Pacific Gas and Electric Company

One California Street, Room F-235
San Francisco, CA 94106
415/973-5615

Britt

February 21, 1992

Mr. Barney M. Chan
Hazardous Material Specialist
Hazardous Material Division
Department of Environmental Health
Alameda County Health Care Services
80 Sway Way, Room 200
Oakland, CA 94621

Dear Mr. Chan:

Enclosed are the results of the groundwater monitoring performed in December 1991 at the PG&E ENCON Gas T&D yard located at 4930 Coliseum Way in Oakland. 94621

Item 1.0 provides background summary and 2.0 sampling activities. As was true last quarter, the presence of benzene in OW-5 continues to suggest that an upgradient (off-site) fuel leak exists. High concentrations of dichlorobenzenes in OW-7 may additionally show upgradient solvents.

Water level measurements collected from the wells prior to sampling continue to indicate the uppermost groundwater beneath the location continues to flow to the west-southwest towards Coliseum Way. Included in this report are groundwater-contour maps prepared from data collected during 1991 monitoring events.

The next quarterly sampling report will be performed in late March or early April 1992. Please phone me at 415/973-5615 if you have any questions about this report.

Sincerely,

Wally A. Pearce
nm

Wally A. Pearce

WAP:nm

Enclosure

Quarterly

Groundwater Monitoring Report

December 1991

PGandE
ENCON-GAS Transmission and Distribution Construction Yard
4930 Coliseum Way
Oakland, California

Prepared by:

Aqua Resources Inc. (ARI)
a wholly owned subsidiary of The Earth Technology Corp.
2030 Addison Street, Suite 500
Berkeley, CA 94704

Report issued:
February 12, 1992

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1.0 BACKGROUND

This report presents the results of the quarterly groundwater monitoring performed in December 1991 at the PG&E ENCON and Distribution Construction Yard. The yard is located at 4930 Coliseum Way in Oakland, California. The groundwater analyses were performed to monitor the distribution of waste oil, solvents, and fuel compounds in the uppermost aquifer beneath the northwestern part of the yard, near the former sites of five underground storage tanks.

The tanks were excavated and removed in January 1988. Analysis of their contents revealed that of the four tanks formerly located in a cluster near the north corner of the yard, two tanks contained mineral spirits and two tanks contained heavy oil. A concrete sump formerly connected to the tank cluster was located approximately 50 feet northeast of the tank cluster. The fifth tank formerly located near the west corner of the yard contained diesel fuel.

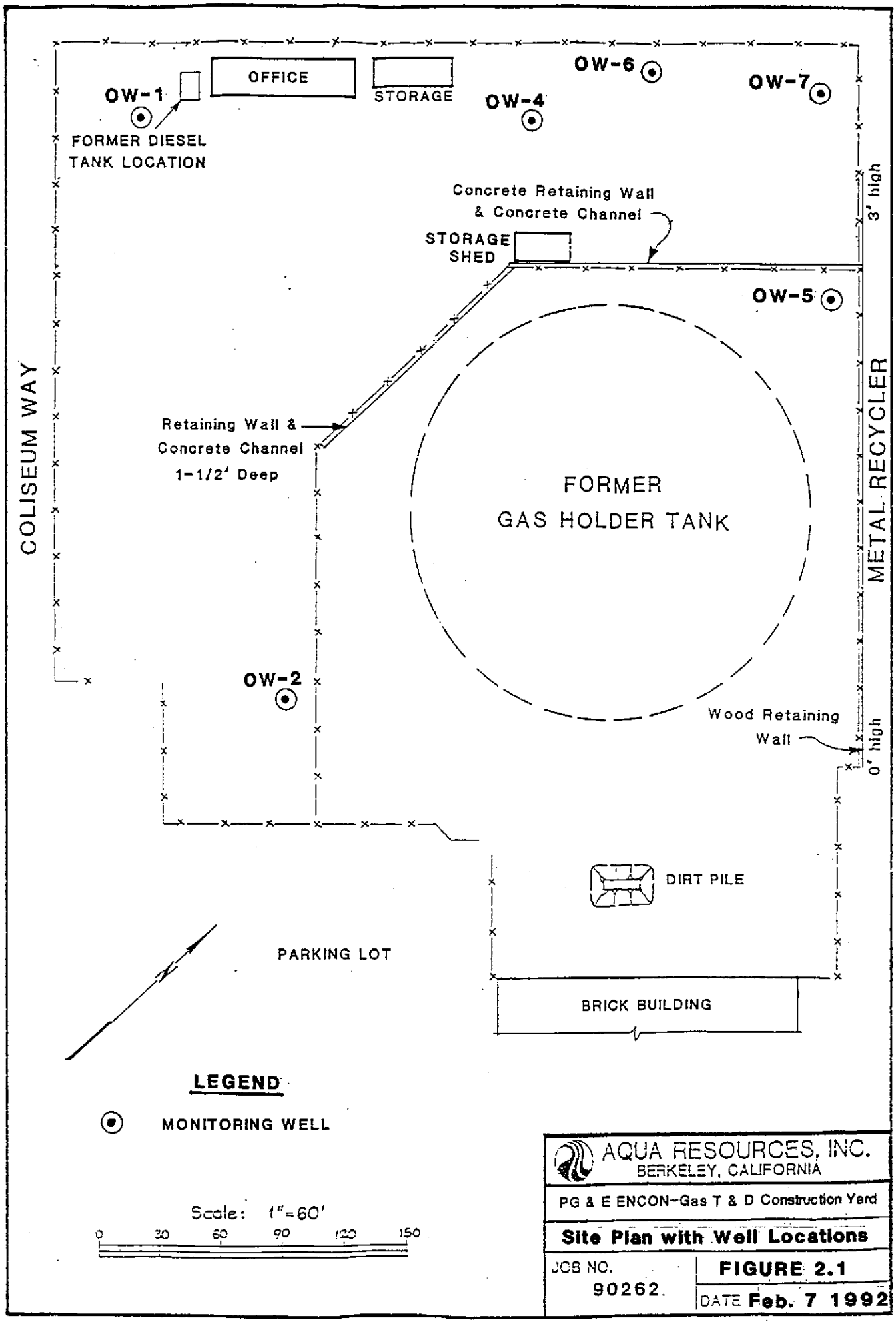
An area of approximately 6,600 square feet was excavated in November and December of 1991 as a remedial action for the petroleum hydrocarbon soil contamination believed to originate from one or more of the following: the tank cluster, a nearby former shop location, or a possible offsite release. The removed soil, which generally extended from the ground surface to the groundwater free surface at about 8 to 8 1/2 feet below grade, was replaced with clean compacted backfill.

