A REPORT DOCUMENTING THE
PURGING AND SAMPLING OF
THREE GROUNDWATER MONITORING
WELLS ON TWO CONSECUTIVE QUARTERS
AND THE DETERMINATION OF GROUNDWATER
GRADIENT FOR SIX CONSECUTIVE MONTHS:

ALAMEDA FIRE STATION #2
635 PACIFIC STREET
ALAMEDA, CALIFORNIA

prepared by:

Helen Mawhinney 3-8-93
ENVIRONMENTAL TECHNICAL SERVICES
Helen Mawhinney
Senior Environmental Specialist

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Appendix D
Groundwater Development Reports

1.0 INTRODUCTION

The following report documents the sampling of three groundwater monitoring wells and the determination of groundwater gradient at the Alameda Fire Station No. 2, 635 Pacific Street, Alameda, CA.

Groundwater was sampled on two consecutive quarters and groundwater gradient determined for six consecutive months.

The work was performed in response to the discovery of petroleum hydrocarbons beneath the site and has been requested by the Alameda County Environmental Health Department, Hazardous Materials Division.

2.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

2.1 TANK REMOVAL

On November 15, 1991, one (1) 285-gallon gasoline underground storage tank (UST) was removed from the subject site. The tank had previously contained diesel.

One soil sample was collected from the native soil beneath the tank. The sample contained a detectable amount of toluene at 6.5 ppb and total xylenes at 4.4 ppb.

A soil sample was collected from stockpiled fill material removed from the tank pit. This had a detectable amount of total petroleum hydrocarbons as diesel at 220 ppm and xylenes at 52 ppb.

2.2 EXCAVATION OF CONTAMINATED SOIL

Excavation of contaminated soil was completed on August 17, 1992 and four soil samples were collected. A sample was collected from each sidewall vadose/capillary zone. These samples were designated as FSX-1 and FSX-4. Soil sample FSX2-A was collected subsequent to excavation of material around sample FSX2, and confirms removal of the slight contamination present around FSX2. See Table 1A for analytical results.

An existing 2-inch groundwater monitoring well is located adjacent to and within 1.5' of the tank pit cavity. The well was constructed by Aqua Science Engineering on June 3, 1986. The well was constructed in compliance with Assembly Bill 1362 and the Groundwater Monitoring Guidelines for Hazardous Materials Storage drafted by the Alameda County Water District in May 1984. The well was placed in the assumed local down gradient direction. Gradient direction information differed within the area.

3.0 SCOPE OF SERVICES

3.1 Groundwater Purging & Sampling

The three existing groundwater monitoring wells were purged and sampled on September 5, 1992 and January 11, 1993. The wells were developed (purged using a clean stainless steel bailer (1.5" diameter by 3' length). Subsequent to purging each well was sampled using a clean stainless steel bailer. A separate bailer was dedicated to each well for the sampling event. At consistent intervals throughout sampling groundwater parameters (pH, conductivity, salinity, and temperature) were monitored to evaluate stabilization of the wells.

A water sample was decanted from the sampling bailer into three one-liter amber bottles and three 40-ml volatile organics analysis vials (VOAs) to a positive meniscus eliminating headspace.

The samples were transported to a Certified Hazardous Analytical Laboratory under chain of custody for analysis.

Refer to Appendix D, Groundwater Development Report.

3.2 Groundwater Analysis

Each groundwater sample was analyzed for Total Petroleum Hydrocarbons as Gasoline, benzene, toluene, ethylbenzene, total xylenes (TPHg & BTEX, using EPA Method 5030/602) and Total Petroleum Hydrocarbons as Diesel (TPHd using EPA Method 3510)

3.3 Groundwater Analytical Results

TABLE II
GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTER SAMPLING
September 5, 1992

Results reported in ug/L

Sample#	TPHg	TPHd	B	T	E	X
MW-2	ND	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND	ND
MW-4	ND	ND	ND	ND	ND	ND

