R0324

GET

Geo Environmental Technology

Quarterly Groundwater Monitoring
Second Quarter 2003

For

Livermore Gas and Mini Mart
160 Holmes Street
Livermore, California

Prepared by

Geo Environmental Tech
343 Soquel Avenue, #33
Santa Cruz, CA 95062

Costas Orountiotis
Project Manager

7/18/03
Date

Kenneth L. Meleen
Senior Engineer

7/18/03
Date

July 2003

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

GET
Geo Environmental Technology

GROUNDWATER MONITORING REPORT
SECOND QUARTER 2003

Livermore Gas and Mini Mart
160 Holmes Street
Livermore, California

1.0 INTRODUCTION

This report documents the results of the 6/25/03 quarterly groundwater monitoring performed at the Livermore Gas and Mini Mart, located at 160 Holmes Street in Livermore, California (site). A Site Vicinity Map is presented as Figure 1 and site details are shown on the Site Plan, Figure 2.

The Livermore Gas and Mini Mart had been serviced by three 10,000-gallon gasoline and one 10,000-gallon diesel Underground Storage Tanks (USTs). The USTs, piping and dispensers were removed on 4/5/99 under permit from the Livermore-Pleasanton Fire Department (LPFD). Analysis of soil and groundwater samples collected at the time of the UST removal, indicated that the site has been impacted by a release of petroleum hydrocarbons and MTBE.

The Alameda County Environmental Health Services (ACEHS) has directed quarterly groundwater monitoring for this site.

2.0 PAST WORK ON SITE

On 2/26/99, a soil boring was advanced in the northern section of the property, about 10 feet from the edge of First Street sidewalk, to log the soil profile and determine depth to groundwater. A groundwater grab sample was collected and analyzed for Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, toluene, ethyl-benzene, total xylenes (BTEX) and methyl tertiary butyl ether (MTBE). The sample was found to be impacted by petroleum hydrocarbons (TPHg: 100,000 µg/l, Benzene: 6,100 µg/l, MTBE: 60,000 µg/L). The results were communicated to the Livermore-Pleasanton Fire Department (LPFD) and a UST Unauthorized Release Report was generated.

343 Soquel Avenue #33, Santa Cruz, CA 95062
Phone: (831) 423-8780
Fax: (831) 423-8827

On 4/5/99, three gasoline and one diesel USTs, associated dispensers and piping were removed, manifested and disposed, under permit by the LPFD. The pit was over-excavated and samples were collected from native soil beneath the USTs; sample analysis indicated the presence of petroleum hydrocarbons in soil. Total Petroleum Hydrocarbons as diesel (TPHd) were detected at low levels (61 mg/kg) in the soil stockpile, but not beneath the diesel tank; Total Petroleum Hydrocarbons as gasoline (TPHg) concentrations ranged from undetectable to 80 mg/kg in all samples; MTBE concentrations ranged from 24 to 110 mg/kg.

On 5/20/99 soil samples were collected beneath the dispenser islands. TPHg was found beneath the east dispenser island in varying concentrations ranging from 32 to 6,500 mg/kg; TPHd beneath the diesel dispenser was detected at 1300 mg/kg; no MTBE was detected beneath the dispenser islands.

On 7/26/00, three soil borings were drilled onsite to an approximate depth of 30' below ground surface (bgs). Soil samples were collected for analyses. Upon completion of drilling activities, the soil borings were converted to groundwater monitoring wells (MW1, MW2 and MW3) by installing 2-inch diameter, Schedule 40, factory threaded polyvinyl chloride (PVC) slotted pipe (0.010-inch slots). The slotted interval extends from 15 to 30 feet bgs. The wells were sampled on 8/11/00 and analyzed for TPHd, TPHg, BTEX and MTBE. The sample results indicated significant hydrocarbon impact in the groundwater. Directly downgradient well MW1 had concentrations of TPHg and MTBE of 170,000 μg/L and 320,000 μg/L respectively. A "Well Installation Report" was issued by ETIC Engineering on 9/22/00.