2.0 SAMPLING ACTIVITIES

Four of the previous five monitoring wells remain in existence on the site. One monitoring well, OW-3, was destroyed during remedial excavation performed in the northern corner of the yard. Two new monitoring wells were installed on December 19, 1991. The fifth well, OW-6, was installed in the general vicinity of OW-3 to act as its replacement. The sixth monitoring well, OW-7, was installed at the northeastern end of the remediation area to gauge the likelihood of upgradient contamination in the shallow groundwater underlying the PG&E site. The locations of these new wells were approved by the Alameda County Health Care Services Agency. Figure 2.1 presents the site plan including all present monitoring well locations. On December 20, 1991, groundwater samples were collected by ARI personnel from monitoring wells OW-1, OW-2, OW-4, OW-5 and the new wells, OW-6 and OW-7. Prior to sampling, at least six casing volumes were purged with a bailer from each well. An additional few casing volumes were purged from wells OW-6 and OW-7 to ensure development of these wells.

Groundwater samples collected from each well were analyzed by Curtis & Tompkins, Ltd. Analytical Laboratories, Berkeley, California for extractable petroleum hydrocarbons as diesel (TPH-D; LUFT Manual, October 1989), total oil and grease (SMWW 17:5520BF) and volatile organic compounds (EPA methods 8010 and 8020).

Certified laboratory results are presented in Appendix A. Chain-of-Custody documentation is provided in Appendix B. The boring logs for the two new wells are located in Appendix C.



AQUA RESOURCES, INC.
BERKELEY, CALIFORNIA

PG & E ENCON-Gas T & D Construction Yard

Site Plan with Well Locations

JOB NO. 90262.

FIGURE 2.1

DATE **Feb. 7 1992**

3.0 ANALYTICAL RESULTS

Table 3.1 summarizes the analytical results for petroleum hydrocarbons detected in the groundwater samples collected in December 1991. TPH-Diesel was detected in each of the monitoring wells and was found in the highest concentration in upgradient well OW-7. All samples were below the method detection limit for hydrocarbon oil and grease (O&G).

Table 3.1 Petroleum Hydrocarbons in Groundwater, in mg/l

Well	Oil & Grease	TPH-Diesel
OW-1	ND	1.60
OW-2	ND	0.65
OW-4	ND	2.00
OW-5	ND	1.20
OW-6	ND	5.50
OW-7	ND	7.10

Notes:

1) ND = Not Detected at or above Method Detection Limit (MDL)
2) Oil & Grease = Hydrocarbon Oil & Grease (Gravimetric) Method SMWW 17:5520BF, Reporting Limit = 5 mg/l
3) TPH-Diesel = Extractable Petroleum Hydrocarbons, Diesel Range, LUFT Manual October 1989; Reporting Limit = 0.05 mg/l.

