



PACIFIC
ENVIRONMENTAL
GROUP INC.

ENVIRONMENTAL
PROTECTION

SEP 28 PM 4:27

Quarterly Groundwater Monitoring Report First Quarter 1997

ARCO Service Station 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

Prepared for


Mr. Paul Supple
ARCO Products Company

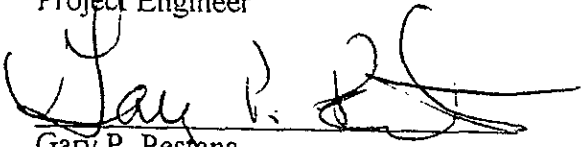
July 25, 1997

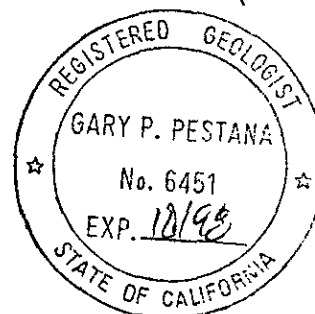
Prepared by

Pacific Environmental Group, Inc.
2025 Gateway Place, Suite 440
San Jose, California 95110

Project 330-084.2D


Shaw Garakani
Project Engineer


Gary P. Pestana
Project Manager
RG 6451



Date: July 25, 1997
Quarter: 1Q97

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Facility No.: 0374 Address: 6407 Telegraph Avenue at Alcatraz Avenue, Oakland
ARCO Environmental Engineer: Paul Supple
Consulting Co./Contact Person: Pacific Environmental Group, Inc./Shaw Garakani
Consultant Project No.: 330-084.2D
Primary Agency/Regulatory ID No.: Regional Water Quality Control Board - S.F. Bay Region

WORK PERFORMED THIS QUARTER (First - 1997):

1. Submitted fourth quarter 1997 groundwater monitoring report.
2. Performed first quarter 1997 groundwater monitoring event.
3. Prepared first quarter 1997 groundwater monitoring report.
4. Continued intrinsic bioremediation enhancement at Well MW-3.

WORK PROPOSED FOR NEXT QUARTER (Second - 1997):

1. Submit first quarter 1997 groundwater monitoring report.
2. Perform second quarter 1997 groundwater monitoring event.
3. Prepare second quarter 1997 groundwater monitoring event.
4. Continue intrinsic bioremediation enhancement at Well MW-3.

Current Phase of Project:	<u>Monitoring</u>	(Assmnt, Remed., etc.)
Frequency of Groundwater Sampling:	<u>Quarterly/Annually</u>	(Quarterly, etc.)
Frequency of Groundwater Monitoring:	<u>Quarterly</u>	(Monthly, etc.)
Is Free Product (FP) Present On-Site:	<u>No</u>	(Yes/No)
FP Recovered this Quarter:	<u>None</u>	(gallons)
Cumulative FP Recovered to Date:	<u>None</u>	(gallons)
Bulk Soil Removed This Quarter:	<u>None</u>	(cubic yards)
Bulk Soil Removed to Date:	<u>None</u>	(cubic yards)
Current Remediation Techniques:	<u>Bioremediation enhancement</u>	(SVE/Sparge/FP Removal, etc.)
Approximate Depth to Groundwater:	<u>4.40 to 7.75</u>	(Measure Feet)
Groundwater Gradient:	<u>Southwest</u>	(Direction)
	<u>0.04</u>	(Magnitude)

DISCUSSION:

- Hydrocarbon concentrations at all wells sampled except Well MW-4 are near or below detection limits; concentrations at Well MW-4 have increased compared to previous quarters.
- Intrinsic bioremediation is occurring based on an evaluation performed during third quarter 1996.
- Please refer to PACIFIC's *Quarterly Groundwater Monitoring Report - Fourth Quarter 1996* for historical groundwater elevation and analytical data.

ATTACHMENTS:

- Table 1 - Groundwater Sampling Schedule
- Table 2 - Groundwater Elevation and Analytical Data
- Figure 1 - Groundwater Elevation Contour Map
- Figure 2 - TPPH-g/Benzene Concentration Map
- Attachment A - Field and Laboratory Procedures
- Attachment B - Certified Analytical Reports, Chain-of-Custody Documentation, and Field Data Sheets
- Attachment C - Remedial System Performance Evaluation

cc: Ms. Susan Hugo, Alameda County Health Care Services Agency
Mr. Kevin Graves, Regional Water Quality Control Board - S.F. Bay Region

Table 1
Groundwater Sampling Schedule

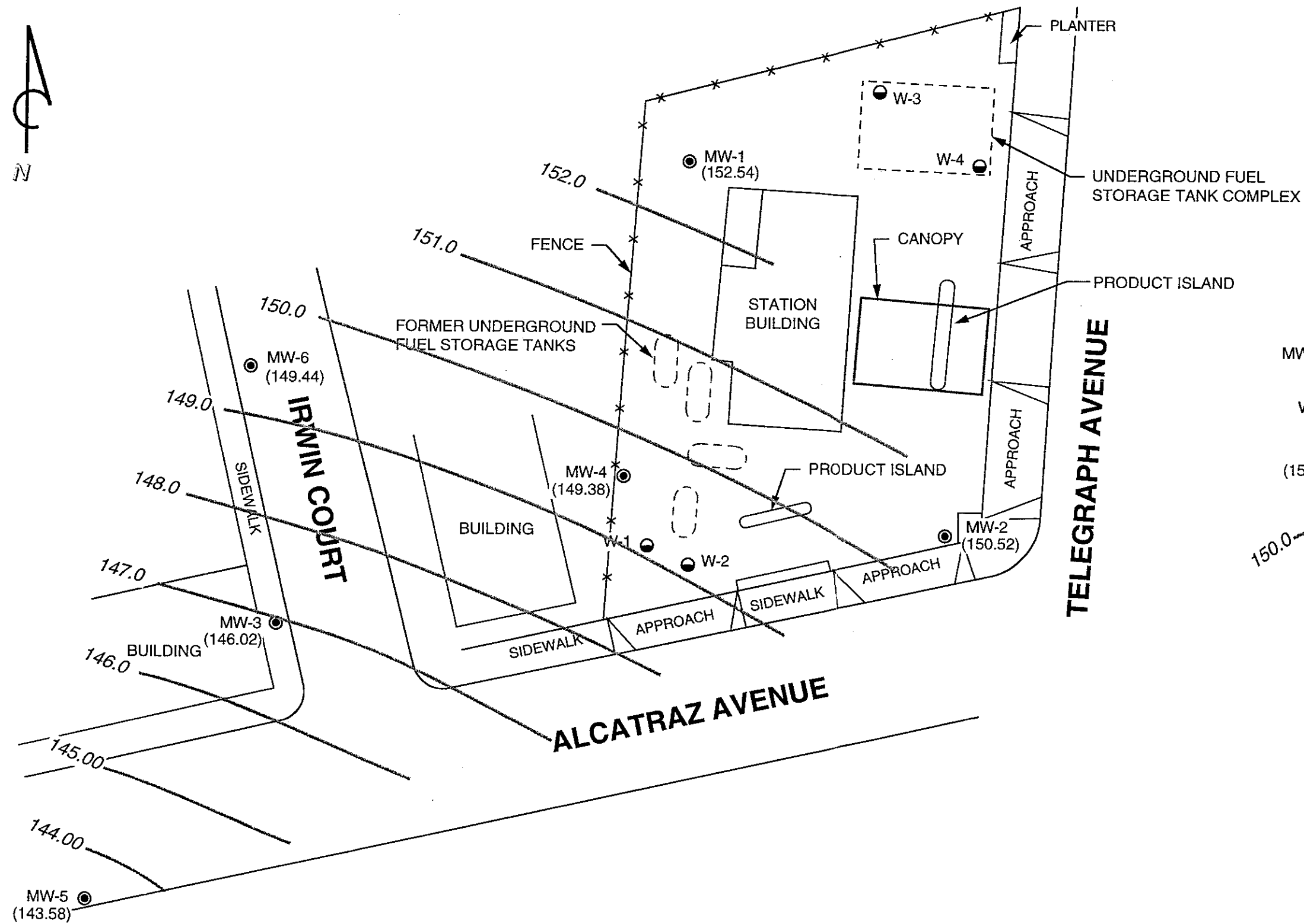
ARCO Service Station 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

Well Number	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Sampling Frequency
MW-1			a		Annually
MW-2			a		Annually
MW-3	a	a	a	a	Semiannually
MW-4	a	a	a	a	Semiannually
MW-5	a	a	a	a	Quarterly
MW-6			a		Annually
a. Samples analyzed for TPHH-g, BTEX compounds, and MtBE according to EPA Methods 8015 (modified) and 8020.					

