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 GOLF COURSE
ONE MEMORIAL CLUBHOUS DRIVE
ALAMEDA, CALIFORNIA

prepared by:

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ENVIRONMENTAL TECHNICAL SERVICES
Helen Mawhinney
Senior Environmental Specialist

REVISED COPY

E. T. S. - 1548 JACOB AVENUE, SAN JOSE, CALIFORNIA 95118

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1.0 INTRODUCTION

The following report documents the sampling of three groundwater monitoring wells and the determination of groundwater gradient at the Alameda Golf Course, One Memorial Clubhouse Drive, Alameda, Calfornia.

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

One July 10, 1991, one 500-gallon and one 125-gallon gasoline underground storage tanks were removed from the subject site. Groundwater was encountered at 5 feet within the tank pit excavation. Therefore, soil samples were collected from the tank pit wall vadose/saturated capillary zone and were analyzed for Total Petroleum Hydrocarbons as Gasoline with benzene, toluene, ethylbenzene, and total xylenes (TPH-G, BTEX, EPA Method 5030/8020).

2.2 EXCAVATION OF CONTAMINATED SOIL

The excavation and stockpiling of contaminated soils was performed the same day by Zaccor Corporation. Confirmatory soil samples were collected subsequent to the excavation and were found to be without detectable concentrations of previously noted contaminants, with the exception of sample #6. The excavation os soil within this area was limited by the presence of an existing monitoring well.

Results of these analyses are located in Table 1A, 1B, and 1C.

2.3 ORIGINAL TANK REMOVAL, ANALYTICAL RESULTS

TABLE 1A
TANK PIT SOIL ANALYTICAL RESULTS
Total Petroleum Hydrocarbons as Gasoline
with Benzene, Toluene, Ethylbenzene and Xylenes
July 10, 1991

TPHg and BTEX results reported in ppm

Sample #	TPH-G	B	T	E	X
2	960	3.5	0.10	3.0	13
4	ND	0.011	ND	ND	0.005
5	ND	ND	ND	ND	ND
6	3.0	0.030	0.006	0.023	0.059
7	ND	ND	ND	ND	ND
8	ND	ND	ND	ND	ND

TABLE 1B
STOCKPILE ANALYTICAL RESULTS
JULY 10, 1991

TPHg and BTEX results reported in ppm

Composite Sample #	TPH-G	B	T	E	X
1A, 1B, 1C	2000	1.2	2.8	2.6	26
3A-3C	250	0.52	0.45	0.65	5.4
9A-9D	ND	ND	ND	ND	ND
10A-10D	11	0.13	0.48	0.29	1.9

TABLE 1C
GROUNDWATER ANALYTICAL RESULTS
JULY 10, 1991

Results in ug/L

Sample #	TPH-G	B	T	E	X
TPW-1	8,200	210	ND	270	1,200

ND= Not detected at lower detection limit for this compound

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 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 Waste 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, and total xylenes (TPHg & BTEX, using EPA Method 5030/602).