Table 3.2 presents the analytical results for volatile organic compounds. Several volatile organics were detected in groundwater samples collected from OW-1, OW-5, OW-6, and OW-7. The State maximum contaminant level (MCL) for 1,4-Dichlorobenzene of 5 µg/l was exceeded in monitoring wells OW-6 (23 ug/l) and OW-7 (440 ug/l). In OW-5, benzene was detected at 11 ug/l, above the MCL of 1 ug/l. All other organic compounds detected were below the MCLs.

Feb. 1992

Table 3.2: Volatile Organic Compounds in Groundwater, in ug/l

PURGEABLE HALOCARBONS	MCL	RL	Well Number (RL multiplier for individual analysis)					
			OW-1 (RL x 1.0)	OW-2 (RL x 1.0)	OW-4 (RL x 1.0)	OW-5 (RL x 1.0)	OW-6 (RL x 1.0)	OW-7 (RL x 10)
Chloromethane		2	ND	ND	ND	ND	ND	ND
Bromomethane		2	ND	ND	ND	ND	ND	ND
Vinyl chloride	0.5	2	ND	ND	ND	ND	ND	ND
Chloroethane		2	ND	ND	ND	ND	ND	ND
Methylene Chloride		1	ND	ND	ND	ND	ND	14
Trichlorofluoromethane	150	1	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	6	1	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	1	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	6	1	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	10	1	ND	ND	ND	ND	ND	ND
Chloroform	100#*	1	ND	ND	ND	ND	ND	ND
Freon 113	1200	1	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.5	1	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	1	ND	ND	ND	18	ND	ND
Carbon Tetrachloride	0.5	1	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100#*	1	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	5	1	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5***	1	ND	ND	ND	ND	ND	ND
Trichloroethylene	5	1	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	32	1	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5***	1	ND	ND	ND	ND	ND	ND
Dibromochloromethane	100#*	1	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether		2	ND	ND	ND	ND	ND	ND
Bromoform	100#*	1	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	5	1	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	1	ND	ND	ND	ND	ND	ND
Chlorobenzene	30	1	ND	ND	ND	ND	5.7	10
1,3-Dichlorobenzene		1	ND	ND	ND	ND	15	460
1,2-Dichlorobenzene	600#	1	ND	ND	ND	ND	5.8	120
1,4-Dichlorobenzene	5	1	3.2	ND	ND	ND	23	440
PURGEABLE AROMATICS								
Benzene	1	1	ND	ND	ND	11	ND	ND
Toluene	1000#	1	ND	ND	ND	ND	ND	ND
Ethylbenzene	680	1	ND	ND	ND	ND	ND	ND
Total Xylenes	1750**	1	ND	ND	ND	6.9	2.0	ND
Chlorobenzene	30	1	ND	ND	ND	ND	5.7	10
1,4-Dichlorobenzene	5	1	3.2	ND	ND	ND	23	440
1,3-Dichlorobenzene		1	ND	ND	ND	ND	15	460
1,2-Dichlorobenzene	600#	1	ND	ND	ND	ND	5.8	120

