EMCON
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

97 MAR 31 PM 3:52

Date March 28, 1997
Project 20805-120.006

To:

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harborbay Parkway, Suite 250
Alameda, California 94502-6577

We are enclosing:

Copies	Description
1	Fourth quarter 1996 groundwater monitoring report results and remediation system performance evaluations report, retail service station, 10600 MacArthur Boulevard, Oakland, CA

For your:	X	Use	Sent by:		Regular Mail
		Approval			Standard Air
		Review			Courier
		Information		X	Other: Cert. Mail

Comments:

The enclosed groundwater monitoring report is being sent to you per the request of ARCO Products Company. Plaese call if you have questions or comments.

John C. Young
Project Manager

cc: Kevin Graves, RWQCB - SFBR
Richard Gilcrease, Drake Builders
Kyle Christie, ARCO Products Company
Beth Dorris, ARCO Legal Department
File

ARCO Products Company

Date: March 21, 1997

Re: ARCO Station # 10600 MacArthur Boulevard • Oakland, CA
Fourth Quarter 1996 Groundwater Monitoring Results
and Remediation System Performance Evaluation Report

"I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached proposal or report are true and correct."

Submitted by:

Kyle Christie
Environmental Engineer

EMCON
1921 Ringwood Avenue • San Jose, California 95131-1721 • (408) 453-7300 • Fax (408) 437-9526

March 24, 1997
Project 20805-120.006

Kyle Christie
ARCO Products Company
P.O. Box 5077
Buena Park, California 90622-5077

Re: Fourth quarter 1996 groundwater monitoring program results and remediation system performance evaluation report, SVE system at retail service station, 10600 MacArthur Boulevard, Oakland, California

Dear Mr. Christie:

This letter presents the results of the fourth quarter 1996 groundwater monitoring program for the retail service station at 10600 MacArthur Boulevard, Oakland, California (Figure 1). Operation and performance data for the site's soil-vapor extraction (SVE) system are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

LIMITATIONS

No monitoring event is thorough enough to describe all geologic and hydrogeologic conditions of interest at a given site. If conditions have not been identified during the monitoring event, such a finding should not therefore be construed as a guarantee of the absence of such conditions at the site, but rather as the result of the scope, limitations, and cost of work performed during the monitoring event.

Please call if you have questions.

Sincerely,

EMCON

Krishnaveni M
Krishnaveni Meka
Staff Engineer

REGISTERED GEOLOGIST
JOHN CHARLES YOUNG
7/98
NO. 6407
STATE OF CALIFORNIA

John C. Young, R.G. 6407
Project Manager

March 24, 1997

ARCO QUARTERLY REPORT

Address: 10600 MacArthur Boulevard,	Oakland, California
EMCON Project No.:	20805-120.006
ARCO Environmental Engineer/Phone No.:	Kyle Christie /(714) 670-5303
EMCON Project Manager/Phone No.:	John Young /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Barney Chan
Reporting Period:	October 1, 1996 to January 1, 1997

WORK PERFORMED THIS QUARTER (Fourth- 1996):

1. Conducted quarterly groundwater monitoring and sampling for fourth quarter 1996.
2. Stimulated natural biodegradation with oxygen releasing compounds (ORCs) in groundwater monitoring wells MW-2 and MW-7.
3. Prepared and submitted quarterly report for third quarter 1996.

WORK PROPOSED FOR NEXT QUARTER (First- 1997):

1. Perform quarterly groundwater monitoring and sampling for first quarter 1997.
2. Continue monitoring dissolved oxygen in groundwater monitoring wells MW-2 and MW-7.
3. Prepare and submit quarterly report for fourth quarter 1996.
4. Prepare and submit risk-based corrective action (RBCA) evaluation.
5. Request that this site be reviewed for closure.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring Stimulate natural biodegradation with ORCs. SVE system was shut down on 3-26-96, due to high groundwater levels and low hydrocarbon concentrations in extracted soil vapors.
Frequency of Sampling:	Quarterly (groundwater)
Frequency of Monitoring:	Quarterly (groundwater)
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Cumulative FP Recovered to Date :	18.54 gallons, Wells MW-2 and MW-7
FP Recovered This Quarter :	None
Bulk Soil Removed to Date :	564 cubic yards of TPH-impacted soil
Bulk Soil Removed This Quarter :	None
Water Wells or Surface Waters, within 2000 ft., impacted by site:	None
Current Remediation Techniques:	SVE System
Approximate Depth to Groundwater:	19.58 feet
Groundwater Gradient (Average):	Flat Gradient

SVE QUARTERLY OPERATION AND PERFORMANCE:

Equipment Inventory:	Anguil Energy Systems Remedi-Cat, 500 cfm, Catalytic Oxidizer For the period from September 6, 1990 through December 22, 1994, please refer to *Fourth Quarter 1994 Groundwater Monitoring Results and Remediation System Performance Evaluation Report,* (EMCON, March 1995), for system operation before December 1994. SVE system was shut down on 3-26-96, due to high groundwater levels and low hydrocarbon concentrations in extracted soil vapors.
Operating Mode:	Catalytic Oxidation
BAAQMD Permit #, A/N:	5998
TPH Conc. End of Period (lab):	NA (Not Available)
Benzene Conc. End of Period (lab):	NA
Flowrate End of Period:	NA
HC Destroyed This Period:	0.0 pounds
HC Destroyed to Date:	7,801.1 pounds
Utility Usage	
Electric (KWH):	0
Gas (Therms):	68
Operating Hours This Period:	0.0 hours
Percent Operational:	0.0%
Operating Hours to Date:	4282.8 hours
Unit Maintenance:	NA
Number of Auto Shut Downs:	0
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	NA
Stack Temperature:	NA
Source Flow:	0.0 scfm
Process Flow:	0.0 scfm
Source Vacuum:	0.0 inches of water

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Fourth Quarter 1996
- Table 2 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 3 - Historical Groundwater Analytical Data, Volatile Organic Compounds
- Table 4 - Approximate Cumulative Floating Product Recovered
- Table 5 - Soil-Vapor Extraction System Operation and Performance Data
- Table 6 - Soil-Vapor Extraction Well Data
- Figure 1 - Site Location
- Figure 2 - TPHG and Benzene Concentrations in Groundwater, Fourth Quarter 1996
- Figure 3 - Tetrachloroethene (PCE) Concentrations in Groundwater, Fourth Quarter 1996
- Figure 4 - Soil-Vapor Extraction and Treatment System, Historical Well Field Influent TVHG and Benzene Concentrations
- Figure 5 - Soil-Vapor Extraction and Treatment System, Historical Hydrocarbon Removal Rates

- Appendix A - Analytical Results and Chain-of-Custody Documentation, Fourth Quarter 1996 Groundwater Monitoring Event
- Appendix B - SVE System Monitoring Data Log Sheets

cc: Barney Chan, ACHCSA
Kevin Graves, RWQCB-SFBR
Richard Gilcrease, Drake Builders
Beth Dorris, ARCO Legal Department

Table 1
Groundwater Monitoring Data
Fourth Quarter 1996

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418 1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	11-21-96	55.92	30 19	25 73	ND	FG	FG	11-21-96	<50	<0.5	<0 5	<0.5	<0 5	<3	--	--	--
MW-2	11-21-96	55 10	15 44	39 66	ND	FG	FG	11-21-96	2200	45	3 4	9	140	44	--	--	--
MW-3	11-21-96	56 55	30.85	25 70	ND	FG	FG	11-21-96	<300*	<0.5	<0 5	<0 5	<0 5	<3	--	--	--
MW-4	11-21-96	55 98	30 30	25 68	ND	FG	FG	11-21-96	<400*	<1**	<1**	<1**	<1**	<5**	--	<0 5	--
MW-5	11-21-96	55 43	29.92	25 51	ND	FG	FG	11-21-96	<600*	<1**	<1**	<1**	<1**	<20**	--	--	--
MW-6	11-21-96	61 21	35 70	25 51	ND	FG	FG	11-21-96	<300*	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
MW-7	11-21-96	58.22	19 58	38 64	ND	FG	FG	11-21-96	41000	190	150	730	2900	<300**	--	--	--
MW-8	11-21-96	53.65	28 16	25 49	ND	FG	FG	11-21-96	<50	<0 5	<0 5	<0 5	<0 5	19	--	--	--
RW-1	11-21-96	56.32	30 65	25 67	ND	FG	FG	11-21-96	<70*	<0 5	<0.5	<0 5	<0.5	<3	--	--	--
WGR-3	11-21-96	NR	18 70	NR	ND	FG	FG	11-21-96	<50	<0 5	<0 5	0.6	<0.5	10	--	--	--

ft-MSL elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L micrograms per liter
EPA United Statest Environmental Protection Agency
MTBE methyl-tert-butyl ether
TRPH total recoverable petroleum hydrocarbons
TPHD total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND none detected
FG flat gradient, the groundwater gradient over the local area was nearly flat
-- not analyzed or not applicable
*. raised method reporting limit due to matrix interference, the sample contains a single non-fuel component eluting in the gasoline range and quantitated as gasoline (possibly PCE). and the chromatogram does not match the typical gasoline fingerprint
** raised method reporting limit due to matrix interference requiring sample dilution
*** raised MRL due to high analyte concentration requiring a dilution

esj/h \0276\0276mdb.xls\Table 1:imi
20805-120.006

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994-Present^

10600 and 10700 MacArthur Boulevard
Oakland, California

Date. 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418.1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	02-04-94	55 92	24 48	31 44	ND	NR	NR	02-04-94	<50	<0 5	<0 5	<0.5	<0.5	--	--	--	--
MW-1	05-02-94	55 92	31 66	24 26	ND	NR	NR	05-02-94	<50	<0 5	<0 5	<0.5	<0 5	--	--	--	--
MW-1	08-03-94	55 92	32 54	23.38	ND	SW	0 002	08-03-94	<50	<0.5	<0 5	<0.5	<0 5	--	--	--	--
MW-1	12-06-94	55.92	31 89	24 03	ND	W	0 001	12-06-94	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-1	03-10-95	55.92	26 26	29 66	ND	NNE	0 003	03-10-95	<57*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-1	06-05-95	55 92	25 71	30 21	ND	FG	FG	06-05-95	<84*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-1	08-29-95	55 92	28 44	27 48	ND	FG	FG	08-29-95	<60*	<0 5	<0 5	<0 5	<0 5	--	<1	--	--
MW-1	11-16-95	55.92	30 85	25 07	ND	SW	0.003	11-16-95	<50	<0 5	<0 5	<0 5	<0.5	<3	--	--	--
MW-1	02-28-96	55 92	24 99	30 93	ND	NNE	0 004	02-28-96	<50	<0 5	<0 5	<0.5	<0 5	--	--	--	--
MW-1	05-28-96	55 92	24 92	31 00	ND	FG	FG	05-28-96	<50	<0.5	<0 5	<0.5	<0 5	<3	--	--	--
MW-1	08-19-96	55 92	28 04	27 88	ND	FG	FG	08-19-96	<50	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
MW-1	11-21-96	55 92	30 19	25 73	ND	FG	FG	11-21-96	<50	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
MW-2	02-04-94	55 10	16 42	38 68	ND	NR	NR	02-04-94	2100	110	5 6	26	110	--	--	--	--
MW-2	05-02-94	55 10	16 15	38 95	ND	NR	NR	05-02-94	3400	130	21	73	180	--	--	--	--
MW-2	08-03-94	55 10	Not surveyed	well was inaccessible due to a parked ve				08-03-94	Not sampled	well was inaccessible due to a parked vehicle							
MW-2	12-06-94	55 10	14 74	40 36	Sheen	W	0 001	12-07-94	26000	570	43	220	1100	--	--	--	--
MW-2	03-10-95	55.10	13.98	41 12	ND	NNE	0.003	03-11-95	2800	88	12	16	200	--	--	--	--
MW-2	06-05-95	55.10	15 65	39 45	ND	FG	FG	06-05-95	1800	59	10	53	130	--	--	--	--
MW-2	08-29-95	55.10	17 14	37 96	ND	FG	FG	08-29-95	4500	170	20	150	330	--	71	--	--
MW-2	11-16-95	55 10	Not surveyed.	well was inaccessible				11-16-95	Not surveyed·	well was inaccessible							
MW-2	02-28-96	55 10	12 46	42 64	ND	NNE	0 004	02-28-96	330	18	0 9	13	13	--	--	--	--
MW-2	05-28-96	55 10	15 23	39 87	ND	FG	FG	05-28-96	1200	48	3	28	75	87	--	--	--
MW-2	08-19-96	55.10	16 84	38.26	ND	FG	FG	08-21-96	880	45	1	15	31	80	--	--	--
MW-2	11-21-96	55.10	15 44	39 66	ND	FG	FG	11-21-96	2200	45	3 4	9	140	44	--	--	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994-Present^