On 10/19/00 groundwater samples were collected as part of quarterly monitoring at the site. Samples were analyzed for TPHd, TPHg, BTEX and MTBE. The sample results confirmed the presence of significant hydrocarbon impact in the groundwater. Directly downgradient well MW1 had concentrations of TPHg and MTBE of 170,000 μg/L and 200,000 μg/L respectively. Geo Environmental Technologies (GET) issued a "Quarterly Monitoring Report" on 1/31/01.

On 02/22/01 groundwater samples were collected and analyzed for TPHd, TPHg BTEX and MTBE. The sample results confirmed significant hydrocarbon impact in the groundwater. Directly downgradient well MW1 had concentrations of TPHg and MTBE of 11,000 μg/L and 190,000 μg/L respectively. GET issued a "Quarterly Monitoring Report" on 3/31/01.

On 05/30/01 groundwater samples were not collected because all three monitoring wells were found to be dry.

The monitoring wells also were dry in August 2001.

On 11/14/01 groundwater samples were collected following the installation of an onsite extraction well and three off-site monitoring wells. Monitoring wells MW1, MW2 and MW3 were all dry. Groundwater samples collected from the four newly installed wells were analyzed for TPHd, TPHg, BTEX and MTBE. The sample results confirmed the presence of significant hydrocarbon concentrations offsite and an areal impact to the groundwater. Directly downgradient extraction well EX1 contained concentrations of TPHg and MTBE of 2,000 μg/L and 2,200 μg/L respectively. GET issued a "Quarterly Monitoring Report" on 3/31/02. Construction details of all wells are presented in Table 1.

On 5/7/02 groundwater samples were collected and analyzed for TPHd, TPHg/BTEX and MTBE. Directly downgradient extraction well EX1 contained concentrations of TPHg and MTBE of 7,700 μg/L and 6,200 μg/L respectively. GET issued a "Quarterly Monitoring Report" on May 28, 2002.

On 9/11/02 groundwater samples were collected and analyzed for TPHd, TPHg/BTEX and MTBE. Directly downgradient wells EX1 and MW1 contained TPHg concentrations of 2,800 and 130,000 μg/L and MTBE of 2,500 and <5,000 μg/L respectively. GET issued a "Quarterly Monitoring Report" on December 13, 2002.

On 12/1/02 groundwater samples were collected and analyzed for TPHd, TPHg/BTEX and MTBE. Directly downgradient well EX1 contained concentrations of TPHg at 3,000 μg/L and MTBE 1,200 μg/L. Down-gradient well MW1 was dry and therefore was not sampled. GET issued a "Quarterly Monitoring Report" on February 2003.

On 3/14/03 groundwater samples were collected and analyzed for TPHd, TPHg/BTEX and MTBE. Downgradient wells MW1 and EX1 contained concentrations of TPHg at 180,000 and 750 μg/L respectively and concentrations of MTBE at 220,000 and 1,200 μg/L respectively. GET issued a "Quarterly Monitoring Report" in April 2003.

3.0 SITE CONTACTS

The following is a listing of site contacts, addresses and phone numbers.

UST Operator:	Livermore Gas and Mini Mart Attention: Manwel and Samira Shuwayhat 160 Holmes Street Livermore, CA 94520
Local Oversight Agency:	ACEHS Attention: Eva Chu 1131 Harbor Bay Parkway, Suite 250 Alameda, CA 94502 Phone: (510) 567-6700

Environmental engineers: Geo Environmental Technologies
Attention: Costas Orountiotis
343 Soquel Avenue, #33
Santa Cruz, CA 95062
Phone: (831) 423-8780

4.0 METHODS AND PROCEDURES

4.1 Sample Collection and Analysis

Groundwater was sampled on 6/25/03. Depth to groundwater (DTW) was measured in each of the monitoring wells prior to purging and sampling. DTW data is summarized in Table 2. A sample of static groundwater was collected from each well using a clean, clear plastic bailer to visually assess for the presence of floating product or product sheen. No floating product or sheen was found.

To maximize the possibility of sampling fresh, inflowing groundwater, individual wells were purged of four well casing volumes of groundwater prior to sample collection. Purged groundwater was stored in a steel, 55-gallon, DOT 17H drum. After ascertaining that a minimum 80 percent recovery of the initial casing volume had occurred in the well, the monitoring wells were sampled. Field purge data is presented in Appendix A.