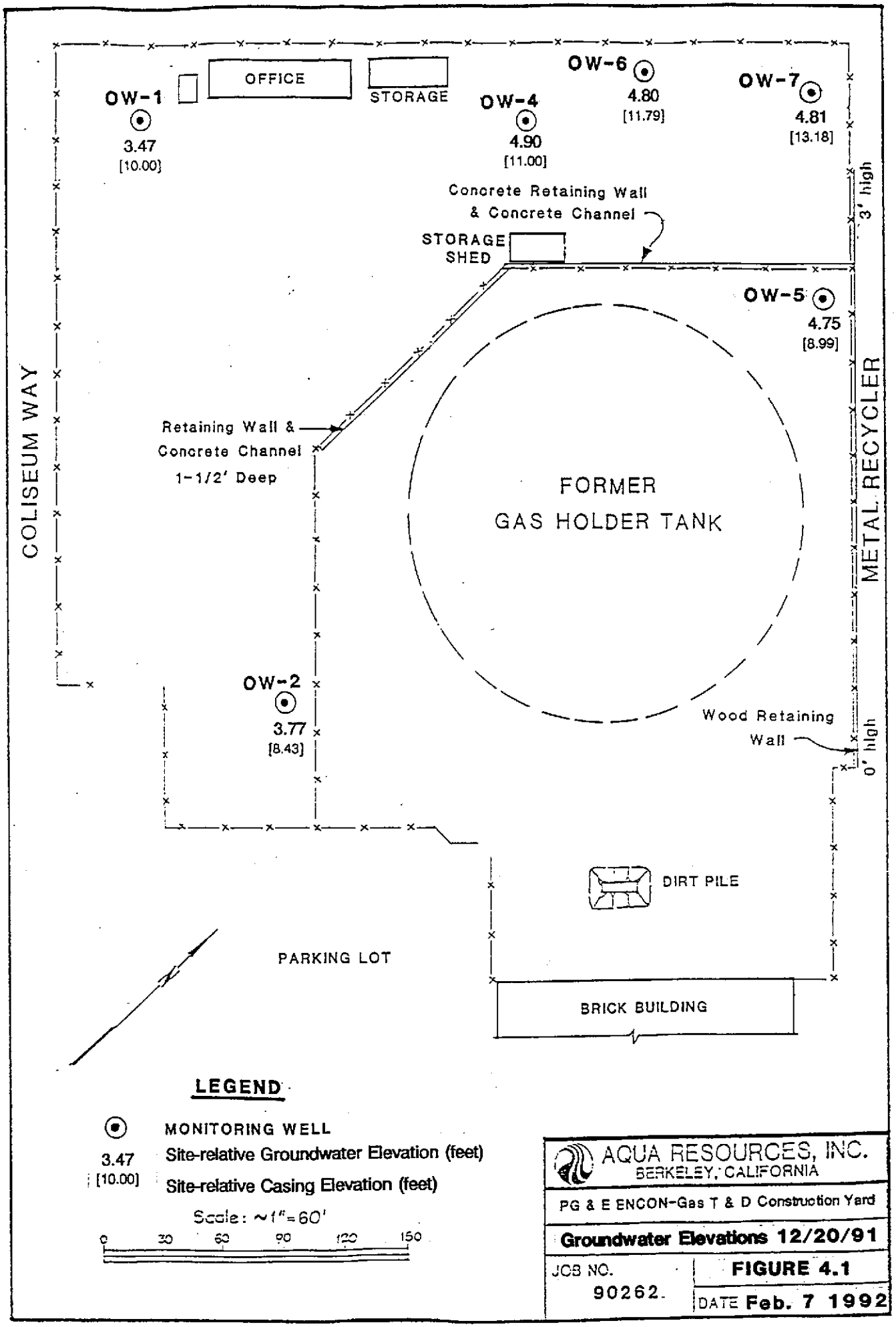
Notes:

1) RL = Reporting Limit
2) MCL = Maximum Contaminant Level in drinking water (State MCL, if not noted otherwise)
3) # = EPA MCL
4) * = MCL for sum of four compounds
5) ** = MCL for sum of all xylene isomers
6) *** = MCL for sum of trans- and cis-1,3-Dichloropropene
7) ND = Not Detected at or above MDL
8) Purgeable Halocarbons (EPA method 8010)
9) Purgeable Aromatics (EPA method 8020)

4.0 GROUNDWATER FLOW DIRECTION

Water level measurements were collected on December 20, 1991 prior to sampling the six onsite wells. Groundwater elevations are related to a site specific coordinate system for consistency with previous reports. The top of casing (TOC) elevations for each of these wells is based upon an assumed TOC elevation of 10 feet at well OW-1. The TOC of the two new wells were surveyed by a registered surveyor relative to OW-1 on January 9, 1992. Wells OW-2, OW-4 and OW-5 were resurveyed at this time and found to be within 0.01 feet of their previously measured elevations.

The measured groundwater elevations are presented in Figure 4.1 along with the relative TOC elevations of each of the wells. The groundwater flow direction calculated from elevations in OW-1, OW-2, and OW-5 indicates the general regional groundwater flow to be to the southwest at a gradient of approximately 0.0038 ft/ft. This flow direction is consistent with previous measurements. The groundwater elevations in wells OW-4 and OW-6 however appear anomalously high, perhaps indicating the presence of a perched zone or artificial water source in the vicinity of these wells. The unexpectedly high water levels in the vicinity of these wells, about 0.5 feet above what would be predicted for a homogenous aquifer using data from the other four wells, have been noted in previous quarterly measurements.



AQUA RESOURCES, INC.
BERKELEY, CALIFORNIA

PG & E ENCON-Gas T & D Construction Yard

Groundwater Elevations 12/20/91

JOB NO. 90262.

FIGURE 4.1

DATE **Feb. 7 1992**

5.0 CONCLUSIONS

Results of analyses performed on groundwater samples collected in April 1991 from monitoring wells OW-1, OW-2, OW-4, OW-5, OW-6 and OW-7 show that diesel fuel was detected in each well above the method detection limit (MDL). The highest concentration of diesel was observed in upgradient well OW-7. Oil and grease were not detected in any of the wells at concentrations above the MDL.

Samples from OW-5, OW-6, and OW-7 exceeded the maximum contaminant level for certain volatile organic compounds for drinking water. Benzene, detected in OW-5 above the MCL, might indicate an upgradient (off-site) source of fuel contamination. High concentrations of dichlorobenzenes were observed in the other upgradient well, OW-7. Groundwater flow across most of the site appears to be to the southwest toward Coliseum Way.

