



744

DEC 26 2001

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

December 21, 2001

Mr. Amir Gholami, REHS
Hazardous Materials Specialist
Alameda County Health Care Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Handwritten notes: "Amir (12/26/01)" and "BAJ" with initials in a circle.

Subject: Schedule for Proposed Dual-Phase High Vacuum Pilot Test and Site Groundwater Remediation
ARCO Station No. 2111
1156 Davis Street
San Leandro, California
Delta Project No. D000-306

Dear Mr. Gholami:

On behalf of ARCO, Delta Environmental Consultants, Inc. (Delta) is presenting a schedule for the proposed 5-day high vacuum dual-phase extraction (HVDPE) test previously recommended in Delta's letter dated November 1, 2001. The test was originally scheduled to commence on December 17, 2001 and run through December 21, 2001. However, due to last minute and unforeseen circumstances that the equipment vendor (Solleco) experienced, the test had to be postponed. The test has been rescheduled to commence on January 7, 2002 and run through January 11, 2002.

To increase natural attenuation of dissolved petroleum hydrocarbons in the groundwater, an oxygen release compound (ORC[®] by Renesis Inc.) has been scheduled for installation in MW-1 and MW-5 during the month of December 2001. Impacted groundwater in MW-2 and MW-7 will continue to be addressed by monthly liquid phase hydrocarbons checks and bailing until the new HVDPE testing has been evaluated.

Due to the close proximity of the proposed HVDPE test scheduled for early January 2002, the fourth quarter 2001 pump-out event of MW-2 and MW-7, normally scheduled to occur in December 2001, has been rescheduled for the first quarter of 2002.

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

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Steven W. Meeks, P.E.
Project Manager

SWM (CL010.306.doc)
Attachments

cc: Mr. Paul Supple – ARCO
Mr. Mike Bakaldin – San Leandro Fire Department - HAZMAT Division



December 21, 2001

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

Mr. Robert Cave
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Subject: *Request for Approval of 5-Day Dual-Phase High Vacuum Pilot Test*
ARCO Station No. 2111
1156 Davis Street
San Leandro, California
Delta Project No. D000-306

Dear Mr. Cave:


At the request of ARCO, Delta Environmental Consultants, Inc. (Delta) is requesting your approval of a 5-day dual-phase high vacuum pilot test at the subject site (Figure 1). The test is being performed to obtain pertinent design information for a potential future remediation system. The test is scheduled to start on January 7, 2002 and run continuously for 5 days through January 11, 2002.

The test will consist of connecting a mobile dual-phase high vacuum thermal oxidizer unit up to existing under ground piping that terminates to wells V-2 and MW-7. The mobile unit consists of a Solleco 20 HP oil scaled 350 CFM MTS propane fired thermal oxidizer. Electricity will be supplied with a 45 KVA diesel powered generator. Depending upon daily test results, other wells may be tested during the event. Extracted soil vapors will be treated by the thermal oxidizer prior to atmospheric discharge. Extracted ground water will be stored on-site in a 21,000 gallon closed top Baker tank for disposal by an ARCO approved hauler. At a minimum, influent and effluent vapor samples will be collected at startup and at the conclusion of the test. Daily field readings will be collected by FID or PID calibrated to either methane or hexane. Vapor samples will be collected and submitted to a California-certified analytical laboratory for analyses of BTEX and TPH as gasoline using EPA methods 8020 and 8015 modified, respectively. Vapor flow rates will be measured daily.

If you have any questions regarding the information presented in this letter please contact me at (916) 536-2613.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.


Steven W. Meeka, PE
Project Manager

SWM (CL009.306)
Enclosures

cc: Mr. Paul Supple, ARCO
Mr. Mike Bakaldin – San Leandro Fire Department - HAZMAT Division
Mr. Amir Gholami – Alameda County Health Care Services Agency



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

May 3, 2000
Project 800032

744

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

ARCO

Re: High Vacuum Extraction Pilot Test Report for ARCO Service Station No. 2111,
Located at 1156 Davis Street, San Leandro, California

9/27/00

Dear Mr. Supple:

IT Corporation (IT) has prepared this letter to present the results of the High Vacuum Extraction (HVE) Pilot Test, conducted at ARCO Service Station No. 2111, located at 1156 Davis Street, San Leandro, California (Figure 1). The HVE Pilot Test was conducted from November 15 to November 19, 1999. The objective of the Test was to assess HVE as a remedial alternative for ARCO Service Station No. 2111, and other sites with similar lithology. Additionally, the HVE Pilot Test was conducted to provide five days interim petroleum hydrocarbon mass removal. The HVE system is designed to extract both soil vapors and groundwater. Dewatering the formation to expose previously saturated sediments to a vacuum enhances soil vapor extraction. Following is a description of the test, an evaluation of the collected data, conclusions, and recommendations.

DESCRIPTION

EnviroSupply & Service was retained to provide the equipment and instrumentation to conduct the HVE Pilot Test. A 5-horsepower high vacuum pump was used to extract petroleum hydrocarbon-laden soil vapors and groundwater from monitoring well MW2. The extracted soil vapors were abated using a 100-cubic feet per minute (cfm) catalytic oxidizer. A 40-kilowatt diesel generator was used to power the pump and oxidizer. Five 550-gallon Baker tanks were used for storing the extracted groundwater.

As the test was designed, the highest possible vacuum, approximately 100 inches of H₂O, was applied to MW2 (Figure 2). However, due to higher than anticipated water production rates from MW2 and the limitations of the knockout tank transfer pump, the applied vacuum was decreased to 62.5 inches of H₂O. This vacuum was maintained for the duration of the test. After the test was completed, the vacuum was increased to extract additional groundwater to fill the remaining capacity in the Baker tanks.

The oxidizer was configured to maintain a 600°F minimum operating temperature to abate the petroleum hydrocarbon vapors. Dilution air was adjusted as necessary to prevent a high temperature shutdown. The oxidizer influent and effluent air streams were periodically measured for petroleum hydrocarbon concentration to assess destruction efficiency, using a Photo-Ionization Detector (PID).

Extracted groundwater and vapor samples were collected for chemical analysis at predetermined intervals from the remediation system to assess the site and system performance. Refer to Table 1 and Table 3 for sample intervals. All samples were analyzed by Columbia Analytical Services (CAS), a state-certified laboratory, for TPHg by EPA Method 8015M, BTEX by EPA Method 8021B, and fuel oxygenates by EPA Method 8260 (groundwater only). Extracted groundwater was monitored for electrical conductivity, pH, and dissolved oxygen in the field.

Depth-to-Water (DTW) and induced vacuum were measured during the test to determine the influence of the applied vacuum. Monitoring wells MW1, V1, V2, V3, and V4 were equipped with magnehelic gauges for measuring induced vacuum. DTW measurements were collected from monitoring wells MW1, MW3, MW4, MW7, V1, V2, V3, and V4. The wellhead connection for the HVE system prevented MW2 DTW monitoring during the test; therefore, MW2 well recovery information was collected instead.

DATA EVALUATION

Liquid Phase

Six extracted groundwater samples were collected over the five-day test period. Two samples were collected on the first day, just after startup and at the end of the day. One sample was collected daily thereafter. Table 1 presents the analytical results of the extracted groundwater samples. Additionally, Table 1 shows analytical results from the MW2 fourth quarter 1999 sampling event (used as a baseline) and the MW2 first quarter 2000 sampling event (used to gauge effectiveness).

The analytical results show that concentrations of petroleum hydrocarbons exhibit a decreasing trend through the duration of the test. However, petroleum hydrocarbon concentrations increased slightly in the groundwater sample from GW6 collected during the final day of the test. This increase may be attributed to the variability of petroleum hydrocarbon concentrations in the groundwater, or may indicate the radius of influence intercepted a zone of higher petroleum hydrocarbon concentrations.

Analytical results from the first quarter 2000 sampling event indicate that TPHg and BTEX concentrations remain consistent with the concentrations measured at the end of the test. However, MtBE and tBA concentrations increased above the baseline concentrations. This increase may be attributed to the affinity of both constituents for the liquid-phase (high water solubility, low retardation factor), and the mobilization of the constituents in groundwater during the HVE Pilot Test. Furthermore, a sheen of free product was observed in MW7 during the first quarter 2000 sampling event.

Mass removal was calculated using the extracted groundwater analytical data and the extracted volume of groundwater between sampling periods. Mass removed, in pounds, was calculated using the following equation:

$$\text{Mass, lbs} = (\text{Concentration, ug/L})(10^{-6} \text{ g/ug})(2.2 \times 10^{-3} \text{ lbs/g})(3.785 \text{ L/gal})(\text{Volume, gal})$$

Table 2 presents the mass removal data. The mass removal rate does not exhibit a similar decreasing trend as the concentration data due to the variations in the extracted water rate. The constant applied vacuum did not produce a constant groundwater extraction flow rate. The total mass removed from the liquid phase by the HVE Pilot Test system was 0.262 lbs, 0.117 lbs, 0.195 lbs, and 0.183 lbs of TPHg, BTEX, MtBE, and tBA, respectively.

On December 7, 1999, a Vac Truck was used to off-haul and dispose of the extracted groundwater stored in the Baker tanks. After emptying the Baker tanks, the Vac truck was used to extract additional groundwater from MW2 and MW7, until the truck reached its capacity. An estimated 1400-gallons of water was extracted from the two wells. Table 2 includes a mass removal calculation for this event. Analytical results from the last groundwater sample (GW6) are used for this calculation.

Vapor Phase

Six influent vapor samples were collected over the five-day test period. Two samples were collected on the first day, just after startup and at the end of the day. One sample was collected daily thereafter. Table 3 presents the analytical results of the influent samples.

Analytical results of these vapor samples show a similar trend to the groundwater data with decreasing concentrations and a slight increase on the last day. As previously discussed, this increase may be attributed to the variability of petroleum hydrocarbon concentrations in the extracted vapor over the last days of the test, or may signify the beginning of test influence on a discrete area of contamination.