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418 1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	02-04-94	56.55	33 58	22 97	ND	NR	NR	02-04-94	<190*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-3	05-02-94	56.55	32 16	24.39	ND	NR	NR	05-02-94	<480*	<0 5	<0 5	<0 5	<0.9**	--	--	--	--
MW-3	08-03-94	56.55	33 09	23 46	ND	SW	0 002	08-03-94	<250*	<0.5	<0 5	<0.5	<0 5	--	--	--	--
MW-3	12-06-94	56 55	32 46	24 09	ND	W	0 001	12-06-94	<380*	<0 5	<0 5	<0.5	<0 5	--	--	--	--
MW-3	03-10-95	56 55	26 74	29 81	ND	NNE	0.003	03-11-95	<440*	<0 5	<0 5	<0 5	0 7	--	--	--	--
MW-3	06-05-95	56 55	26 34	30 21	ND	FG	FG	06-05-95	<970*	<1**	<1**	1 1	1 8	--	--	--	--
MW-3	08-29-95	56 55	29 15	27 40	ND	FG	FG	08-29-95	<700*	<0.5	<0 5	<0 5	<0.5	--	<20	--	--
MW-3	11-16-95	56.55	31.50	25 05	ND	SW	0 003	11-16-95	<500*	<0.5	<0 5	<0 5	<0 5	<3	--	--	--
MW-3	02-28-96	56.55	25 32	31 23	ND	NNE	0.004	02-28-96	<500*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-3	05-28-96	56 55	25 46	31 09	ND	FG	FG	05-28-96	<600*	<0 5	<0.5	<0 5	<0 5	<3	--	--	--
MW-3	08-19-96	56 55	28 71	27 84	ND	FG	FG	08-19-96	<400*	<0 5	<0.5	<0 5	<0.5	<3	--	--	--
MW-3	11-21-96	56 55	30 85	25 70	ND	FG	FG	11-21-96	<300*	<0.5	<0 5	<0.5	<0 5	<3	--	--	--
MW-4	02-04-94	55.98	33 07	22 91	ND	NR	NR	02-04-94	<480*	<0.5	<0.5	<0 5	1.4	--	--	<500	--
MW-4	05-02-94	55 98	31 60	24 38	ND	NR	NR	05-02-94	<490*	<0 5	<0 5	<0 5	<0.9**	--	--	5900	--
MW-4	08-03-94	55.98	32 53	23 45	ND	SW	0 002	08-03-94	<400*	<0 5	<0.5	<0 5	<0 5	--	--	<500	--
MW-4	12-06-94	55 98	31.91	24 07	ND	W	0.001	12-06-94	<970*	<2 5**	<2 5**	<2 5**	<2 5**	--	--	1800	--
MW-4	03-10-95	55 98	26 22	29 76	ND	NNE	0 003	03-11-95	<780*	<1 0**	<1 0**	<1.0**	1	-	--	<500	--
MW-4	06-05-95	55.98	25 79	30 19	ND	FG	FG	06-05-95	<1200*	<1**	<1**	<1**	<1**	--	--	600	--
MW-4	08-29-95	55.98	28 56	27 42	ND	FG	FG	08-29-95	<1100*	<1**	<1**	<1**	<1**	--	<20	--	--
MW-4	11-16-95	55 98	31.00	24.98	ND	SW	0.003	11-16-95	<900*	<0 5	<0.5	<0 5	<0 5	<6**	--	<0 5	--
MW-4	02-28-96	55 98	24 77	31 21	ND	NNE	0 004	02-28-96	<1000*	<1**	<1**	<1**	<1**	--	--	0 7	--
MW-4	05-28-96	55 98	24 91	31 07	ND	FG	FG	05-28-96	<900*	<0 5	<0 5	<0.5	<0 5	<6**	--	<0 5	--
MW-4	08-19-96	55.98	28 17	27 81	ND	FG	FG	08-19-96	<800*	<0.5	<0 5	<0 5	<0 5	<7**	--	0.8	--
MW-4	11-21-96	55 98	30 30	25.68	ND	FG	FG	11-21-96	<400*	<1**	<1**	<1**	<1**	<5**	--	<0 5	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994-Present^

10600 and 10700 MacArthur Boulevard
Oakland, California

Date: 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418.1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-5	02-04-94	55 43	32 45	22 98	ND	NR	NR	02-04-94	<50	<0.5	<0 5	<0 5	<0 5	--	--	--	--
MW-5	05-02-94	55 43	31 06	24 37	ND	NR	NR	05-02-94	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-5	08-03-94	55 43	32 05	23.38	ND	SW	0 002	08-03-94	<50	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-5	12-06-94	55 43	31 44	23 99	ND	W	0 001	12-06-94	<550*	<0 5	0.6	1 1	2	--	--	--	--
MW-5	03-10-95	55 43	25 62	29 81	ND	NNE	0 003	03-10-95	<110*	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-5	06-05-95	55 43	25.30	30 13	ND	FG	FG	06-05-95	<130*	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-5	08-29-95	55 43	28 21	27.22	ND	FG	FG	08-29-95	<120*	<0 5	<0.5	<0 5	<0.5	--	<5	--	--
MW-5	11-16-95	55.43	30.63	24.80	ND	SW	0 003	11-16-95	<500*	<0.5	<0.5	<0 5	0.7	<20**	--	--	--
MW-5	02-28-96	55 43	24 07	31.36	ND	NNE	0 004	02-28-96	<400*	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-5	05-28-96	55 43	24 42	31.01	ND	FG	FG	05-28-96	<100*	<0 5	<0.5	<0 5	<0 5	11	--	--	--
MW-5	08-19-96	55 43	27 82	27.61	ND	FG	FG	08-21-96	<50	<0 5	<0 5	<0 5	<0 5	29	--	--	--
MW-5	11-21-96	55 43	29 92	25 51	ND	FG	FG	11-21-96	<600*	<1**	<1**	<1**	<1**	<20**	--	--	--
MW-6	02-04-94	61 21	38.48	22.73	ND	NR	NR	02-04-94	<830*	<2.5***	<2 5***	<2 5***	3 1	--	--	--	--
MW-6	05-02-94	61 21	37.02	24.19	ND	NR	NR	05-02-94	<860*	<1***	<1***	<1***	1 3	--	--	--	--
MW-6	08-03-94	61 21	37 97	23.24	ND	SW	0 002	08-03-94	<660*	<1***	<1***	<1***	<1***	--	--	--	--
MW-6	12-06-94	61 21	37 33	23.88	ND	W	0 001	12-07-94	<720*	<1**	<1**	<1**	<1**	--	--	--	--
MW-6	03-10-95	61 21	31 54	29 67	ND	NNE	0 003	03-11-95	<390*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-6	06-05-95	61 21	31 15	30.06	ND	FG	FG	06-05-95	<750*	<0 5	<0 5	<0.5	<0 5	--	--	--	--
MW-6	08-29-95	61 21	34 03	27.18	ND	FG	FG	08-29-95	<600*	<0 5	<0 5	<0.5	<0 5	--	<20	--	--
MW-6	11-16-95	61 21	36 40	24.81	ND	SW	0 003	11-16-95	<500*	<0 5	<0 5	<0.5	<0 5	<3	--	--	--
MW-6	02-28-96	61 21	30 18	31 03	ND	NNE	0 004	02-28-96	<500*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-6	05-28-96	61 21	30 29	30 92	ND	FG	FG	05-28-96	<400*	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
MW-6	08-19-96	61 21	33 54	27 67	ND	FG	FG	08-19-96	<300*	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
MW-6	11-21-96	61 21	35 70	25.51	ND	FG	FG	11-21-96	<300*	<0 5	<0 5	<0 5	<0.5	<3	--	--	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994-Present^

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418 1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-7	02-04-94	58.22	20.78	37 44	ND	NR	NR	02-04-94	40000	900	980	1100	9700	--	--	--	--
MW-7	05-02-94	58 22	20 51	37 71	ND	NR	NR	05-02-94	38000	640	600	930	7200	--	--	--	--
MW-7	08-03-94	58 22	22.66	35 56	ND	SW	0 002	08-03-94	47000	1000	1200	1500	10000	--	--	--	--
MW-7	12-06-94	58 22	18.37	## 39 86	0.02	W	0 001	12-07-94	260000	<200***	380	2200	11000	--	--	--	--
MW-7	03-10-95	58 22	17.69	40 53	ND^^	NNE	0 003	03-11-95	Not sampled floating product entered the well during purging								
MW-7	06-05-95	58 22	19 68	38 54	ND	FG	FG	06-05-95	36000	90	51	450	2000	--	--	--	--
MW-7	08-29-95	58 22	21 70	36 52	ND	FG	FG	08-29-95	86000	380	260	1100	5000	--	<10	--	--
MW-7	11-16-95	58 22	23.02	35 20	ND	SW	0 003	11-16-95	1400000	610	590	7800	3300	<4000***	--	--	--
MW-7	02-28-96	58 22	16.54	41 68	ND	NNE	0 004	02-28-96	29000	<20***	<20***	180	1000	--	--	--	--
MW-7	05-28-96	58 22	19 29	38 93	ND	FG	FG	05-28-96	50000	<100***	100	510	2300	<500***	--	--	--
MW-7	08-19-96	58 22	21 84	36 38	ND	FG	FG	08-21-96	45000	340	200	820	3400	<300***	--	--	--
MW-7	11-21-96	58 22	19 58	38 64	ND	FG	FG	11-21-96	41000	190	150	730	2900	<300**	--	--	--
MW-8	02-04-94	53 65	30 73	22 92	ND	NR	NR	02-04-94	<50	<0 5	<0 5	<0.5	<0 5	--	--	--	--
MW-8	05-02-94	53 65	29 26	24 39	ND	NR	NR	05-02-94	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-8	08-03-94	53.65	30 33	23 32	ND	SW	0 002	08-03-94	<50	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-8	12-06-94	53.65	29 66	23 99	ND	W	0 001	12-07-94	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-8	03-10-95	53 65	23 60	30 05	ND	NNE	0 003	03-10-95	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-8	06-05-95	53 65	23 48	30 17	ND	FG	FG	06-05-95	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
MW-8	08-29-95	53 65	26 44	27 21	ND	FG	FG	08-29-95	<50	<0 5	<0.5	<0.5	<0 5	--	3	--	--
MW-8	11-16-95	53 65	28 90	24 75	ND	SW	0 003	11-16-95	<50	<0 5	<0 5	<0 5	<0 5	6	9	--	--
MW-8	02-28-96	53 65	22.16	31 49	ND	NNE	0 004	02-28-96	<50	<0 5	<0.5	<0 5	<0 5	--	--	--	--
MW-8	05-28-96	53 65	22.62	31 03	ND	FG	FG	05-28-96	<50	<0.5	<0.5	<0 5	<0 5	5	--	--	--
MW-8	08-19-96	53 65	26 70	26 95	ND	FG	FG	08-21-96	<50	<0 5	<0 5	<0 5	<0.5	18	--	--	--
MW-8	11-21-96	53 65	28 16	25 49	ND	FG	FG	11-21-96	<50	<0 5	<0 5	<0 5	<0 5	19	--	--	--

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10600 and 10700 MacArthur Boulevard
Oakland, California