APPENDIX A

CERTIFIED LABORATORY RESULTS

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 12/20/91
DATE REPORTED: 01/08/92

LABORATORY NUMBER: 106115

CLIENT: AQUA RESOURCES, INC.

PROJECT ID: 90262.2

LOCATION: P.G. & E. ENCON

RESULTS: SEE ATTACHED

Reviewed By

Reviewed By

Curtis & Tompkins, Ltd.

Client: Aqua Resources

Laboratory Login Number: 106115

Project Name: PG&E: ENCON
Project Number: 90262.2

Report Date: 08 January 92

ANALYSIS: Hydrocarbon Oil & Grease (Gravimetric) METHOD: SMWW 17:5520BF

Lab ID	Sample ID	Matrix	Sampled	Received	Analyzed	Result	Units	RL	Analyst	QC Batch
106115-001	OW-1	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780
106115-002	OW-2	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780
106115-003	OW-4	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780
106115-004	OW-5	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780
106115-005	OW-6	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780
106115-006	OW-7	Water	20-DEC-91	20-DEC-91	27-DEC-91	ND	mg/L	5	TR	3780

ND = Not Detected at or above Reporting Limit (RL).

Curtis & Tompkins, Ltd.

QC Batch Report

Client: Aqua Resources
Project Name: PG&E: ENCON
Project Number: 90262.2

Laboratory Login Number: 106115
Report Date: 08 January 92

ANALYSIS: Hydrocarbon Oil & Grease (Gravimetric) **QC Batch Number: 3780**

Blank Results

Sample ID	Result	MDL	Units	Method	Date Analyzed
BLANK	ND	5	mg/L	SMWW 17:5520BF	27-DEC-91

Spike/Duplicate Results

Sample ID	Recovery	Method	Date Analyzed
BS	90%	SMWW 17:5520BF	27-DEC-91
BSD	88%	SMWW 17:5520BF	27-DEC-91

		Control Limits
Average Spike Recovery	89%	80% - 120%
Relative Percent Difference	2.1%	< 20%

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON

DATE RECEIVED: 12/20/91
DATE EXTRACTED: 12/30/91
DATE ANALYZED: 01/03/92
DATE REPORTED: 01/08/92

Extractable Petroleum Hydrocarbons in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	REPORTING LIMIT* (ug/L)
106115-1	OW-1	ND	1,600	50
106115-2	OW-2	ND	650	50
106115-3	OW-4	ND	2,000	50
106115-4	OW-5	ND	1,200	50
106115-5	OW-6	ND	5,500	50
106115-6	OW-7	ND	7,100	50

ND = Not detected at or above reporting limit.

*Reporting limit applies to all analytes.

QA/QC SUMMARY

RPD, %	9
RECOVERY, %	115

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-1
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-1

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	3.2	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	102

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-1
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-1

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	1.0
Toluene	ND	1.0
Etbyl Benzene	ND	1.0
Total Xylenes	ND	1.0
Chlorobenzene	ND	1.0
1,4-Dichlorobenzene	3.2	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-2
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-2

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-2
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-2

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	1.0
Toluene	ND	1.0
Ethyl Benzene	ND	1.0
Total Xylenes	ND	1.0
Chlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-3
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-4

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	102

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-3
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2 ENCON
LOCATION: P.G. & E.
SAMPLE ID: OW-4

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	1.0
Toluene	ND	1.0
Ethyl Benzene	ND	1.0
Total Xylenes	ND	1.0
Chlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-4
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-5

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	18	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	104

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-4
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-5

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	11	1.0
Toluene	ND	1.0
Ethyl Benzene	ND	1.0
Total Xylenes	6.9	1.0
Chlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-5
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-6

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	5.7	1.0
1,3-Dichlorobenzene	15	1.0
1,2-Dichlorobenzene	5.8	1.0
1,4-Dichlorobenzene	23	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-5
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-6

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	1.0
Toluene	ND	1.0
Ethyl Benzene	ND	1.0
Total Xylenes	2.0	1.0
Chlorobenzene	5.7	1.0
1,4-Dichlorobenzene	23	1.0
1,3-Dichlorobenzene	15	1.0
1,2-Dichlorobenzene	5.8	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-6
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-7

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	20
Bromomethane	ND	20
Vinyl chloride	ND	20
Chloroethane	ND	20
Methylene chloride	14	10
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
cis-1,2-Dichloroethene	ND	10
trans-1,2-Dichloroethene	ND	10
Chloroform	ND	10
Freon 113	ND	10
1,2-Dichloroethane	ND	10
1,1,1-Trichloroethane	ND	10
Carbon tetrachloride	ND	10
Bromodichloromethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethylene	ND	10
1,1,2-Trichloroethane	ND	10
trans-1,3-Dichloropropene	ND	10
Dibromochloromethane	ND	10
2-Chloroethylvinyl ether	ND	20
Bromoform	ND	10
Tetrachloroethene	ND	10
1,1,2,2-Tetrachloroethane	ND	10
Chlorobenzene	10	10
1,3-Dichlorobenzene	460	10
1,2-Dichlorobenzene	120	10
1,4-Dichlorobenzene	440	10