ND = Not detected at lower detection limit for this compound

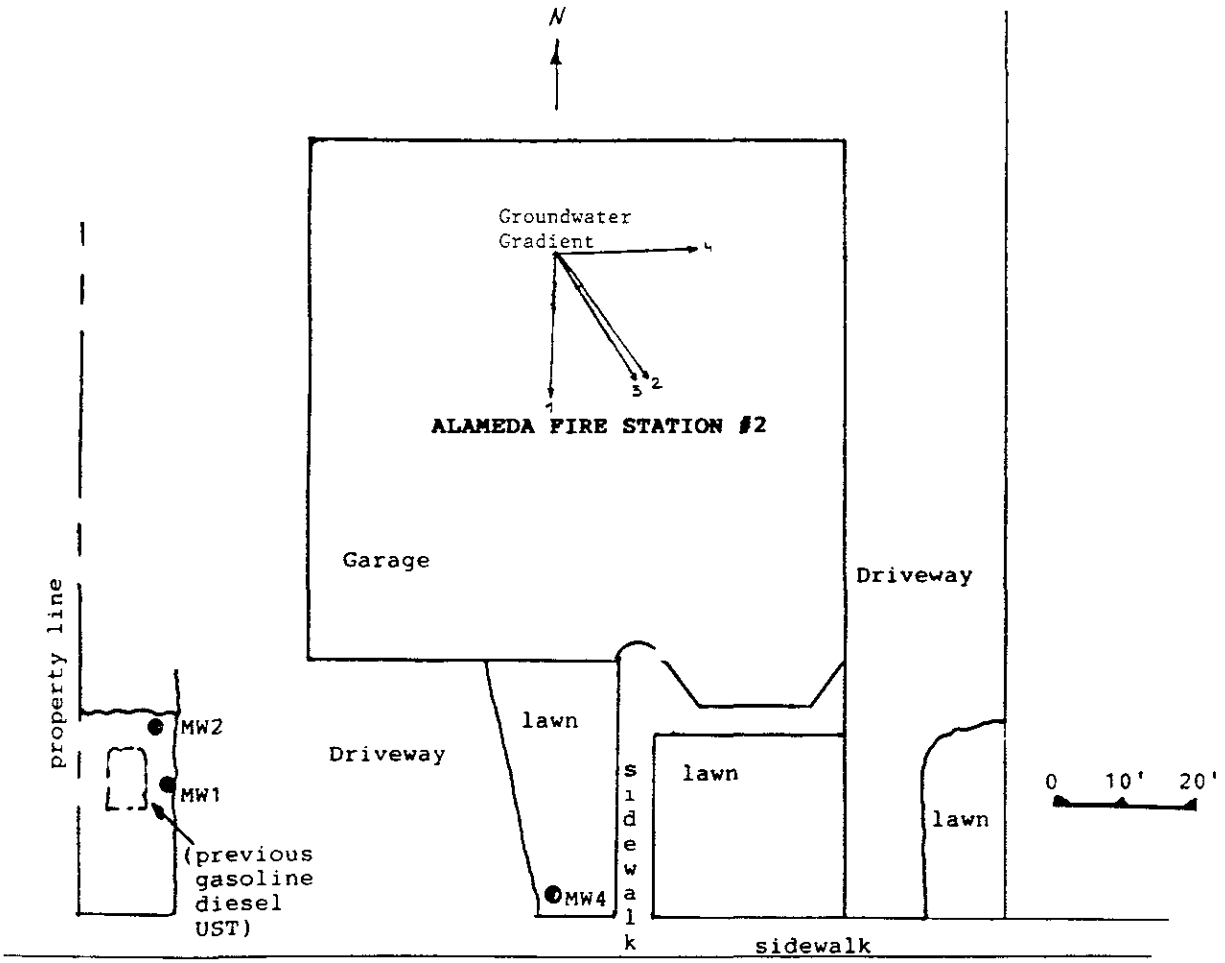
TABLE III
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTER SAMPLING
JANUARY 11, 1993

Results reported in ug/L

Sample#	TPHg	TPHd	B	T	E	X
MW-2	ND	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND	ND
MW-4	ND	ND	ND	ND	ND	ND

ND= Not detected at lower detection limit for this compound

3.4 Groundwater Gradient



GROUNDWATER GRADIENT DATA

Key#	Date	E4	Flow	Grad.
1	10/14/92	3.02	183	.0020
2	11/10/92	3.06	143	.0026
3	12/11/92	3.98	146	.0027
4	01/11/93	5.36	89	.0082

NOTES

(1) Water elevation in MW4
(2) Flow Azimuth (east of N)
(3) Gradient (ft/ft)

4.0 REPORT

Please forward copies of this report, chain of custody documentation, and laboratory analytical reports to the San Francisco Regional Water Quality Control Board, and the Alameda County Department of Environmental Health Hazardous Materials Division.