Mass removal was calculated using the extracted vapor analytical data, and the associated air flow and time between sampling periods. Mass removed, in pounds, was calculated using the following equation:

$$\text{Mass, lbs} = [(\text{Flow, cfm})(\text{Concentration, ppmv})(\text{MW, g/mole})(\text{Time, min})(28.3 \text{ L/cf})] / [(10^6)(24.45 \text{ moles/L})(453.6 \text{ g/lb})]$$

Table 4 presents the mass removal data. The mass removal does not reflect the same decreasing trend as the concentration data due to the variable air flow rate and time interval between samples. The air flow rate will vary with the varying rate of extracted groundwater. The total mass removed from the vapor phase by the HVE Pilot Test system was 34.6 lbs, 2.73 lbs, and 0.828 lbs of TPHg, BTEX, and MtBE, respectively.

Influence Monitoring

Table 5 presents the monitoring well data. Most of the data showed negligible influence (vacuum pressure) from the applied vacuum on MW2. Monitoring wells V1 and V2 were within the closest proximity of MW2. V1 never showed any influence. V2 showed no influence until the fourth day of the test when 0.7 inches of mercury (Hg) vacuum was observed. V3 showed the only considerable influence with daily induced vacuum measurements of 0.5, 1.35, 1.6, and 1.3 inches of Hg.

No significant change of depth-to-water in the monitoring wells was observed. Additionally, rainfall during the test may have effected observable water elevation changes. No significant change of depth-to-water in MW2 during recovery was observed.

CONCLUSIONS

Mass Removal

The HVE system removed 34.9, 2.85, and 1.02 pounds of TPHg, BTEX, and MtBE, respectively. As suggested by Tables 2 and 4, soil vapor extraction is a more efficient means of extracting petroleum hydrocarbons than groundwater extraction. Furthermore, the cost of storing, treating, and disposing the extracted groundwater exceeds the cost of operating the catalytic oxidizer on an equivalent extracted mass basis.

HVE System

As previously discussed, higher than anticipated water production from MW2 was experienced during the HVE Pilot Test. Figure 3 presents a geologic cross section (A-A') from an EMCON Soil and Water Investigation (9/16/1996). Although the formation is mostly clay, this cross section shows a sand lens at the bottom of MW2. This sand lens may be a source of groundwater recharge to MW2.

HVE systems are typically used for remediating low permeability formations with limited groundwater. The high vacuum dewateres the area, which enhances soil vapor extraction. However, if the formation does not dewater, then a HVE system becomes inefficient and not cost-effective. The high vacuum is expended dewatering the formation, limiting soil vapor extraction.

The observation well monitoring data suggests that soil vapor extraction only occurred within close proximity of the test well, which may be attributed to the additional energy required from the blower to dewater the area. With the high recharge rates at MW2, the blower is primarily utilized as a groundwater pump, at an excessive capital and energy cost relative to using a groundwater pump. Additionally, the higher groundwater production rates complicate design issues and increase costs substantially for storage, treatment, and disposal. The results of this HVE test indicate that the HVE system is neither an efficient or cost-effective remedial alternative for the site.

RECOMMENDATIONS

Based on the data collected during the HVE Pilot Test and the first quarter 2000 monitoring event, IT recommends continued monitoring to assess the extent of contamination and the effect of the HVE Pilot Test. Furthermore, IT recommends interim remediation by quarterly batch extraction from monitoring well MW2 and/or MW7 using a Vac truck, if the data from continued monitoring warrants.

450- 100°
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DKA

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219

1145
865
755
390

Mr. Paul Supple
May 3, 2000
Page 6

Project 800032

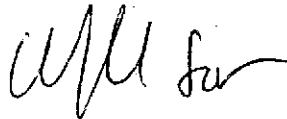
If you have any questions, please call Dan Lescure at (510) 740-5800.

Sincerely,

IT Corporation



Dan Lescure
Project Engineer



Stephen Lofholm, R.G.
Project Manager

Attachments: Table 1 Extracted Groundwater Analytical Data
Table 2 Mass Removal from Groundwater
Table 3 Extracted Vapor Analytical Data
Table 4 Mass Removal from Vapor Phase
Table 5 Field Data Sheet-Monitoring Well Data
Figure 1 Site Location
Figure 2 Site Plan
Figure 3 EMCON Geologic Cross Section A-A'
Appendix A Certified Analytical Reports and Chain-of-Custody Documentation
Appendix B Field Data Sheets

cc: Mr. Amir Gholami, Alameda County Health Care Services Agency
Mr. Robert Cave, Bay Area Air Quality Management District
Mr. Steve Meeks, Delta Environmental

Table 1
High Vacuum Extraction Pilot Test
Extracted Groundwater Analytical Data

ARCO Service Station No. 2111
1156 Davis Street, San Leandro, California

Date (mm/dd/yy)	Sample No. (ID#)	TPHg (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylene (ug/L)	MtBE ¹ (ug/L)	tBA ² (ug/L)
11/10/99	MW2 ³	56000	2400	5900	1500	10000	21000	<25000
11/15/99	GW1	33000	1300	4500	890	4700	18000	<25000
11/15/99	GW2	30000	14000	1200	4400	760	14000	<10000
11/16/99	GW3	5500	260	620	74	980	5700	<5000
11/17/99	GW4	4700	200	500	38	830	3700	410
11/18/99	GW5	230	5.2	18	2.9	46	2100	340
11/19/99	GW6	1500	36	120	28	160	3100	<2500
02/09/00	MW2 ⁴	1700	270	14	17	21	55000	<50000

¹ MtBE and tBA analysis by EPA Method 8260
² tBA MRL was elevated due to high MtBE concentration requiring sample dilution
³ 11/10/99 data from 1999 4th Quarter Sampling Event (Baseline)
⁴ 02/09/99 data from 2000 1st Quarter Sampling Event

Table 2
High Vacuum Extraction Pilot Test
Mass Removal from Groundwater

ARCO Service Station No. 2111
1156 Davis Street, San Leandro, California

Date (mm/dd/yy)	Volume (gal)	Sample No. (ID#)	TPHg (lbs) ¹	Benzene (lbs)	Toluene (lbs)	Ethylbenzene (lbs)	Xylene (lbs)	MtBE ¹ (lbs)	tBA ² (lbs)
11/15/99	395.2	GW1	0.109	0.004	0.015	0.003	0.015	0.059	0.082
11/16/99	346.3	GW2	0.087	0.040	0.003	0.013	0.002	0.040	0.029
11/17/99	631.5	GW3	0.029	0.001	0.003	0.000	0.005	0.030	0.026
11/18/99	281.1	GW4	0.011	0.000	0.001	0.000	0.002	0.009	0.001
11/19/99	77.4	GW5	0.000	0.000	0.000	0.000	0.000	0.001	0.000
11/19/99	757.8	GW6	0.009	0.000	0.001	0.000	0.001	0.020	0.016
12/07/99	1400	GW6	0.017	0.000	0.001	0.000	0.002	0.036	0.029
Total	3889		0.262	0.047	0.025	0.017	0.028	0.195	0.183

MtBE and tBA analysis by EPA Method 8260
¹ tBA MRL was elevated due to high MtBE concentration requiring sample dilution
Mass, lbs = (Concentration, ug/L)(10⁻⁶ g/ug)(2.2x10⁻³ lbs/g)(3.785 L/gal)(Volume, gal)
12/07/99: Extracted 1400-gallons from MW2 and MW7 by Vac Truck

Table 3
High Vacuum Extraction Pilot Test
Extracted Vapor Analytical Data

ARCO Service Station No. 2111
1156 Davis Street, San Leandro, California

Date (mm/dd/yy)	Sample No. (V#)	TPHg (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylene (ppmv)	MtBE (ppmv)
11/15/99	V1	1900	21	58	12	44	58
11/15/99	V2	2200	24	69	14	51	61
11/16/99	V3	1400	13	48	10	37	50
11/17/99	V4	760	3.4	23	5.5	20	28
11/18/99	V5	590	7.8	22	4.8	18	31
11/19/99	V6	830	7.2	29	7.1	25	NA