Table 2
Groundwater Elevation and Analytical Data
 Total Purgeable Petroleum Hydrocarbons
 (TPPH as Gasoline, BTEX Compounds, and MtBE)

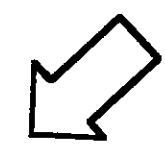
ARCO Service Station 0374
 6407 Telegraph Avenue at Alcatraz Avenue
 Oakland, California

Well Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOC)	Groundwater Elevation (feet, MSL)	TPPH as			Ethyl-	Xylenes	MtBE
					Gasoline	Benzene	Toluene	benzene	(ppb)	(ppb)
MW-1	01/31/96	158.91	6.34	152.57	Well Sampled Annually					
	04/10/96		5.82	153.09	Well Sampled Annually					
	07/16/96		7.23	151.68	<50	<0.50	<0.50	<0.50	<0.50	340
	10/14/96		8.34	150.57	Well Sampled Annually					
	03/27/97		6.37	152.54	Well Sampled Annually					
MW-2	01/31/96	157.92	6.51	151.41	Well Sampled Annually					
	04/10/96		6.94	150.98	Well Sampled Annually					
	07/16/96		7.73	150.19	<50	1.2	<0.50	<0.50	<0.50	33
	10/14/96		8.35	149.57	Well Sampled Annually					
	03/27/97		7.40	150.52	Well Sampled Annually					
MW-3*	01/31/96	153.64	7.02	146.62	140	20	0.87	11	14	NA
	04/10/96		7.82	145.82	84	2.4	<0.50	1.9	1.1	NA
	07/16/96		6.80	146.84	<50	2.2	<0.50	<0.50	<0.50	<2.5
	10/14/96		7.67	145.97	<50	1.2	<0.50	<0.50	0.81	2.9
	03/27/97 †		7.62	146.02	<50	0.94	<0.50	0.9	0.63	<2.5
MW-4	01/31/96	156.53	5.64	150.89	230	23	2.2	3.7	32	NA
	04/10/96		6.66	149.87	7,300	1,600	350	350	830	NA
	07/16/96		7.73	148.80	5,600	1,100	160	240	520	150
	10/14/96		8.55	147.98	4,500	860	72	160	340	<62
	03/27/97 †		7.15	149.38	25,000	5,200	760	850	2,600	<250
MW-5	01/31/96	151.33	8.64	142.69	<50	<0.50	<0.50	<0.50	<0.50	NA
	04/10/96		N/A	—	<50	<0.50	<0.50	<0.50	<0.50	NA
	07/16/96		8.15	143.18	<50	0.79	1.3	<0.50	<0.50	<2.5
	10/14/96		7.92	143.41	<50	<0.50	<0.50	<0.50	<0.50	<2.5
	03/27/97 †		7.75	143.58	<50	<0.50	<0.50	<0.50	<0.50	<2.5
MW-6	01/31/96	153.84	5.15	148.69	Well Sampled Annually					
	04/10/96		4.58	149.26	Well Sampled Annually					
	07/16/96		4.96	148.88	<50	<0.50	<0.50	<0.50	<0.50	150
	10/14/96		6.15	147.69	Well Sampled Annually					
	03/27/97		4.40	149.44	Well Sampled Annually					
MtBE	= Methyl tert-butyl ether									
MSL	= Mean sea level									
TOC	= Top of casing									
ppb	= Parts per billion									
<	= Less than laboratory detection limit stated to the right									
NA	= Not analyzed									
N/A	= Not available									
*	= ORC program at this well was initiated November 1995. Please see Attachment C for details.									
†	= Well sampled without purging. Please refer to Field and Laboratory Procedures (Attachment A) for details.									



LEGEND

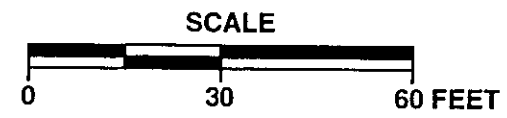
- MW-1 ● GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- W-1 ● TANK PIT GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- (152.54) LIQUID SURFACE ELEVATION IN FEET - MSL, 3-27-97
- 150.0 LIQUID SURFACE ELEVATION CONTOUR IN FEET - MSL, 3-27-97



APPROXIMATE DIRECTION OF GROUNDWATER FLOW
APPROXIMATE GRADIENT = 0.04



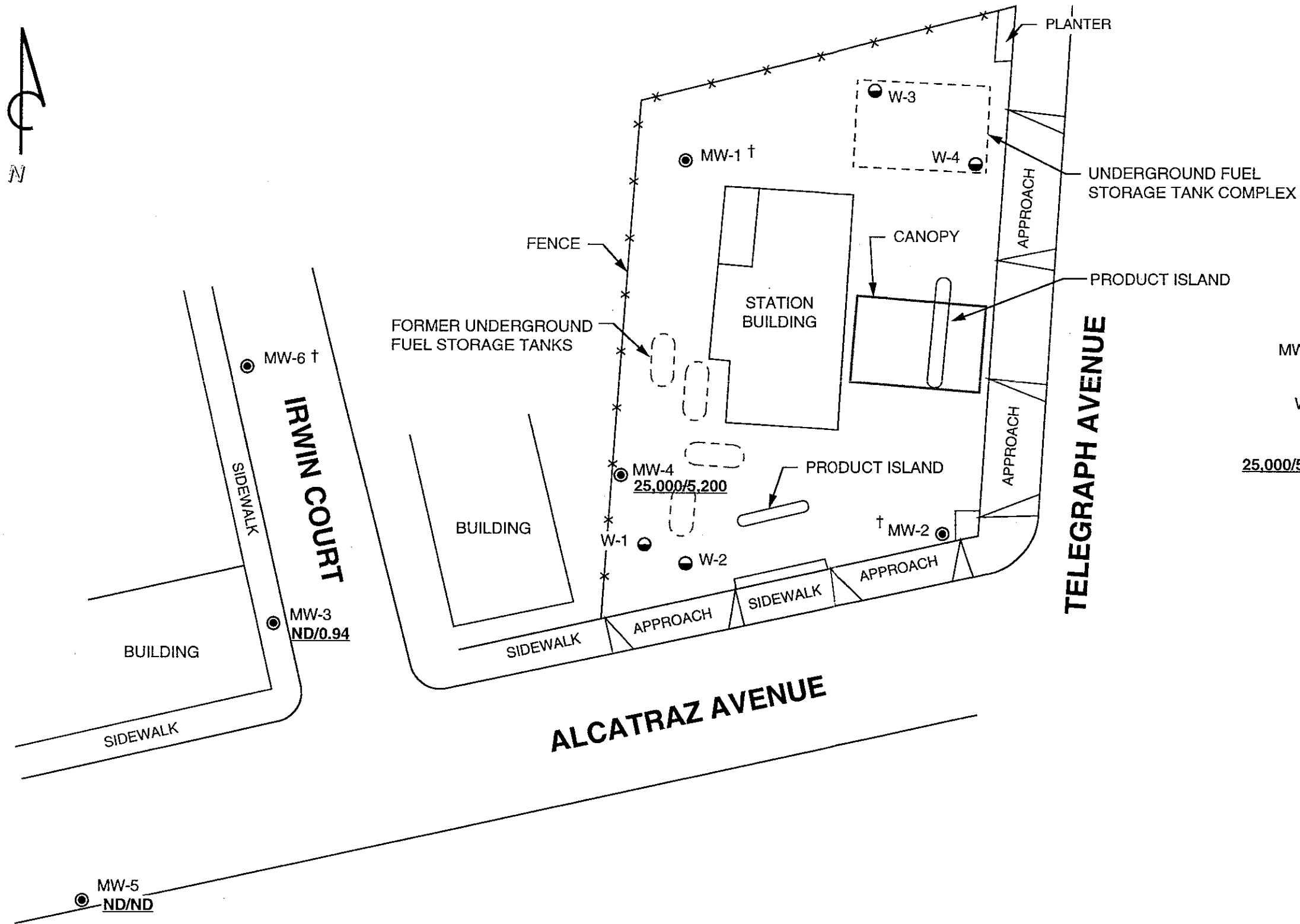
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ARCO SERVICE STATION 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

GROUNDWATER ELEVATION CONTOUR MAP

FIGURE: 1
PROJECT: 330-084.2D



LEGEND

MW-1 ● GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

W-1 ● TANK PIT GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

25,000/5,200 TPPH-g/BENZENE CONCENTRATION IN GROUNDWATER, IN PARTS PER BILLION, 3-27-97

ND NOT DETECTED

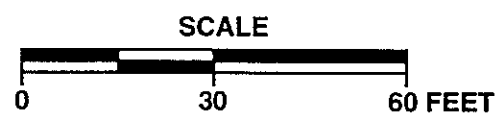
† WELL SAMPLED ANNUALLY



APPROXIMATE DIRECTION OF GROUNDWATER FLOW



PACIFIC ENVIRONMENTAL GROUP, INC.