3.3 Groundwater Analytical Results

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

Results for TPHg & BTEX reported in ug/L

Sample #	TPHg	B	T	E	X	Lead
MW-1	ND	ND	ND	ND	ND	ND
MW-2	ND	ND	ND	ND	ND	6.3
MW-3	ND	ND	ND	ND	ND	ND

ND = Not detected at lower detection limit for this compound

3.3 Groundwater Analytical Results (cont.)

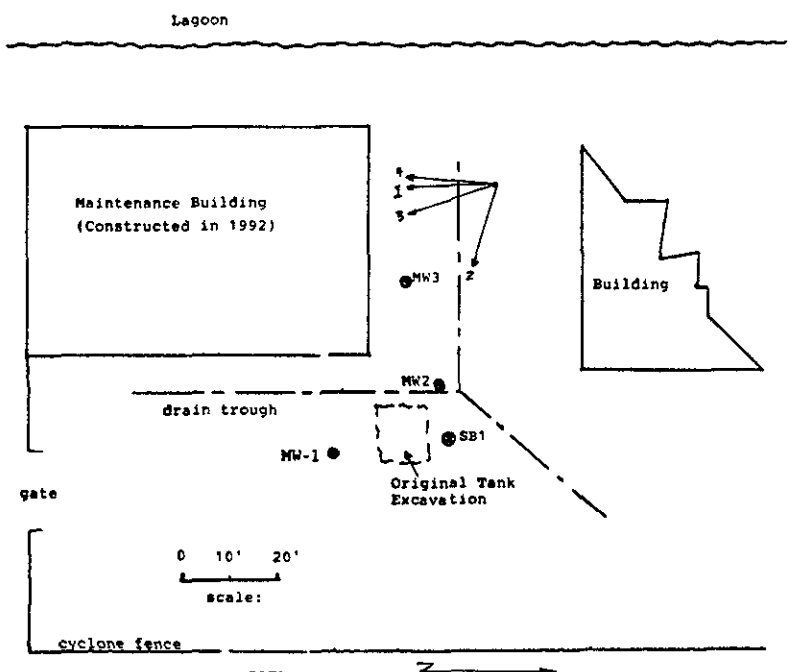
TABLE III
GROUNDWATER ANALYTICAL RESULTS
SECOND QUARTER
JANUARY 11, 1993

Results for TPHg & BTEX reported in ug/L

Sample #	TPHg	B	T	E	X	Lead
MW-1	ND	ND	ND	ND	ND	NA
MW-2	ND	ND	ND	ND	ND	NA
MW-3	ND	ND	ND	ND	ND	NA

ND = Not detected at lower detection limit for this compound
NA = Not analyzed for this compound

3.4 Groundwater Gradient



GROUNDWATER GRADIENT DATA

Map No.	Date	El(1)	Flow(2)	Grad(3)
1	10/14/92	-	181	.080
2	11/10/92	92.18	107	.015
3	12/11/92	92.17	164	.016
4	01/11/93	92.18	184	.004

NOTES

(1) Water elev. in MW1
(2) Flow azimuth (° E 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:

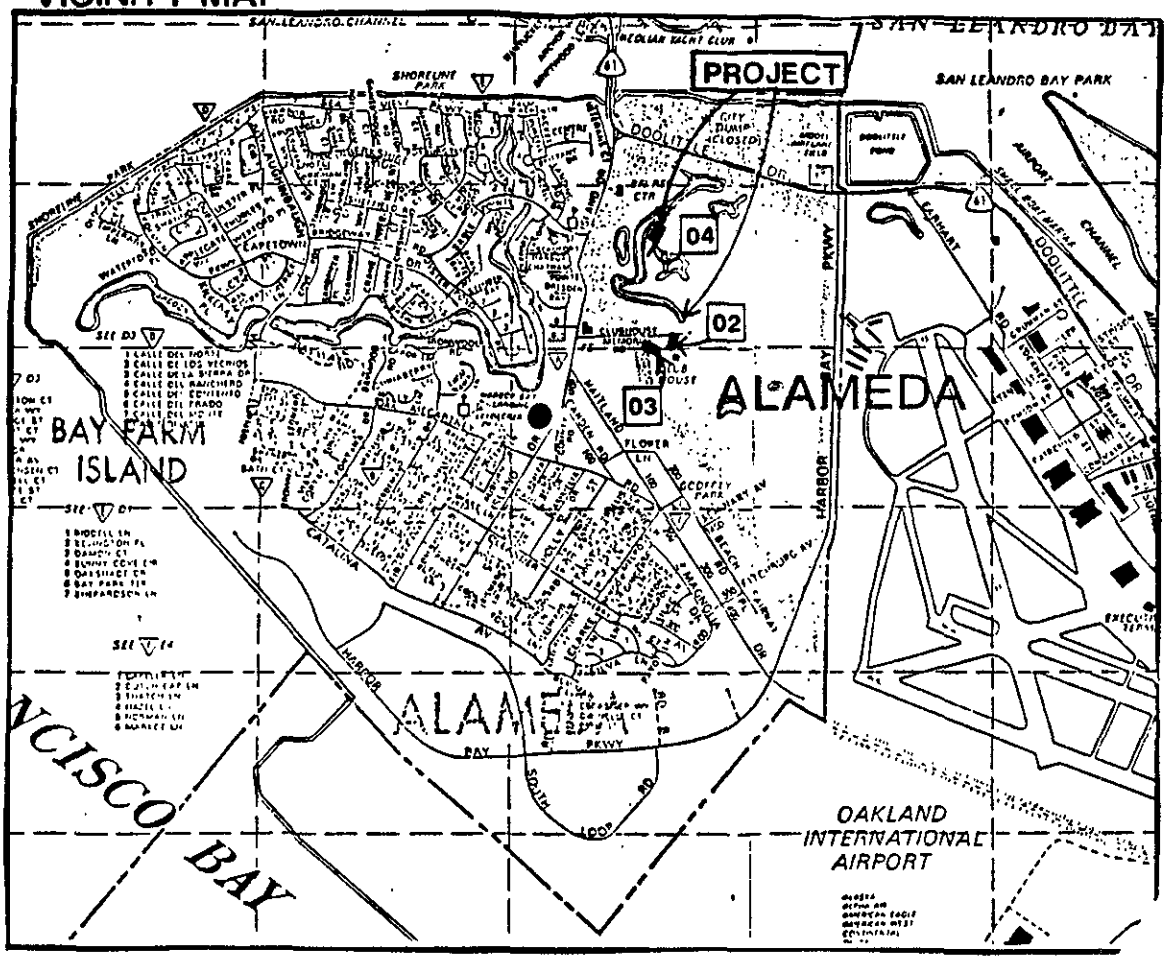
Water Quality Control Board
San Francisco Bay Region
2101 Webster Street
Room 500
Oakland, CA 94621