Date: 02-06-97

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		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RW-1	02-04-94	56 32	33 43	22 89	ND	NR	NR	02-04-94	<540*	<0.5	<0.5	<0 5	<1 5**	--	--	--	--
RW-1	05-02-94	56 32	31 96	24 36	ND	NR	NR	05-02-94	<50	<0.5	<0.5	<0 5	<0 5	--	--	--	--
RW-1	08-03-94	56 32	32 90	23 42	ND	SW	0 002	08-03-94	<140*	<0.5	<0 5	<0 5	<0.5	--	--	--	--
RW-1	12-06-94	56 32	32 24	24.08	ND	W	0 001	12-07-94	<79*	<0 5	<0 5	<0 5	<0.5	--	--	--	--
RW-1	03-10-95	56 32	26 48	29.84	Sheen	NNE	0 003	03-10-95	<180*	<0 5	<0 5	<0 5	<0 5	--	--	--	--
RW-1	06-05-95	56 32	26 20	30 12	ND	FG	FG	06-05-95	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
RW-1	08-29-95	56 32	28 98	27 34	ND	FG	FG	08-29-95	<200*	<0 5	<0 5	<0 5	<0 5	--	<5	--	--
RW-1	11-16-95	56 32	31.34	24 98	ND	SW	0.003	11-16-95	<50	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
RW-1	02-28-96	56 32	25 12	31 20	ND	NNE	0 004	02-28-96	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
RW-1	05-28-96	56 32	25 26	31 06	ND	FG	FG	05-28-96	<50	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
RW-1	08-19-96	56 32	28.51	27 81	ND	FG	FG	08-21-96	<50	<0 5	<0 5	<0 5	<0 5	<3	--	--	--
RW-1	11-21-96	56 32	30 65	25 67	ND	FG	FG	11-21-96	<70*	<0.5	<0.5	<0 5	<0 5	<3	--	--	--
WGR-3	05-02-94	NR	20 06	NR	ND	NR	NR	05-02-94	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
WGR-3	08-03-94	NR	22 30	NR	ND	NR	NR	08-03-94	<50	<0.5	<0 5	<0 5	<0 5	--	--	--	--
WGR-3	12-06-94	NR	17 52	NR	ND	NR	NR	12-07-94	<50	<0 5	<0 5	<0 5	0 6	--	--	--	--
WGR-3	03-10-95	NR	15 20	NR	ND	NR	NR	03-11-95	<50	<0 5	<0 5	<0 5	<0 5	--	--	--	--
WGR-3	06-05-95	NR	19 25	NR	ND	NR	NR	06-05-95	<50	<0.5	<0.5	<0.5	<0 5	--	--	--	--
WGR-3	08-29-95	NR	21 41	NR	ND	NR	NR	08-29-95	<50	<0.5	<0.5	<0 5	<0 5	--	10	--	--
WGR-3	11-16-95	NR	22 50	NR	ND	SW	0 003	11-16-95	<50	<0.5	<0 5	<0 5	<0 5	3	--	--	--
WGR-3	02-28-96	NR	14 90	NR	ND	NNE	0 004	02-28-96	<50	<0 5	<0 5	1 5	1 6	--	--	--	--
WGR-3	05-28-96	NR	18 33	NR	ND	FG	FG	05-28-96	<50	<0 5	<0 5	<0 5	<0 5	20	--	--	--
WGR-3	08-19-96	NR	21 38	NR	ND	FG	FG	08-19-96	<50	<0 5	<0 5	<0 5	<0 5	17	--	--	--
WGR-3	11-21-96	NR	18 70	NR	ND	FG	FG	11-21-96	<50	<0 5	<0 5	0 6	<0 5	10	--	--	--

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10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418.1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

ft-MSL elevation in feet, relative to mean sea level
MWN ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA United States Environmental Protection Agency
MTBE· Methyl-tert-butyl ether
TRPH total recoverable petroleum hydrocarbons
TPHD. total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND none detected
NR· not reported, data not available or not measurable
SW southwest
W west
NNE north-northeast
FG flat gradient. the groundwater gradient over the local area was nearly flat
##. corrected elevation (Z'). such that Z' = Z + (h * 0 73) where Z = measured elevation, h = floating product thickness, 0 73 = density ratio of oil to water
^^ floating product entered the well during purging
* raised method reporting limit due to matrix interference the sample contains a single non-fuel component eluting in the gasoline range and quantitated as gasoline (possibly PCE), and the chromatogram does not match the typical gasoline fingerprint
** raised method reporting limit due to matrix interference requiring sample dilution
*** raised method reporting limit due to high analyte concentration requiring sample dilution
- -. not analyzed or not applicable
^: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Results and Remediation System Performance Evaluation Report, Retail Service Station 10600 and 10700 MacArthur Boulevard, Oakland, California, (EMCON, March 22, 1996)*

Table 3
Historical Groundwater Analytical Data
Volatile Organic Compounds
1994-Present*

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 601/8010 or 624/8240					BTEX by EPA Method 624/8240			
		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	02-04-94	22	<1	<1	<1	--	<1	<1	<1	<5
MW-1	05-02-94	35	<1	<1	<1	--	<1	<1	<1	<5
MW-1	08-03-94	14	<1	--	<1	--	<1	<1	<1	<5
MW-1	12-06-94	17	<1	--	<1	--	<1	<1	<1	<5
MW-1	03-10-95	170	<1	--	<1	--	<1	<1	<1	<5
MW-1	06-05-95	210	<5	--	<5	--	<5	<5	<5	<25
MW-1	08-29-95	130	<1	--	<1	--	<1	<1	<1	<5
MW-1	11-16-95	45	<1	--	<1	<1	<1	<1	<1	<5
MW-1	02-28-96	97	<1	<1	<1	--	<1	<1	<1	<5
MW-1	05-28-96	160	<5	<5	<5	--	<5	<5	<5	<25
MW-1	08-19-96	77	<1	<1	<1	--	<1	<1	<1	<5
MW-1	11-21-96	30	<1	<1	<1	--	<1	<1	<1	<5
MW-2	02-04-94	<1	<1	<1	<1	--	170	9	36	160
MW-2	05-02-94	<1	<1	<1	<1	--	140	21	79	190
MW-2	08-03-94	Not sampled well was inaccessible due to a parked car								
MW-2	12-06-94	<5	<5	--	<5	--	620	28	220	1200
MW-2	03-11-95	<1	<1	--	<1	--	110	12	15	240
MW-2	06-05-95	<1	<1	--	<1	--	83	14	72	190
MW-2	08-29-95	<5	<5	--	<5	--	220	26	210	450
MW-2	11-16-95	Not surveyed· well was inaccessible								
MW-2	02-28-96	<1	<1	<1	<1	--	18	<1	13	14
MW-2	05-28-96	<1	<1	<1	<1	--	44	<1	22	62
MW-2	08-21-96	<1	<1	<1	<1	--	49	<1	17	40
MW-2	11-21-96	<1	<1	<1	<1	--	49	3	7	180

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Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 601/8010 or 624/8240					BTEX by EPA Method 624/8240			
		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	02-04-94	91	<5	<5	<5	--	<5	<5	<5	<25
MW-3	05-02-94	1600	<20	<20	<20	--	<20	<20	<20	<100
MW-3	08-03-94	680	<20	--	<20	--	<20	<20	<20	<100
MW-3	12-06-94	1100	<25	--	<25	--	<25	<25	<25	<125
MW-3	03-11-95	1700	<10	--	<10	--	<10	<10	<10	<50
MW-3	06-05-95	2500	<20	--	<20	--	<20	<20	<20	<100
MW-3	08-29-95	1600	<20	--	<20	--	<20	<20	<20	<100
MW-3	11-16-95	1100	<20	--	<20	<20	<20	<20	<20	<100
MW-3	02-28-96	1100	<10	<10	<10	--	<10	<10	<10	<50
MW-3	05-28-96	1700	<20	<20	<20	--	<20	<20	<20	<100
MW-3	08-19-96	1200	<20	<20	<20	--	<20	<20	<20	<100
MW-3	11-21-96	710	<20*	<20*	<20*	--	<20*	<20*	<20*	<100*
MW-4	02-04-94	1900	<20	<20	<20	--	<20	<20	<20	<100
MW-4	05-02-94	1700	<20	<20	<20	--	<20	<20	<20	<100
MW-4	08-03-94	1200	<20	--	<20	--	<20	<20	<20	<100
MW-4	12-06-94	2200	<20	--	<20	--	<20	<20	<20	<100
MW-4	03-11-95	2600	<20	--	<20	--	<20	<20	<20	<100
MW-4	06-05-95	3100	<20	--	<20	--	<20	<20	<20	<100
MW-4	08-29-95	2900	<20	--	<20	--	<20	<20	<20	<100
MW-4	11-16-95	2100	<20	--	<20	<20	<20	<20	<20	<100
MW-4	02-28-96	2400	<20	<20	<20	--	<20	<20	<20	<100
MW-4	05-28-96	2700	<20	<20	<20	--	<20	<20	<20	<100
MW-4	08-19-96	2600	<20	<20	<20	--	<20	<20	<20	<100
MW-4	11-21-96	1100	<20*	<20*	<20*	--	<20*	<20*	<20*	<100*

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Oakland, California

Date: 02-06-97

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 601/8010 or 624/8240					BTEX by EPA Method 624/8240			
		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-5	02-04-94	39	<1	<1	<1	- -	<1	<1	<1	<5
MW-5	05-02-94	35	<1	<1	<1	- -	<1	<1	<1	<5
MW-5	08-03-94	25	<1	- -	<1	- -	<1	<1	<1	<5
MW-5	12-06-94	1800	<20	- -	<20	- -	<20	<20	<20	<100
MW-5	03-10-95	270	<5	- -	<5	- -	<5	<5	<5	<25
MW-5	06-05-95	310	<5	- -	<5	- -	<5	<5	<5	<25
MW-5	08-29-95	240	<5	- -	<5	- -	<5	<5	<5	<25
MW-5	11-16-95	940	<5	- -	<5	<5	<5	<5	<5	<25
MW-5	02-28-96	1100	<10	<10	<10	- -	<10	<10	<10	<50
MW-5	05-28-96	360	<5	<5	<5	- -	<5	<5	<5	<25
MW-5	08-21-96	150	<1	<1	2	- -	<1	<1	<1	<5
MW-5	11-21-96	1900	<20*	<20*	<20*	- -	<20*	<20*	<20*	<100*
MW-6	02-04-94	2900	<50	<50	<50	- -	<50	<50	<50	<250
MW-6	05-02-94	2000	<50	<50	<50	- -	<50	<50	<50	<250
MW-6	08-03-94	1400	<50	- -	<50	- -	<50	<50	<50	<250
MW-6	12-06-94	2000	<50	- -	<50	- -	<50	<50	<50	<250
MW-6	03-11-95	1300	<20	- -	<20	- -	<20	<20	<20	<100
MW-6	06-05-95	2000	<20	- -	<20	- -	<20	<20	<20	<100
MW-6	08-29-95	1300	<20	- -	<20	- -	<20	<20	<20	<100
MW-6	11-16-95	1300	<20	- -	<20	<20	<20	<20	<20	<100
MW-6	02-28-96	960	<20	<20	<20	- -	<20	<20	<20	<100
MW-6	05-28-96	970	<20	<20	<20	- -	<20	<20	<20	<100
MW-6	08-19-96	820	<20	<20	<20	- -	<20	<20	<20	<100
MW-6	11-21-96	680	<20*	<20*	<20*	- -	<20*	<20*	<20*	<100*

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		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-7	02-04-94	<50	<50	<50	<50	--	940	950	1100	9100
MW-7	05-02-94	<50	<50	<50	<50	--	440	400	660	5200
MW-7	08-03-94	<50	<50	--	<50	--	640	770	960	6200
MW-7	12-06-94	<50	<50	--	<50	--	230	180	750	4800
MW-7	03-11-95	Not sampled floating product entered the well during purging								
MW-7	06-05-95	<10	<10	--	<10	--	86	27	420	1400
MW-7	08-29-95	<10	<10	--	<10	--	410	230	1100	5000
MW-7	11-16-95	<20	<20	--	<20	<20	360	220	1700	10000
MW-7	02-28-96	<10	<10	<10	<10	--	<10	<10	87	760
MW-7	05-28-96	<10	<10	<10	<10	--	74	36	340	1600
MW-7	08-21-96	<1	<1	<1	<1	--	260	200	800	3200
MW-7	11-21-96	<10*	<10*	<10*	<10*	--	180	120	640	2900
MW-8	02-04-94	<1	<1	<1	<1	--	<1	<1	<1	<5
MW-8	05-02-94	<1	<1	<1	<1	--	<1	<1	<1	<5
MW-8	08-03-94	<1	<1	--	<1	--	<1	<1	<1	<5
MW-8	12-06-94	2	<1	--	<1	--	<1	<1	<1	<5
MW-8	03-10-95	<1	<1	--	<1	--	<1	<1	<1	<5
MW-8	06-05-95	<1	<1	--	<1	--	<1	<1	<1	<5
MW-8	08-29-95	<1	<1	--	<1	--	<1	<1	<1	<5
MW-8	11-16-95	<1	<1	--	<1	<1	<1	<1	<1	<5
MW-8	02-28-96	3	<1	<1	<1	--	<1	<1	<1	<5
MW-8	05-28-96	<1	<1	<1	<1	--	<1	<1	<1	<5
MW-8	08-21-96	<1	<1	<1	<1	--	<1	<1	<1	<5
MW-8	11-21-96	7	<1	<1	<1	--	<1	<1	<1	<5

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Date 02-06-97

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 601/8010 or 624/8240					BTEX by EPA Method 624/8240			
		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RW-1	02-04-94	2200	<20	<20	<20	- -	<20	<20	<20	<100
RW-1	05-02-94	45	<1	<1	<1	- -	<1	<1	<1	<5
RW-1	08-03-94	350	4	- -	<1	- -	<1	<1	<1	<5
RW-1	12-06-94	340	<5	- -	<5	- -	<5	<5	<5	<25
RW-1	03-10-95	260	<5	- -	<5	- -	<5	<5	<5	<25
RW-1	06-05-95	59	<1	- -	<1	- -	<1	<1	<1	<5
RW-1	08-29-95	570	<5	- -	<5	- -	<5	<5	<5	<25
RW-1	11-16-95	140	<1	- -	<1	<1	<1	<1	<1	<5
RW-1	02-28-96	6	<1	<1	<1	- -	<1	<1	<1	<5
RW-1	05-28-96	12	<1	<1	<1	- -	<1	<1	<1	<5
RW-1	08-21-96	100	<1	<1	<1	- -	<1	<1	<1	<5
RW-1	11-21-96	190	1	<1	<1	- -	<1	<1	<1	<5