The following addresses have been included for your convenience:

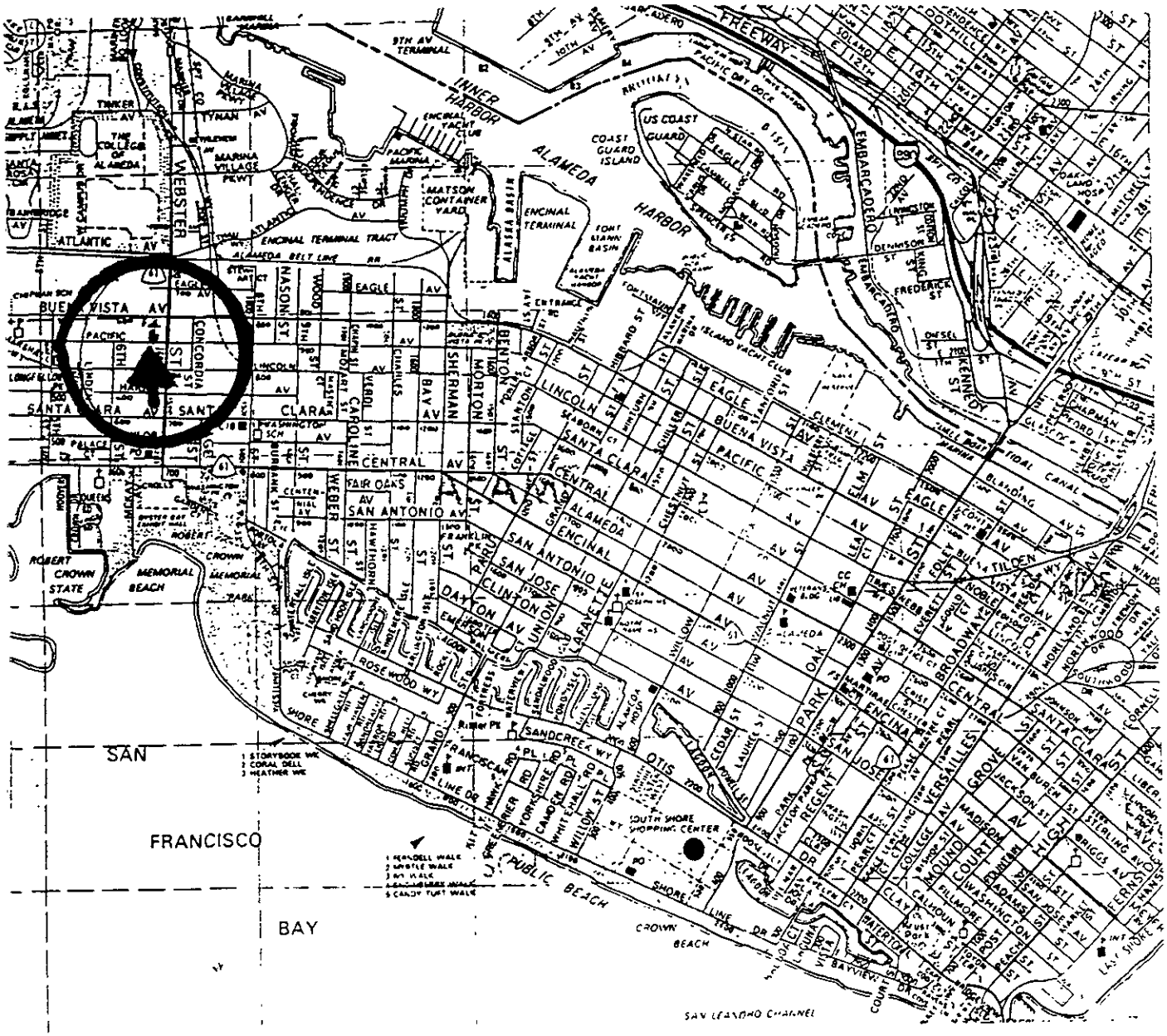
Water Quality Control Board
San Francisco Bay Region
2101 Webster Street
Room 500
Oakland, CA 94621