Analysis by EPA Method 8015M and 8020

Table 4
High Vacuum Extraction Pilot Test
Mass Removal from Vapor

ARCO Service Station No. 2111
1156 Davis Street, San Leandro, California

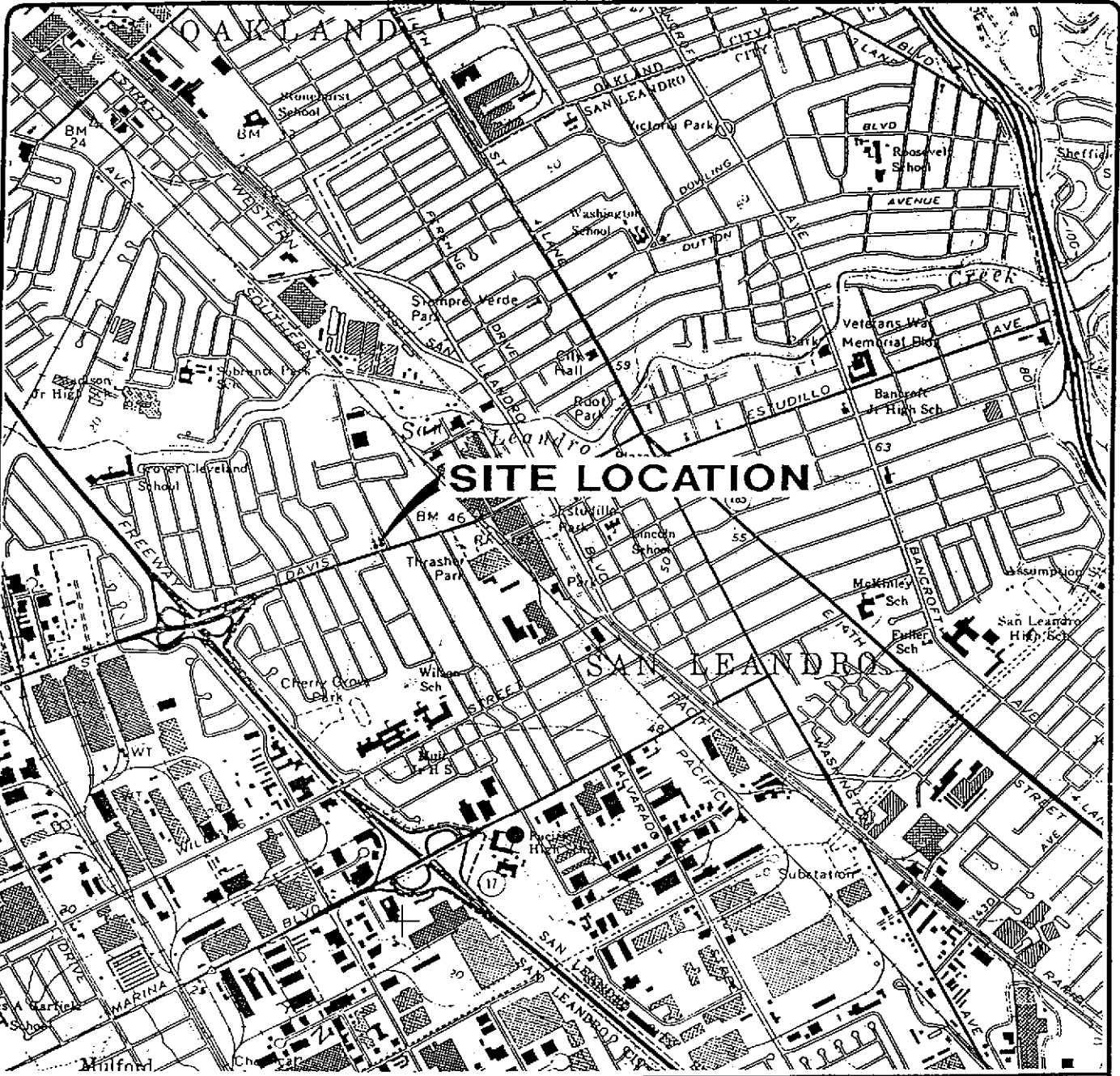
Date (mm/dd/yy)	Air Flow (cfm)	TPHg (lbs) ¹	Benzene (lbs)	Toluene (lbs)	Ethylbenzene (lbs)	Xylene (lbs)	MtBE (lbs)
11/15/99	22	1.06	0.010	0.031	0.008	0.028	0.030
11/15/99	23.5	4.51	0.040	0.137	0.032	0.117	0.116
11/16/99	10.9	3.00	0.023	0.100	0.024	0.089	0.099
11/17/99	30	9.78	0.036	0.287	0.079	0.288	0.335
11/18/99	32	5.08	0.055	0.184	0.046	0.173	0.248
11/19/99	32	11.2	0.080	0.379	0.107	0.377	NA
Total		34.6	0.244	1.12	0.296	1.07	0.828

Mass, lbs = [(Flow, cfm)(Concentration, ppmv)(g/mole)(Time, min)(28.3 L/cf)] / [(10⁶)(24.45 moles/L)(453.6 g/lb)]
 where MW, g/mole: TPHg (C6-C12) = 95; Benzene = 78.1; Toluene = 92.1; Ethylbenzene = 106.2; Xylene = 106.2; MtBE = 88.2

Table 5
High Vacuum Extraction (HVE) Pilot Test
Field Data Sheet-Monitoring Well Data

ARCO Service Station No. 2111
1156 Davis Street, San Leandro, California

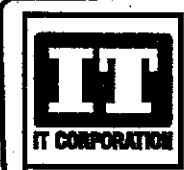
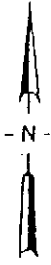
Time (mins)	MW1		MW3	MW4	MW7	V1		V2		V3		V4
	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	DTW (ft bgs)	DTW (ft bgs)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)
11/15/99												
0	17.8		17.2	16	16.5	17	0	16.2	0	16	0	16.5
15						17	0	16.2	0	16	0	
30						17	0	16.2	0	15.9	0	
60						17	0	16.2	0	15.9	0	
120						17	0	16.2	0	15.9	0	
240						17	0	16.2	0	16	0	
480												
11/16/99	17.9		17.5	16.1	16.5	17	0	16.2	0	16	0.5	16.4
11/17/99	17.6		17.2	15.9	16.5	16.8		16.1		15.8	1.35	16.2
11/18/99	17.7	0	17.2	15.9	16.5	16.9		16.2	0.7	15.8	1.6	16.2
11/19/99	17.8	0	17.2	15.9	16.5	16.9	0	16.2	0.1	15.9	1.3	16.3



Base map from USGS 7.5' Quad. Map:
San Leandro, California. (PR 1980).



Scale : 0 2000 4000 Feet



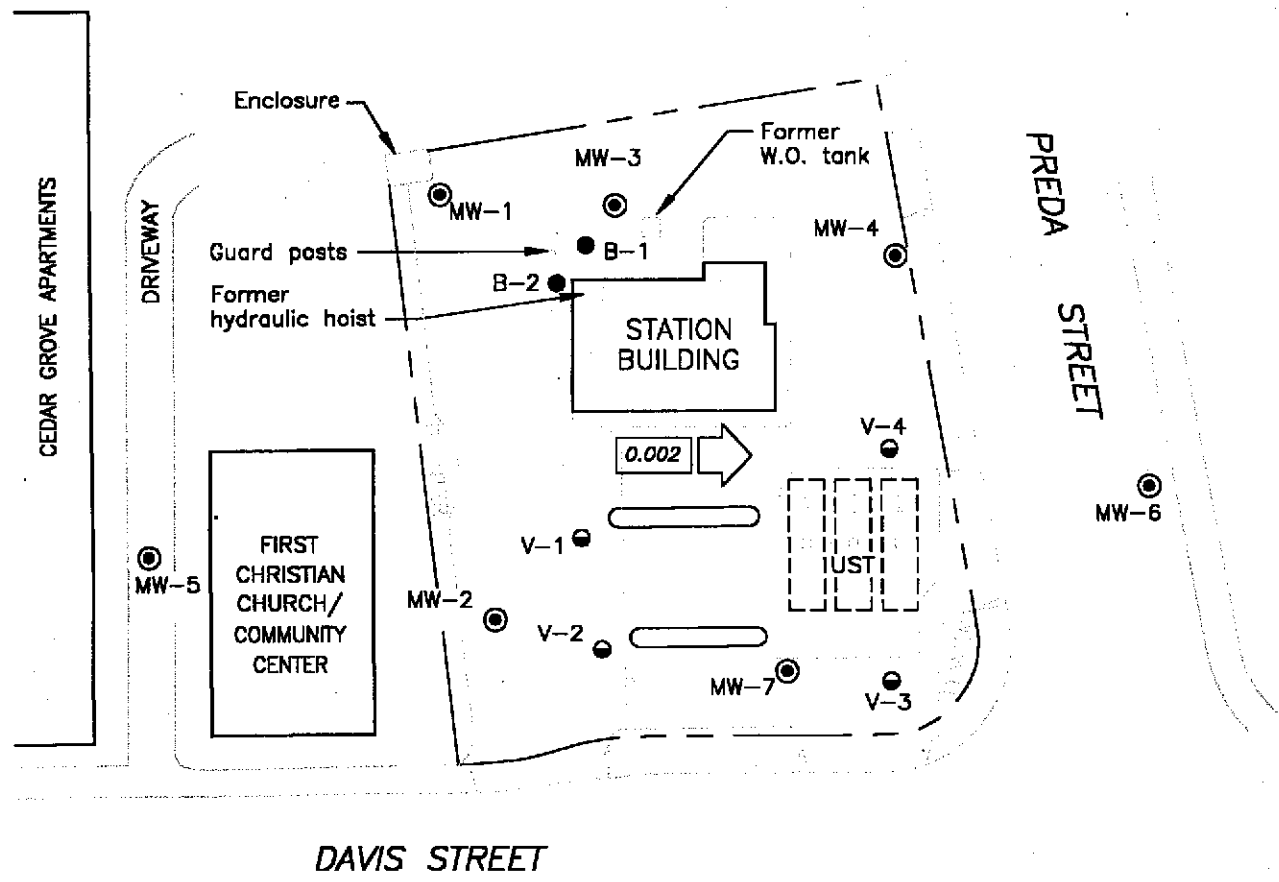
ARCO PRODUCTS COMPANY
SERVICE STATION 2111, 1156 DAVIS STREET
SOIL AND GROUNDWATER ASSESSMENT
SAN LEANDRO, CALIFORNIA

SITE LOCATION

FIGURE
1
PROJECT NO.
805-127.01

EXPLANATION

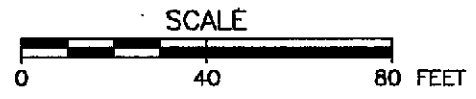
- ⊙ Groundwater monitoring well
- Soil boring
- ⦿ Vapor extraction well