Groundwater samples were collected using new, clean, disposable plastic bailers. Water was decanted from the bailer into 1-liter amber bottles and 40-ml VOA vials with caps equipped with Teflon-lined septa, in such a manner that neither headspace nor air bubbles were allowed to remain in the containers. Samples were labeled and placed in a pre-cooled container on ice, to minimize potential loss of volatile constituents. Labels contained project name, sample number, date and time of collection.

Sample collection information was entered onto a Chain of Custody (COC) document that accompanied the samples during site time and during transport to McCampbell Analytical Labs, Inc., a State certified laboratory for hazardous materials analysis, for the requisite analyses.

Groundwater samples were analyzed for TPHd, TPHg, BTEX and MTBE using EPA Methods 8015 MOD and 8020.

4.2 Results

Downgradient monitoring well MW1 remains impacted. TPHd was detected at 3,100 µg/L, TPHg at 71,000 µg/L and MTBE at 210,000 µg/L. BTEX concentrations were 7,500, 4,700, 4,800, and 8,900 µg/L respectively.

Cross-gradient well MW2 contained concentration levels of 180 μg/L TPHd, 260 μg/L TPHg, and 2,000 μg/L MTBE; traces of BTEX concentrations were detected.

Upgradient well MW3 contained no detectable concentrations of TPHd, TPHg, BTEX, or MTBE.

Offsite monitoring wells MW4, and MW6 contained no detectable concentrations of TPHg, TPHd, MTBE or BTEX.

Offsite monitoring well MW5 contained no detectable concentrations of TPHg, TPHd, or BTEX; MTBE concentrations were detected at 89 μg/L.

Extraction well EX1 contained 120 μg/L TPHg, 260 μg/L MTBE and trace BTEX concentrations; TPHd concentrations were below laboratory detection limits.

Cumulative groundwater analytical results are presented in Table 2. Copies of the Laboratory analysis report and COC documentation for this monitoring event are presented in Appendix B.

4.3 Groundwater Flow and Gradient

DTW measurements taken on 6/25/03 were used to calculate the groundwater flow direction and gradient. Groundwater flow direction was northerly, consistent with general area direction of flow. The gradient was 0.0113 ft/ft. This information is presented graphically in Figure 4.

5.0 RECOMMENDATIONS

Based on the results of this groundwater monitoring episode and directives of the ACEHS the following course of action will be pursued:

- Continue quarterly groundwater sampling and depth to water data collection. Next monitoring date within a 15-day window of opportunity, is 9/20/03.
- A soil vapor extraction (SVE) feasibility test performed on 4/23/03 indicated that SVE presents a viable remediation technology for this site. It is recommended that a Corrective Action Plan, incorporating SVE be prepared for site remediation.
- Forward a copy of this report to:

  ACEHS
  Attention: Eva Chu
  1131 Harbor Bay Parkway, Suite 250
  Alameda, CA 94502

TABLE 1 - Well Construction Details

Livermore Gas and Minimart, 160 Holmes, Livermore, California

Well Number	Date Installed	TOC (feet)	Total Depth (feet bgs)	Borehole Diameter (inches)	Casing Diameter (inches)	Slot (inch)	Interval					DTW 3/14/03 (feet)
							Screen (feet)	Blank Casing (feet)	Sand Pack (feet)	Bentonite Seal (feet)	Cement Grout (feet)	
MW-1	07/26/00	465.04	30	8	2	0.01	30-15	15-0.5	30-13	13-11	11-1.0	22.63
MW-2	07/26/00	464.96	30	8	2	0.01	30-15	15-0.5	30-13	13-11	11-1.0	22.41
MW-3	07/26/00	465.86	30	8	2	0.01	30-15	15-0.5	30-13	13-11	11-1.0	23.04
MW-4	10/30/01	465.25	50	8	2	0.01	50-20	20-0.5	50-18	18-16	16-0.5	23.14
MW-5	10/30/01	464.74	50	8	2	0.01	50-20	20-0.5	50-18	18-16	16-0.5	24.26
MW-6	10/30/01	464.23	50	8	2	0.01	50-20	20-0.5	50-18	18-16	16-0.5	23.46
EX1	10/30/01	465.39	55	10	6	0.01	55-30	30-0.5	55-28	28-26	26-0.5	23.02