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

APPENDIX A

MAPS

VICINITY MAP

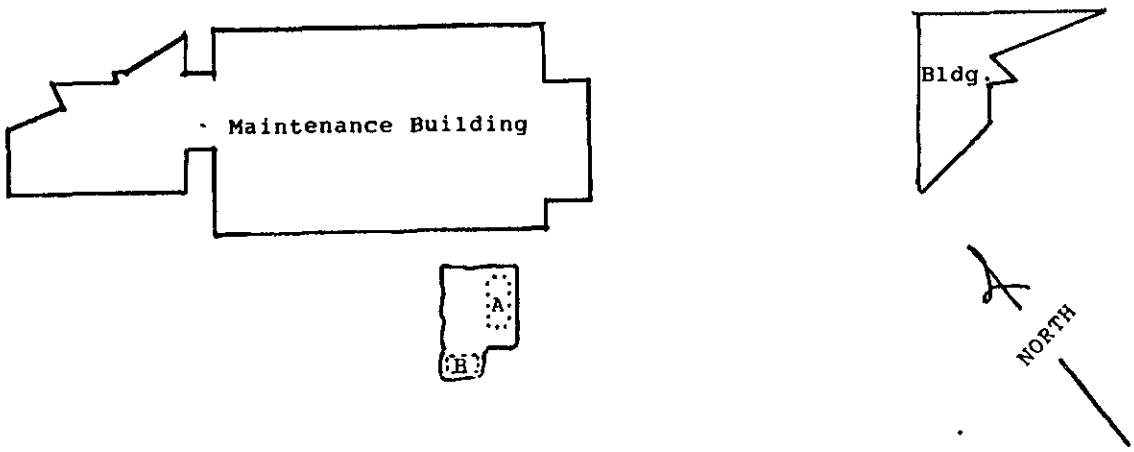


ENVIRONMENTAL TECHNICAL SERVICES	Site: **ALAMEDA GOLF COURSE** **1 MEMORIAL CLUB HOUSE DRIVE** **ALAMEDA, CALIFORNIA**	
Figure 1.	Site Location Map	

ENVIRONMENTAL
TECHNICAL
SERVICES

at: Alameda Golf Course, 1 Memorial Club House Drive, Alameda CA.