Table 3
Historical Groundwater Analytical Data
Volatile Organic Compounds
1994-Present*

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 601/8010 or 624/8240					BTEX by EPA Method 624/8240			
		Tetrachloro-ethene	Trichloro-ethene	1,2-Dichloro-ethene	cis-1,2-Dichloro-ethene	Freon 12	Benzene	Toluene	Ethylbenzene	Total Xylenes
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
WGR-3	05-02-94	<1	<1	<1	<1	--	<1	<1	<1	<5
WGR-3	08-03-94	<1	<1	--	<1	--	<1	<1	<1	<5
WGR-3	12-06-94	4	<1	--	<1	--	<1	<1	<1	<5
WGR-3	03-11-95	<1	<1	--	<1	--	<1	<1	<1	<5
WGR-3	06-05-95	<1	<1	--	<1	--	<1	<1	<1	<5
WGR-3	08-29-95	<1	<1	--	<1	--	<1	<1	<1	<5
WGR-3	11-16-95	<1	<1	--	<1	<1	<1	<1	<1	<5
WGR-3	02-28-96	<1	<1	<1	<1	--	<1	<1	<1	<5
WGR-3	05-28-96	<1	<1	<1	<1	--	<1	<1	<1	<5
WGR-3	08-19-96	<1	<1	<1	<1	--	<1	<1	<1	<5
WGR-3	11-21-96	<1	<1	<1	<1	--	<1	<1	<1	<5

µg/L micrograms per liter
-- not analyzed or not reported
* method reporting limit was raised due to (1) high analyte concentration requiring sample dilution, or (2) matrix interference
^: For previous historical analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Results and Remediation System Performance Evaluation Report, Retail Service Station 10600 and 10700 MacArthur Boulevard, Oakland, California, (EMCON, March 22, 1996)*

Table 4
Approximate Cumulative Floating Product Recovered

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97

Well Designation	Date	Floating Product Recovered gallons
MW-2 and MW-7	1991	18.15
MW-2 and MW-7	1992	0 39
MW-2 and MW-7	1993	0.00
MW-2 and MW-7	1994	0 00
MW-2 and MW-7	1995	0 00
MW-2 and MW-7	1996	0.00
	1991 to 1996 Total	18.54

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard
Oakland, California

Vapor Treatment Unit: Anguil Energy Systems
Remedi-Cat, 500cfm
Catalytic Oxidizer

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 09-06-90
Operation and Performance Data From: 09-06-90
To: 01-01-97
System was shut down on 3-26-96.

Date Begin.		09-06-90	12-22-94	01-01-95	02-01-95	03-01-95
Date End:		12-22-94	01-01-95	02-01-95	03-01-95	04-01-95
Mode of Oxidation:		Catalytic (14)	Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation:		0.0	4.9	26.4	28.0	31.0
Days of Downtime:		0.0	26.2	4.6	0.0	0.0
Average Vapor Concentrations (1)						
On-site WF Influent:	ppmv (2) as gasoline	NA (15)	32	<15	<15	1.2
	mg/m3 (3) as gasoline	NA	116	<60	<60	4.4
	ppmv as benzene	NA	<0.1	<0.1	<0.1	<0.05
	mg/m3 as benzene	NA	<0.3	<0.5	<0.5	<0.16
Off-site WF Influent:	ppmv as gasoline	NA	closed	closed	<15	1.4
	mg/m3 as gasoline	NA	closed	closed	<60	4.9
	ppmv as benzene	NA	closed	closed	<0.1	<0.05
	mg/m3 as benzene	NA	closed	closed	<0.5	<0.16
System Influent:	ppmv as gasoline	NA	32	<15	<15	<1.0
	mg/m3 as gasoline	NA	116	<60	<60	<3.6
	ppmv as benzene	NA	<0.1	<0.1	<0.1	<0.05
	mg/m3 as benzene	NA	<0.3	<0.5	<0.5	<0.16
System Effluent:	ppmv as gasoline	NA	<15	<15	<15	1.3
	mg/m3 as gasoline	NA	<54	<60	<60	4.6
	ppmv as benzene	NA	<0.1	<0.1	<0.1	<0.05
	mg/m3 as benzene	NA	<0.3	<0.5	<0.5	<0.16
Average On-site Well Field Flow Rate (4), scfm (5):		NA	81.6	53.7	62.0	71.3
Average Off-site Well Field Flow Rate (4), scfm:		NA	closed	closed	17.6	47.8
Average System Influent Flow Rate (4), scfm:		NA	81.6	53.7	79.6	119.1
Total Process Flow Rate, scfm		NA	500.0	500.0	500.0	500.0
Average Destruction Efficiency (6), percent (7):		NA	53.4 (16)	NA	NA	NA
Average Emission Rates (8), pounds per day (9)						
Gasoline:		NA	0.40	0.29	0.43	0.05
Benzene:		NA	0.00	0.00	0.00	0.00
Operating Hours This Period:		NA	116.5	633.4	672.0	744.0
Operating Hours To Date:		NA	116.5	749.9	1421.9	2165.9
Pounds/ Hour Removal Rate, as gasoline (10):		NA	0.035	0.012	0.018	0.004
Pounds Removed This Period, as gasoline (11):		NA	4.13	7.64	12.01	3.08
Pounds Removed To Date, as gasoline (12):		7665.5	7669.6	7677.3	7689.3	7692.4
Gallons Removed This Period, as gasoline (13):		NA	0.67	1.23	1.94	0.50
Gallons Removed To Date, as gasoline:		1236.4	1237.1	1238.3	1240.3	1240.8

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard
Oakland, California

Vapor Treatment Unit: Anguil Energy Systems
Remedi-Cat, 500cfm
Catalytic Oxidizer

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 09-06-90
Operation and Performance Data From. 09-06-90
To: 01-01-97
System was shut down on 3-26-96.

Date Begin:		04-01-95	05-01-95	08-01-95	09-01-95	10-01-95
Date End:		05-01-95	08-01-95	09-01-95	10-01-95	01-01-96
Mode of Oxidation:		Catalytic	Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation:		30.0	18.7	17.9	0.0	0.0
Days of Downtime:		0.0	73.3	13.1	30.0	92.0
Average Vapor Concentrations (1)						
On-site WF Influent:	ppmv (2) as gasoline	<15	<15	95	NA	NA
	mg/m3 (3) as gasoline	<60	<60	350	NA	NA
	ppmv as benzene	<0.1	<0.1	1.1	NA	NA
	mg/m3 as benzene	<0.5	<0.5	3.6	NA	NA
Off-site WF Influent:	ppmv as gasoline	<15	<15	<15	NA	NA
	mg/m3 as gasoline	<60	<60	<60	NA	NA
	ppmv as benzene	<0.1	<0 1	<0.1	NA	NA
	mg/m3 as benzene	<0.5	<0.5	<0.5	NA	NA
System Influent:	ppmv as gasoline	<15	<15	93	NA	NA
	mg/m3 as gasoline	<60	<60	340	NA	NA
	ppmv as benzene	<0.1	<0.1	1	NA	NA
	mg/m3 as benzene	<0.5	<0.5	3.3	NA	NA
System Effluent:	ppmv as gasoline	<15	<15	<15	NA	NA
	mg/m3 as gasoline	<60	<60	<60	NA	NA
	ppmv as benzene	<0.1	<0.1	<0.1	NA	NA
	mg/m3 as benzene	<0.5	<0.5	<0.5	NA	NA
Average On-site Well Field Flow Rate (4), scfm (5):		74.5	79.6	83.5	0.0	0.0
Average Off-site Well Field Flow Rate (4), scfm:		37.1	33.6	34.2	0.0	0.0
Average System Influent Flow Rate (4), scfm:		111.6	113.3	117.7	0.0	0.0
Total Process Flow Rate, scfm:		500.0	500.0	500.0	0.0	0.0
Average Destruction Efficiency (6), percent (7):		NA	NA	82.4 (16)	NA	NA
Average Emission Rates (8), pounds per day (9)						
Gasoline·		0.60	0.61	0.63	NA	NA
Benzene		0.01	0.01	0.01	NA	NA
Operating Hours This Period		720.0	447.9	428.8	0.0	0.0
Operating Hours To Date·		2885.9	3333.8	3762.6	3762.6	3762.6
Pounds/ Hour Removal Rate, as gasoline (10):		0.025	0.025	0.154	0.000	0.000
Pounds Removed This Period, as gasoline (11):		18.04	11.39	66.11	0.00	0.00
Pounds Removed To Date, as gasoline (12):		7710.4	7721.8	7787.9	7787.9	7787.9
Gallons Removed This Period, as gasoline (13)·		2.91	1.84	10.66	0.00	0.00
Gallons Removed To Date, as gasoline·		1243.7	1245.5	1256.2	1256 2	1256.2

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard
Oakland, California

Vapor Treatment Unit: Anguil Energy Systems
Remedi-Cat, 500cfm
Catalytic Oxidizer

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 09-06-90
Operation and Performance Data From: 09-06-90
To: 01-01-97
System was shut down on 3-26-96.

Date Begin.		01-01-96	02-01-96	03-01-96	04-01-96	05-01-96
Date End:		02-01-96	03-01-96	04-01-96	05-01-96	06-01-96
Mode of Oxidation.		Catalytic	Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation		12.8	1.5	7.4	0.0	0.0
Days of Downtime:		18.2	27.5	23.6	30.0	31.0
Average Vapor Concentrations (1)						
On-site WF Influent:	ppmv (2) as gasoline	<15	NA	NA	NA	NA
	mg/m3 (3) as gasoline	<60	NA	NA	NA	NA
	ppmv as benzene	<0.1	NA	NA	NA	NA
	mg/m3 as benzene	<0.5	NA	NA	NA	NA
Off-site WF Influent:	ppmv as gasoline	<15	NA	NA	NA	NA
	mg/m3 as gasoline	<60	NA	NA	NA	NA
	ppmv as benzene	<0.1	NA	NA	NA	NA
	mg/m3 as benzene	<0.5	NA	NA	NA	NA
System Influent:	ppmv as gasoline	<15	NA	NA	NA	NA
	mg/m3 as gasoline	<60	NA	NA	NA	NA
	ppmv as benzene	<0.1	NA	NA	NA	NA
	mg/m3 as benzene	<0.5	NA	NA	NA	NA
System Effluent:	ppmv as gasoline	<15	NA	NA	NA	NA
	mg/m3 as gasoline	<60	NA	NA	NA	NA
	ppmv as benzene	<0.1	NA	NA	NA	NA
	mg/m3 as benzene	<0.5	NA	NA	NA	NA
Average On-site Well Field Flow Rate (4), scfm (5):		174.1	178.4	178.4	0.0	0.0
Average Off-site Well Field Flow Rate (4), scfm.		17.2	19.4	19.4	0.0	0.0
Average System Influent Flow Rate (4), scfm:		191.3	197.8	197 8	0.0	0.0
Total Process Flow Rate, scfm:		500.0	500.0	500.0	0.0	0.0
Average Destruction Efficiency (6), percent (7):		82.4 (16)	NA	NA	NA	NA
Average Emission Rates (8), pounds per day (9)						
Gasoline:		1.03	NA	NA	NA	NA
Benzene.		0.01	NA	NA	NA	NA
Operating Hours This Period:		306.9	35.5	177.8	0.0	0.0
Operating Hours To Date:		4069 5	4105.0	4282.8	4282.8	4282.8
Pounds/ Hour Removal Rate, as gasoline (10).		0.043	0.000	0.000	0.000	0.000
Pounds Removed This Period, as gasoline (11):		13.18	0.00	0.00	0.00	0.00
Pounds Removed To Date, as gasoline (12):		7801.1	7801.1	7801.1	7801.1	7801.1
Gallons Removed This Period, as gasoline (13):		2.13	0.00	0.00	0.00	0.00
Gallons Removed To Date, as gasoline.		1258.3	1258.3	1258.3	1258.3	1258.3

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard
Oakland, California

Vapor Treatment Unit: Anguil Energy Systems
Remedi-Cat, 500cfm
Catalytic Oxidizer

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 09-06-90
Operation and Performance Data From: 09-06-90
To: 01-01-97
System was shut down on 3-26-96.