Notes:

bgs	Below ground surface
DTW	Depth to water
TOC	Top of Casing Elevation

TABLE 2 - Groundwater Analytical Results

Livermore Gas and Minimart, 160 Holmes, Livermore, California

Well ID.	Date	DTW (feet)	TPHd (µg/L)	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW1	08/11/00		57,000	170,000	6,400	7,600	4,200	9,700	320,000
	10/19/00	21.94	17,000	170,000	8,400	3,200	2,700	10,000	200,000
	02/22/01	22.91	11,000	82,000	5,100	1,000	13,000	8,700	190,000
	05/30/01	Dry							
	11/14/01	Dry							
	05/07/02	Dry							
	09/11/02	26.16	NA	130,000	7,700	1,100	4,500	1,500	<5000
	12/01/02	27.55	NS	NS	NS	NS	NS	NS	NS
	03/14/03	22.63	3,800	180,000	7,100	3,200	4,300	6,000	220,000
	06/25/03	22.1	3,100	71,000	7,500	4,700	4,800	8,900	210,000
MW2	08/11/00		1,900	4,500	220	52	160	170	3,000
	10/19/00	21.80	1,300	3,400	150	21	100	70	1,900
	02/22/01	22.87	880	7,600	25	< 10	69	25	2,200
	05/30/01	Dry	not sampled						
	11/14/01	Dry	not sampled						
	05/07/02	26.70	86	400	5.4	<0.50	1.9	2.3	230
	09/11/02	25.96	NA	260	1.3	<0.50	0.57	0.77	200
	12/11/02	27.56	120	250	7.9	1.6	13	9.9	180
	03/14/03	22.41	110	830	56	<0.50	<0.50	<1.0	1,200
	06/25/03	21.97	180	260	0.92	2.9	3.1	8.1	2,000
MW3	08/11/00		260	59	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	10/19/00	22.45	< 65	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	02/22/01	23.51	100	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	05/30/01	Dry	not sampled						
	11/14/01	Dry	not sampled						
	05/07/02	Dry	not sampled						
	09/11/02	26.61	NA	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	12/11/02	28.18	not sampled						
	03/14/03	23.04	<50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	06/25/03	22.59	<50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
MW-4	11/14/01	33.84	90	510	4	< 0.50	< 0.50	< 0.50	14
	05/07/02	26.75	< 50	150	3.5	0.5	< 0.50	< 0.50	48
	09/11/02	26.66	NA	< 50	< 0.50	< 0.50	< 0.50	< 0.50	15
	12/11/02	28.39	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	24
	03/14/03	23.14	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
	06/25/03	22.72	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
MW-5	11/14/01	34.94	< 66	< 50	< 0.50	< 0.50	< 0.50	< 0.50	8.2
	05/07/02	27.90	< 50	140	< 0.50	< 0.50	< 0.50	< 0.50	110
	09/11/02	27.99	NA	< 50	< 0.50	< 0.50	< 0.50	< 0.50	6.3
	12/11/02	29.50	< 50	73	< 0.50	< 0.50	< 0.50	< 0.50	160
	03/14/03	24.26	< 50	110	< 0.50	< 0.50	< 0.50	< 0.50	170