ARCO PRODUCTS COMPANY
SERVICE STATION 2111

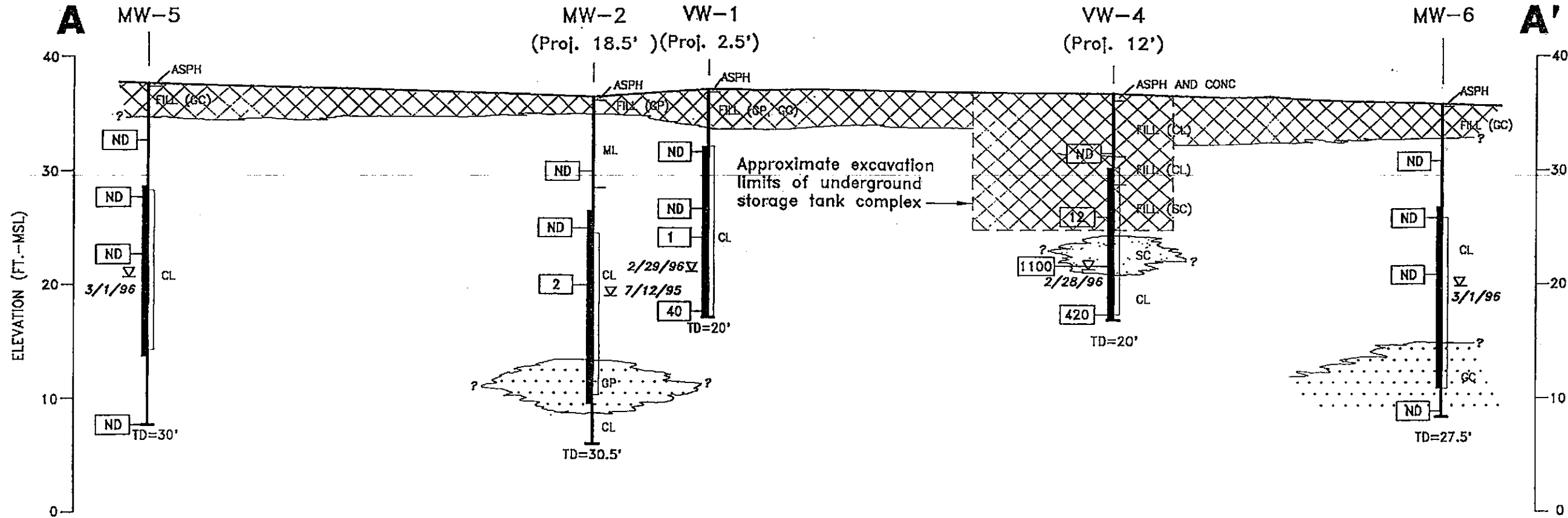
FIGURE 2
SITE PLAN

1156 DAVIS STREET
SAN LEANDRO, CALIFORNIA




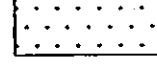


SOUTHWEST

NORTHEAST



EXPLANATION

-  FILL
-  SILTS AND CLAYS (ML, CL)
-  SANDS, SILTY AND CLAYEY SANDS (SP, SM, SC)
-  GRAVELS, SILTY AND CLAYEY GRAVELS (GP, GM, GC)

? ——— Geologic contact; dashed where approximate, queried where uncertain

- VW-4 Well/boring designation
- Borehole
- <1.0 TPH as gasoline (ppm)
- Sand pack interval
- ∇ First encountered groundwater (showing date measured)
- Screened Interval
- TD=23.5' Total depth of boring

NOTES:

1. See Figure 2 for location of cross section.
2. See Appendix F for soil symbol explanation.



SCALE: 0 20 40 FEET
(Horizontal)

ARCO PRODUCTS COMPANY
SERVICE STATION 2111, 1156 DAVIS STREET
SOIL AND GROUNDWATER ASSESSMENT
SAN LEANDRO, CALIFORNIA

GEOLOGIC CROSS SECTION A-A'

FIGURE NO.

3

PROJECT NO.
805-127.001

APPENDIX A
CERTIFIED ANALYTICAL REPORTS
AND CHAIN-OF-CUSTODY DOCUMENTATION



December 8, 1999

Service Request No.: S9903581

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

RE: TO#800032.00/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 16, 1999. 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 17, 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).

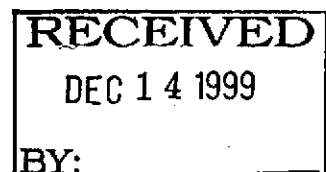
If you have any questions, please call me at (408) 748-9700.

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:
Project:
Sample Matrix:

ARCO Products Company
TO#800032.00/2111 SAN LEANDRO
Water

Service Request: S9903581
Date Collected: 11/15/99
Date Received: 11/16/99

Fuel Oxygenates


Sample Name: GW1
Lab Code: S9903581-001
Test Notes: C1, O

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	500	NA	12/06/99	<25000	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	500	NA	12/06/99	18000	
Diisopropyl Ether	EPA 5030A	8260	5	500	NA	12/06/99	<2500	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	500	NA	12/06/99	<2500	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	500	NA	12/06/99	<2500	

C1
O

The MRL was elevated due to high analyte concentration requiring sample dilution. Sample was analyzed 6 days past the end of the recommended maximum holding time. Analyte concentration should be considered an estimate.

Approved By: _____  Date: 12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:
Project:
Sample Matrix:

ARCO Products Company
TO#800032.00/2111 SAN LEANDRO
Water

Service Request: S9903581
Date Collected: NA
Date Received: NA

Fuel Oxygenates

Sample Name:
Lab Code:
Test Notes:

Method Blank (MS01)
S991203-WB2

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	1	NA	12/03/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	1	NA	12/03/99	ND	
Diisopropyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	

Approved By: _____



Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:
Project:
Sample Matrix:

ARCO Products Company
TO#800032.00/2111 SAN LEANDRO
Water

Service Request: S9903581
Date Collected: NA
Date Received: NA

Fuel Oxygenates

Sample Name:
Lab Code:
Test Notes:

Method Blank (MS01)
S991206-WB2

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	1	NA	12/06/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	1	NA	12/06/99	ND	
Diisopropyl Ether	EPA 5030A	8260	5	1	NA	12/06/99	ND	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	1	NA	12/06/99	ND	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	1	NA	12/06/99	ND	

Approved By: _____

PT

Date: _____

12/08/99

1544400210274

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
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	P e r c e n t R e c o v e r y		
			Dibromofluoromethane	Toluene-D8	4-Bromofluorobenzene
GW1	S9903581-001		99	100	100
GW2	S9903581-002		107	104	105
GW3	S9903581-003		99	99	98
Lab Control Sample	S991203-LCS		106	104	98
Lab Control Sample	S991203-DLCS		106	103	98
Method Blank (MS01)	S991203-WB2		101	103	104
Method Blank (MS01)	S991206-WB2		100	101	100

EPA Acceptance Limits: 86-118 88-110 86-115

Approved By: _____



Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032.00/2111 SAN LEANDRO
 LCS Matrix: Water

Service Request: S9903581
 Date Collected: NA
 Date Received: NA
 Date Extracted: NA
 Date Analyzed: 12/04/99

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
 Fuel Oxygenates

Sample Name: Lab Control Sample
 Lab Code: S991203-LCS, S991203-DLCS
 Test Notes:

Units: ug/L (ppb)
 Basis: NA

Percent Recovery

Analyte	Prep Method	Analysis Method	True Value		Result		CAS		Relative Percent Difference	Result Notes	
			LCS	DLCS	LCS	DLCS	LCS	DLCS			Acceptance Limits
1,1-Dichloroethene	EPA 5030A	8260	10	10	11	11	110	110	62-145	<1	
Benzene	EPA 5030A	8260	10	10	11	11	110	110	77-127	<1	
Trichloroethene	EPA 5030A	8260	10	10	10	11	100	110	71-119	10	
Toluene	EPA 5030A	8260	10	10	10	11	100	110	76-124	10	
Chlorobenzene	EPA 5030A	8260	10	10	10	11	100	110	75-127	10	
1,2-Dichlorobenzene	EPA 5030A	8260	10	10	11	12	110	120	74-126	9	
Naphthalene	EPA 5030A	8260	10	10	8.0	12	80	120	43-157	40	

Approved By: _____

PT

Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
Date Collected: 11/15/99
Date Received: 11/16/99

BTEX, MTBE and TPH as Gasoline

Sample Name: GW1
Lab Code: S9903581-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/26/99	33000	
Benzene	EPA 5030	8021B	0.5	20	NA	11/26/99	1300	
Toluene	EPA 5030	8021B	0.5	20	NA	11/26/99	4500	
Ethylbenzene	EPA 5030	8021B	0.5	20	NA	11/26/99	890	
Xylenes, Total	EPA 5030	8021B	1	20	NA	11/26/99	4700	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	20	NA	11/26/99	16000	

Approved By: _____



Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
Date Collected: 11/15/99
Date Received: 11/16/99

BTEX, MTBE and TPH as Gasoline

Sample Name: GW2
Lab Code: S9903581-002
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/26/99	30000	
Benzene	EPA 5030	8021B	0.5	20	NA	11/26/99	14000	
Toluene	EPA 5030	8021B	0.5	20	NA	11/26/99	1200	
Ethylbenzene	EPA 5030	8021B	0.5	20	NA	11/26/99	4400	
Xylenes, Total	EPA 5030	8021B	1	20	NA	11/26/99	760	
Methyl tert -Butyl Ether	EPA 5030	8021B	3	20	NA	11/26/99	4800	

Approved By: _____



Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
Date Collected: 11/16/99
Date Received: 11/16/99

BTEX, MTBE and TPH as Gasoline

Sample Name: GW3
Lab Code: S9903581-003
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	5	NA	11/25/99	5500	
Benzene	EPA 5030	8021B	0.5	5	NA	11/25/99	260	
Toluene	EPA 5030	8021B	0.5	5	NA	11/25/99	620	
Ethylbenzene	EPA 5030	8021B	0.5	5	NA	11/25/99	74	
Xylenes, Total	EPA 5030	8021B	1	5	NA	11/25/99	980	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	5	NA	11/25/99	4600	

Approved By: _____  Date: 12/08/04

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S991125-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/25/99	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	11/25/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	1	NA	11/25/99	ND	

Approved By: _____



Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
 Project: TO#800032.00/2111 SAN LEANDRO
 Sample Matrix: Water

Service Request: S9903581
 Date Collected: NA
 Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
 Lab Code: S991126-WB1
 Test Notes:

Units: ug/L (ppb)
 Basis: NA

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	11/26/99	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	11/26/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	1	NA	11/26/99	ND	

Approved By: _____

PT

Date: _____

12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903581
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 CALUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			a,a,a-Trifluorotoluene	Fluorobenzene
GW1	S9903581-001		96	97
GW2	S9903581-002		106	93
GW3	S9903581-003		101	96
Lab Control Sample	S991125-LCS		98	105
Dup Lab Control Sample	S991125-DLCS		95	105
Method Blank	S991125-WB1		107	90
Method Blank	S991126-WB1		105	94