Alameda County Department
of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, CA 94621

APPENDIX A

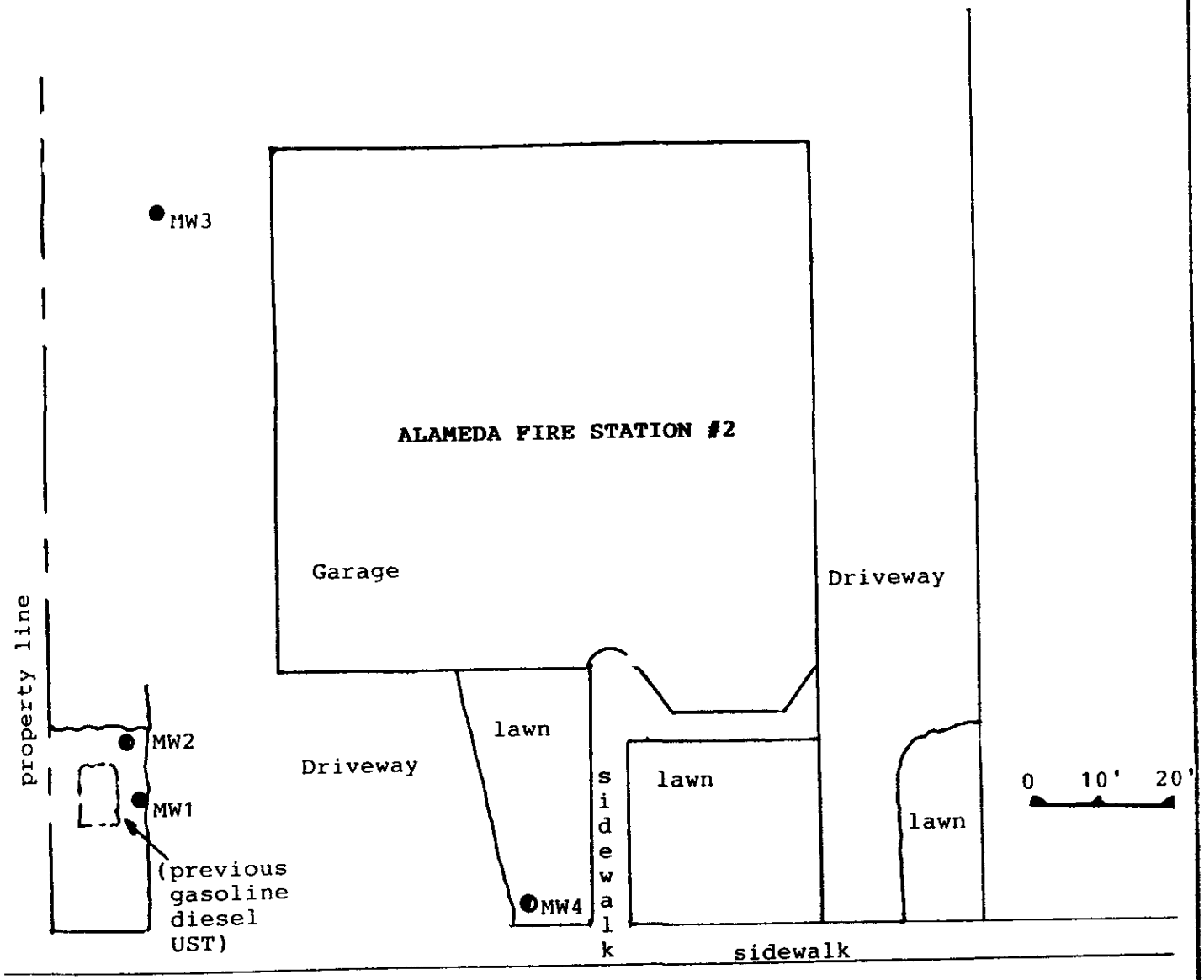
MAPS

ALAMEDA FIRE DEPARTMENT #2



635 Pacific Avenue, Alameda, California

Figure 1. Site Location Map



ENVIRONMENTAL TECHNICAL SERVICES	Site: **FIRE STATION #2** **635 PACIFIC STREET** **ALAMEDA, CALIFORNIA**	Drawn by: Mawhinney 9/26/92
Figure 2.	Monitoring Well Location Map 8/17/92	