ARCO SERVICE STATION 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

TPPH-g/BENZENE CONCENTRATION MAP

FIGURE:
2
PROJECT:
330-084.2D

ATTACHMENT A
FIELD AND LABORATORY PROCEDURES

ATTACHMENT A

FIELD AND LABORATORY PROCEDURES

Sampling Procedures

The sampling procedure for each well consists first of measuring the water level and then checking for the presence of separate-phase hydrocarbons (SPH), using either an electronic indicator and a clear Teflon[®] bailer or an oil-water interface probe. Wells not containing SPH are then purged of approximately three casing volumes of water (or to dryness) using a centrifugal pump, gas displacement pump, or bailer. Equipment used for the current sampling event is noted on the attached field data sheets. During purging, temperature, pH, and electrical conductivity are monitored in order to document that these parameters are stable prior to collecting samples. After purging, water levels are allowed to partially recover. Ground-water samples are collected using a Teflon[®] bailer, placed into appropriate EPA-approved containers, labeled, logged onto chain-of-custody documents, and transported on ice to a California State-certified laboratory.

ARCO initiated utilization of a case-by-case approach for the implementation of non-purge sampling of monitoring wells impacted by petroleum hydrocarbons, beginning first quarter 1997. The criteria for implementation of non-purge sampling include:

- The screened interval of the well casing is not fully submerged.
- The well is not located within a confined aquifer.
- The well is not being monitored for the first time.
- The site is not being monitored during the confirmation monitoring period, prior to site closure.

Based on the above criteria, prescreening of monitoring wells are performed for each site. Depth to water data obtained on the sampling date is compared to the well construction data, to decide whether the well may be sampled without purging.

Laboratory Procedures

The groundwater samples were analyzed for the presence of total purgeable petroleum hydrocarbons calculated as gasoline, benzene, toluene, ethylbenzene, xylenes, and methyl tert-butyl ether. The analyses were performed according to EPA Methods 8015 (modified), 8020, and 5030 utilizing a purge-and-trap extraction technique. Final detection was by gas chromatography using flame- and photo-ionization detectors. The methods of analysis for the groundwater samples are documented in the certified analytical report. The certified analytical report, chain-of-custody documentation, and field data sheets are presented as Attachment B.

ATTACHMENT B

**CERTIFIED ANALYTICAL REPORTS,
CHAIN-OF-CUSTODY DOCUMENTATION,
AND FIELD DATA SHEETS**



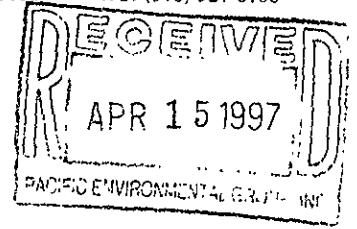
Sequoia Analytical

680 Chesapeake Drive
404 N. Wiget Lane
819 Striker Avenue, Suite 8

Redwood City, CA 94063
Walnut Creek, CA 94598
Sacramento, CA 95834

(415) 364-9600
(510) 988-9600
(916) 921-9600

FAX (415) 364-9233
FAX (510) 988-9673
FAX (916) 921-0100



Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110
Attention: Shaw Garakani

Project: 330-084.2K, 0374, Berkeley

Enclosed are the results from samples received at Sequoia Analytical on March 27, 1997.
The requested analyses are listed below:

<u>SAMPLE #</u>	<u>SAMPLE DESCRIPTION</u>	<u>DATE COLLECTED</u>	<u>TEST METHOD</u>
9703F88 -01	LIQUID, MW-3	03/27/97	TPGBMW Purgeable TPH/BTEX
9703F88 -02	LIQUID, MW-4	03/27/97	TPGBMW Purgeable TPH/BTEX
9703F88 -03	LIQUID, MW-5	03/27/97	TPGBMW Purgeable TPH/BTEX
9703F88 -04	LIQUID, TB-1	03/27/97	TPGBMW Purgeable TPH/BTEX

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Project Manager

Quality Assurance Department





Pacific Environmental Group	Client Proj. ID: 330-084.2K, 0374, Berkeley	Sampled: 03/27/97
2025 Gateway Place, Suite 440	Sample Descript: MW-3	Received: 03/27/97
San Jose, CA 95110	Matrix: LIQUID	
Attention: Shaw Garakani	Analysis Method: 8015Mod/8020	Analyzed: 04/03/97
	Lab Number: 9703F88-01	Reported: 04/09/97

QC Batch Number: GC040397BTEX06A
Instrument ID: GCHP06

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	0.94
Toluene	0.50	N.D.
Ethyl Benzene	0.50	0.90
Xylenes (Total)	0.50	0.63
Chromatogram Pattern:		

Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	77

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

368

Tod Granicher
Project Manager





Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Client Proj. ID: 330-084.2K, 0374, Berkeley
Sample Descript: MW-4
Matrix: LIQUID
Analysis Method: 8015Mod/8020
Lab Number: 9703F88-02

Sampled: 03/27/97
Received: 03/27/97
Analyzed: 04/03/97
Reported: 04/09/97

Attention: Shaw Garakani


QC Batch Number: GC040397BTEX06A
Instrument ID: GCHP06

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	5000	25000
Methyl t-Butyl Ether	250	N.D.
Benzene	50	5200
Toluene	50	760
Ethyl Benzene	50	850
Xylenes (Total)	50	2600
Chromatogram Pattern:		Gas
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	80

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Tod Granicher
Project Manager





Pacific Environmental Group Client Proj. ID: 330-084.2K, 0374, Berkeley Sampled: 03/27/97
2025 Gateway Place, Suite 440 Sample Descript: MW-5 Received: 03/27/97
San Jose, CA 95110 Matrix: LIQUID
Attention: Shaw Garakani Analysis Method: 8015Mod/8020 Analyzed: 04/02/97
Lab Number: 9703F88-03 Reported: 04/09/97


QC Batch Number: GC040297BTEX06A
Instrument ID: GCHP06

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	82

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Tod Granicher
Project Manager





Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Client Proj. ID: 330-084.2K, 0374, Berkeley
Sample Descript: TB-1
Matrix: LIQUID
Analysis Method: 8015Mod/8020
Lab Number: 9703F88-04

Sampled: 03/27/97
Received: 03/27/97
Analyzed: 04/02/97
Reported: 04/09/97

Attention: Shaw Garakani

QC Batch Number: GC040297BTEX06A


Instrument ID: GCHP06

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	87

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Tod Granicher
Project Manager





Pacific Environmental Group Client Project ID: 330-084.2K / 0374, Berkeley
 2025 Gateway Place, Suite 440 Matrix: LIQUID
 San Jose, CA 95110
 Attention: Shaw Garakani Work Order #: 9703F88 01-04 Reported: Apr 12, 1997

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes	Gas
QC Batch#:	GC040297BTEX06A	GC040297BTEX06A	GC040297BTEX06A	GC040297BTEX06A	GC040297BTEX06A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015M
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030

Analyst:	A. Porter	A. Porter	A. Porter	A. Porter	A. Porter
MS/MSD #:	9703F0506	9703F0506	9703F0506	9703F0506	9703F0506
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Prepared Date:	4/2/97	4/2/97	4/2/97	4/2/97	4/2/97
Analyzed Date:	4/2/97	4/2/97	4/2/97	4/2/97	4/2/97
Instrument I.D.#:	GCHP6	GCHP6	GCHP6	GCHP6	GCHP6
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L	60 µg/L
Result:	8.2	8.5	9.0	27	73
MS % Recovery:	82	85	90	90	122
Dup. Result:	8.0	8.5	8.9	27	73
MSD % Recov.:	80	85	89	90	122
RPD:	2.5	0.0	1.1	0.0	0.0
RPD Limit:	0-25	0-25	0-25	0-25	0-25