CAS Acceptance Limits: 69-116 60-140

Approved By: _____ *MS* _____ Date: 12/08/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032.00/2111 SAN LEANDRO

Service Request: S9903581
 Date Analyzed: 11/25/99

Initial Calibration Verification (ICV) Summary
 BTEX, MTBE 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		Result Notes
					Acceptance Limits	Percent Recovery	
TPH as Gasoline	EPA 5030	CA/LUFT	500	480	85-115	96	
Benzene	EPA 5030	8021B	50	50	85-115	100	
Toluene	EPA 5030	8021B	50	49	85-115	98	
Ethylbenzene	EPA 5030	8021B	50	49	85-115	98	
Xylenes, Total	EPA 5030	8021B	150	97	85-115	65	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	50	50	85-115	100	

Approved By: _____



Date: _____

12/08/99

ICV/032196

ARCO Facility no. 2111	City (Facility) SAN LEANDEO	Project manager (Consultant) GLEN JAMMERLIEBEN	Laboratory name CAS
ARCO engineer PAUL SUPPLE	Telephone no. (ARCO)	Telephone no. (Consultant) 510 740 5807	Contract number
Consultant name IT CORP		Address (Consultant) 2101 BLOSSOM #101 OAKLAND CA 94612	
		Fax no. (Consultant) 510 663 3315	

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 801/8010	EPA 824/8240	EPA 825/8270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	CMM Metals EPA 8010/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org. DHS Lead EPA 7420/7421 <input type="checkbox"/>	4100 MTBE 0.51917172	Method of shipment PK & E OAKLAND IT OFFICE
			Soil	Water	Other	Ice	Acid																
GW1	(1)			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	11/19/99	12:30		<input checked="" type="checkbox"/>											<input checked="" type="checkbox"/>	Special detection Limit/reporting MTBE < 10 ppb
GW2	(2)			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	11/19/99	6:30		<input checked="" type="checkbox"/>											<input checked="" type="checkbox"/>	Special QA/QC
GW3	(3)			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	11/19/99	8:00		<input checked="" type="checkbox"/>											<input checked="" type="checkbox"/>	Remarks
																							Lab number
																							Turnaround time

Condition of sample:				Temperature received: DOE: 12/2/99 R11D3 D			
Relinquished by sampler Paul Supple	Date 11/16/99	Time 11:50 AM	Received by Brian Paula	Date 11/16/99	Time 11:50 am	Priority Rush <input checked="" type="checkbox"/> 1 Business Day	
Relinquished by	Date	Time	Received by	Date	Time	Rush <input type="checkbox"/> 2 Business Days	
Relinquished by	Date	Time	Received by laboratory	Date	Time	Expedited <input type="checkbox"/> 5 Business Days	
						Standard <input checked="" type="checkbox"/> 10 Business Days	



December 9, 1999

Service Request No.: S9903648

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

RE: TO#800032/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 18, 1999. 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 17, 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).

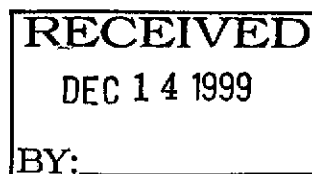
If you have any questions, please call me at (408) 748-9700.

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
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: L9905068
Date Collected: 11/17/99
Date Received: 11/18/99

Volatile Organic Compounds

Sample Name: GW4
Lab Code: L9905068-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Batch Number
Methyl tert-Butyl Ether	EPA 5030	8260B	2	50	NA	12/02/99	3700	
tert-Butyl Alcohol	EPA 5030	8260B	50	5	NA	12/01/99	410	
Diisopropyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	
Ethyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	
tert-Amyl methyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	20	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: L9905068
Date Collected: 11/18/99
Date Received: 11/18/99

Volatile Organic Compounds

Sample Name: GW5
Lab Code: L9905068-002
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Batch Number
Methyl tert-Butyl Ether	EPA 5030	8260B	2	50	NA	12/02/99	2100	
tert-Butyl Alcohol	EPA 5030	8260B	50	5	NA	12/02/99	340	
Diisopropyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	
Ethyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	
tert-Amyl methyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	12	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO=800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: L9905068
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: L991201-MB
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Batch Number
Methyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	
tert-Butyl Alcohol	EPA 5030	8260B	50	1	NA	12/01/99	ND	
Diisopropyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	
Ethyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	
tert-Amyl methyl Ether	EPA 5030	8260B	2	1	NA	12/01/99	ND	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: L9905068
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: L991202-MB
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Batch Number
Methyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	
tert-Butyl Alcohol	EPA 5030	8260B	50	1	NA	12/02/99	ND	
Diisopropyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	
Ethyl tert-Butyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	
tert-Amyl methyl Ether	EPA 5030	8260B	2	1	NA	12/02/99	ND	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: L9905068
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
 Volatile Organic Compounds

Prep Method: EPA 5030
Analysis Method: 8260B

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	P e r c e n t R e c o v e r y		
			Dibromofluoromethane	Toluene-D ₈	4-Bromofluorobenzene
GW4	L9905068-001		86	102	99
GW5	L9905068-002		84	102	99
Method Blank	L991201-MB		99	107	101
Method Blank	L991202-MB		92	104	97
Batch QC	L9904919-00816N		93	103	99
Batch QC	L9904919-00816D		89	101	97
Lab Control Sample	L991201-LCS		90	101	98
Lab Control Sample	L991202-LCS		90	100	98

CAS Acceptance Limits: 70-130 88-110 86-115

Approved By: _____

MS

Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/2111 SAN LEANDRO
 Sample Matrix: Water
 Batch Number:

Service Request: L9905068
 Date Collected: NA
 Date Received: NA
 Date Extracted: NA
 Date Analyzed: 12/01/99

Matrix Spike/Duplicate Matrix Spike Summary
 Volatile Organic Compounds

Sample Name: Batch QC
 Lab Code: L9904919-00816MS, L9904919-00816DMS
 Test Notes:

Units: ug/L (ppb)
 Basis: NA

Analyte	Prep Method	Analysis Method	CRDL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits*	Relative Percent Difference	RPD Limit
				MS	DMS		MS	DMS	MS	DMS			
Benzene	EPA 5030	8260B	0.5	10.0	10.0	2.44	11.7	11.6	93	92	76-127	<1	25
Toluene	EPA 5030	8260B	0.5	10.0	10.0	7.85	16.9	16.5	90	86	76-125	2	25
Ethylbenzene	EPA 5030	8260B	0.5	10.0	10.0	4.21	14.2	14.1	100	99	75-130	<1	25
Methyl tert-Butyl Ether	EPA 5030	8260B	2.0	20.0	20.0	ND	19.6	15.8	98	79	50-150	24	25

Approved By: _____

Date: _____

12/09/99

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
LCS Matrix: Water
Batch Number:

Service Request: L9905068
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 12/02/99

Laboratory Control Sample Summary
 Volatile Organic Compounds

Sample Name: Lab Control Sample
Lab Code: L991202-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	8260B	10.0	8.41	84	76-127	
Toluene	EPA 5030	8260B	10.0	8.40	84	76-125	
Ethylbenzene	EPA 5030	8260B	10.0	8.89	89	75-130	
Methyl tert-Butyl Ether	EPA 5030	8260B	20.0	14.5	72	50-150	

Approved By: _____

[Signature]

Date: _____

12/09/99

LCS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903648
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S991201-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	12/01/99	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	12/01/99	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	12/01/99	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	12/01/99	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	12/01/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	1	NA	12/01/99	ND	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903648
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S991126-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/26/99	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	11/26/99	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	11/26/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	3	1	NA	11/26/99	ND	

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903648
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	Fluorobenzene
GW4	S9903648-001		101	86
GW5	S9903648-002		105	85
Lab Control Sample	S991201-LCS		97	113
Dup Lab Control Sample	S991201-DLCS		95	97
Method Blank	S991201-WB1		108	88
Method Blank	S991126-WB1		105	94

CAS Acceptance Limits: 69-116 60-140

Approved By: _____



Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
LCS Matrix: Water

Service Request: S9903648
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 12/01/99

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
 BTEX and TPH as Gasoline

Sample Name: Dup Lab Control Sample
Lab Code: S991201-LCS, S991201-DLCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	Percent Recovery								Result Notes
			True Value		Result		CAS Acceptance		Relative Percent Difference		
			LCS	DLCS	LCS	DLCS	LCS	DLCS		Limits	
Benzene	EPA 5030	8021B	50	50	52	53	104	106	75-135	2	
Toluene	EPA 5030	8021B	50	50	50	51	100	102	73-136	2	
Ethylbenzene	EPA 5030	8021B	50	50	51	51	102	102	69-142	<1	
Gasoline	EPA 5030	CA/LUFT	500	500	480	480	96	96	75-135	<1	

Approved By: _____

PS

Date: _____

12/09/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO

Service Request: S9903648
Date Analyzed: 12/01/99

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

Sample Name: ICV
 Lab Code: ICVI
 Test Notes:
 Units: ug/L (ppb)
 Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	CAS Percent Recovery		Result Notes
					Acceptance Limits	Percent Recovery	
TPH as Gasoline	EPA 5030	CA/LUFT	500	450	85-115	90	
Benzene	EPA 5030	8021B	50	52	85-115	104	
Toluene	EPA 5030	8021B	50	50	85-115	100	
Ethylbenzene	EPA 5030	8021B	50	50	85-115	100	
Xylenes, Total	EPA 5030	8021B	150	150	85-115	100	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8021B	50	50	85-115	100	

Approved By: _____

Date: _____

12/09/99

ICV/032196

ARCO Facility no. 2111	City (Facility) SAN LEANDRO	Project manager (Consultant) G. VAN DER VEEN	Laboratory name CAS
ARCO engineer P. SUPPLE	Telephone no. (ARCO)	Telephone no. (Consultant) 510 740 5207	Contract number
Consultant name IT CORP		Address (Consultant) 2201 BROADWAY #101 OAKLAND CA 94612	
Fax no. (Consultant) 510 663 3311		Method of shipment	

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 801/8010	EPA 824/8240	EPA 625/8270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals EPA 601/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>	MISC / CRT 8260	Special detection Limit/reporting		
			Soil	Water	Other	Ice	Acid																	
GN4	①			✓			✓	11/17/99	3:30		✓													
GN5	②			✓			✓	11/18/99	10:00		✓													
V4	① BF				AIR			11/17/99	3:30		✓													
V5	④				AIR			11/18/99	10:00		✓													

Condition of sample:				Temperature received:			
Relinquished by sampler <i>Sam Supple</i>	Date 11/18/99	Time 12:45	Received by <i>Brian Bell</i>	Date 11/18/99	Time 12:45		
Relinquished by	Date	Time	Received by	Date	Time		
Relinquished by	Date	Time	Received by laboratory	Date	Time		

Lab number
Turnaround time
Priority Rush AIR 1 Business Day <input checked="" type="checkbox"/>
Rush 2 Business Days <input type="checkbox"/>
Expedited 5 Business Days <input type="checkbox"/>
Standard GN 10 Business Days <input checked="" type="checkbox"/>



December 10, 1999

Service Request No.: S9903673

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

RE: TO#800032/RAT#8/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 19, 1999. 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 12, 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).