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	103

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-6
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON
SAMPLE ID: OW-7

DATE RECEIVED: 12/20/91
DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	10
Toluene	ND	10
Ethyl Benzene	ND	10
Total Xylenes	ND	10
Chlorobenzene	10	10
1,4-Dichlorobenzene	440	10
1,3-Dichlorobenzene	460	10
1,2-Dichlorobenzene	120	10

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	101

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-METHOD BLANK
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON

DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8010
Purgeable Halocarbons in Water

Compound	Result ug/L	Reporting Limit ug/L
Chloromethane	ND	2.0
Bromomethane	ND	2.0
Vinyl chloride	ND	2.0
Chloroethane	ND	2.0
Methylene chloride	ND	1.0
Trichlorofluoromethane	ND	1.0
1,1-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
trans-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
Freon 113	ND	1.0
1,2-Dichloroethane	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon tetrachloride	ND	1.0
Bromodichloromethane	ND	1.0
1,2-Dichloropropane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
Trichloroethylene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
Dibromochloromethane	ND	1.0
2-Chloroethylvinyl ether	ND	2.0
Bromoform	ND	1.0
Tetrachloroethene	ND	1.0
1,1,2,2-Tetrachloroethane	ND	1.0
Chlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 106115-METHOD BLANK
CLIENT: AQUA RESOURCES, INC.
PROJECT ID: 90262.2
LOCATION: P.G. & E. ENCON

DATE ANALYZED: 01/02/92
DATE REPORTED: 01/08/92

EPA 8020: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	REPORTING LIMIT ug/L
Benzene	ND	1.0
Toluene	ND	1.0
Ethyl Benzene	ND	1.0
Total Xylenes	ND	1.0
Chlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

ND = Not detected at or above reporting limit.

QA/QC SUMMARY

Surrogate Recovery, %	100

Curtis & Tompkins, Ltd.

BS/BSD SUMMARY SHEET FOR EPA 8010\8020

Operator: AV
Analysis date: 1/2/92
Sample type: WATER
Sample ID:

Spike file: 002W/X013
Spike dup file: 002W/X014
Instrument: GC12
Sequence Name: JAN2

8010 BS/BSD DATA (spiked at 20 ppb)

SPIKE COMPOUNDS	READING	RECOVERY	STATUS	LIMITS
1,1-Dichloroethene	16.90	85 %	OK	60 - 133
Trichloroethene	18.34	92 %	OK	88 - 125
Chlorobenzene	19.51	98 %	OK	90 - 127
SPIKE DUP COMPOUNDS				
1,1-Dichloroethene	16.36	82 %	OK	60 - 133
Trichloroethene	18.40	92 %	OK	88 - 125
Chlorobenzene	19.58	98 %	OK	90 - 127
SURROGATES				
BROMOBENZENE (BS)	101.00	101 %	OK	98 - 115
BROMOBENZENE (BSD)	100.00	100 %	OK	98 - 115

8020 BS/BSD DATA (spiked at 20 ppb)

SPIKE COMPOUNDS	READING	RECOVERY	STATUS	LIMITS
Benzene	18.08	90 %	OK	62 - 120
Toluene	18.48	92 %	OK	61 - 121
Chlorobenzene	20.99	105 %	OK	84 - 115
SPIKE DUP COMPOUNDS				
Benzene	17.88	89 %	OK	62 - 120
Toluene	18.24	91 %	OK	61 - 121
Chlorobenzene	20.83	104 %	OK	84 - 115
SURROGATES				
BROMOBENZENE (BS)	100.00	100 %	OK	91 - 107
BROMOBENZENE (BSD)	101.00	101 %	OK	91 - 107

RPD DATA

8010 COMPOUNDS	SPIKE	SPIKE DUP	RPD	STATUS	LIMITS
1,1-Dichloroethene	16.90	16.36	3 %	OK	<= 14
Trichloroethene	18.34	18.40	0 %	OK	<= 14
Chlorobenzene	19.51	19.58	0 %	OK	<= 13
8020 COMPOUNDS					
Benzene	18.08	17.88	1 %	OK	<= 11
Toluene	18.48	18.24	1 %	OK	<= 13
Chlorobenzene	20.99	20.83	1 %	OK	<= 13