APPENDIX B

GROUNDWATER ANALYTICAL RESULTS
FIRST QUARTER

S&W
Soil and Water
Environmental
Laboratory

Drinking Water
Waste Water ○ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client: Environmental Tech. Services
1548 Jacob Ave.
San Jose CA 95118

Report Date: 09/29/92

Sample Site:
Alam Fire Dept
635 Pacific Street
Alameda
Alam Fire #2

Date Received: 09/05/92

Analysis Requested	Procedure	Date Analyzed
Total Hydrocarbons - Gas	EPA 5030	09/05/92
Total Hydrocarbons - Diesel	EPA 3510	
BTEX	EPA 602	

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
2492-ET1-A	MW-2	Water/TPH-G	*	50 ppb
2492-ET1-A	MW-2	Water/TPH-D	*	50 ppb
2492-ET1-A	MW-2	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
2492-ET1-B	MW-4	Water/TPH-G	*	50 ppb
2492-ET1-B	MW-4	Water/TPH-D	*	50 ppb
2492-ET1-B	MW-4	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb

* No detectable amount @ detection limit

Analyst Signature: R. W. Lanay

1/87

S&W
Soil and Water
Environmental
Laboratory

Drinking Water
Waste Water ○ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client
Environmental Tech. Services
1548 Jacob Ave.
San Jose CA 95118

Report Date
09/10/92

Sample Site
Alameda Fire Det.
635 Pacific St.
Alameda, CA
Alam Fire #2

Date Received
09/05/92

Analysis Requested	Procedure	Date Analyzed
Total Hydrocarbons - Gas	EPA 5030	09/06/92
Total Hydrocarbons - Diesel	EPA 3510	
BTEX	EPA 602	

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
2432-ET1-C	MW-3	Water/TPH-G	*	50 ppb
2432-ET1-C	MW-3	Water/TPH-D	*	50 ppb
2432-ET1-C	MW-3	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb

* No detectable amount @ detection limit

Analyst Signature R. W. Lemon

CHAIN OF CUSTODY RECORD

PROJECT NO.	SITE NAME & ADDRESS
92118M608	Alameda Golf Course Alameda Ca

WITNESSING AGENCY / INSPECTOR NAME / DATE: Juliet Shen / Alam. Health Dept

ID NO.	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	TPH (Gasoline) & B, T, X & E	TPH (Diesel) & B, T, X & E	Total Oil & Grease	Halogenated HC's	B, T, X & E	Heavy Metals	Total Lead	REMARKS
mw-1	9/4/92			X		✓						✓	
mw-2				X		✓						✓	
mw-3				X		✓						✓	

ANALYSES REQUESTED (1)

(1) See attached "Table 2" for specific analysis method.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Helen Mawhinney	9/5/92 1:16	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Rec'd for Laboratory by: (Signature)
	9/5/92 1:15	R. M. Lemay

The following MUST BE completed by the laboratory accepting samples for analysis:

1. Have all samples received for analysis been stored in ice?
2. Will samples remain refrigerated until analyzed?
3. Did any samples received for analysis have head space?
4. Were samples in appropriate containers and properly packaged?

Signature _____ Title _____ Date _____

Rev: 12-88

APPENDIX C

GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTER

S&W
Soil and Water
Environmental
Laboratory

Drinking Water
Waste Water ○ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client: Environmental Tech. Services
1548 Jacob Ave.
San Jose CA 95118

Report Date: 01/15/93

Sample Site: Alam Fire Station #2
635 Pacific Ave
Alameda
2MWALAMFIRE2

Date Received: 01/12/93

Analysis Requested	Procedure	Date Analyzed
Total Hydrocarbons - Gas	EPA 5030	01/14/93
Total Hydrocarbons - Diesel	EPA 3510	
Total Oil & Grease	EPA 503e	
BTEX	EPA 602	