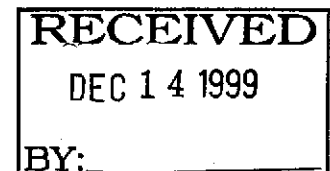
If you have any questions, please call me at (408) 748-9700.

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
TTLIC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903673
Date Collected: 11/19/99
Date Received: 11/19/99


Fuel Oxygenates

Sample Name: GW6
Lab Code: S9903673-001
Test Notes: C1

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	50	NA	12/03/99	<2500	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	50	NA	12/03/99	3100	
Diisopropyl Ether	EPA 5030A	8260	5	50	NA	12/03/99	<250	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	50	NA	12/03/99	<250	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	50	NA	12/03/99	<250	

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

Approved By:  Date: 12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:
Project:
Sample Matrix:

ARCO Products Company
TO#800032/RAT#8/2111 SAN LEANDRO
Water

Service Request: S9903673
Date Collected: NA
Date Received: NA

Fuel Oxygenates

Sample Name: Method Blank (MS01)
Lab Code: S991203-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	1	NA	12/03/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	1	NA	12/03/99	ND	
Diisopropyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	

Approved By: _____



Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:
Project:
Sample Matrix:

ARCO Products Company
TO#800032/RAT#8/2111 SAN LEANDRO
Water

Service Request: S9903673
Date Collected: NA
Date Received: NA

Fuel Oxygenates

Sample Name: Method Blank (MS01)
Lab Code: S991203-WB2
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
<i>tert</i> -Butyl Alcohol	EPA 5030A	8260	50	1	NA	12/03/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	0.5	1	NA	12/03/99	ND	
Diisopropyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
Ethyl <i>tert</i> -Butyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	
<i>tert</i> -Amyl Methyl Ether	EPA 5030A	8260	5	1	NA	12/03/99	ND	

Approved By: _____

AT

Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903673
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	P e r c e n t R e c o v e r y		
			Dibromofluoromethane	Toluene-D8	4-Bromofluorobenzene
GW6	S9903673-001		98	102	105
Lab Control Sample	S991203-LCS		106	104	98
Lab Control Sample	S991203-DLCS		106	103	98
Method Blank (MS01)	S991203-WB1		101	100	102
Method Blank (MS01)	S991203-WB2		101	103	104

EPA Acceptance Limits: 86-118 88-110 86-115

Approved By: _____

PT

Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903673
Date Collected: 11/19/99
Date Received: 11/19/99

BTEX and TPH as Gasoline

Sample Name: GW6
Lab Code: S9903673-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	5	NA	11/26/99	1500	
Benzene	EPA 5030	8021B	0.5	5	NA	11/26/99	36	
Toluene	EPA 5030	8021B	0.5	5	NA	11/26/99	120	
Ethylbenzene	EPA 5030	8021B	0.5	5	NA	11/26/99	28	
Xylenes, Total	EPA 5030	8021B	1	5	NA	11/26/99	160	

Approved By: _____



Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903673
Date Collected: NA
Date Received: NA

BTEX and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S991125-WB2
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/25/99	ND	
Benzene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Toluene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Ethylbenzene	EPA 5030	8021B	0.5	1	NA	11/25/99	ND	
Xylenes, Total	EPA 5030	8021B	1	1	NA	11/25/99	ND	

Approved By: _____



Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Water

Service Request: S9903673
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: 8021B CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			a,a,a-Trifluorotoluene	Fluorobenzene
GW6	S9903673-001		103	93
Lab Control Sample	S991125-LCS		98	105
Dup Lab Control Sample	S991125-DLCS		95	105
Method Blank	S991125-WB2		104	92

CAS Acceptance Limits: 69-116 60-140

Approved By: _____



Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
LCS Matrix: Water

Service Request: S9903673
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/25/99

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
 BTEX and TPH as Gasoline

Sample Name: Dup Lab Control Sample
Lab Code: S991125-LCS, S991125-DLCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	Percent Recovery								Relative Percent Difference	Result Notes
			True Value		Result		CAS Acceptance		Limits			
			LCS	DLCS	LCS	DLCS	LCS	DLCS				
Benzene	EPA 5030	8021B	50	50	50	48	100	96	75-135	4		
Toluene	EPA 5030	8021B	50	50	50	47	100	94	73-136	6		
Ethylbenzene	EPA 5030	8021B	50	50	49	47	98	94	69-142	4		
Gasoline	EPA 5030	CA/LUFT	500	500	480	470	96	94	75-135	2		

Approved By: _____

AW

Date: _____

12/10/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/RAT#8/2111 SAN LEANDRO

Service Request: S9903673
 Date Analyzed: 11/25/99

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	Result Notes
					Percent Recovery Acceptance Limits		
TPH as Gasoline	EPA 5030	CA/LUFT	500	480	85-115	96	
Benzene	EPA 5030	8021B	50	50	85-115	100	
Toluene	EPA 5030	8021B	50	49	85-115	98	
Ethylbenzene	EPA 5030	8021B	50	49	85-115	98	
Xylenes, Total	EPA 5030	8021B	150	150	85-115	100	

Approved By: _____

Date: _____

12/10/99

ICV032196

ARCO Facility no. **Z411** City (Facility) **SAN LEANDRO** Project manager (Consultant) **G. VANDERZEN**
 ARCO engineer **P. SUPPLE** Telephone no. (ARCO) Telephone no. (Consultant) **510 740 5507** Fax no. (Consultant) **510 444 6633/15**
 Consultant name **DT CORP.** Address (Consultant) **2201 BROADWAY #101 OAKLAND CA 94612**

Laboratory name **CAS**
Contract number

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1632/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCIP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	CAM Metals EPA 601/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS <input type="checkbox"/> Lead EPA 7420/7421 <input type="checkbox"/>	8000 MUSE/PTJ	
			Soil	Water	Other	Ice	Acid																
GN6				<input checked="" type="checkbox"/>				11/19/99	930		<input checked="" type="checkbox"/>	5990	36	72									<input checked="" type="checkbox"/>
V6					AIR			11/19/99	930		<input checked="" type="checkbox"/>	5990	36	73									

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time
 Priority Rush **AIR**
 1 Business Day
 Rush
 2 Business Days
 Expedited
 5 Business Days
 Standard **GN**
 10 Business Days

Condition of sample: Temperature received:
 Relinquished by sampler **[Signature]** Date **11/19/99** Time **11:40** Received by **[Signature]** Date **11/19/99** Time **11:40**
 Relinquished by Date Time Received by
 Relinquished by Date Time Received by laboratory Date Time



November 18, 1999

Service Request No.: S9903580

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

RE: TO#800032.00/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 16, 1999. 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 15, 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).

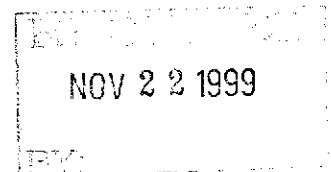
If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director



COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

AZLA	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
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903580
Date Collected: 11/15/99
Date Received: 11/16/99

BTEX and Total Volatile Hydrocarbons

Sample Name: V1
Lab Code: S9903580-001
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	NONE	8021B	0.4	20	NA	11/17/99	68	
Toluene	NONE	8021B	0.4	20	NA	11/17/99	220	
Ethylbenzene	NONE	8021B	0.5	20	NA	11/17/99	51	
Xylenes, Total	NONE	8021B	0.9	20	NA	11/17/99	190	
Total Volatile Hydrocarbons:								
C1 - C5	NONE	8015M	12	20	NA	11/17/99	6400	
C6 - C12	NONE	8015M	20	20	NA	11/17/99	7600	
TPH as Gasoline*	NONE	8015M	20	20	NA	11/17/99	7600	
Methyl tert-Butyl Ether	NONE	8021B	3	20	NA	11/17/99	210	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____

Handwritten Signature

Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903580
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S991117-VB1
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	NONE	8021B	0.4	1	NA	11/17/99	ND	
Toluene	NONE	8021B	0.4	1	NA	11/17/99	ND	
Ethylbenzene	NONE	8021B	0.5	1	NA	11/17/99	ND	
Xylenes, Total	NONE	8021B	0.9	1	NA	11/17/99	ND	
Total Volatile Hydrocarbons:								
C1 - C5	NONE	8015M	12	1	NA	11/17/99	ND	
C6 - C12	NONE	8015M	20	1	NA	11/17/99	ND	
TPH as Gasoline*	NONE	8015M	20	1	NA	11/17/99	ND	
Methyl tert-Butyl Ether	NONE	8021B	3	1	NA	11/17/99	ND	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____

[Signature]