7/10/91



KEY

(A) 500 gal gasoline tank

(B) 125 gal gasoline tank

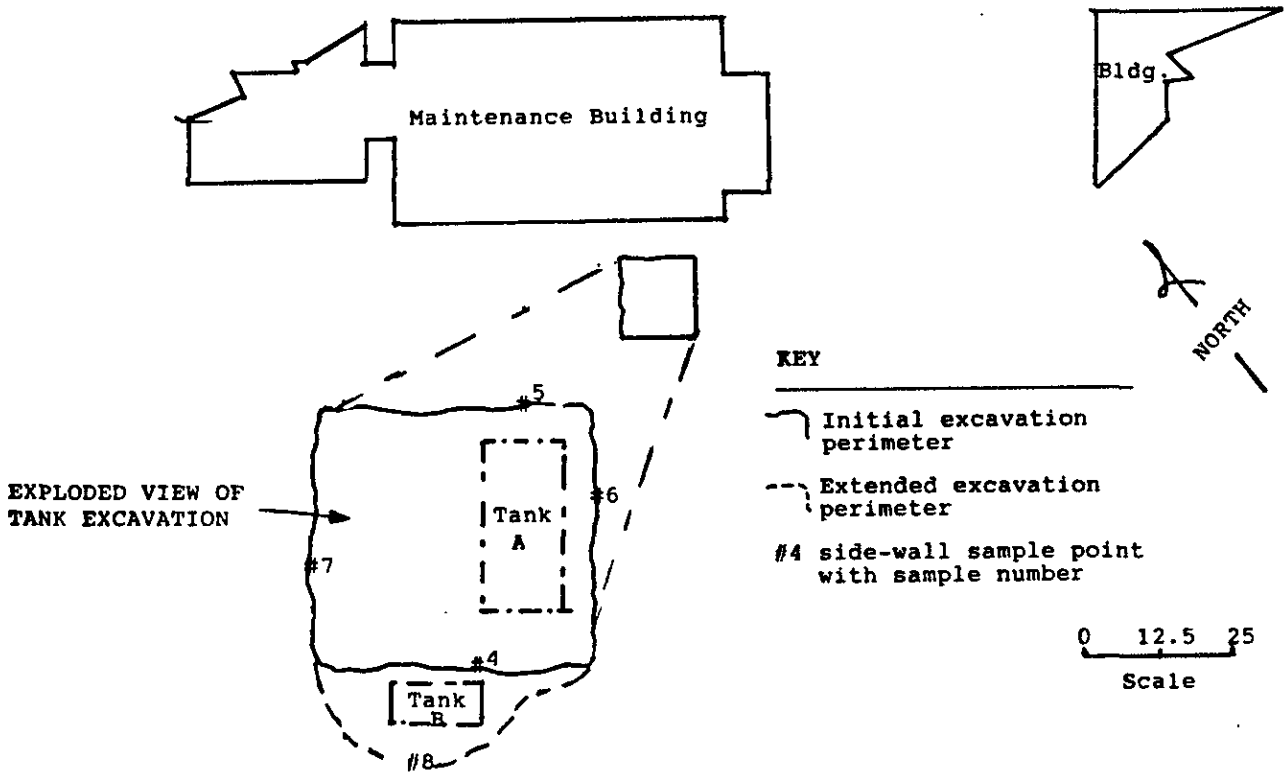
0 12.5 25
Scale

ENVIRONMENTAL TECHNICAL SERVICES	Site: **ALAMEDA GOLF COURSE** **1 MEMORIAL CLUB HOUSE DRIVE** **ALAMEDA, CALIFORNIA**	
Figure 2.	Tank Location Map	

ENVIRONMENTAL
TECHNICAL
SERVICES

at: Alameda Golf Course, 1 Memorial Club House Drive, Alameda CA.

7/10/91



ENVIRONMENTAL TECHNICAL SERVICES	Site: **ALAMEDA GOLF COURSE 1 MEMORIAL CLUBHOUSE DRIVE ALAMEDA, CALIFORNIA**	
Figure 3.	Excavation/Sampling Map	

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: Alameda Golf Course
Alameda, CA

MW ALAM Golf

Date Received: 09/05/92

Analysis Requested: Total Hydrocarbons - Gas
BTEX

Procedure: EPA 5030
EPA 602

Date Analyzed: 09/05/92

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
2492-ET2-C	MW-1	Water/TPH-G	*	50 ppb
2492-ET2-C	MW-1	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
2492-ET2-D	MW-2	Water/TPH-G	*	50 ppb
2492-ET2-D	MW-2	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
2492-ET2-E	MW-3	Water/TPH-G	*	50 ppb
2492-ET2-E	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

Soil and Water Environmental Laboratory
14072 West Park Avenue
Boulder Creek, CA 95006
(408) 338-3053/4466

CHAIN - OF - CUSTODY

Project Number	Site Name and Address	Type and Number of Containers	Analysis Required							Laboratory ID	Comments
MWAIGolf	Clubhouse DR Alameda Golf Course		TPH-G + BTEX	TPH-D + BTEX	TOG	TOTAL LEAD				Condition of Samples 1 - Good 2 - See Reverse	
Witnessing Agency/Inspector Name and Date: Juliet Shen/Alam. Co Env Hlth Dept											
Sample ID	Date / Time / Matrix / Sample Location										
MW1	9/5/92 / H2O / 2-40ml VOAs vials		✓			✓				1	Not enough
MW2	↓ / ↓ / ↓		✓			✓				1	Hold for Lead
MW3	↓ / ↓ / ↓		✓			✓				1	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Remarks:
Helen Mauskemmy	9-5-92			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	COMPANY: ETS
Relinquished by: (Signature)	Date/Time	Received by Lab: (Signature) R A Lemon	Date/Time 9/5/93 6:45	ADDRESS: PHONE: FAX:

LABORATORY REQUIRES TWO (2) COPIES OF THIS FORM.