LCS #:	BLK040297BSA	BLK040297BSA	LK040297BSA	BLK040297BSA	BLK040297BSA
Prepared Date:	4/2/97	4/2/97	4/2/97	4/2/97	4/2/97
Analyzed Date:	4/2/97	4/2/97	4/2/97	4/2/97	4/2/97
Instrument I.D.#:	GCHP6	GCHP6	GCHP6	GCHP6	GCHP6
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L	60 µg/L
LCS Result:	8.0	8.4	8.9	27	69
LCS % Recov.:	80	84	89	90	115

MS/MSD	60-140	60-140	60-140	60-140	60-140
LCS	70-130	70-130	70-130	70-130	70-130
Control Limits					

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Joe
 Tod Granicher
 Project Manager

Please Note:
 The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9703F88.PPP <1>





Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Client Project ID: 330-084.2K / 0374, Berkeley
Matrix: LIQUID

Attention: Shaw Garakani

Work Order #: 9703F88 01-04

Reported: Apr 12, 1997

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes	Gas
QC Batch#:	GC040397BTEX06A	GC040397BTEX06A	GC040397BTEX06A	GC040397BTEX06A	GC040297BTEX06A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015M
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030

Analyst:	A. Porter	A. Porter	A. Porter	A. Porter	A. Porter
MS/MSD #:	9703F6506	9703F6506	9703F6506	9703F6506	9703F6506
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Prepared Date:	4/3/97	4/3/97	4/3/97	4/3/97	4/3/97
Analyzed Date:	4/3/97	4/3/97	4/3/97	4/3/97	4/3/97
Instrument I.D.#:	GCHP6	GCHP6	GCHP6	GCHP6	GCHP6
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L	60 µg/L
Result:	9.6	9.4	9.4	28	77
MS % Recovery:	96	94	94	93	128
Dup. Result:	10	10	10	30	83
MSD % Recov.:	100	100	10	100	138
RPD:	4.1	6.2	6.2	6.9	7.5
RPD Limit:	0-25	0-25	0-25	0-25	0-25

LCS #:	BLK040397BSA	BLK040397BSA	LK040397BSA	BLK040397BSA	BLK040397BSA
Prepared Date:	4/3/97	4/3/97	4/3/97	4/3/97	4/3/97
Analyzed Date:	4/3/97	4/3/97	4/3/97	4/3/97	4/3/97
Instrument I.D.#:	GCHP6	GCHP6	GCHP6	GCHP6	GCHP6
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L	60 µg/L
LCS Result:	9.0	8.8	8.9	26	74
LCS % Recov.:	90	88	89	87	123

MS/MSD	60-140	60-140	60-140	60-140	60-140
LCS	70-130	70-130	70-130	70-130	70-130
Control Limits					

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

TG
Tod Granicher
Project Manager

Please Note:
The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9703F88.PPP <2>





Sequoia
Analytical

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(415) 364-9600
(510) 988-9600
(916) 921-9600

FAX (415) 364-9233
FAX (510) 988-9673
FAX (916) 921-0100

Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110
Attention: Shaw Garakani

Client Proj. ID: 330-084.2K, 0374, Berkeley

Lab Proj. ID: 9703F88


Received: 03/27/97

Reported: 04/09/97

LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 10 pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

SEQUOIA ANALYTICAL



Tod Granicher
Project Manager



SEQUOIA ANALYTICAL SAMPLE RECEIPT LOG

CLIENT NAME: PEG
 REC. BY (PRINT) PKL

WORKORDER: 9703F88
 DATE OF LOG-IN: 3/29/97

CIRCLE THE APPROPRIATE RESPONSE

		LAB SAMPLE #	DASH #	CLIENT IDENTIFICATION	CONTAINER DESCRIPTION	SAMPLE MATRIX	DATE SAMP.	REMARKS: CONDITION (ETC.)
1. Custody Seal(s) Present / <input checked="" type="radio"/> Absent Intact / Broken*		1	A-C	NW - 3	VOA (3)	liquid	03-27-97	
2. Custody Seal #: Put in Remarks Section		2	↓	↓ 4	↓	↓	↓	
3. Chain-of-Custody <input checked="" type="radio"/> Present / Absent*		3	↓	↓ 5	↓	↓	↓	
4. Traffic Reports or Packing List: Present / <input checked="" type="radio"/> Absent		4	A,B	TB - 1	VOA (2)	↓	↓	
5. Airbill: Airbill / Sticker Present / <input checked="" type="radio"/> Absent								
6. Airbill #:								
7. Sample Tags: Sample Tags #s: <input checked="" type="radio"/> Present / Absent <input checked="" type="radio"/> Listed / Not Listed on Chain-of-Custody								
8. Sample Condition: <input checked="" type="radio"/> Intact / Broken* / Leaking*								
9. Does information on custody reports, traffic reports and sample tags agree? <input checked="" type="radio"/> Yes / No*								
10. Proper Preservatives used: <input checked="" type="radio"/> Yes / No*								
11. Date Rec. at Lab:	<u>03-27-97</u>							
12. Time Rec. at Lab:	<u>16:41</u>							
13. Temp Rec. at Lab:	<u>7°C</u>							

FILED 03-27-97

*if Circled, contact Project Manager and attach record of resolution.

ARCO Products Company
Division of AtlanticRichfield Company

30-084.2K

Task Order No. 1934800

SAVIE WAY CHANGE

Chain of Custody

ARCO Facility no. **0374** City (Facility) **6407 Telegraph Ave, Berkeley CA** Project manager (Consultant) **Shaw Garkner**
 ARCO engineer **Paul Surple** Telephone no. (ARCO) _____ Telephone no. (Consultant) **(408) 441-7500** Fax no. (Consultant) **(408) 441-7539**
 Consultant name **Pacific Environmental Group** Address (Consultant) **2025 GATEWAY Pl. Suite 440 SAN BAE CA 95110**

Laboratory name
Sequwa
Contract number

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	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	Semi Metals TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/>	CAA Metals EPA 6010/7000 TTLIC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS <input type="checkbox"/> Lead EPA 7420/7421 <input type="checkbox"/>	
			Soil	Water	Other	Ice	Acid HCl														
✓ MW-3	1	3		X			3/27/97	9:46													
✓ MW-4	2	1		↓				9:35													
✓ MW-5	3	↓		↓				10:02													
✓ TB-1	4	2		↓				NA													

Method of shipment
9703F88

Special detection Limit/reporting

Special QA/QC

Remarks
MAR 27 4 41

Lab number

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

Condition of sample: _____ Temperature received: _____
 Relinquished by sampler **[Signature]** Date **3/27/97** Time **11:45** Received by **[Signature]** Date **3/27/97** Time **11:45**
 Relinquished by **[Signature]** Date **3/27/97** Time **14:35** Received by **[Signature]**
 Relinquished by **[Signature]** Date **3/27/97** Time **4:30** Received by laboratory **[Signature]** Date **03-27-97** Time **10:41**

FILED
1997
GROUP

FIELD SERVICES / O & M REQUEST

SITE INFORMATION FORM

Project #:330-084.2k

1st time visit

Station #:374

1st 2nd 3rd 4th

Date of Request: 1Q

Site Address:6407 Telegraph ave
Berkeley, California

Monthly

Ideal Field Date:

Semi-Monthly

County:Alameda

Weekly

Budget Hrs. 2

Project Manager:Shaw Garakani

One time Event

Actual Hrs. 2

Requestor:David Nanstad

Other. _____

Mob de Mob 1

Client:Arco

Client P.O.C.: Paul Supple

Purge Total _____

Prefield contacts:None

Field Tasks: For General Description

First Quarter 1997 Groundwater sampling event: DTW/DTL on all wells TOB/TOC sample per attached protocol.

WA# 21026 00

Comments, remarks, from Field Staff (include problems encountered)

Completed by: Don Waterman

Date: 3/27/97

Checked by: _____

FIELD REPORT

DEPTH TO WATER/SEPARATE-PHASE HYDROCARBON SURVEY

PROJECT No.: 330-084.2K LOCATION: 6407 Telegraph Berkeley DATE: 3/27/97
 CLIENT/STATION NO.: 0374 FIELD TECHNICIAN: Don W. Stenbaugh DAY OF WEEK: Thur.