Date: _____

11/17/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903580
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S991117-VB1
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	NONE	8021B	0.1	1	NA	11/17/99	ND	
Toluene	NONE	8021B	0.1	1	NA	11/17/99	ND	
Ethylbenzene	NONE	8021B	0.1	1	NA	11/17/99	ND	
Xylenes, Total	NONE	8021B	0.2	1	NA	11/17/99	ND	
Total Volatile Hydrocarbons:								
C1 - C5	NONE	8015M	5	1	NA	11/17/99	ND	
C6 - C12	NONE	8015M	5	1	NA	11/17/99	ND	
TPH as Gasoline*	NONE	8015M	5	1	NA	11/17/99	ND	
Methyl tert-Butyl Ether	NONE	8021B	1.4	1	NA	11/17/99	ND	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____

[Handwritten Signature]

Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032.00/2111 SAN LEANDRO
 Sample Matrix: Air

Service Request: S9903580
 Date Collected: 11/15/99
 Date Received: 11/16/99
 Date Extracted: NA
 Date Analyzed: 11/17/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: V1
 Lab Code: s9903580-001DUP
 Test Notes:

Units: mg/m3
 Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	NONE	8021B	0.4	68	73	71	7	
Toluene	NONE	8021B	0.4	220	230	230	4	
Ethylbenzene	NONE	8021B	0.5	51	54	53	6	
Xylenes, Total	NONE	8021B	0.9	190	200	200	5	
Total Volatile Hydrocarbons								
C1 - C5	NONE	8015M	12	6400	6600	6500	3	
C6 - C12	NONE	8015M	20	7600	8100	7900	6	
TPH as Gasoline*	NONE	8015M	20	7600	8100	7900	6	
Methyl tert-Butyl Ether	NONE	8021B	3	210	230	220	9	

Approved By: _____

Handwritten signature

Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903580
Date Collected: 11/15/99
Date Received: 11/16/99
Date Extracted: NA
Date Analyzed: 11/17/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: V1
Lab Code: s9903580-001DUP
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	NONE	8021B	0.1	21.3	22.9	22.1	7	
Toluene	NONE	8021B	0.1	58.5	61.1	59.8	4	
Ethylbenzene	NONE	8021B	0.1	11.8	12.5	12.2	6	
Xylenes, Total	NONE	8021B	0.2	43.8	46.1	45	5	
Total Volatile Hydrocarbons								
C1 - C5	NONE	8015M	5	2700	2780	2,740	3	
C6 - C12	NONE	8015M	5	1860	1980	1,920	6	
TPH as Gasoline*	NONE	8015M	5	1860	1980	1,920	6	
Methyl tert-Butyl Ether	NONE	8021B	0.8	58.3	63.9	61.1	9	

Approved By: _____

MS

Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
LCS Matrix: Air

Service Request: S9903580
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/17/99

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S991117-LCS
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	NONE	8021B	24	20	83	60-140	
Toluene	NONE	8021B	24	19	79	60-140	
Ethylbenzene	NONE	8021B	24	20	83	60-140	
Gasoline	NONE	8015M	210	200	95	60-140	

Approved By: _____



Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO
LCS Matrix: Air

Service Request: S9903580
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/17/99

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S991117-LCS
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	NONE	8021B	7.5	6.3	84	60-140	
Toluene	NONE	8021B	6.4	5.1	80	60-140	
Ethylbenzene	NONE	8021B	5.5	4.6	84	60-140	
Gasoline	NONE	8015M	51	48.9	96	60-140	

Approved By: _____



Date: _____

11/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032.00/2111 SAN LEANDRO

Service Request: S9903580
Date Analyzed: 11/17/99

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Sample Name: ICV Units: mg/m3
Lab Code: ICV1 Basis: NA
Test Notes:

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Result Notes
Benzene	NONE	8021B	25	25	100	
Toluene	NONE	8021B	25	24	96	
Ethylbenzene	NONE	8021B	25	25	100	
Xylenes, Total	NONE	8021B	75	74	99	
Gasoline	NONE	8015M	250	250	100	
Methyl tert-Butyl Ether	NONE	8021B	25	23	92	

Approved By: _____

ACT

Date: _____

11/18/99

ICV/032196

ARCO Facility no. 211	City (Facility) SAN LEANDRO	Project manager (Consultant) GLEN VANDERVOEN	Laboratory name CAS
ARCO engineer PAUL SUPPLE	Telephone no. (ARCO)	Telephone no. (Consultant) 5107405807	Fax no. (Consultant) 5106633315
Consultant name VT CORP		Address (Consultant) 2201 BLOOMINGDALE #101 OAKLAND CA 94612	

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCMP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	CAMP Metals EPA 601/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>	BTX/TPH BTX/TPH	
			Soil	Water	Other	Ice	Acid																
V1	①				AIR			11/19/99	12:30		✓												✓
V2	②				AIR			11/19/99	6:30		✓												✓
V3	③				AIR			11/20/99	8:00		✓												✓

Method of shipment

Special detection Limit/reporting
MTBE LID PAB

Special QA/QC

Remarks
per Glen Vandervoer
on 11/17/99, analyze
for gas/btex/mtbe
only; cancel 8/dec
BT 11/17/99

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: DOE: 11/17/99			
Relinquished by sampler Sam W...	Date 11/16/99	Time 11:50 AM	Received by Brian Fuller	Date 11/16/99	Time 11:50 am		
Relinquished by	Date	Time	Received by				
Relinquished by	Date	Time	Received by laboratory	Date	Time		



November 22, 1999

Service Request No.: S9903649

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

RE: TO#800032/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 18, 1999. 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 13, 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).

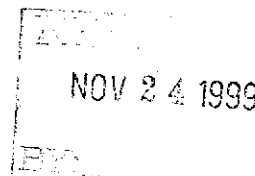
If you have any questions, please call me at (408) 748-9700.

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
TTLIC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903649
Date Collected: 11/18/99
Date Received: 11/18/99

BTEX and Total Volatile Hydrocarbons

Sample Name: V5
Lab Code: S9903649-002
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	NONE	8021B	0.4	20	NA	11/19/99	25	
Toluene	NONE	8021B	0.4	20	NA	11/19/99	82	
Ethylbenzene	NONE	8021B	0.5	20	NA	11/19/99	21	
Xylenes, Total	NONE	8021B	0.9	20	NA	11/19/99	78	
Total Volatile Hydrocarbons:								
C1 - C5	NONE	8015M	12	20	NA	11/19/99	2000	
C6 - C12	NONE	8015M	20	20	NA	11/19/99	2400	
TPH as Gasoline*	NONE	8015M	20	20	NA	11/19/99	2400	
Methyl tert-Butyl Ether	NONE	8021B	3	20	NA	11/19/99	100	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____ *[Signature]* Date: 11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/2111 SAN LEANDRO
 Sample Matrix: Air

Service Request: S9903649
 Date Collected: 11/17/99
 Date Received: 11/18/99
 Date Extracted: NA
 Date Analyzed: 11/19/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: V4
 Lab Code: S9903649-001DUP
 Test Notes:

Units: mg/m3
 Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	NONE	8021B	0.4	11	11	11	<1	
Toluene	NONE	8021B	0.4	86	87	86.5	1	
Ethylbenzene	NONE	8021B	0.5	24	24	24	<1	
Xylenes, Total	NONE	8021B	0.9	87	84	85.5	3	
Total Volatile Hydrocarbons								
C1 - C5	NONE	8015M	12	2300	2200	2250	4	
C6 - C12	NONE	8015M	20	3100	2800	2950	10	
TPH as Gasoline*	NONE	8015M	20	3100	2800	2950	10	
Methyl tert-Butyl Ether	NONE	8021B	3	89	88	88.5	1	

Approved By: _____

Handwritten signature

Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/2111 SAN LEANDRO
 Sample Matrix: Air

Service Request: S9903649
 Date Collected: 11/17/99
 Date Received: 11/18/99
 Date Extracted: NA
 Date Analyzed: 11/19/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: V4
 Lab Code: S9903649-001DUP
 Test Notes:

Units: ppmV
 Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	NONE	8021B	0.1	3.4	3.4	3.4	<1	
Toluene	NONE	8021B	0.1	23	23	23	<1	
Ethylbenzene	NONE	8021B	0.1	5.5	5.5	5.5	<1	
Xylenes, Total	NONE	8021B	0.2	20	19	19.5	5	
Total Volatile Hydrocarbons								
C1 - C5	NONE	8015M	5	970	930	950	4	
C6 - C12	NONE	8015M	5	760	680	720	11	
TPH as Gasoline*	NONE	8015M	5	760	680	720	11	
Methyl tert-Butyl Ether	NONE	8021B	0.8	28	22	25	24	

Approved By: _____



Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/2111 SAN LEANDRO
 LCS Matrix: Air

Service Request: S9903649
 Date Collected: NA
 Date Received: NA
 Date Extracted: NA
 Date Analyzed: 11/19/99

Laboratory Control Sample Summary
 BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
 Lab Code: S991119-LCS
 Test Notes:

Units: mg/m3
 Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Benzene	NONE	8021B	24	17	71	60-140	
Toluene	NONE	8021B	24	16	67	60-140	
Ethylbenzene	NONE	8021B	24	16	67	60-140	
Gasoline	NONE	8015M	210	200	95	60-140	

Approved By: _____

PT

Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO
LCS Matrix: Air

Service Request: S9903649
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/19/99

Laboratory Control Sample Summary
 BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S991119-LCS
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS	Result Notes
						Percent Recovery Acceptance Limits	
Benzene	NONE	8021B	7.5	5.3	71	60-140	
Toluene	NONE	8021B	6.4	4.2	66	60-140	
Ethylbenzene	NONE	8021B	5.5	3.7	67	60-140	
Gasoline	NONE	8015M	51	49	96	60-140	

Approved By: _____

dt

Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/2111 SAN LEANDRO

Service Request: S9903649
Date Analyzed: 11/19/99

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Sample Name: ICV
Lab Code: ICV1
Test Notes:
Units: mg/m3
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Result Notes
Benzene	NONE	8021B	25	28	112	
Toluene	NONE	8021B	25	27	108	
Ethylbenzene	NONE	8021B	25	28	112	
Xylenes, Total	NONE	8021B	75	85	113	
Gasoline	NONE	8015M	250	250	100	
Methyl tert-Butyl Ether	NONE	8021B	25	27	108	