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. e. Rd.
San Jose, CA 95118

Report Date
10-01-92

Sample Site
Alameda Golf Course
Alameda, CA

Date Received
9-17-92

Analysis Requested
Heavy Metals

Procedure
EPA-6010/7000

Date Analyzed
9-21-92

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
2492-ET2 C	MW-1	Total Lead	< 5.0 ppb	
D	MW-2	Total Lead	6.3 ppb	
E	MW-3	Total Lead	< 5.0 ppb	

MDL- 5.00 ppb

This analysis performed for S & W Laboratory by West Laboratory
Davis, California

Analyst Signature

1/87

Soil and Water Environmental Laboratory
14072 West Park Avenue
Boulder Creek, CA 95006
(408) 338-3053/4466

CHAIN - OF - CUSTODY

Project Number	Site Name and Address	Type and Number of Containers	Analysis Required							Laboratory ID	Comments
MWALC015	Alameda Memorial Club Golf Course Harpe Dr		TPH-G + BTEX	TPH-D + BTEX	TOG	Total Lead				Condition of Samples 1 - Good 2 - See Reverse	
Witnessing Agency/Inspector Name and Date											
Alam. Co Env Health Dept / Syed Ahsan											

Sample ID	Date	Time	Matrix	Sample Location									
MW-1	9/17/92		H2O	2 Liters Amber				✓					Additional water for lead analysis (9-5-92)
MW-2	9/17/92		↓	↓				✓					
MW-3	9/17/92		↓	↓				✓					

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Remarks:
Helen Mawhinney	4:02 9/17/92			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	COMPANY:
				ADDRESS:
Relinquished by: (Signature)	Date/Time	Received by Lab: (Signature)	Date/Time	PHONE: FAX:
		R W Gavron	4:00 9/17/93	

LABORATORY REQUIRES TWO (2) COPIES OF THIS FORM.

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 35118

Report Date: 01/15/93

Sample Site: Alameda Golf Cource
1 Club House Memorial Dr.

SMWALGLF

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-ET3-A	MW-1	Water/TPH-G	*	50 ppb
0123-ET3-A	MW-1	Water/TPH-D	*	50 ppb
0123-ET3-A	MW-1	Water/TOG	*	5 ppm
0123-ET3-A	MW-1	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
0123-ET3-B	MW-2	Water/TPH-G	*	50 ppb
0123-ET3-B	MW-2	Water/TPH-D	*	50 ppb
0123-ET3-B	MW-2	Water/TOG	*	5 ppm
0123-ET3-B	MW-2	Water/BTEX		
		Benzene	*	0.5 ppb
		Toluene	*	0.5 ppb
		Ethylbenzene	*	0.5 ppb
		Xylenes	*	0.5 ppb
0123-ET3-C	MW-3	Water/TPH-G	*	50 ppb
0123-ET3-C	MW-3	Water/TPH-D	*	50 ppb
0123-ET3-C	MW-3	Water/TOG	*	5 ppm
0123-ET3-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. A. Lamoy

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
2MWALGLF	Alameda NAS Golf Course, Lewis House Memorial Dr		TPH-G + BTEX	TPH-D - BTEX	TOG					0123-ET-3	
Witnessing Agency/Inspector Name and Date: Alam Co Env Health Serv. July 92 Then										Condition of Samples 1 - Good 2 - See Reverse	
Sample ID	Date / Time / Matrix / Sample Location										
MW-1	1/11/93		✓							A	
MW-2			✓							B	
MW-3			✓							C	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Remarks:
Helen Mawhinney	1/11/93 4:30	ETS FRINGE	1/11/93 4:30	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	COMPANY:
				ADDRESS:
Relinquished by: (Signature)	Date/Time	Received by Lab: (Signature)	Date/Time	
	1/12/93	R. H. Lowry	1/12/93 2:10	PHONE: FAX:

APPENDIX D

GROUNDWATER DEVELOPMENT REPORTS

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.1

PROJECT NAME:	WELL #
ALAMEDA GOLF COURSE	MW-1

DATE: JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	12:45

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
9.8	3.2	2"

TIME	GALLONS	pH	TEMP.	COND.
1:00	1	6.81	59.1	15.40
1:05	2	6.85	59.3	15.40
1:10	3	6.87	59.3	15.38
1:20	4	6.87	59.4	15.37
1:25	5	6.88	59.4	15.37
1:34	7	6.88	59.4	15.37

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 slow.