PROBE TYPE/ID No. _____
 Oil/Water IF/ _____
 H₂O level indicator _____
 Other: _____

Dtw Order	Well ID	Time	Surface Seal	Lid Secure	Gasket	Lock	Expanding Cap	Total Depth (feet)	First Depth to Water (feet) TOB/TOC	Second Depth to Water (feet) TOB/TOC	SEPARATE-PHASE HYDROCARBONS (SPH)							Liquor Removed (gallons)			
											SPH Depth (feet) TOB/TOC	SPH Thickness (feet)	Fresh	Weathered	Gas	Oil	VISCOSITY			SPH	
																	Light		Medium		Heavy
5	1	MW-6	8:55	✓	✓	✓	✓	14.5	4.83 / 4.40	4.83 / 4.40											
10	2	MW-5	9:00	✓	✓	✓	✓	22	8.14 / 7.75	8.14 / 7.75											
7	3	MW-1	9:06	✓	✓	✓	✓	26.5	6.65 / 6.37	6.65 / 6.37											
7	4	MW-2	9:13	✓	✓	✓	✓	26	7.67 / 7.40	7.67 / 7.40											
7	5	MW-3	9:18	✓	✓	✓	✓	27	7.83 / 7.62	7.83 / 7.62											
7	6	MW-4	9:25	✓	✓	✓	✓	27	7.95 / 7.15	7.95 / 7.15											

Comments: _____

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 330-084.2B LOCATION: 5407 Telegraph Ave Oakland WELL ID #: MW-3

CLIENT/STATION No.: Arco #0374

FIELD TECHNICIAN: _____

WELL INFORMATION

Depth to Liquid: _____ TOB _____ TOC _____
 Depth to water: 7.83 TOB 7.62 TOC _____
 Total depth: _____ TOB 27 TOC _____
 Date: 3/27/97 Time (2400): 9:18

Probe Type and I.D. #
 Oil/Water interface _____
 Electronic indicator _____
 Other; _____

CASING DIAMETER

<input type="checkbox"/>	2	_____	<u>0.17</u>
<input type="checkbox"/>	3	_____	<u>0.38</u>
<input checked="" type="checkbox"/>	4	_____	<u>0.66</u>
<input type="checkbox"/>	4.5	_____	<u>0.83</u>
<input type="checkbox"/>	5	_____	<u>1.02</u>
<input type="checkbox"/>	6	_____	<u>1.5</u>
<input type="checkbox"/>	8	_____	<u>2.6</u>

GAL/ LINEAR FT.

SAMPLE TYPE

Groundwater
 Duplicate
 Extraction well
 Trip blank
 Field blank
 Equipment blank
 Other; _____

TD _____ - DTW _____ = _____ x Foot _____ = _____ x Casings _____ = Calculated Purge _____

DATE PURGED: NA START: NA END (2400 hr): NA PURGED BY: AM
 DATE SAMPLED: 3/27/97 START: 9:46 END (2400 hr): 9:46 SAMPLED BY: DmJ

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR
<u>9:46</u>	<u>NA</u>	<u>7.99</u>	<u>1130</u>	<u>66.5</u>	<u>Clear</u>	<u>Trace</u>	<u>NONE</u>

Pumped dry Yes / No _____

FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:

DTW: _____ TOB/TOC _____

PURGING EQUIPMENT/I.D. #

Bailer: _____ Airlift Pump: _____
 Centrifugal Pump: _____ Dedicated: _____
 Other: _____

SAMPLING EQUIPMENT/I.D. #

Bailer: 31-6
 Dedicated: _____
 Other: _____

SAMP. CNTRL #	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-3</u>	<u>3/27/97</u>	<u>9:46</u>	<u>3</u>	<u>40ml</u>	<u>VOA</u>	<u>HCL</u>	<u>Gas/BtoX</u>

REMARKS: _____

SIGNATURE: _____

Bob Chapman



PACIFIC ENVIRONMENTAL

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 330-084.2K LOCATION: 5407 Telegraph Ave Oakland WELL ID #: MW-4

CLIENT/STATION No.: Arco #0374 FIELD TECHNICIAN: _____

WELL INFORMATION

Depth to Liquid: _____ TOB _____ TOC _____
 Depth to water: 7.95 TOB 2.15 TOC _____
 Total depth: _____ TOB 27 TOC _____
 Date: 3/27/97 Time (2400): 9:25

Probe Type and I.D. #
 Oil/Water interface _____
 Electronic indicator _____
 Other; _____

CASING DIAMETER GAL/LINEAR FT.

- 2 _____ 0.17
- 3 _____ 0.38
- 4 _____ 0.66
- 4.5 _____ 0.83
- 5 _____ 1.02
- 6 _____ 1.5
- 8 _____ 2.6

SAMPLE TYPE

- Groundwater
- Duplicate
- Extraction well
- Trip blank
- Field blank
- Equipment blank
- Other; _____

TD _____ - DTW _____ = _____ Gal/Linear x Foot _____ = _____ Number of Casings _____ Calculated Purge _____

DATE PURGED: _____ START: _____ END (2400 hr): _____ PURGED BY: _____
 DATE SAMPLED: 3/27/97 START: 9:35 END (2400 hr): 9:35 SAMPLED BY: Dme

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 2.5°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR
<u>9:35</u>	<u>NA</u>	<u>7.42</u>	<u>1600</u>	<u>66.2</u>	<u>clear</u>	<u>trace</u>	<u>Faint</u>

Pumped dry Yes. / No _____

FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:

DTW: _____ TOB/TOC _____

PURGING EQUIPMENT/I.D. #

- Bailer: _____
- Centrifugal Pump: _____
- Other: _____
- Airlift Pump: _____
- Dedicated: _____

SAMPLING EQUIPMENT/I.D. #

- Bailer: 31-7
- Dedicated: _____
- Other: _____

SAMP. CNTRL #	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-4</u>	<u>3/27/97</u>	<u>9:35</u>	<u>3</u>	<u>40ml</u>	<u>VOM</u>	<u>HCL</u>	<u>Gas/Btox</u>

REMARKS: _____

SIGNATURE: Dm W...

FIELD DATA SHEET

WATER SAMPLE FIELD DATA SHEET

PROJECT No.: 330-084.2 LOCATION: 5407 Telegraph Ave Oakland WELL ID #: MW-5

CLIENT/STATION No.: Arco #0374 FIELD TECHNICIAN: Don Waterpugh

WELL INFORMATION

Depth to Liquid: TOB TOC
 Depth to water: 8.14 TOB 7.75 TOC
 Total depth: TOB 22 TOC
 Date: 9-20-87 Time (2400): 9:00

Probe Type and I.D. #
 Oil/Water interface
 Electronic indicator
 Other;

CASING
DIAMETER
 2 _____ GAL/
 3 _____ LINEAR FT.
 4 _____ 0.66
 4.5 _____ 0.83
 5 _____ 1.02
 6 _____ 1.5
 8 _____ 2.6

SAMPLE TYPE
 Groundwater
 Duplicate
 Extraction well
 Trip blank
 Field blank
 Equipment blank
 Other;

TD _____ - DTW _____ = _____ x Foot _____ = _____ x Casings _____ = Calculated Purge _____

DATE PURGED: NA START: NA END (2400 hr): NA PURGED BY: _____
 DATE SAMPLED: 3/27/87 START: 10:02 END (2400 hr): _____ SAMPLED BY: AW

TIME (2400 hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25°C)	TEMPERATURE (°F)	COLOR	TURBIDITY	ODOR
	<u>NA</u>	<u>8.05</u>	<u>1040</u>	<u>70.4</u>	<u>clear</u>	<u>trace</u>	<u>none</u>

Pumped dry Yes / No

FIELD MEASUREMENTS AT TIME OF SAMPLE, AFTER RECHARGE:

DTW: _____ TOB/TOC _____

PURGING EQUIPMENT/I.D. #

Bailer: _____ Airlift Pump: _____
 Centrifugal Pump: _____ Dedicated: _____
 Other: _____

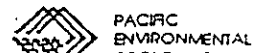
SAMPLING EQUIPMENT/I.D. #

Bailer: 31-8
 Dedicated: _____
 Other: _____

SAMP. CNTRL #	DATE	TIME (2400)	No. of Cont.	SIZE	CONTAINER	PRESERVE	ANALYTICAL PARAMETER
<u>MW-5</u>	<u>3/27/87</u>	<u>10:02</u>	<u>3</u>	<u>40ml</u>	<u>VOA</u>	<u>HCL</u>	<u>Gas/BTEX</u>

REMARKS: _____

SIGNATURE: Don Waterpugh



ATTACHMENT C

REMEDIAL SYSTEM PERFORMANCE EVALUATION

ATTACHMENT C

REMEDIAL SYSTEM PERFORMANCE EVALUATION

GWE System

Groundwater extraction (GWE) was conducted between December 21, 1993, and October 13, 1995. No evidence of plume migration has been observed since system deactivation. The GWE system was comprised of a pneumatic pump in Well W-2 and three 200-pound granular activated carbon vessels arranged in series to treat the extracted groundwater. Extracted and treated groundwater was discharged into the East Bay Municipal Utility District (EBMUD) Permit Account Number 502-85611. Based on verbal approval from the ACHCSA, indicating that GWE would no longer be required at the site, the EBMUD permit was relinquished on June 14 1996. Overall, approximately 0.1 million gallons of groundwater were extracted and less than 0.05 gallon of benzene was removed.