Date Begin:		06-01-96	07-01-96	08-01-96	09-01-96
Date End:		07-01-96	08-01-96	09-01-96	10-01-96
Mode of Oxidation:		Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation:		0.0	0.0	0.0	0.0
Days of Downtime:		30.0	31.0	31.0	30.0
Average Vapor Concentrations (1)					
On-site WF Influent:	ppmv (2) as gasoline	NA	NA	NA	NA
	mg/m3 (3) as gasoline	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA
Off-site WF Influent:	ppmv as gasoline	NA	NA	NA	NA
	mg/m3 as gasoline	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA
System Influent:	ppmv as gasoline	NA	NA	NA	NA
	mg/m3 as gasoline	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA
System Effluent:	ppmv as gasoline	NA	NA	NA	NA
	mg/m3 as gasoline	NA	NA	NA	NA
	ppmv as benzene	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA
Average On-site Well Field Flow Rate (4), scfm (5):		0.0	0.0	0.0	0.0
Average Off-site Well Field Flow Rate (4), scfm:		0.0	0.0	0.0	0.0
Average System Influent Flow Rate (4), scfm.		0.0	0.0	0.0	0.0
Total Process Flow Rate, scfm.		0.0	0.0	0.0	0.0
Average Destruction Efficiency (6), percent (7):		NA	NA	NA	NA
Average Emission Rates (8), pounds per day (9)					
Gasoline.		NA	NA	NA	NA
Benzene		NA	NA	NA	NA
Operating Hours This Period:		0.0	0.0	0.0	0.0
Operating Hours To Date:		4282.8	4282.8	4282.8	4282.8
Pounds/ Hour Removal Rate, as gasoline (10).		0.000	0.000	0.000	0.000
Pounds Removed This Period, as gasoline (11).		0.00	0.00	0.00	0.00
Pounds Removed To Date, as gasoline (12).		7801.1	7801.1	7801.1	7801.1
Gallons Removed This Period, as gasoline (13):		0.00	0.00	0.00	0.00
Gallons Removed To Date, as gasoline:		1258.3	1258.3	1258.3	1258.3

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard
Oakland, California

Vapor Treatment Unit: Anguil Energy Systems
Remedi-Cat, 500cfm
Catalytic Oxidizer

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 09-06-90
Operation and Performance Data From: 09-06-90
To: 01-01-97
System was shut down on 3-26-96.

Date Begin.	10-01-96	11-01-96	12-01-96
Date End:	11-01-96	12-01-96	01-01-97
Mode of Oxidation	Catalytic	Catalytic	Catalytic
Days of Operation:	0.0	0.0	0.0
Days of Downtime:	31.0	30.0	31.0
Average Vapor Concentrations (1)			
On-site WF Influent: ppmv (2) as gasoline	NA	NA	NA
mg/m3 (3) as gasoline	NA	NA	NA
ppmv as benzene	NA	NA	NA
mg/m3 as benzene	NA	NA	NA
Off-site WF Influent: ppmv as gasoline	NA	NA	NA
mg/m3 as gasoline	NA	NA	NA
ppmv as benzene	NA	NA	NA
mg/m3 as benzene	NA	NA	NA
System Influent: ppmv as gasoline	NA	NA	NA
mg/m3 as gasoline	NA	NA	NA
ppmv as benzene	NA	NA	NA
mg/m3 as benzene	NA	NA	NA
System Effluent: ppmv as gasoline	NA	NA	NA
mg/m3 as gasoline	NA	NA	NA
ppmv as benzene	NA	NA	NA
mg/m3 as benzene	NA	NA	NA
Average On-site Well Field Flow Rate (4), scfm (5):	0.0	0 0	0.0
Average Off-site Well Field Flow Rate (4), scfm:	0.0	0.0	0.0
Average System Influent Flow Rate (4), scfm:	0.0	0.0	0.0
Total Process Flow Rate, scfm:	0.0	0.0	0.0
Average Destruction Efficiency (6), percent (7):	NA	NA	NA
Average Emission Rates (8), pounds per day (9)			
Gasoline:	NA	NA	NA
Benzene	NA	NA	NA
Operating Hours This Period:	0.0	0.0	0.0
Operating Hours To Date:	4282.8	4282 8	4282.8
Pounds/ Hour Removal Rate, as gasoline (10).	*0.000*	*0.000*	*0.000*
Pounds Removed This Period, as gasoline (11).	0.00	0.00	0.00
Pounds Removed To Date, as gasoline (12).	7801.1	7801.1	7801.1
Gallons Removed This Period, as gasoline (13):	0.00	0.00	0.00
Gallons Removed To Date, as gasoline:	1258.3	1258.3	1258.3

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

Location: 10600 and 10700 MacArthur Boulevard Oakland, California	Vapor Treatment Unit: Anguil Energy Systems Remedi-Cat, 500cfm Catalytic Oxidizer
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 09-06-90 Operation and Performance Data From: 09-06-90 To: 01-01-97 System was shut down on 3-26-96.

CURRENT REPORTING PERIOD:	10-01-96	to	01-01-97
DAYS / HOURS IN PERIOD:	92	2208.0	
DAYS / HOURS OF OPERATION:	0	0.0	
DAYS / HOURS OF DOWN TIME:	92	2208.0	
PERCENT OPERATIONAL:		0.0 %	
PERIOD POUNDS REMOVED:	0.0		
PERIOD GALLONS REMOVED:	0.0		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		0.0	

1 Average concentrations are based on discrete sample results reported during the month; refer to Appendix B for discrete sample results
2. ppmv parts per million by volume
3 mg/m3 milligrams per cubic meter
4 Average flow rates (time weighted average) are based on instantaneous flow rates recorded during the month, refer to Appendix C for instantaneous flow data
5 scfm flow in standard cubic feet per minute at one atmosphere and 70 degrees Fahrenheit
6. Average destruction efficiencies are calculated using monthly average concentrations; refer to Appendix B for instantaneous destruction efficiency data.
7 destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - system effluent concentration (as gasoline in mg/m3)] / system influent concentration (as gasoline in mg/m3)) x 100 percent
8 Average emission rates are calculated using monthly average concentrations and flow rates; refer to Appendix B for instantaneous emission rate data
9 emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0 02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
10. pounds/ hour removal rate (as gasoline) = well field influent concentration (as gasoline in mg/m3) x well field influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
11 pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
12 Pounds removed data for the period from September 6, 1990 through December 22, 1994, were reported by EVAX, PEG, and RESNA. Please refer to *Fourth Quarter 1994 Groundwater Monitoring Results and Remediation System Performance Evaluation Report, EMCON March 1995, for additional data for system operation before December 1994*
13 gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1613 gallons/pound of gasoline
14 The existing catalytic oxidation unit was used as the off-gas abatement device for the site, with the exception of the period from September 6, 1990 to March 21, 1991, when EVAX used an internal combustion engine as the abatement device.
15. NA: not analyzed, not available, or not applicable
16 Although the destruction efficiency appeared to be less than 90 percent, laboratory analytical results collected during this period indicate the effluent TVHG and benzene concentrations in off-gas discharged to the atmosphere were below laboratory detection limits, indicating compliance with BAAQMD discharge requirements

Table 6
Soil-Vapor Extraction Well Data

10600 and 10700 MacArthur Boulevard
Oakland, California

Date: 02-06-97
Project Number: 0805-120 04

Date	Well Identification											
	VW-1			VW-2			VW-3			VW-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
12-22-94	open	<15 LAB	13 1	open	68 LAB	13.0	open	28 LAB	12 0	open	<15 LAB	13 1
01-17-95	closed	NA	NA	open	NA	NA	open	NA	NA	closed	NA	NA
02-16-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
03-27-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
05-24-95	System was shut doun											
08-01-95	System was restarted											
08-01-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
08-23-95	System was shut doun											
01-16-96	System was restarted											
01-16-96	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
03-26-96	System was shut doun											

TVHG concentration of total volatile hydrocarbons as gasoline
ppmv parts per million by volume
in-H2O· inches of water
open open to the system
passive open to the atmosphere
closed closed to the system and atmosphere
NA not analyzed or not measured
FID TVHG concentration was measured with a portable flame ionization detector
LAB TVHG concentration was analyzed in the laboratory
PID· TVHG concentration was measured with a portable photoionization detector

Table 6
Soil-Vapor Extraction Well Data

10600 and 10700 MacArthur Boulevard
Oakland, California

Date 02-06-97
Project Number 0805-120 04

Date	Well Identification									
	VW-5			VW-7			MW-2			
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	
12-22-94	open	<15 LAB	13 0	open	<15 LAB	13 1	open	<15 LAB	7 0	
01-17-95	closed	NA	NA	closed	NA	NA	open	NA	NA	
02-16-95	open	NA	NA	open	NA	NA	open	NA	NA	
03-27-95	open	NA	NA	open	NA	NA	open	NA	NA	
05-24-95	System was shut doun									
08-01-95	System was restarted									
08-01-95	open	NA	NA	open	NA	NA	open	NA	NA	
08-23-95	System was shut doun									
01-16-96	System was restarted									
01-16-96	open	NA	NA	open	NA	NA	open	NA	NA	
03-26-96	System was shut doun									

TVHG concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open. open to the system
passive open to the atmosphere
closed: closed to the system and atmosphere
NA not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB TVHG concentration was analyzed in the laboratory
PID TVHG concentration was measured with a portable photoionization detector

152753

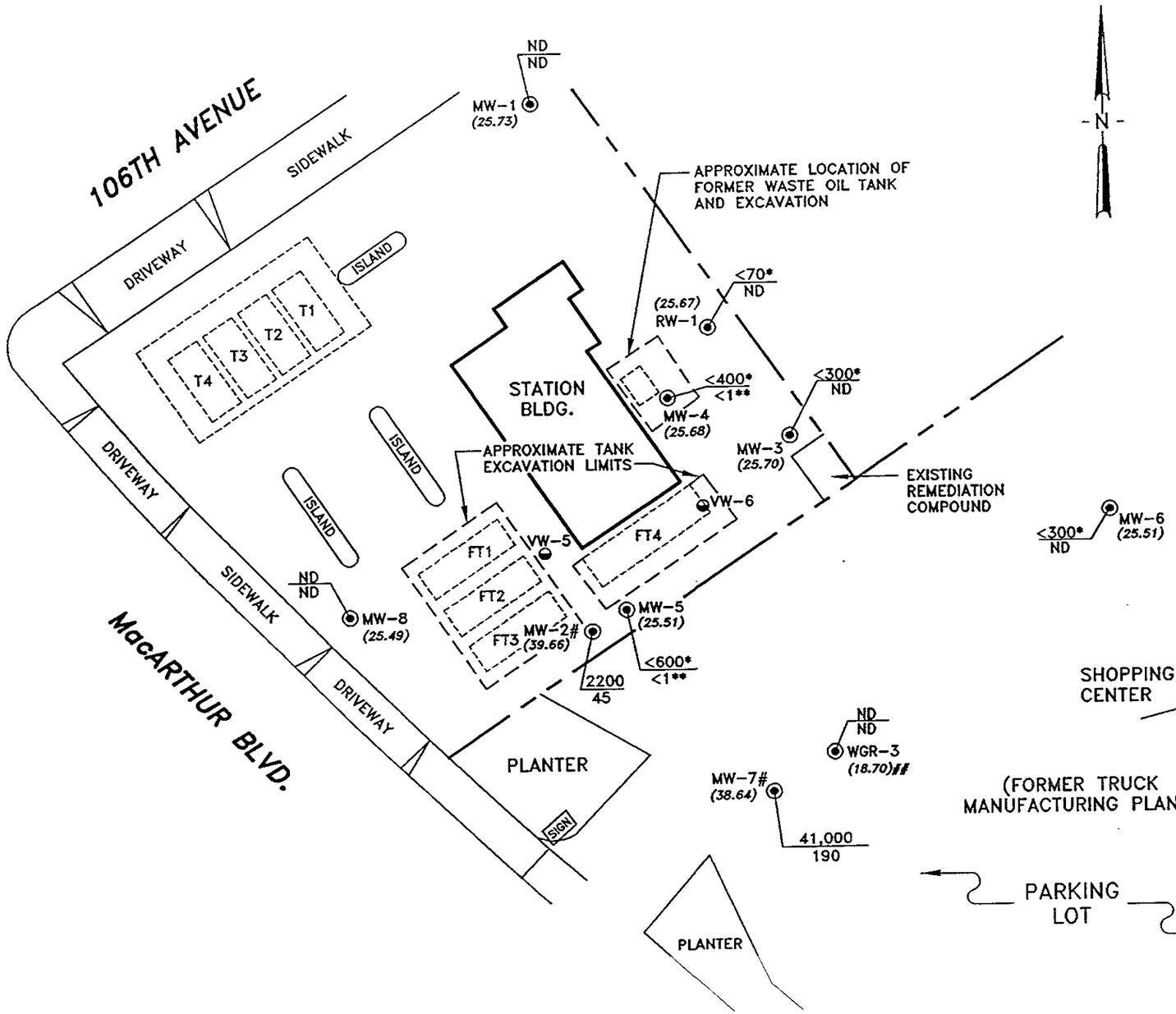
EMCON

10600 AND 10700 MACARTHUR BLVD.
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORINA

SITE LOCATION

FIGURE
1

PROJECT NO.
805-120.06



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Existing underground storage tank
- Former underground storage tank
- (27.61) Groundwater elevation (Ft.–MSL); measured 11/21/96
- 880 / 45 — TPHG concentration in groundwater (ug/L); sampled 11/21/96 / Benzene concentration in groundwater (ug/L); sampled 11/21/96
- * Raised method reporting limit due to matrix interference; the sample contains a single non–fuel component eluting in the gasoline range and quantitated as gasoline (possibly PCE). The chromatogram does not match the typical gasoline fingerprint
- ** Raised method reporting limit due to matrix interference requiring sample dilution
- *** Raised method reporting limit due to high analyte concentration requiring sample dilution
- ND Not detected at or above the method reporting limit for TPHG (50 ug/L) or benzene (0.5 ug/L)
- NR Not recorded
- # Well screened in shallow water–bearing zone; not used in contouring
- ## Depth to water; well not surveyed

Note: Not contoured because of relatively flat gradient.