Approved By: _____



Date: _____

11/22/99

ICV/032196

ARCO Facility no. 2111	City (Facility) SAN LEANDRO	Project manager (Consultant) G. VAN DER VEEN	
ARCO engineer P. SUPPLE	Telephone no. (ARCO)	Telephone no. (Consultant) 510 740 5807	Fax no. (Consultant) 510 663 3315
Consultant name IT CORP		Address (Consultant) 2201 BROADWAY #101 OAKLAND CA 94612	

Laboratory name
CAS

Contract number

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1462/2402/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCUP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	CAN Metals EPA 6010/7000 TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>	MISG/CAF 8260	
			Soil	Water	Other	Ice	Acid																
V1	1	BE 1	Soil	Water	Other	Ice	11/17/99	3:30	✓														
V2	1	BE 1	Soil	Water	Other	Ice	11/18/99	10:00	✓														
V4	1	BE 1			AIR		11/17/99	3:30	✓														
V5	1	2			AIR		11/18/99	10:00	✓														

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

Priority Rush **AIR** 1 Business Day

Rush 2 Business Days

Expedited 5 Business Days

Standard **6W** 6 Business Days

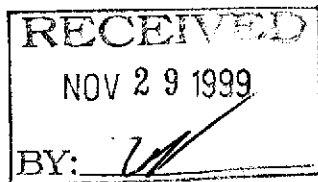
Condition of sample:		Temperature received: Due: 11/19/99	
Relinquished by sampler Sam Supple	Date 11/18/99	Time 12:45	Received by Priscilla
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory
			Date
			Time



November 22, 1999

Service Request No.: S9903672

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



RE: TO#800032/RAT#8/2111 SAN LEANDRO

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 19, 1999. 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 13, 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
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903672
Date Collected: NA
Date Received: NA


BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S991119-VB1
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8021B	0.4	1	NA	11/19/99	ND	
Toluene	5030	8021B	0.4	1	NA	11/19/99	ND	
Ethylbenzene	5030	8021B	0.5	1	NA	11/19/99	ND	
Xylenes, Total	5030	8021B	0.9	1	NA	11/19/99	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	11/19/99	ND	
C6 - C12	5030	8015M	20	1	NA	11/19/99	ND	
TPH as Gasoline*	5030	8015M	20	1	NA	11/19/99	ND	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____  Date: 11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903672
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S991119-VB1
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8021B	0.1	1	NA	11/19/99	ND	
Toluene	5030	8021B	0.1	1	NA	11/19/99	ND	
Ethylbenzene	5030	8021B	0.1	1	NA	11/19/99	ND	
Xylenes, Total	5030	8021B	0.2	1	NA	11/19/99	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	11/19/99	ND	
C6 - C12	5030	8015M	5	1	NA	11/19/99	ND	
TPH as Gasoline*	5030	8015M	5	1	NA	11/19/99	ND	

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

Approved By: _____

AT

Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: TO#800032/RAT#8/2111 SAN LEANDRO
 Sample Matrix: Air

Service Request: S9903672
 Date Collected: NA
 Date Received: NA
 Date Extracted: NA
 Date Analyzed: 11/19/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: BATCH QC
 Lab Code: S9903649-001DUP
 Test Notes:

Units: mg/m3
 Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	5030	8021B	0.4	11	11	11.0	<1	
Toluene	5030	8021B	0.4	86	87	86.5	1	
Ethylbenzene	5030	8021B	0.5	24	24	24.0	<1	
Xylenes, Total	5030	8021B	0.9	87	84	85.5	3	
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	12	2300	2200	2250	4	
C6 - C12	5030	8015M	20	3100	2800	2950	10	
TPH as Gasoline*	5030	8015M	20	3100	2800	2950	10	

Approved By: _____

dt

Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
Sample Matrix: Air

Service Request: S9903672
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/19/99

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: BATCH QC
Lab Code: S9903649-001DUP
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate	Average	Relative Percent Difference	Result Notes
					Sample Result			
Benzene	5030	8021B	0.1	3.4	3.4	3.4	<1	
Toluene	5030	8021B	0.1	23	23	23.0	<1	
Ethylbenzene	5030	8021B	0.1	5.5	5.5	5.5	<1	
Xylenes, Total	5030	8021B	0.2	20	19	19.5	5	
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	5	970	930	950	4	
C6 - C12	5030	8015M	5	760	680	720	11	
TPH as Gasoline*	5030	8015M	5	760	680	720	11	

Approved By: _____



Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO
LCS Matrix: Air

Service Request: S9903672
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/19/99

Laboratory Control Sample Summary
BTE

Sample Name: Lab Control Sample
Lab Code: S991119-LCS
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS	Result Notes
						Percent Recovery Acceptance Limits	
Benzene	5030	8021B	7.5	5.3	71	60-140	
Toluene	5030	8021B	6.4	4.2	66	60-140	
Ethylbenzene	5030	8021B	5.5	3.7	67	60-140	

Approved By: _____



Date: _____

11/22/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#800032/RAT#8/2111 SAN LEANDRO

Service Request: S9903672
Date Analyzed: 11/19/99

Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: mg/m3
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Acceptance Limits
Benzene	5030	8021B	25	28	112	80-120
Toluene	5030	8021B	25	27	108	80-120
Ethylbenzene	5030	8021B	25	28	112	80-120
Xylenes, Total	5030	8021B	75	85	113	80-120
Gasoline	5030	8015M	250	250	100	80-120

Approved By: _____



Date: _____

11/22/99

ICV/032196

APPENDIX B
FIELD DATA SHEETS

ARCO Service Station No. 2111
1156 Davis Street
San Leandro, California

High Vacuum Extraction (HVE) Pilot Test
Field Data Sheet-Groundwater(MW2)

Date	Time (min)	Σ(Time) (min)	MW2 DTW (ft. bgs)	E.C. (umhos/cm)	pH (units)	D.O. (mg/L)	T1 DTW (in. bt)	T2 DTW (in. bt)	T3 DTW (in. bt)	T4 DTW (in. bt)	T5 DTW (in. bt)	Volume (gal)	Flow (gpm)	Σ(Flow) (gpm)	Sample Name
11/15/1999															
	10:45:00	0	16.1	NM	NM	NM	67.5	67.5	67.5	67.5	67.5	0.0	0.0	0.0	
	12:30:00	105	NM	0.699	6.33	9	45	67.5	67.5	67.5	67.5	183.3	1.75	1.75	GW1
	14:30:00	120	NM	NM	NM	NM	29	67.5	67.5	67.5	67.5	313.7	1.09	1.39	
	18:30:00	240	NM	0.658	6.57	7.4	19	67.5	67.5	67.5	67.5	395.2	0.34	0.85	GW2
11/16/1999															
	8:00:00	810	NM	0.644	6.51	6.02	16	28	67.5	67.5	67.5	741.5	0.43	0.58	GW3
11/17/1999															
	15:30:00	1170	NM	0.702	6.61	4.18	9	10	15	67.5	67.5	1373.0	0.54	0.56	GW4
11/18/1999															
	10:00:00	1110	NM	0.648	6.82	4.35	9	10	14	34	67.5	1654.1	0.25	0.47	GW5
11/19/1999															
	9:30:00	1740	NM	0.693	6.95	4.82	9	10	14	32	60	1731.5	0.04	0.33	GW6
	15:00:00	330	15.6	NM	NM	NM	0	0	8	10	14	2489.3	2.30	0.44	
	15:01:00	1	15.7												
	15:03:00	2	15.7												
	15:06:00	3	15.7												
	15:10:00	4	15.7												
	15:15:00	5	15.7												
	15:25:00	10	15.6												
	15:40:00	15	15.7												
	16:10:00	30	15.7												
	17:10:00	60	15.6												

ARCO Service Station No. 2111

1156 Davis Street

San Leandro, California

High Vacuum Extraction (HVE) Pilot Test

Field Data Sheet-Vapor Extraction (MW2)

Date	Time (min)	Σ (Time) (min)	Influent PID (ppmv)	Vacuum (in.H ₂ O)	Flow (cfm)	Effluent PID (ppmv)	Sample Name
11/15/1999							
	10:45:00	0	>2500	100			
	11:00:00	15	>2500	100			
	11:30:00	30	>2500	100			
	12:30:00	60	>2500	62.5	13.5		V1
	14:30:00	120	>2500	62.5	22		
	18:30:00	240	>2500	62.5	23.5		V2
11/16/1999							
	8:00:00	810	680	62.5	10.9	<100	V3
11/17/1999							
	15:30:00	1170	260 & >2500	62.5	30	<10	V4
11/18/1999							
	10:00:00	1110	1470	62.5	32	0	V5
11/19/1999							
	9:30:00	1740	>2500	62.5	32	0	V6

ARCO Service Station No. 2111
 1156 Davis Street
 San Leandro, California

High Vacuum Extraction (HVE) Pilot Test
 Field Data Sheet-Monitoring Wells

Time (mins)	MW1		MW3	MW4	MW7	V1		V2		V3		V4
	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	DTW (ft bgs)	DTW (ft bgs)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)	Vacuum (in. Hg)	DTW (ft bgs)
11/15/1999												
0	17.8		17.2	16	16.5	17	0	16.2	0	16	0	16.5
15						17	0	16.2	0	16	0	
30						17	0	16.2	0	15.9	0	
60						17	0	16.2	0	15.9	0	
120						17	0	16.2	0	15.9	0	
240						17	0	16.2	0	16	0	
480												
11/16/1999	17.9		17.5	16.1	16.5	17	0	16.2	0	16	0.5	16.4
11/17/1999	17.6		17.2	15.9	16.5	16.8		16.1		15.8	1.35	16.2
11/18/1999	17.7	0	17.2	15.9	16.5	16.9		16.2	0.7	15.8	1.6	16.2
11/19/1999	17.8	0	17.2	15.9	16.5	16.9	0	16.2	0.1	15.9	1.3	16.3