APPENDIX B

CHAIN-OF-CUSTODY DOCUMENTATION

The Earth Technology Corporation®

CHAIN OF CUSTODY RECORD

SHIPMENT NO.: 1

PAGE 1 OF 1

DATE 12/20/91

Aqua Resources Inc

PROJECT NAME: PG+E- ENCON

PROJECT NO.: 9262.2

Sample Number	Location	Type of Sample		Type of Container	Type of Preservation		Analysis Required
		Material	Method		Temp	Chemical	
OW-1	Well OW-1	Water	Bail	3 x VOAs	± 4°C	HCl	1
OW-1	"	"	"	1 x l amber	"	H_2SO_4	2
OW-1	"	"	"	1 x l amber	"		3
OW-2	Well OW-2	"	"	3 x VOAs	"	HCl	1
OW-2	"	"	"	1 x l amber	"	H_2SO_4	2
OW-2	"	"	"	1 x l amber	"		3
OW-4	Well OW-4	"	"	3 x VOAs	"	HCl	1
OW-4	"	"	"	1 x l amber	"	H_2SO_4	2
OW-4	"	"	"	1 x l amber	"		3
OW-5	Well OW-5	"	"	3 x VOAs	"	HCl	1
OW-5	"	"	"	1 x l amber	"	H_2SO_4	2
OW-5	"	"	"	1 x l amber	"		3
OW-6	Well OW-6	"	"	3 x VOAs	"	HCl	1
OW-6	"	"	"	1 x l amber	"	H_2SO_4	2
OW-6	"	"	"	1 x l amber	"		3
OW-7	Well OW-7	"	"	3 x VOAs	"	HCl	1
OW-7	"	"	"	1 x l amber	"	H_2SO_4	2
OW-7	"	"	"	1 x l amber	"		3
Field Blank							
Trip Blank							

Total Number of Samples Shipped: 30

Sampler's Signature:

Relinquished By: Signature Printed Name Company Reason	Received By: Signature Printed Name Nancy J. Wilson Company CET Hou	Date 12/20/91 Time 1720
Relinquished By: Signature Printed Name Company Reason	Received By: Signature Printed Name Company	Date / / Time

REMARKS:

NORMAL 1 WEEK TURNAROUND

1 = 8010/8020

2 = 046

3 = TEHD

Special Shipment / Handling / Storage Requirements:

APPENDIX C

BORING LOGS and SURVEY RESULTS FOR NEW WELLS

AQUA RESOURCES, INC.

BORING LOG

LOCATION & NOTES

LOCATION Oakland	JOB NAME PG&E	JOB NO. 90262.2	
DRILLING COMPANY Exceltech/Resna		BORING NO. OW-6	
DRILLER'S NAME Don Jenkins		SHEET 1 OF 2	
DRILL RIG [ ] Solid Flight Auger			
8" [X] Hollow Auger [ ] Rotary Wash			
SAMPLER TYPE: [X] 2.5" I.D. Split Barrel [ ] 2.0" I.D. Shelby Tube [X] SPT			
DRIVE WEIGHT 140 LB.	FALL 30 IN.	START TIME 8:05 AM/PM	FINISH TIME 8:54 AM/PM
WATER LEVEL (Feet) 8'			
TIME 8:15 am		DATE 12/19/91	
DATE 12/19/91			
CASING DEPTH (FEET) 18'		FIELD ENGINEER Mark Peterson	
ELEVATION FEET			

DATUM: [ ] Mean Sea Level [ ] Other

BLOWS PER HALF FOOT	BLOWS/FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT (pcf)	DEPTH IN FEET	USCS CLASSIFICATION
				0	
				1	
				2	
				3	
				4	
				5	
				6	
				7	
				8	
16					GC
18				9	
20	38				
				10	SP

SURFACE CONDITIONS:
Graded surface of agregate to base rock, nearly level

Water on top end of sampler with slight sheen
Gravel with interstitial silty clay, olive brown (2.5Y 4/3), saturated. Gravel backfill that penetrated saturated native soil.

Gravelly sand, brown (10YR 4/3), saturated, medium dense, fine to coarse grained sand, poorly sorted, subangular gravel up to 3/4" across.

AQUA RESOURCES, INC.

BORING LOG

LOCATION & NOTES

LOCATION	JOB NAME PG&E	JOB NO. 90262.2
DRILLING COMPANY Exceltech/Resna		BORING NO. OW-6
DRILLER'S NAME Don Jenkins		SHEET 2 OF 2
DRILL RIG [ ] Solid Flight Auger [X] Hollow Auger [ ] Rotary Wash		
SAMPLER TYPE: [ ] 2.0" I.D. Split Barrel [ ] 2.0" I.D. Shelby Tube [ ] SPT		
DRIVE WEIGHT LB.	FALL IN.	START TIME AM PM
WATER LEVEL (Feet)		FINISH TIME AM PM
TIME		DATE 12/19/91
DATE		
CASING DEPTH (FEET)		
ELEVATION FEET	FIELD ENGINEER Mark Peterson	

DATUM: [ ] Mean Sea Level [ ] Other

SURFACE CONDITIONS:

BLOWS PER HALF FOOT	BLOWS/FT.	MOISTURE CONTENT %	DRY UNIT WEIGHT (pcf)	DEPTH IN FEET	USCS CLASSIFICATION	
				0		
20						
20				1		
15	35					
				2		
				3		
				4		
13					GM	Increased gravel at 14' to 15'
9				5		
6	15					Silty clay with minor very fine grained sand, light yellowish brown (2.3Y5/3), wet, medium stiff to stiff, rare dark brown staining
					CL/CH	
				6		
				7		
2						
3				8		
4	SPT 7					Bottom at 18½'
				9		
				10		

AQUA RESOURCES, INC.