Base map modified from RESNA, 1993

EMCON

SCALE: 0 30 60 FEET

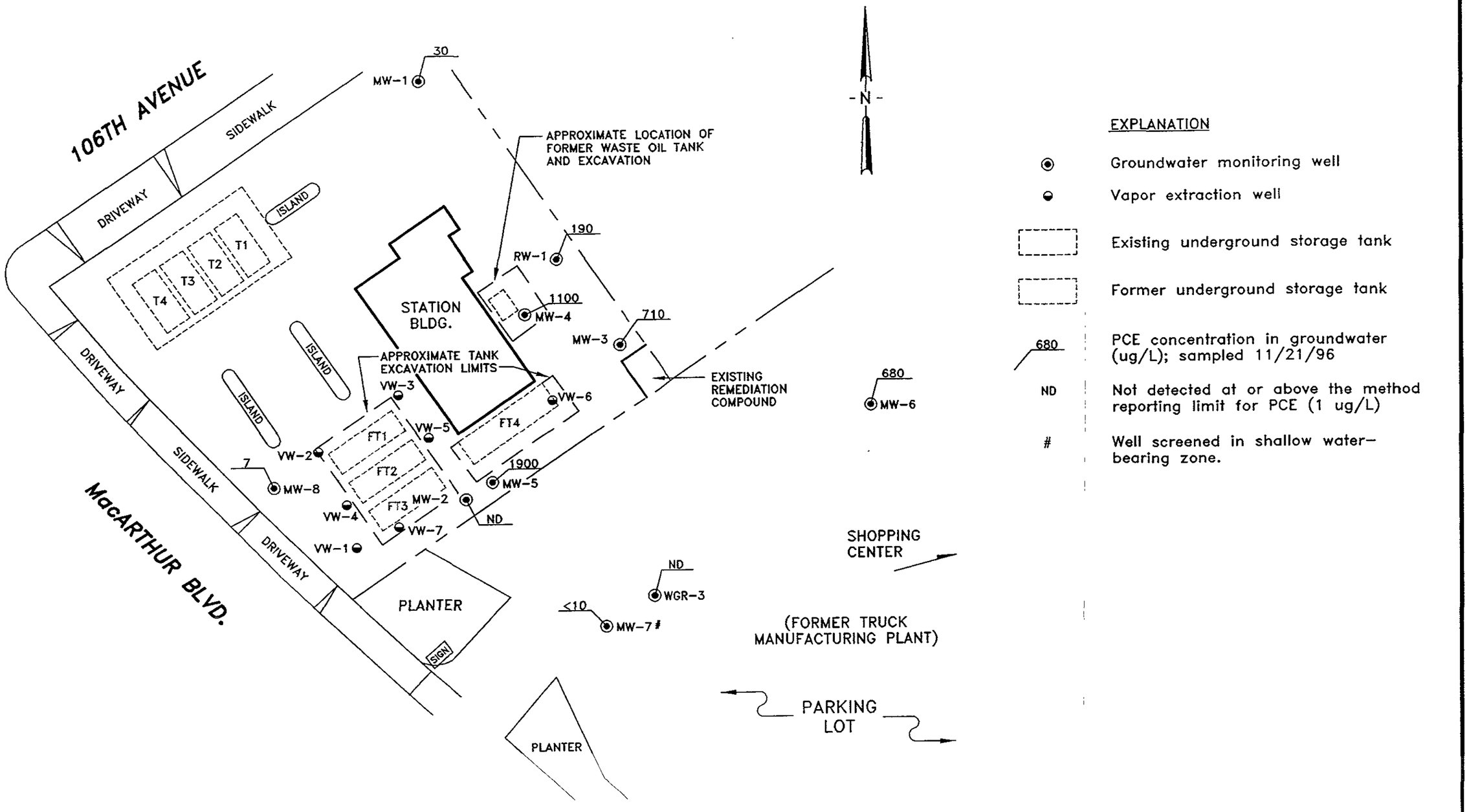
10600 AND 10700 MACARTHUR BLVD.
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

TPHG AND BENZENE CONCENTRATIONS IN GROUNDWATER
FOURTH QUARTER 1996

FIGURE NO. 2

PROJECT NO. 805–120.006

G:\805-120\G00A REV 0 2/59/ 12:32:41 KMM LJ



Base map modified from RESNA, 1993

EMCON

SCALE: 0 30 60 FEET

10600 AND 10700 MACARTHUR BLVD.
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

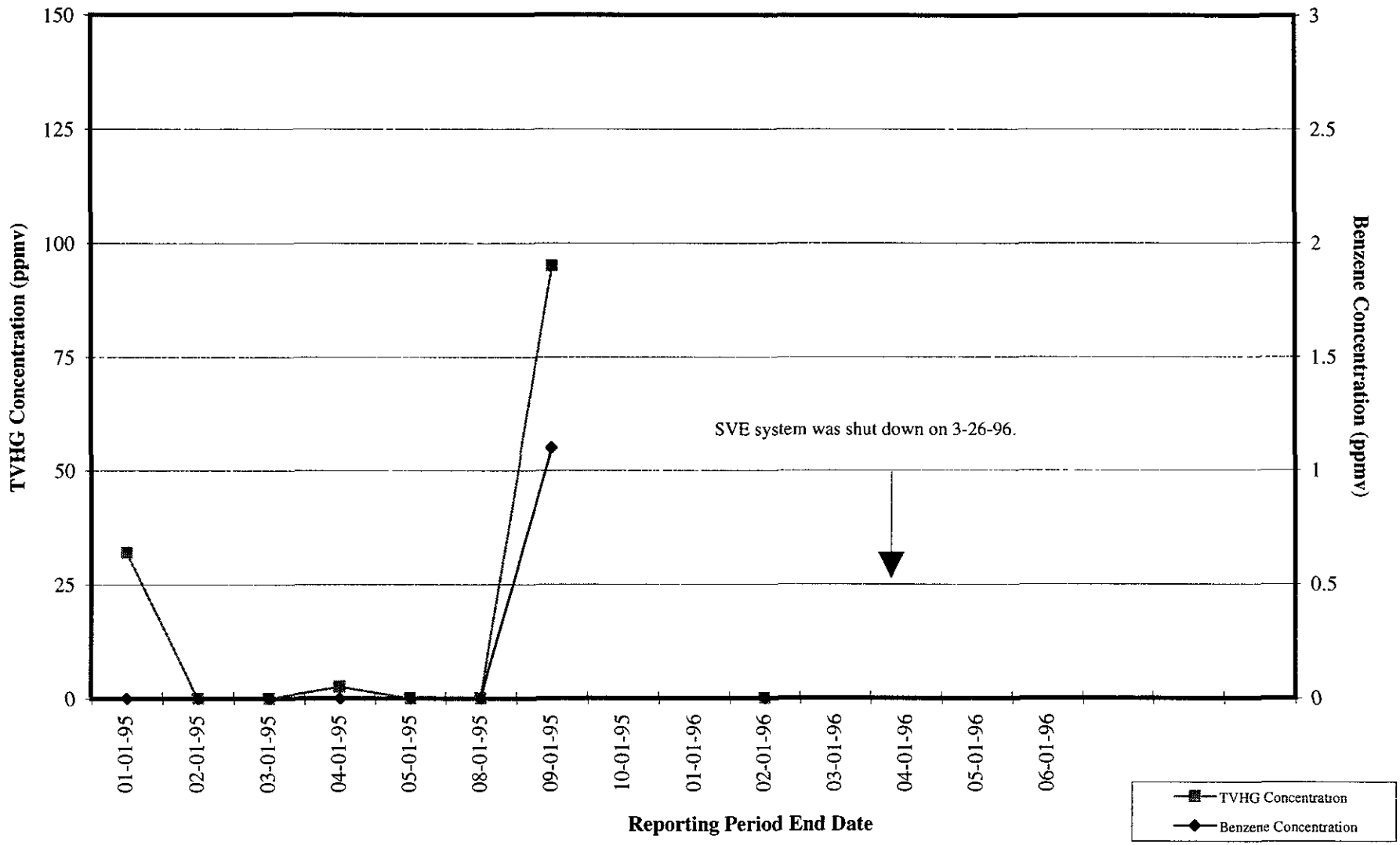
TETRACHLOROETHENE (PCE) CONCENTRATIONS IN GROUNDWATER
FOURTH QUARTER 1996

FIGURE NO.
3
PROJECT NO.
805-120.006

G:\805-120\PCE REV 0 2/7/97 12:42:33 KMM DJ

Figure 4

10600 and 10700 MacArthur Boulevard
Soil-Vapor Extraction and Treatment System
Historical Well Field Influent TVHG and Benzene Concentrations

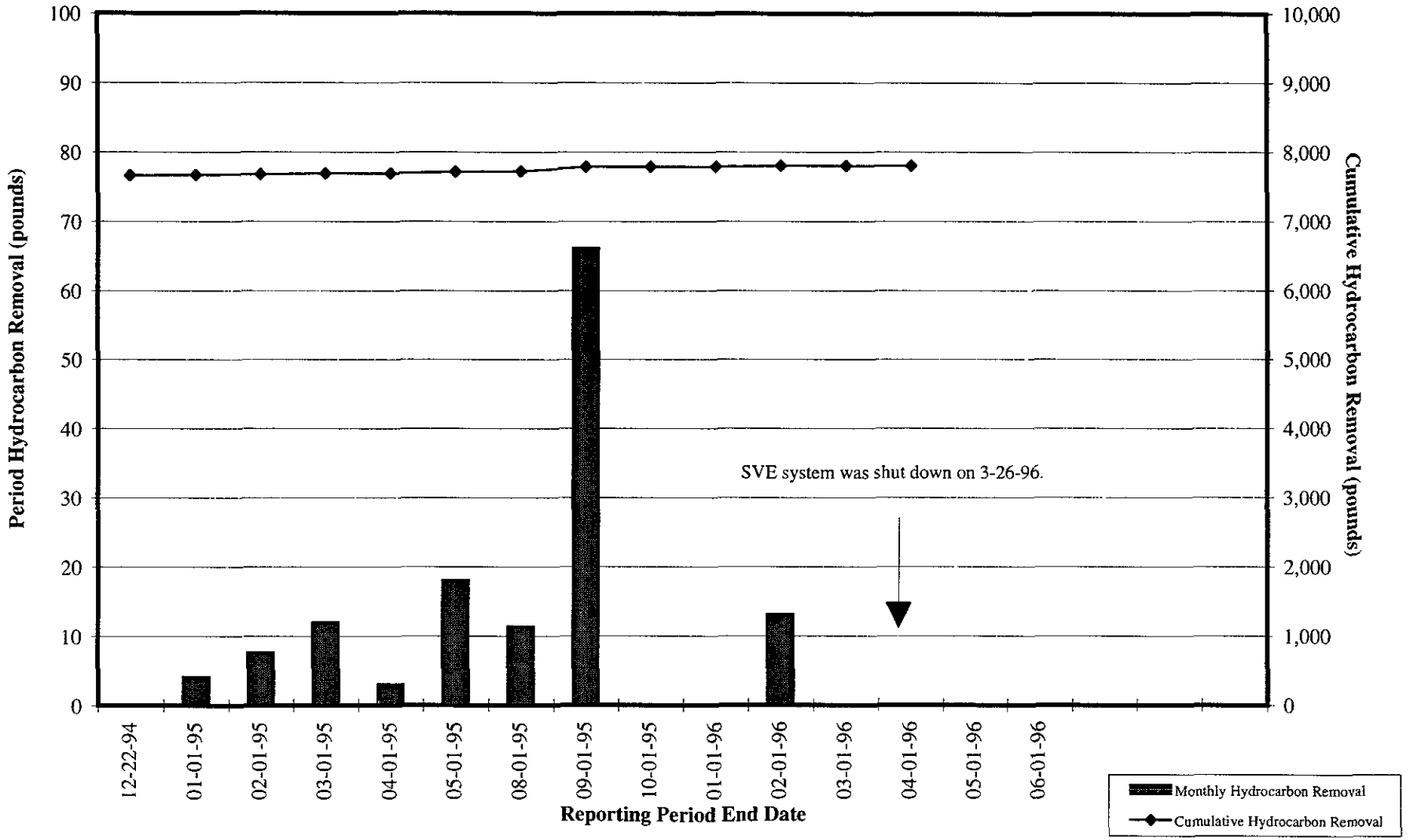


TVHG total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/h:\0276\0276tdb xls\SVE Model:imi
20805-120.006

Figure 5

10600 and 10700 MacArthur Boulevard
On-Site Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



Based on data from EVAX, PEG, and RESNA, approximately 7,666 pounds of hydrocarbon were removed between September 6, 1990 and December 22, 1994.

esj/h.\0276\0276tdb.xls\SVE Model:imi
20805-120.006

APPENDIX A

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, FOURTH QUARTER 1996 GROUNDWATER MONITORING EVENT

Columbia Analytical Services inc.