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
0123-ET2-A	MW-2	Water/TPH-G	*	50 ppb
0123-ET2-A	MW-2	Water/TPH-D	*	50 ppb
0123-ET2-A	MW-2	Water/TOG	*	5 ppm
0123-ET2-A	MW-2	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
0123-ET2-B	MW-3	Water/TPH-G	*	50 ppb
0123-ET2-B	MW-3	Water/TPH-D	*	50 ppb
0123-ET2-B	MW-3	Water/TOG	*	5 ppm
0123-ET2-B	MW-3	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
0123-ET2-C	MW-4	Water/TPH-G	*	50 ppb
0123-ET2-C	MW-4	Water/TPH-D	*	50 ppb
0123-ET2-C	MW-4	Water/TOG	*	5 ppm
0123-ET2-C	MW-4	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb

* No detectable amount @ detection limit

Analyst Signature: R. W. Lawson

Environmental Technical Services
(408) 267-6427

CHAIN - OF - CUSTODY

Project Number	Site Name and Address	Type and Number of Containers	Analysis Required							Laboratory ID	Comments
2MWALAMFIRE2	ALAM Fire Stn #2 635 Pacific Ave, Alameda		TPH-G + BTEX	TPH-D + [illegible]	TOG					Condition of Samples 1 - Good 2 - See Reverse	
Witnessing Agency/Inspector Name and Date: ALAM. CO. ENV HLTH DEPT, JulieH Shen											
Sample ID / Date / Time / Matrix / Sample Location											
MW-2 / 1/11/93 / / H2O / 1st GW		2 liters 2 VOAs	✓	✓							
MW-3 / ↓ / / ↓ / ↓		↓	✓	✓							
MW-4 / ↓ / / ↓ / ↓		↓	✓	✓							

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Remarks:
Helen Mawhinney	1/11/93 4:30	ETS FRIDGE		
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	COMPANY:
3:30 P.				ADDRESS:
Relinquished by: (Signature)	Date/Time	Received by Lab: (Signature)	Date/Time	PHONE: FAX:
Tom Clark	1/12/93	R. N. Lemon	1/12/93 9:16	

APPENDIX D

GROUNDWATER DEVELOPMENT REPORTS

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.1

PROJECT NAME:	WELL #
ALAMEDA FIRE STATION #2	MW-1

DATE:
JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	12:45

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
19.2	5.7	2"

TIME	GALLONS	pH	TEMP.	COND.
10:45	1	7.3	61.0	1.49
10:50	2	7.2	61.0	1.48
10:55	3	7.3	61.0	1.49
11:05	4	7.2	59.0	1.49
11:15	5	7.2	61.0	1.49
11:19	7	7.2	61.0	1.49

VOLUME EVACUATED	PURGING EQUIP.	SAMPLING EQUIP.
8 gallons	Stainless Steel Bailer	Stainless Steel Bailer

DEPTH TO WATER UPON COMPLETION OF SAMPLING

Not measured. Recharge very good

SHEEN	FLOATING PRODUCT	SAMPLE COLOR	ODOR
no	no	gold	no

SEDIMENT/FOREIGN MATTER: Sample clear

SAMPLE ID#	ANALYSIS	LABORATORY
MW-1	TPHg, BTEX	S & W Lab.

SAMPLE CONTAINERS	PRESERVATIVE
3/ 40-ml VOAs	none (24 hr.analysis)

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.2

PROJECT NAME:	WELL #
ALAMEDA FIRE STATION #2	MW-2

DATE: JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	11:25

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
17.7	5.3	2"

TIME	GALLONS	pH	TEMP.	COND.
11:25	1	7.96	60.4	3.47
11:30	2	7.94	60.5	3.47
11:35	3	7.93	60.5	3.48
11:40	4	7.90	60.5	3.51
11:45	5	7.90	60.4	3.53
11:50	7	7.90	60.4	3.53

VOLUME EVACUATED	PURGING EQUIP.	SAMPLING EQUIP.
8 gallons	Stainless Steel Bailer	Stainless Steel Bailer

DEPTH TO WATER UPON COMPLETION OF SAMPLING
Not measured.