SHEEN	FLOATING PRODUCT	SAMPLE COLOR	ODOR
no	no	grey	no

SEDIMENT/FOREIGN MATTER: very little silt

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

SAMPLE CONTAINERS
3/ 40-ml VOAs, 2 Liters

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.2

PROJECT NAME:	WELL #
ALAMEDA GOLF COURSE	MW-2

DATE: JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	1:40

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
9.8	1.7	2"

TIME	GALLONS	pH	TEMP.	COND.
1:40	1	7.02	60.7	17.70
1:45	2	7.02	60.7	17.70
1:55	3	7.02	60.8	17.69
2:00	4	7.02	60.9	17.68
2:05	5	7.02	60.9	17.68
2:07	7	7.02	60.9	17.68

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	grey	no

SEDIMENT/FOREIGN MATTER: very little silt

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

SAMPLE CONTAINERS
3/ 40-ml VOAs, 2 Liters

MONITORING WELL SAMPLING DATA
MONITORING WELL NO.3

PROJECT NAME:	WELL #
ALAMEDA GOLF COURSE	MW-3

DATE:
JANUARY 11, 1993

NAME:	TIME BEGAN:
Helen Mawhinney	2:10p

DEPTH OF WELL(FT.)	DEPTH OF WATER(FT.)	WELL DIAM.
9.7	2.4	2"

TIME	GALLONS	pH	TEMP.	COND.
2:10	1	7.26	55.3	12.10
2:20	2	7.25	55.3	12.09
2:25	3	7.24	55.3	12.09
2:35	4	7.23	55.3	12.09
3:00	5	7.22	55.3	12.08
3:05	7	7.22	55.3	12.08

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 slow

SHEEN	FLOATING PRODUCT	SAMPLE COLOR	ODOR
no	no	grey	no

SEDIMENT/FOREIGN MATTER:

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

SAMPLE CONTAINERS
3/ 40-ml VOAs, 2 Liters

MONITORING WELL SAMPLING DATA/ MW-1

Project Name:	Well#
ALAMEDA GOLF COURSE	MW-1
Date: September 18, 1992	
Name:	Time Began:
Mawhinney	11:27

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
9.77	5.36	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
11:27	1	1.2	5.6	20 C	21.0
11:40	3	1.2	*	19 C	21.0
11:52	5	1.2	*	19 C	23.0
12:07	7	1.2	*	19 C	21.0

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

Depth to Water Upon Completion of Sampling

Not measured. Slow Recharge

Sheen	Floating Product	Sample Color	Odor
no	no	grey	no

Sediment/Foreign Matter: very little silt

Sample ID#	Analysis	Laboratory
MW-1	TPHg, BTEX, Total Lead	S & W Lab.

Sample Containers
3/ 40-ml VOAs, 2 Liters

MONITORING WELL SAMPLING DATA/ MW-2

Project Name:	Well#
ALAMEDA GOLF COURSE	MW-2

Date: September 18, 1992

Name:	Time Began:
Mawhinney	12:19

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
9.77	1.89	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
12:25	1	1.8		21 C	31.0
12:36	3	1.7		21 C	29.0
12:49	5	2.0		20 C	34.0
1:03	7	2.2		19 C	36.0
1:15	10	2.2		19 C	36.0

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

Depth to Water Upon Completion of Sampling

Not measure. Slow Recharge

Sheen	Floating Product	Sample Color	Odor
no	no	grey	no

Sediment/Foreign Matter: silt

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

Sample Containers
3/ 40-ml VOAs, 2 Liters

MONITORING WELL SAMPLING DATA/ MW-3

Project Name:	Well#
ALAMEDA GOLF COURSE	MW-3

Date: September 18, 1992

Name:	Time Began:
Mawhinney	1:29

DEPTH OF WELL(ft.)	DEPTH TO WATER(ft.)	WELL DIAM.
9.71	2.28	2"

Time	Gallons	Salinity	pH	Temp.	Cond.
1:29	1	1.8		21 C	31.0
1:37	3	1.7		21 C	27.0
1:48	5	1.7		19C	29.0
1:59	7	2.0		20 C	30.0
2.15	10	2.2		19 C	30.0

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

Depth to Water Upon Completion of Sampling

Not measure. Slow Recharge

Sheen	Floating Product	Sample Color	Odor
no	no	grey	no

Sediment/Foreign Matter: silt

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

Sample Containers
3/ 40-ml VOAs