December 6, 1996 Service Request No.: S9601984

Mr. John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 276 OAKLAND/20805-120.006/TO#19350.00

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on November 21, 1996. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above. To help expedite our service, please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 20, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

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

Sincerely,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	L9604679
Project:	276 OAKLAND/#20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	11/25/96
		Date Analyzed:	11/25/96

Total Recoverable Petroleum Hydrocarbons (TRPH)
EPA Method 418.1
Units: mg/L (ppm)

Sample Name	Lab Code	MRL	Result
MW-4 (47)	L9604679-001	0.5	ND
Method Blank	L961125-MB	0.5	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

	Sample Name:	**EB-1**	**MW-1 (38)**	**MW-8 (46)**
	Lab Code:	S9601984-001	S9601984-002	S9601984-003
	Date Analyzed:	11/22/96	11/26/96	11/22/96
Analyte	**MRL**			
Chloromethane	10	ND	ND	ND
Vinyl Chloride	10	ND	ND	ND
Bromomethane	10	ND	ND	ND
Chloroethane	10	ND	ND	ND
Trichlorofluoromethane (CFC 11)	1	ND	ND	ND
Trichlorotrifluoroethane (CFC 113)	10	ND	ND	ND
1,1-Dichloroethene	1	ND	ND	ND
Acetone	20	ND	ND	ND
Carbon Disulfide	1	ND	ND	ND
Methylene Chloride	10	ND	ND	ND
trans-1,2-Dichloroethene	1	ND	ND	ND
cis-1,2-Dichloroethene	1	ND	ND	ND
2-Butanone (MEK)	10	ND	ND	ND
1,1-Dichloroethane	1	ND	ND	ND
Chloroform	1	ND	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND	ND
Carbon Tetrachloride	1	ND	ND	ND
Benzene	1	ND	ND	ND
1,2-Dichloroethane	1	ND	ND	ND
Vinyl Acetate	10	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND
Bromodichloromethane	1	ND	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND	ND
trans-1,3-Dichloropropene	1	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Toluene	1	ND	ND	ND
cis-1,3-Dichloropropene	1	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	30	7
Dibromochloromethane	1	ND	ND	ND
Chlorobenzene	1	ND	ND	ND
Ethylbenzene	1	ND	ND	ND
Styrene	1	ND	ND	ND
Total Xylenes	5	ND	ND	ND
Bromoform	1	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

	Sample Name:	RW-1 (47)	WGR-3 (26)	MW-5 (45)
	Lab Code:	S9601984-004	S9601984-005	S9601984-006 C
	Date Analyzed:	11/22/96	11/22/96	12/2/96
Analyte	**MRL**			
Chloromethane	10	ND	ND	<200
Vinyl Chloride	10	ND	ND	<200
Bromomethane	10	ND	ND	<200
Chloroethane	10	ND	ND	<200
Trichlorofluoromethane (CFC 11)	1	ND	ND	<20
Trichlorotrifluoroethane (CFC 113)	10	ND	ND	<200
1,1-Dichloroethene	1	ND	ND	<20
Acetone	20	ND	ND	<400
Carbon Disulfide	1	ND	ND	<20
Methylene Chloride	10	ND	ND	<200
trans-1,2-Dichloroethene	1	ND	ND	<20
cis-1,2-Dichloroethene	1	ND	ND	<20
2-Butanone (MEK)	10	ND	ND	<200
1,1-Dichloroethane	1	ND	ND	<20
Chloroform	1	ND	ND	<20
1,1,1-Trichloroethane (TCA)	1	ND	ND	<20
Carbon Tetrachloride	1	ND	ND	<20
Benzene	1	ND	ND	<20
1,2-Dichloroethane	1	ND	ND	<20
Vinyl Acetate	10	ND	ND	<200
Trichloroethene (TCE)	1	1	ND	<20
1,2-Dichloropropane	1	ND	ND	<20
Bromodichloromethane	1	ND	ND	<20
2-Chloroethyl Vinyl Ether	10	ND	ND	<200
trans-1,3-Dichloropropene	1	ND	ND	<20
4-Methyl-2-pentanone (MIBK)	10	ND	ND	<200
2-Hexanone	10	ND	ND	<200
Toluene	1	ND	ND	<20
cis-1,3-Dichloropropene	1	ND	ND	<20
1,1,2-Trichloroethane	1	ND	ND	<20
Tetrachloroethene (PCE)	1	190	ND	1,900
Dibromochloromethane	1	ND	ND	<20
Chlorobenzene	1	ND	ND	<20
Ethylbenzene	1	ND	ND	<20
Styrene	1	ND	ND	<20
Total Xylenes	5	ND	ND	<100
Bromoform	1	ND	ND	<20
1,1,2,2-Tetrachloroethane	1	ND	ND	<20
1,3-Dichlorobenzene	1	ND	ND	<20
1,4-Dichlorobenzene	1	ND	ND	<20
1,2-Dichlorobenzene	1	ND	ND	<20

C The MRL is elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

	Sample Name:	MW-6 (50)	MW-3 (38)	MW-4 (47)
	Lab Code:	S9601984-007 C	S9601984-008 C	S9601984-009 C
	Date Analyzed:	11/22/96	11/22/96	11/22/96
Analyte	**MRL**			
Chloromethane	10	<200	<200	<200
Vinyl Chloride	10	<200	<200	<200
Bromomethane	10	<200	<200	<200
Chloroethane	10	<200	<200	<200
Trichlorofluoromethane (CFC 11)	1	<20	<20	<20
Trichlorotrifluoroethane (CFC 113)	10	<200	<200	<200
1,1-Dichloroethene	1	<20	<20	<20
Acetone	20	<400	<400	<400
Carbon Disulfide	1	<20	<20	<20
Methylene Chloride	10	<200	<200	<200
trans-1,2-Dichloroethene	1	<20	<20	<20
cis-1,2-Dichloroethene	1	<20	<20	<20
2-Butanone (MEK)	10	<200	<200	<200
1,1-Dichloroethane	1	<20	<20	<20
Chloroform	1	<20	<20	<20
1,1,1-Trichloroethane (TCA)	1	<20	<20	<20
Carbon Tetrachloride	1	<20	<20	<20
Benzene	1	<20	<20	<20
1,2-Dichloroethane	1	<20	<20	<20
Vinyl Acetate	10	<200	<200	<200
Trichloroethene (TCE)	1	<20	<20	<20
1,2-Dichloropropane	1	<20	<20	<20
Bromodichloromethane	1	<20	<20	<20
2-Chloroethyl Vinyl Ether	10	<200	<200	<200
trans-1,3-Dichloropropene	1	<20	<20	<20
4-Methyl-2-pentanone (MIBK)	10	<200	<200	<200
2-Hexanone	10	<200	<200	<200
Toluene	1	<20	<20	<20
cis-1,3-Dichloropropene	1	<20	<20	<20
1,1,2-Trichloroethane	1	<20	<20	<20
Tetrachloroethene (PCE)	1	680	710	1,100
Dibromochloromethane	1	<20	<20	<20
Chlorobenzene	1	<20	<20	<20
Ethylbenzene	1	<20	<20	<20
Styrene	1	<20	<20	<20
Total Xylenes	5	<100	<100	<100
Bromoform	1	<20	<20	<20
1,1,2,2-Tetrachloroethane	1	<20	<20	<20
1,3-Dichlorobenzene	1	<20	<20	<20
1,4-Dichlorobenzene	1	<20	<20	<20
1,2-Dichlorobenzene	1	<20	<20	<20

C The MRL is elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

	Sample Name:	MW-2 (24)	MW-7 (36)	Method Blank
	Lab Code:	S9601984-010	S9601984-011 C	S961122-WB1
	Date Analyzed:	11/22/96	11/22/96	11/22/96
Analyte	**MRL**			
Chloromethane	10	ND	<100	ND
Vinyl Chloride	10	ND	<100	ND
Bromomethane	10	ND	<100	ND
Chloroethane	10	ND	<100	ND
Trichlorofluoromethane (CFC 11)	1	ND	<10	ND
Trichlorotrifluoroethane (CFC 113)	10	ND	<100	ND
1,1-Dichloroethene	1	ND	<10	ND
Acetone	20	ND	<200	ND
Carbon Disulfide	1	ND	<10	ND
Methylene Chloride	10	ND	<100	ND
trans-1,2-Dichloroethene	1	ND	<10	ND
cis-1,2-Dichloroethene	1	ND	<10	ND
2-Butanone (MEK)	10	ND	<100	ND
1,1-Dichloroethane	1	ND	<10	ND
Chloroform	1	ND	<10	ND
1,1,1-Trichloroethane (TCA)	1	ND	<10	ND
Carbon Tetrachloride	1	ND	<10	ND
Benzene	1	49	180	ND
1,2-Dichloroethane	1	ND	<10	ND
Vinyl Acetate	10	ND	<100	ND
Trichloroethene (TCE)	1	ND	<10	ND
1,2-Dichloropropane	1	ND	<10	ND
Bromodichloromethane	1	ND	<10	ND
2-Chloroethyl Vinyl Ether	10	ND	<100	ND
trans-1,3-Dichloropropene	1	ND	<10	ND
4-Methyl-2-pentanone (MIBK)	10	ND	<100	ND
2-Hexanone	10	ND	<100	ND
Toluene	1	3	120	ND
cis-1,3-Dichloropropene	1	ND	<10	ND
1,1,2-Trichloroethane	1	ND	<10	ND
Tetrachloroethene (PCE)	1	ND	<10	ND
Dibromochloromethane	1	ND	<10	ND
Chlorobenzene	1	ND	<10	ND
Ethylbenzene	1	7	640	ND
Styrene	1	ND	<10	ND
Total Xylenes	5	180	2,900	ND
Bromoform	1	ND	<10	ND
1,1,2,2-Tetrachloroethane	1	ND	<10	ND
1,3-Dichlorobenzene	1	ND	<10	ND
1,4-Dichlorobenzene	1	ND	<10	ND
1,2-Dichlorobenzene	1	ND	<10	ND

C The MRL is elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

	Sample Name:	**Method Blank**	**Method Blank**
	Lab Code:	S961126-WB1	S961202-WB1
	Date Analyzed:	11/26/96	12/2/96
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
Trichlorofluoromethane (CFC 11)	1	ND	ND
Trichlorotrifluoroethane (CFC 113)	10	ND	ND
1,1-Dichloroethene	1	ND	ND
Acetone	20	ND	ND
Carbon Disulfide	1	ND	ND
Methylene Chloride	10	ND	ND
trans-1,2-Dichloroethene	1	ND	ND
cis-1,2-Dichloroethene	1	ND	ND
2-Butanone (MEK)	10	ND	ND
1,1-Dichloroethane	1	ND	ND
Chloroform	1	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND
Carbon Tetrachloride	1	ND	ND
Benzene	1	ND	ND
1,2-Dichloroethane	1	ND	ND
Vinyl Acetate	10	ND	ND
Trichloroethene (TCE)	1	ND	ND
1,2-Dichloropropane	1	ND	ND
Bromodichloromethane	1	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
trans-1,3-Dichloropropene	1	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND
2-Hexanone	10	ND	ND
Toluene	1	ND	ND
cis-1,3-Dichloropropene	1	ND	ND
1,1,2-Trichloroethane	1	ND	ND
Tetrachloroethene (PCE)	1	ND	ND
Dibromochloromethane	1	ND	ND
Chlorobenzene	1	ND	ND
Ethylbenzene	1	ND	ND
Styrene	1	ND	ND
Total Xylenes	5	ND	ND
Bromoform	1	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND
1,3-Dichlorobenzene	1	ND	ND
1,4-Dichlorobenzene	1	ND	ND
1,2-Dichlorobenzene	1	ND	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

	Sample Name:	**EB-1**	**MW-1 (38)**	**MW-8 (46)**
	Lab Code:	S9601984-001	S9601984-002	S9601984-003
	Date Analyzed:	12/3/96	12/3/96	12/3/96
Analyte	**MRL**			
TPH as Gasoline	50	ND	ND	ND
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
Methyl *tert*-Butyl Ether	3	ND	ND	19

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120 006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

Sample Name:	**RW-1 (47)**	**WGR-3 (26)**	**MW-5 (45)**
Lab Code:	S9601984-004	S9601984-005	S9601984-006
Date Analyzed:	12/4/96	12/3/96	12/4/96

Analyte	**MRL**			
TPH as Gasoline	50	<70 X	ND	<600 X
Benzene	0.5	ND	ND	<1 D
Toluene	0.5	ND	ND	<1 D
Ethylbenzene	0.5	ND	0.6	<1 D
Total Xylenes	0.5	ND	ND	<1 D
Methyl *tert*-Butyl Ether	3	ND	10	<20 D

D The MRL is elevated because of matrix interferences.