BORING LOG

LOCATION & NOTES

LOCATION: Oakland	JOB NAME: PG&E	JOB NO: 90262.2
DRILLING COMPANY: Exceltech/Resna		BORING NO.: OW-7
DRILLER'S NAME: Don Jenkins		SHEET: 1 OF 2
DRILL RIG: [ ] Solid Flight Auger; 7"[X] Hollow Auger; [ ] Rotary Wash		
SAMPLER TYPE: [X] 2.5" I.D Split Barrel; [ ] 2.0" I.D Shelby Tube; [ ] SPT		
DRIVE WEIGHT: 140 LB.	FALL: 30 IN.	START TIME: 9:55 AM PM
WATER LEVEL (Feet):		FINISH TIME: AM PM
TIME:		DATE: 12/19/91
DATE:		
CASING DEPTH (FEET):		
ELEVATION: FEET	FIELD ENGINEER: M. Peterson/ A. Stessman	

DATUM: [ ] Mean Sea Level [ ] Other

SURFACE CONDITIONS:

BLOWS PER HALF FOOT	BLOWS/ft.	MOISTURE CONTENT %	DRY UNIT WEIGHT (pcf)	DEPTH IN FEET	USCS CLASSIFICATION	
				0		
				1		
				2		
				3		
				4		
				5		
				6		
				7		
				8		
20						Gravel backfill material
12				9		
11	23				SP/SC	Gravelly sand with minor silt and clay, greyish green (5G4/2), medium dense, wet, fine to coarse grained sand, poorly sorted, subangular gravel. Note tarry product visible. No OVM, slight hydrocarbon odor.
				10		

AQUA RESOURCES, INC.

BORING LOG

LOCATION & NOTES

LOCATION: Oakland	JOB NAME: PG&E	JOB NO.: 90262.2	
DRILLING COMPANY		BORING NO.: OW-7	
DRILLER'S NAME		SHEET: 2 of 2	
DRILL RIG: [ ] Solid Flight Auger [ ] Hollow Auger [ ] Rotary Wash			
SAMPLER TYPE: [ ] 2.5" I.D. Split Barrel [ ] 2.0" I.D. Shelby Tube [ ] SPT			
DRIVE WEIGHT: LB.	FALL: IN.	START TIME: AM PM	FINISH TIME: AM PM
WATER LEVEL (Feet)		DATE	
TIME			
DATE			
CASING DEPTH (FEET)			
ELEVATION: FEET	FIELD ENGINEER		

DATUM: [ ] Mean Sea Level [ ] Other

BLOWS PER HALF FOOT	BLOWS/ft.	MOISTURE CONTENT %	DRY UNIT WEIGHT (pcf)	DEPTH IN FEET	USCS CLASSIFICATION	SURFACE CONDITIONS.
				0		
				1		
				2		
7						Gravelly sand with increasing clay and silt, yellowish brown (10 YR 516), loose, saturated, fine to coarse grained sand, poorly sorted, subangular gravel. No OVM or odor.
14				3	SC	
11	25					
				4		
						Silty clay with minor very fine grained sand, light yellowish-brown (2.5Y 613), wet, stiff, rare dark brown staining. No OVM.
				5		
5					CL/ CH	
8				6		No recovery/Redrove same interval recovered 100% 2" gravel lense
10	18					
6				7		3" gravelly clay lense
7						
8	15			8		Silty clay with trace sand and gravel, light yellowish brown (2.5Y 613), wet, stiff, common dark brown-brown staining. No OVM.
						Bottom at 18'
				9		
				10		

Settlement Monitoring
4930 Coliseum Way, Oakland
Monitoring Wells

Elevations (Assumed Datum)
Top North Side of 2" PVC Casing

Well	1-09-92						
1	97.25						
2	95.67						
3	—						
4	98.25						
5	96.23						
6	99.04						
7	100.43						

Apparent Movement

Well	1-09-92						
1	N.A.						
2	"						
3	"						
4	"						
5	"						
6	"						
7	"						

TETRAD ENGINEERING, INC.
5528 PACHECO BLVD.
PACHECO, CA 94553
PH (510) 674-0218
FAX (510) 674-0243

Job 287