Historical GWE system performance and analytical data are presented in Tables C-1 and C-2. Graphical presentations of TPPH-g and benzene mass removal and concentration data are shown on Figures C-1 and C-2, respectively. Field data sheets are presented as Attachment C-A.

Intrinsic Bioremediation Evaluation

At the request of ARCO, PACIFIC monitored intrinsic bioremediation indicator parameters (bioparameters) during the third quarter 1996 groundwater monitoring event. Groundwater samples from Wells MW-3, MW-4, and MW-5 were analyzed for total alkalinity, dissolved oxygen (DO), ferrous iron, nitrate, sulfate, methane, biological oxygen demand (BOD), chemical oxygen demand (COD), and carbon dioxide (CO₂). Intrinsic bioremediation evaluation data are presented in Table C-3.

In general, depleted concentrations of electron acceptors (DO, nitrate, and sulfate), and elevated concentrations of bioremediation byproducts (CO₂, methane, and ferrous iron) within the hydrocarbon-impacted plume compared to background levels indicate that intrinsic bioremediation is occurring. As indicated by Table C-3, collected data follow the trend that indicates the occurrence of intrinsic bioremediation.

Bioremediation Enhancement Program

At the request of ARCO, PACIFIC initiated an in-situ bioremediation enhancement program at off-site Well MW-3 on November 14, 1995. The in-situ bioremediation enhancement program utilizes oxygen releasing compound (ORC) manufactured by Regenesis Bioremediation Products, Inc. Twelve 2-inch-diameter ORC socks were installed below the groundwater surface in Well MW-3. ORC is a formulation of very fine, insoluble magnesium peroxide that releases oxygen at a slow, controlled rate when hydrated. ORC product literature was presented in PACIFIC's fourth quarter 1995 report.

Data collected from Well MW-3 indicate that dissolved oxygen concentration has increased and total purgeable petroleum hydrocarbons calculated as gasoline (TPPH-g) and benzene, toluene, ethylbenzene, and xylenes (BTEX compounds) have decreased since ORC units were installed. ORC units are changed when dissolved oxygen data indicate that they have been depleted. PACIFIC replaced the ORC units in Well MW-3 on January 21, 1997. Data related to the ORC program are presented in Table C-3.

Conclusions

As indicated above, GWE at the site has been terminated with verbal approval from ACHCSA. Bioremediation enhancement program will continue during the second quarter 1997.

Attachments: Table C-1 - Groundwater Extraction System Performance Data
Table C-2 - Groundwater Extraction System Analytical Data -
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline and BTEX Compounds)
Table C-3 - Groundwater Biodegradation Study Field and
Laboratory Data
Figure C-1- Groundwater Extraction System Mass Removal Trend
Figure C-2 Groundwater Extraction System Hydrocarbon Concentrations
Attachment C-A - Operation and Maintenance Field Data Sheets

Table C-1
Groundwater Extraction System Performance Data

ARCO Service Station 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

Sample I.D.	Date Sampled	Totalizer Reading (gallons)	Net Volume (gallons)	Average Flow Rate (gpm)	TPPH			Benzene			Primary Carbon Loading (percent)
					Influent Concentration (µg/L)	Net Removed (lbs)	Removed to Date (lbs)	Influent Concentration (µg/L)	Net Removed (lbs)	Removed to Date (lbs)	
INFL	12/21/93 a	22	22	0.21	NS	0.000	0.00	NS	0.000	0.00	0.0
INFL	12/23/93 a	4,855	4,833	1.6	9,300	0.380	0.38	1,200	0.024	0.02	0.5
INFL	12/27/93 a	6,871	2,016	0.36	5,700	0.130	0.51	820	0.017	0.04	0.6
INFL	12/29/93 a	7,192	321	0.13	5,800	0.016	0.53	950	0.002	0.04	0.7
INFL	01/03/94 a	7,925	733	0.10	6,500	0.010	0.54	860	0.006	0.05	0.7
INFL	01/05/94 a	8,162	237	0.08	5,200	0.010	0.55	970	0.002	0.05	0.7
INFL	01/11/94 a	8,907	745	0.08	6,300	0.030	0.58	900	0.006	0.06	0.7
INFL	01/13/94 a	9,175	268	0.09	8,600	0.019	0.60	950	0.002	0.06	0.7
INFL	01/24/94 a	9,306	131	0.08	NS	0.007	0.60	NS	0.001	0.06	0.8
INFL	02/24/94 a	14,555	5,249	0.21	4,200	0.280	0.88	520	0.011	0.07	1.1
INFL	03/24/94 a	23,723	9,168	0.24	6,200	0.400	1.40	1,100	0.062	0.13	1.8
INFL	04/26/94 b	29,543	5,820	0.12	6,400	0.150	1.55	1,400	0.061	0.19	1.9
INFL	05/24/94 c	35,082	5,539	0.14	NS	0.196	1.75	NS	0.043	0.24	2.2
INFL	11/17/94 d,e	35,507	425	N/A	2,100	0.004	1.75	460	0.001	0.24	2.2
INFL	01/10/95 f	36,493	986	0.01	1,100	0.013	1.76	180	0.003	0.24	2.2
INFL	02/07/95 g	41,399	4,906	0.12	3,500	0.094	1.86	370	0.011	0.25	2.3
INFL	03/03/95 h	53,290	11,891	0.34	NS	0.220	2.08	NS	0.035	0.29	2.6
INFL	04/03/95	62,582	9,292	0.21	5,000	0.194	2.27	1,000	0.039	0.32	2.8
INFL	05/01/95	69,809	7,227	0.18	580	0.168	2.44	40	0.031	0.36	3.0
INFL	06/09/95	75,254	5,445	0.10	1,400	0.045	2.48	420	0.010	0.37	3.1
INFL	07/05/95	81,540	6,286	0.17	750	0.056	2.54	41	0.012	0.38	3.2
INFL	08/10/95	86,868	5,328	0.10	610	0.030	2.57	29	0.002	0.38	3.2
INFL	09/18/95	91,532	4,664	0.08	600	0.024	2.59	10	0.001	0.38	3.2
INFL	10/02/95	92,918	1,386	0.07	790	0.008	2.60	52	0.000	0.38	3.3
INFL	10/13/95 i,h	93,989	1,071	0.07	NS	0.006	2.61	NS	0.000	0.38	3.3
REPORTING PERIOD: 10/01/96 - 12/31/96 (i)											
TOTAL POUNDS REMOVED:								2.61			0.38
TOTAL GALLONS REMOVED:								0.43			0.05
PERIOD POUNDS REMOVED:					0.000			0.00			
PERIOD GALLONS REMOVED:					0.000			0.00			
TOTAL GALLONS EXTRACTED:					93,989						
PERIOD GALLONS EXTRACTED:					0						
PERIOD AVERAGE FLOW RATE (gpm):					N/A						
PRIMARY BED CAPACITY REMAINING:					96.7%						
TPPH = Total purgeable petroleum hydrocarbons gpm = Gallons per minute µg/L = Micrograms per liter lbs = Pounds NS = Not sampled (prior concentrations assumed) N/A = Not available or not applicable a. All data prior to 9/1/94 provided by prior consultant. b. Samples taken 4/21/94; totalizer reading from 4/26/94.					c. Last site visit by RESNA on 5/24/94. d. Pacific Environmental Group, Inc. became consultant for the site 9/1/94. e. System operated for two days in 4th quarter 1994; system down due to extensive repairs required for system and compound. f. System started on January 10, 1995. g. System auto shutdown 2/14/95; shut down 3/3/95 for repairs. h. TPPH/benzene pounds removed estimated from previous data. i. GWE system temporarily shut down 10/13/95.						
System operation began December 21, 1993, under RESNA Industries, Inc.; system shut down 4/27/94 - 11/17/94. Pounds of hydrocarbons removed to date through March 24, 1994 provided by prior consultant. Benzene mass removal from 12/21/93 through 4/27/94 estimated from data provided by prior consultant. Prior to June 1995, TPPH was reported as "TPH calculated as Gasoline". Mass removed is an approximation calculated using averaged concentrations. Carbon loading assumes an 8 percent isotherm. See certified analytical reports for detection limits.											