X Raised MRL due to matrix interference. The sample contains a single non-fuel component eluting in the gasoline range and quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

3S22/060191

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

	Sample Name:	**MW-6 (50)**	**MW-3 (38)**	**MW-4 (47)**
	Lab Code:	S9601984-007	S9601984-008	S9601984-009
	Date Analyzed:	12/4/96	12/4/96	12/4/96
Analyte	**MRL**			
TPH as Gasoline	50	<300 X	<300 X	<400 X
Benzene	0.5	ND	ND	<1D
Toluene	0.5	ND	ND	<1D
Ethylbenzene	0.5	ND	ND	<1D
Total Xylenes	0.5	ND	ND	<1D
Methyl *tert*-Butyl Ether	3	ND	ND	<5 D

D The MRL is elevated because of matrix interferences.

X Raised MRL due to matrix interference. The sample contains a single non-fuel component eluting in the gasoline range and quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

3822/0601*1

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

		Sample Name:	**MW-2 (24)**	**MW-7 (36)**	**Method Blank**
		Lab Code:	S9601984-010	S9601984-011	S961203-WB1
		Date Analyzed:	12/4/96	12/4/96	12/3/96
Analyte	**MRL**				
TPH as Gasoline	50		2,200	41,000	ND
Benzene	0.5		45	190	ND
Toluene	0.5		3.4	150	ND
Ethylbenzene	0.5		9	730	ND
Total Xylenes	0.5		140	2,900	ND
Methyl *tert*-Butyl Ether	3		44	<300 C	ND

C The MRL is elevated due to high analyte concentration requiring sample dilution.

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

Sample Name:	**Method Blank**
Lab Code:	S961204-WB1
Date Analyzed:	12/4/96

Analyte	**MRL**	
TPH as Gasoline	50	ND
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
Methyl *tert*-Butyl Ether	3	ND

3S22/060194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	L9604679
Project:	276 OAKLAND/#20805-120.006/TO#19350.00	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	11/25/96
		Date Analyzed:	11/25/96

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary*
Total Recoverable Petroleum Hydrocarbons (TRPH)
EPA Method 418.1
Units: mg/L (ppm)

	True Value		Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	Limits	**Difference**
TRPH	1.96	1.96	1.64	1.61	84	82	75-125	2

* Sample quantity was insufficient to perform matrix spike and matrix spike duplicate. Three separate, replicate one liter samples are required to analyze sample and spikes.

DLCS/032395

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 624

		Percent Recovery		
Sample Name	**Lab Code**	1,2-Dichloroethane-D_4	Toluene-D_8	4-Bromofluorobenzene
EB-1	S9601984-001	97	98	97
MW-1 (38)	S9601984-002	103	101	96
MW-8 (46)	S9601984-003	93	95	92
RW-1 (47)	S9601984-004	98	98	93
WGR-3 (26)	S9601984-005	97	96	94
MW-5 (45)	S9601984-006	100	100	95
MW-6 (50)	S9601984-007	94	94	92
MW-3 (38)	S9601984-008	92	94	95
MW-4 (47)	S9601984-009	97	95	99
MW-2 (24)	S9601984-010	92	97	102
MW-7 (36)	S9601984-011	94	98	100
MW-5 (45) (MS)	S9601984-006MS	95	97	96
MW-5 (45) (DMS)	S9601984-006DMS	91	97	93
Method Blank	S961122-WB1	99	96	96
Method Blank	S961126-WB1	97	98	92
Method Blank	S961202-WB1	97	100	97
CAS Acceptance Limits:		76-114	88-110	86-115

SUR3/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA
Date Analyzed: 11/22/96

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 624
Units: ug/L (ppb)

Sample Name: MW-5(45)
Lab Code: S9601984-006MS,DMS

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference
1,1-Dichloroethene	250	250	ND	290	280	116	112	61-145	4
Trichloroethene	250	250	ND	280	270	112	108	71-120	4
Chlorobenzene	250	250	ND	240	250	96	100	75-130	4
Toluene	250	250	ND	250	250	100	100	76-125	<1
Benzene	250	250	ND	260	260	104	104	76-127	<1

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 276 OAKLAND/20805-120.006/TO#19350.00
Sample Matrix: Water

Service Request: S9601984
Date Collected: 11/21/96
Date Received: 11/21/96
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Lab Code	PID Detector Percent Recovery 4-Bromofluorobenzene	FID Detector Percent Recovery α,α,α–Trifluorotoluene
EB-1	S9601984-001	103	97
MW-1 (38)	S9601984-002	103	95
MW-8 (46)	S9601984-003	101	93
RW-1 (47)	S9601984-004	101	97
WGR-3 (26)	S9601984-005	99	94
MW-5 (45)	S9601984-006	102	99
MW-6 (50)	S9601984-007	100	100
MW-3 (38)	S9601984-008	104	96
MW-4 (47)	S9601984-009	101	97
MW-2 (24)	S9601984-010	103	106
MW-7 (36)	S9601984-011	98	108
MW-1 (38) (MS)	S9601984-002MS	105	100
MW-1 (38) (DMS)	S9601984-002DMS	104	98
Method Blank	S961203-WB1	99	94
Method Blank	S961204-WB1	100	95
	CAS Acceptance Limits:	69-116	69-116

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Collected:**	11/21/96
Sample Matrix:	Water	**Date Received:**	11/21/96
		Date Extracted:	NA
		Date Analyzed:	12/3/96

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
Units: ug/L (ppb)

Sample Name: MW-1 (38)
Lab Code: S9601984-002MS, DMS

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Benzene	25	25	ND	25.3	25.5	101	102	75-135	1
Toluene	25	25	ND	24.8	25.1	99	100	73-136	1
Ethylbenzene	25	25	ND	26.2	26.3	105	105	69-142	0

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601984
Project:	276 OAKLAND/20805-120.006/TO#19350.00	**Date Analyzed:**	12/3/96

Initial Calibration Verification (ICV) Summary
BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	25.4	102	85-115
Toluene	25	25.0	100	85-115
Ethylbenzene	25	26.4	106	85-115
Xylenes, Total	75	74.6	99	85-115
Gasoline	250	235	94	90-110
Methyl *tert*-Butyl Ether	75	65	87	85-115

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no 276	City (Facility) Oakland	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7300	Fax no. (Consultant) (408)453 0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA 95131		Contract number

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
1	EB-1		4		X		X	HCl	11-21-96	1045		X					X						
2	MW-1(38)		4		X		X	HCl		1110		X					X						
3	MW-8(46)		4		X		X	HCl		1118		X					X						
4	RW-1(47)		4		X		X	HCl		1240		X					X						
5	WGR-3(26)		4		X		X	HCl		1140		X					X						
6	MW-5(45)		4		X		X	HCl		1335		X					X						
7	MW-6(50)		4		X		X	HCl		1210		X					X						
8	MW-3(38)		4		X		X	HCl		1245		X					X						
9	MW-4(47)		6		X		X	HCl		1325		X			X		X						
10	MW-2(24)		4		X		X	HCl		1414		X					X						
11	MW-7(36)		4		X		X	HCl	↓	1400		X					X						

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: All Wells 4-40ml HCl VOAs MW-4 add 2 Liter HCl Glass #20805-120.006

Lab number: S9601984

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

Condition of sample: ok		Temperature received: Cool	
Relinquished by sampler	Date 11-21-96 Time 1520	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory CAS Joanne Brown	Date 11-21-96 Time 1530

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

R8, R9

Subcontract LLAB

ARCO Products Company
Division of AtlanticRichfield Company

Chain of Custody

Task Order No. 19350.00

ARCO Facility no. 276	City (Facility) Oakland	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant)	Fax no. (Consultant)	Contract number
Consultant name EMCON	Address (Consultant) San Jose		Method of shipment Fed Ex 171-0516-035

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
(4?) MW-4	1	2		X		X	X	11/21/96						X								

Special detection Limit/reporting

Special QA/QC

Remarks
20805-120.006
LLAB: 418.1
(see attached)
S960198A

Lab number L9604619

Turnaround time
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days 12/6

Condition of sample:

Temperature received: 6°C one bottle Broken

	Date	Time		Date	Time
Relinquished by sampler			Received by		
Relinquished by			Received by		
Relinquished by Joanie Brown CAS-SJ	11/21/96	1530	Received by laboratory	11-22-96	10:00 AM

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

11/27/96 14:54 FAX CAS Canoga Park →→→ CAS SAN JOSE 005/009

APPENDIX B

SVE SYSTEM MONITORING DATA LOG SHEETS

10600 and 10700 MacArthur Boulevard
SVE SYSTEM
MONITORING DATA

Reporting Period
10/01/96 00:00
11/01/96 00:00

Hours in Period 744.0
Days in Period 31 00

Operation + Down Hours: 744 0
Operation + Down Days: 31 00

Reading Date & Time	Field Monitoring Data: Flow Rates: On-site Well Field Flow Rate	Off-site Well Field Flow Rate	System Influent Flow Rate	FID or PID Results: On-site Well Field	Off-site Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Laboratory Monitoring Data: On-site Well Field Influent: Gasoline	Benzene	Off-site Well Field Influent: Gasoline	Benzene	System Influent: Gasoline	Benzene	System Effluent: Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	scfm	ppm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	ppd	ppd						
10/01/96 00.00																						1216 20				
11/01/96 00 00	0 0	0 0	0.0																		744 00	1216 20	0 00	0 00	744 00	31 00
Period Totals																					744 00		0.00	0 00	744 00	31 00
Averages	0.0	0 0	0.0																							

10600 and 10700 MacArthur Boulevard
SVE SYSTEM
MONITORING DATA

Reporting Period
11/01/96 00 00
12/01/96 00 00

Hours in Period 720.0
Days in Period 30.00

Operation + Down Hours: 720.0
Operation + Down Days: 30 00

	Field Monitoring Data									Laboratory Monitoring Data																		
	Flow Rates			FID or PID Results						On-site Well Field Influent		Off-site Well Field Influent		System Influent		System Effluent												
Reading Date & Time	On-site Well Field Flow Rate	Off-site Well Field Flow Rate	System Influent Flow Rate	On-site Well Field	Off-site Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	scfm	ppm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	ppd	ppd						
11/01/96 00 00																						1216 20				
12/01/96 00.00	0 0	0 0	0 0																		720 00	1216 20	0 00	0 00	720 00	30 00
Period Totals.																					720 00		0 00	0 00	720 00	30 00
Averages	0.0	0 0	0 0																							

10600 and 10700 MacArthur Boulevard
SVE SYSTEM
MONITORING DATA

Reporting Period
12/01/96 00:00
01/01/97 00:00

Hours in Period 744.0
Days in Period 31 00

Operation + Down Hours. 744 0
Operation + Down Days. 31 00

	Field Monitoring Data									Laboratory Monitoring Data																		
	Flow Rates			FID or PID Results						On-site Well Field Influent		Off-site Well Field Influent		System Influent		System Effluent												
Reading Date & Time	On-site Well Field Flow Rate	Off-site Well Field Flow Rate	System Influent Flow Rate	On-site Well Field	Off-site Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	scfm	ppm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	ppd	ppd						
12/01/96 00:00																						1216 20					
01/01/97 00:00	0 0	0 0	0 0																		744 00	1216 20	0 00	0 00	744 00	31.00
Period Totals																					744 00		0 00	0 00	744 00	31 00
Averages	0.0	0 0	0 0																							