SHEEN	FLOATING PRODUCT	SAMPLE COLOR	ODOR
no	no	gold	no

SEDIMENT/FOREIGN MATTER: sample clear

SAMPLE ID#	ANALYSIS	LABORATORY
MW-2	TPHg, BTEX	S & W Lab

SAMPLE CONTAINERS	PRESERVATIVE
3/ 40-ml VOAs	none (24 hr. analysis)

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.3

PROJECT NAME:	WELL #
ALAMEDA FIRE STATION #2	MW-3

DATE: JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	12:00p

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
17.6	6.0	2"

TIME	GALLONS	pH	TEMP.	COND.
12:00	1	7.68	57.1	1.53
12:05	2	7.68	57.3	1.52
12:10	3	7.67	57.3	1.52
12:15	4	7.63	57.4	1.53
12:20	5	7.65	57.5	1.53
12:25	7	7.65	57.5	1.53

VOLUME EVACUATED	PURGING EQUIP.	SAMPLING EQUIP.
8 gallons	Stainless Steel Bailer	Stainless Steel Bailer

DEPTH TO WATER UPON COMPLETION OF SAMPLING

Not measured. Recharge very good

SHEEN	FLOATING PRODUCT	SAMPLE COLOR	ODOR
no	no	gold	no

SEDIMENT/FOREIGN MATTER: very little silt

SAMPLE ID#	ANALYSIS	LABORATORY
MW-3	TPHg, BTEX	S & W Lab.

SAMPLE CONTAINERS	PRESERVATIVE
3/ 40-ml VOAs	none (24 hr.analysis)

MONITORING WELL SAMPLING DATA/MW-2

Project Name:	Well#
ALAMEDA FIRE STATION# 2	MW-2
Date: September 4, 1992	
Name:	**Time Began:**
Mawhinney	3:12

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
17.7	7.33	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
3:12	1	.05	7.5	25 C	1.46
3:30	3	.05	7.3	23 C	1.00
3:41	5	.04	7.0	23 C	1.26
3:54	8	.04	7.3	23 C	1.20
4:11	10	.04	7.3	23 C	1.24

Volume Evacuated	Purging Equip.	Sampling Equip.
10 gallons	Stainless Steel Bailer	Stainless Steel Bailer

Depth to Water Upon Completion of Sampling

Not measured. Recharge very good

Sheen	Floating Product	Sample Color	Odor
no	no	gold	no

Sediment/Foreign Matter: sample clear

Sample ID#	Analysis	Laboratory
MW-2	TPHg, BTEX	S & W Lab.

Sample Containers	Preservative
3/ 40-ml VOAs	None (24 hr analysis)

MONITORING WELL SAMPLING DATA/MW-3

Project Name:	Well#
ALAMEDA FIRE STATION# 2	MW-3
Date: September 4, 1992	
Name:	**Time Began:**
Mawhinney	4:29

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
17.73	7.93	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
12:21	1	.04	7.6	26 C	1.25
12:34	3	.05	7.5	25 C	1.38
12:48	5	.04	7.3	23 C	1.26
1:01	8	.04	7.2	24 C	1.26
1:15	10	.04	7.3	23 C	1.24

Volume Evacuated	Purging Equip.	Sampling Equip.
10 gallons	Stainless Steel Bailer	Stainless Steel Bailer

Depth to Water Upon Completion of Sampling

Recharge very good

Sheen	Floating Product	Sample Color	Odor
no	no	gold	no

Sediment/Foreign Matter: sample clear

Sample ID#	Analysis	Laboratory
MW-3	TPHg, BTEX	S & W Lab.

Sample Containers	Preservative
3/ 40-ml VOAs	None (24 hr analysis)

MONITORING WELL SAMPLING DATA/MW-4

Project Name:	Well#
ALAMEDA FIRE STATION# 2	MW-4

Date: September 4, 1992

Name:	Time Began:
Mawhinney	4:29

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
19.81	7.26	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
2:01	1	.04	7.6	26 C	1.25
2:16	3	.05	7.5	25 C	1.38
2:25	5	.04	7.3	23 C	1.26
2:45	8	.04	7.2	24 C	1.26
3:01	10	.04	7.3	23 C	1.24

Volume Evacuated	Purging Equip.	Sampling Equip.
10 gallons	Stainless Steel Bailer	Stainless Steel Bailer

Depth to Water Upon Completion of Sampling

Recharge very good

Sheen	Floating Product	Sample Color	Odor
no	no	gold	no

Sediment/Foreign Matter: sample clear

Sample ID#	Analysis	Laboratory
MW-4	TPHg, BTEX	S & W Lab.

Sample Containers	Preservative
3/ 40-ml VOAs	None (24 hr analysis)