laboratory Report

MW-7 8200 / 45 MTBE
MW-2 <500 410 previously 1400 by 8020

cc: Kyle Christie, ARCO

SAC\C:\ARCO\276\08051181.DOC-96\???:1

Columbia Analytical Services INC.
An Employee-Owned Company

July 15, 1998 Service Request No.: S9801748

Glen Vanderveen
PINNACLE
144 A Mayhew Wy.
Walnut Creek, CA 94596

RE: 20805-120.008/TO#22312.00/RAT8/276 OAKLAND

Dear Mr. Vanderveen:

The following pages contain analytical results for sample(s) received by the laboratory on June 30, 1998. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above. To help expedite our service, please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 15, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

Please feel welcome to contact me should you have questions or further needs.

Sincerely,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

RECEIVED
JUL 17 1998
BY:

3334 Victor Court ▪ Santa Clara, CA 95054-2316 ▪ Telephone (408) 437-2400 ▪ Fax (408) 437-0356

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 subetance 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:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	6/30/98
Sample Matrix:	Water	**Date Received:**	6/30/98

BTEX and TPH as Gasoline

Sample Name:	MW-2(16')	Units:	ug/L (ppb)
Lab Code:	S9801748-001	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	10	NA	7/7/98	<500	M1
Benzene	EPA 5030	8020	0.5	10	NA	7/7/98	<5	M1
Toluene	EPA 5030	8020	0.5	10	NA	7/7/98	<5	M1
Ethylbenzene	EPA 5030	8020	0.5	10	NA	7/7/98	<5	M1
Xylenes, Total	EPA 5030	8020	0.5	10	NA	7/7/98	<5	M1

M1 The MRL was elevated because of matrix interferences.

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	6/30/98
Sample Matrix:	Water	**Date Received:**	6/30/98

BTEX and TPH as Gasoline

Sample Name:	MW-7(20')	**Units:**	ug/L (ppb)
Lab Code:	S9801748-002	**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	20	NA	7/4/98	8200	
Benzene	EPA 5030	8020	0.5	20	NA	7/4/98	<10	C1
Toluene	EPA 5030	8020	0.5	20	NA	7/4/98	<10	C1
Ethylbenzene	EPA 5030	8020	0.5	20	NA	7/4/98	110	
Xylenes, Total	EPA 5030	8020	0.5	20	NA	7/4/98	260	

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

1522/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980703-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	7/3/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	7/3/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	7/3/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	7/3/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	7/3/98	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980707-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	7/7/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	7/7/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	7/7/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	7/7/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	7/7/98	ND	

1522/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	6/30/98
Sample Matrix:	Water	**Date Received:**	6/30/98

EPA Method 8260
Volatile Organic Compounds

Sample Name:	MW-2(16')	Units:	ug/L (ppb)
Lab Code:	S9801748-001	Basis:	NA
Test Notes:	C1		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Methyl tert-Butyl Ether	NONE	8260	0.5	5	NA	7/14/98	410	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	6/30/98
Sample Matrix:	Water	**Date Received:**	6/30/98

EPA Method 8260
Volatile Organic Compounds

Sample Name:	MW-7(20')	Units:	ug/L (ppb)
Lab Code:	S9801748-002	Basis:	NA
Test Notes:	M1		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Methyl tert-Butyl Ether	NONE	8260	0.5	10	NA	7/14/98	<5	

M1 The MRL was elevated because of matrix interferences.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

EPA Method 8260
Volatile Organic Compounds

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980713-WB2	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Methyl tert-Butyl Ether	NONE	8260	0.5	1	NA	7/13/98	ND	

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-120.008/TO#22312.00/RAT8/276 OAKLAND
Sample Matrix: Water

Service Request: S9801748
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8020 CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery 4-Bromofluorobenzene	Percent Recovery a,a,a-Trifluorotoluene
MW-2(16')	S9801748-001		99	90
MW-7(20')	S9801748-002		98	98
BATCH QC	S9801780-001MS		88	114
BATCH QC	S9801780-001DMS		85	85
Method Blank	S980703-WB1		101	100
Method Blank	S980707-WB1		98	90
CAS Acceptance Limits:			69-116	69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-120.008/TO#22312.00/RAT8/276 OAKLAND
Sample Matrix Water

Service Request: S9801748
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 7/8/98

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S9801780-001MS, S9801780-001DMS
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
Gasoline	EPA 5030	CA/LUFT	50	250	250	180	380	400	80	88	75-135	5

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-120.008/TO#22312.00/RAT8/276 OAKLAND

Service Request: S9801748
Date Analyzed: 7/7/98

Initial Calibration Verification (ICV) Summary
BTEX and TPH as Gasoline

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: ug/L (ppb)
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	CAS Percent Recovery Acceptance Limits	Percent Recovery	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	250		90-110		
Benzene	EPA 5030	8020	25		85-115		
Toluene	EPA 5030	8020	25		85-115		
Ethylbenzene	EPA 5030	8020	25		85-115		
Xylenes, Total	EPA 5030	8020	75		85-115		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9801748
Project:	20805-120.008/TO#22312.00/RAT8/276 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	NA

Surrogate Recovery Summary
Volatile Organic Compounds

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	8260	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery		
			Pentafluorobenzene	Toluene-D8	4-Bromofluorobenzene
MW-2(16')	S9801748-001		96	106	97
MW-7(20')	S9801748-002		102	104	104
Method Blank	S980713-WB2		98	101	95
BATCH QC	S9801747-001MS		99	98	98
BATCH QC	S9801747-001DMS		99	99	101
CAS Acceptance Limits:			82-119	88-112	86-114

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-120.008/TO#22312.00/RAT8/276 OAKLAND
Sample Matrix: Water

Service Request: S9801748
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 7/13/98

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds

Sample Name: BATCH QC
Lab Code: S9801747-001MS, S9801747-001DMS
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	Result Notes
1,1-Dichloroethene	NONE	8260	0.5	10	10	ND	10	10	100	100	62-145	<1	
Benzene	NONE	8260	0.5	10	10	ND	11	11	110	110	77-127	<1	
Trichloroethene	NONE	8260	0.5	10	10	ND	10	11	100	110	71-119	10	
Toluene	NONE	8260	0.5	10	10	ND	9.5	9.8	95	98	76-124	3	
Chlorobenzene	NONE	8260	0.5	10	10	ND	9.0	8.8	90	88	75-127	2	
1,2-Dichlorobenzene	NONE	8260	0.5	10	10	ND	8.4	8.5	84	85	74-126	1	
Naphthalene	NONE	8260	2	10	10	ND	4.5	9.5	45	95	43-157	71	

TPHVOA PC F

ARCO Products Company
Division of Atlantic/Richfield Company

Task Order No. 22312.00

Chain of Custody

ARCO Facility no. 0276	City (Facility) Oakland	Project manager (Consultant) Glen Vanderveen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0452
Consultant name EMCON	Address (Consultant) 144-A Mayhew Way Walnut Creek, CA		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/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐	MTBE 8260
MW-2(40)	1	4 3-dl		X		X	HCL	6/30/98	1025		X										X
MW-7(20)	2	4 3-dl		X		X	HCL	↓	1045		X										X

Special Detection Limit/reporting: Lowest Possible

Method of shipment: Sampler will deliver

Special QA/QC: As Normal

Remarks: RAT 8
4-40ml HCL VOAs
#20805-120.00

Lab Number: 5980748

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 6/30/98 Time	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

RL1/D3