Table C-2
Groundwater Extraction System Analytical Data
 Total Purgeable Petroleum Hydrocarbons
 (TPPH as Gasoline and BTEX Compounds)

ARCO Service Station 0374
 6407 Telegraph Avenue at Alcatraz Avenue
 Oakland, California

Sample I.D.	Date Sampled	TPPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylenes (µg/L)
Influent Samples						
SP-105	01/10/94	1,100	180	2.7	26	51
SP-105	02/07/94	3,500	370	120	67	230
SP-105	04/03/95	5,000	1,000	41	88	300
INFL	05/01/95	580	40	ND	1.2	17
SP-105	06/09/95	1,400	420	7	10	20
SP-105	07/05/95	750	41	ND	2.8	17
SP-105	08/10/95	610	29	0.64	3.4	16
SP-105	09/18/95	600	10	ND	ND	20
105	10/02/95	790	52	ND	8.4	67
Midpoint-1 Samples						
SP-106	01/10/94	ND	ND	ND	ND	ND
SP-106	02/07/94	ND	ND	ND	ND	ND
SP-106	04/03/95	ND	ND	ND	ND	ND
MID-1	05/01/95	ND	ND	ND	ND	ND
SP-106	06/09/95	ND	ND	ND	ND	ND
SP-106	07/05/95	ND	ND	ND	ND	ND
SP-106	08/10/95	ND	ND	ND	ND	ND
SP-106	09/18/95	ND	ND	ND	ND	ND
106	10/02/95	ND	ND	ND	ND	ND
Midpoint-2 Samples						
MID-2	11/17/94	ND	ND	ND	ND	ND
SP-107	01/10/94	ND	ND	ND	ND	ND
SP-107	02/07/94	ND	ND	ND	ND	ND
SP-107	04/03/95	ND	ND	ND	ND	ND
SP-107	06/09/94	ND	ND	ND	ND	ND
SP-107	09/18/95	ND	ND	ND	ND	ND
Effluent Samples						
SP-108	01/10/94	ND	ND	ND	ND	ND
SP-108	02/07/94	ND	ND	ND	ND	ND
SP-108	04/03/95	ND	ND	ND	ND	ND
EFFL	05/01/95	ND	ND	ND	ND	ND
SP-108	06/09/95	79	ND	ND	ND	ND
SP-108	07/05/95	ND	ND	ND	ND	ND
SP-108	08/10/95	ND	ND	ND	ND	ND
SP-108	09/18/95	ND	ND	ND	ND	ND
108	10/02/95	ND	ND	ND	ND	ND
µg/L = Micrograms per liter ND = Not detected above detection limits System startup on 12/21/93 by RESNA Industries, Inc. Pacific Environmental Group, Inc. (PACIFIC) became consultant 9/01/94. PACIFIC restarted system on 11/17/94. See certified analytical reports for individual detection limits.						

Table C-3
Groundwater Biodegradation Study Field and Laboratory Data

ARCO Service Station 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California

Well	Date Sampled	Field Analyses					Laboratory Analyses									
		Groundwater Temperature (deg F)	pH (units)	Conductivity (µmhos)	D.O. (mg/L)	Ferrous Iron (mg/L)	Total Alkalinity (mg CaCO ₃ /L)	B.O.D. (mg/L)	Carbon Dioxide (mg/L)	C.O.D. (mg/L)	Methane (%)	Nitrate as Nitrate (mg/L)	Nitrite as Nitrite (mg/L)	Sulfate (mg/L)	TPPH as Gasoline (µg/L)	Total BTEX (µg/L)
MW-3	11/14/95 **	65.5*	6.76*	508*	7.17	N/A	NS	NS	NS	NS	NS	6.6	<1.0	NS	140	46
	06/06/96 **	66.2	7.38	700	12.28	N/A	NS	NS	NS	NS	NS	NS	NS	NS	84†	5.4†
	07/16/96	67.8	7.08	1,010	8.73	0.0	280	1.8	270	44	<0.020	<1.0	NS	78	<50	2.2
	01/21/97 **	59	N/A	N/A	11.15	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW-4	07/16/96	69.5	6.72	1,370	3.20	4.20	420	NS	470	NS	0.11	<1.0	NS	18	5,600	2,020
MW-5	07/16/96	70.4	6.85	690	6.80	0.0	170	NS	180	NS	<0.020	<1.0	NS	35	<50	1.1
MW-6	06/06/96	N/A	N/A	N/A	3.47	N/A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

D.O. = Dissolved oxygen
B.O.D = Biochemical oxygen demand
C.O.D = Chemical oxygen demand
TPPH = Total purgeable petroleum hydrocarbons
BTEX = Benzene, toluene, ethylbenzene, and xylenes
deg F = Degrees Fahrenheit
µmhos = Micromhos
mg/L = Milligrams per liter
µg/L = Micrograms per liter
NS = Not sampled
N/A = Not available
* = Field measurements collected on November 2, 1995.
** = ORC installed following data collection.
† = From April 10, 1996 groundwater monitoring event.

Figure C-1
 Groundwater Extraction System Mass Removal Trend
 ARCO Service Station 0374
 6407 Telegraph Avenue at Alcatraz Avenue
 Oakland, California

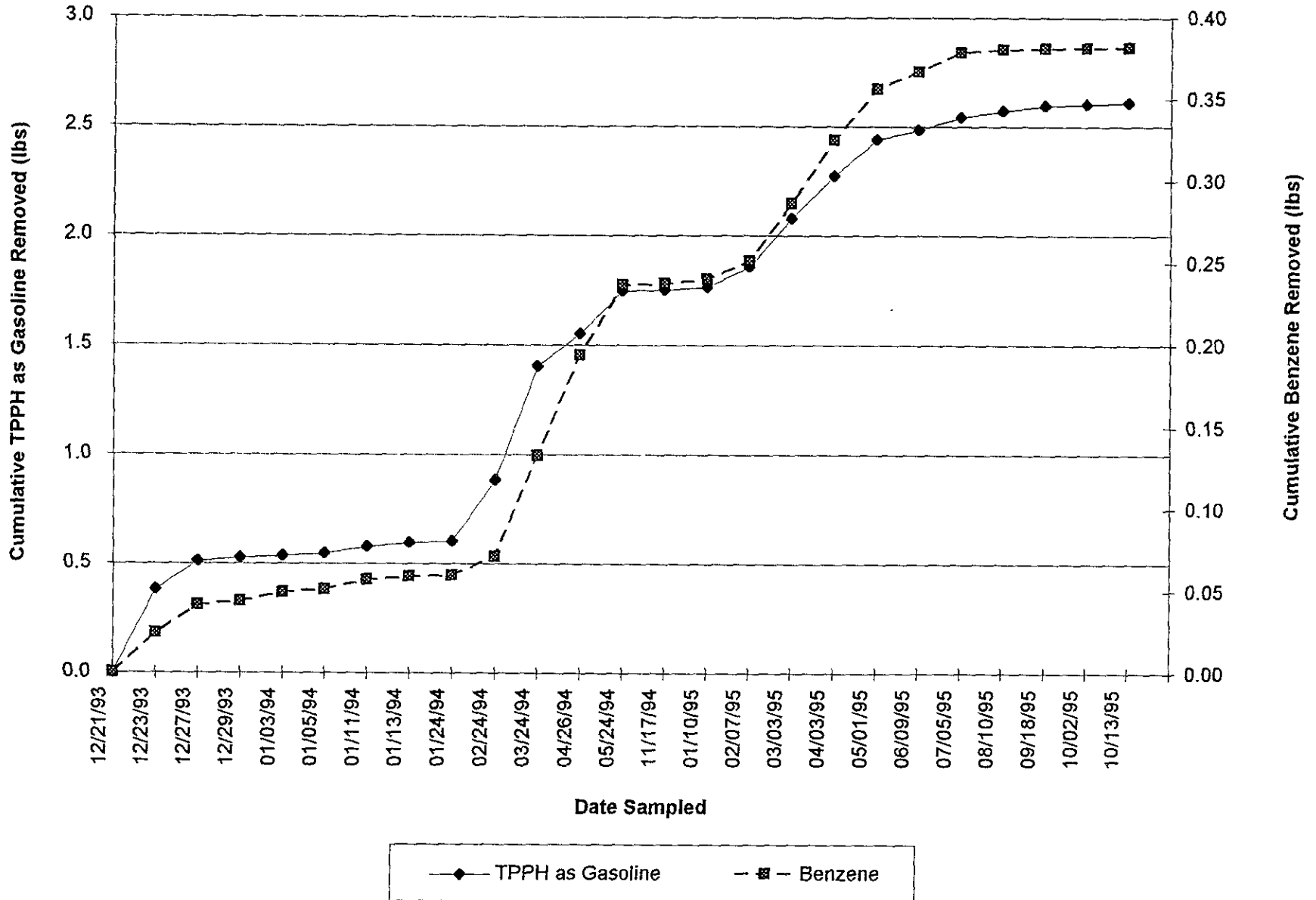
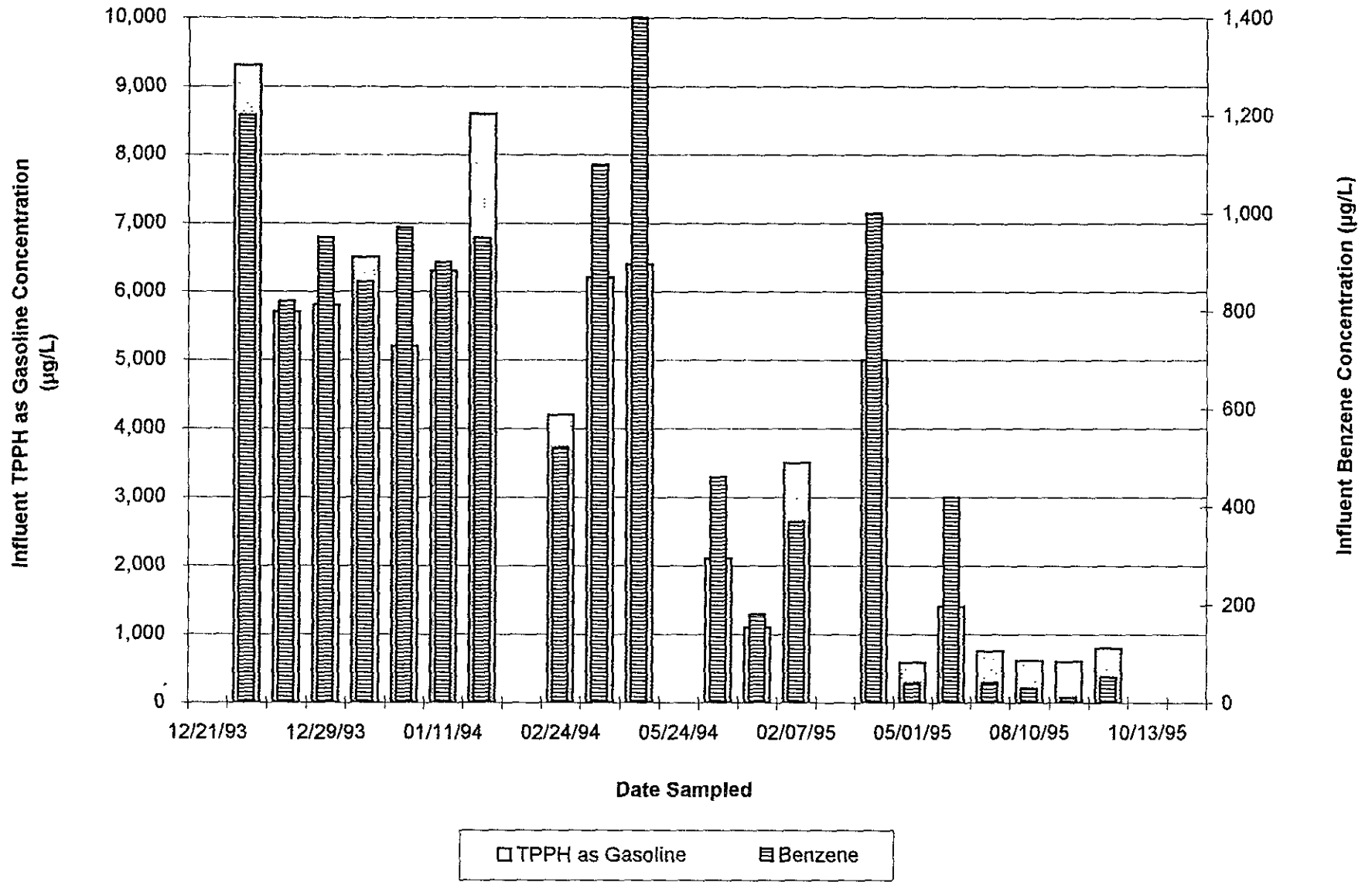


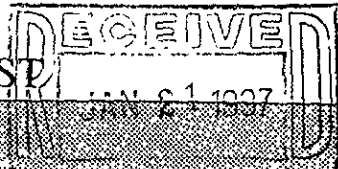
Figure C-2
Groundwater Extraction System Hydrocarbon Concentrations

ARCO Service Station 0374
6407 Telegraph Avenue at Alcatraz Avenue
Oakland, California



ATTACHMENT C-A
OPERATION AND MAINTENANCE
FIELD DATA SHEETS

FIELD SERVICES REQUEST



SITE INFORMATION FORM

Project Type

PACIFIC ENV. Check Appropriate Category

Identification

- Operation & Maintenance
- Sampling
- 1st time visit
- Quarterly
 - 1st
 - 2nd
 - 3rd
 - 4th
- Monthly
- Semi-Monthly
- Weekly
- One time event
- Other:

- In Budget Site Visit
- Out of Budget Site Visit

Project # 330-084.5C
 Station ID # 0374
 Site Address: 6407 Telegraph Ave. Oakland
 Lab: Sequoia
 County: _____
 Project Manager: Shaw Garakani
 Requester: David S. Nanstad
 Client: ARCO
 Client P.O.C: MIKE WHELAN
 Date of Request: January 16, 1997

Budget Hours: 3
 Actual Hours: 4.3
 Mob de Mob: 2

Site Safety Concerns

STANDARD

Ideal field date: asap

Field Tasks General Description

OBJECTIVE: Replace ORC's in well MW-3.

- 1) Measure DO (using both the ampoule and DO meter) and ferrous iron in well MW-3 with ORC's in it and with ORC's out.
- 2) Remove ORC's and store in bucket in GWE system enclosure to dry out.
- 3) Install 12 new 2" ORC's per manufacturers instructions /AT MY DESK.

Comments, remarks from field staff

DTW, TOP - 6' Temp °C - 15.0°C calibration DO₂ - 10.07
Total Depth 27.2 OD Table - 10.08
 DRCS FE ≈ 1.5 DRCS OUT FE - ≈ 1.5 Cl. Bottle DO₂ - 10.38
 IN Ampoule DO₂ - ≈ 11.12 ppm Amp DO₂ - ≈ 9-10 ppm
 before meter - DO₂ - 11.15 meter DO₂ - 10.66

NEW ORCS FE - 1.5
Amp DO₂ - 11
meter DO₂ - 11.20

Completed By: Don W. Stary Date: 1-21-97

FIELD DATA SHEET

Client: ARCO

Date: 1/21/97

Job Address: 6407 Telegraph Ave
Oakland CA

Project No.: 330084.5C

Time Arrived: 9:00

Time Departed: 10:30

Weather Conditions: Drizzle

Equipment at Site: _____

+ 1.5 hrs testing w/ ORC

Personnel at Site: _____

DN 1-20-97

FIELD NOTES

OTW (TOB) 6'

Total Depth 27.2'

Temp - 15.0°C ; Calibration DO_2 - 10.07 / DO_2 Table - 10.08

Calibration Bottle DO_2 - 10.38

	ORCs IN	ORCs out	New ORCs IN
FE	≈ 1.5	≈ 1.5	≈ 1.5
Ampoule DO_2	≈ 11-12 ppm	≈ 9-10 ppm	≈ 11 ppm
DO_2 meter	11.15 ppm	10.66 ppm	11.25 ppm

Don T. [Signature]
Signature