TABLE 2 - Groundwater Analytical Results

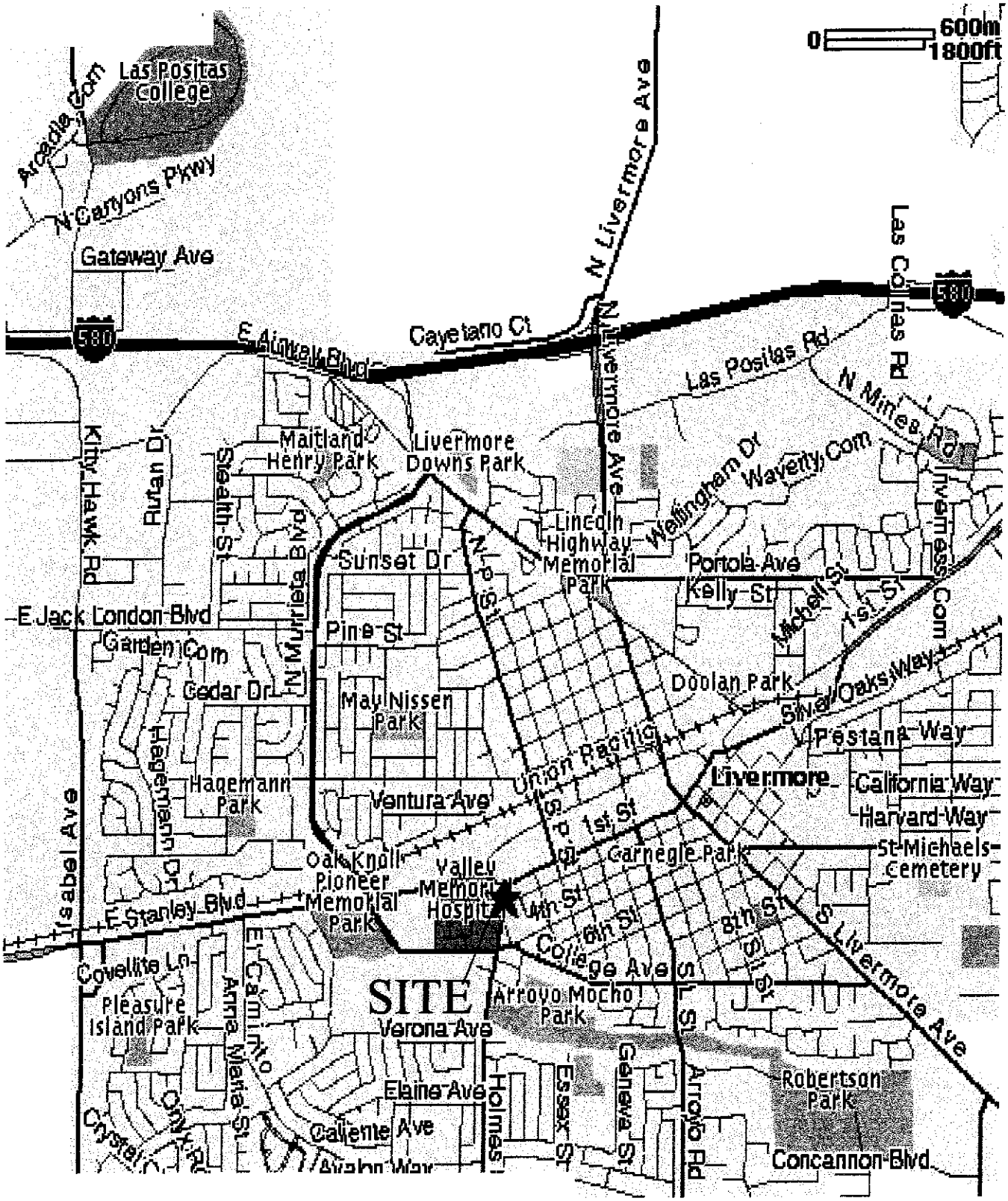
Livermore Gas and Minimart, 160 Holmes, Livermore, California

Well ID.	Date	DTW (feet)	TPHd (µg/L)	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW-5 cont.	06/25/03	24.01	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	89
MW-6	11/14/01	33.88	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	05/07/02	27.01	< 67	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	09/11/02	27.03	NA	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	12/11/02	28.77	< 50	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0
	03/14/03	23.46	< 50	< 50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
	06/25/03	23.08	< 50	< 50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
EX1	11/14/01	33.41	2,000	13,000	180	1,000	330	3,200	2,200
	05/07/02	27.58	560	7,700	320	< 25	66	150	6,200
	09/11/02	NM	NA	2,800	32	< 13	14	< 13	2,500
	12/11/02	27.98	100	3,000	81	< 0.50	44	< 1	4,800
	03/14/03	23.02	50	750	< 0.50	< 0.50	7.7	13	1,200
	06/25/03	22.41	<50	120	3.2	3.7	4.2	7.6	260

Notes:

DTW: Depth to Groundwater
NM: Not Measured
NA: Not Analyzed
TPHg: Total Petroleum Hydrocarbons as gasoline
TPHd: Total Petroleum Hydrocarbons as diesel
MTBE: Methyl tertiary Butyl Ether
µg/L: Micrograms per liter

Figures



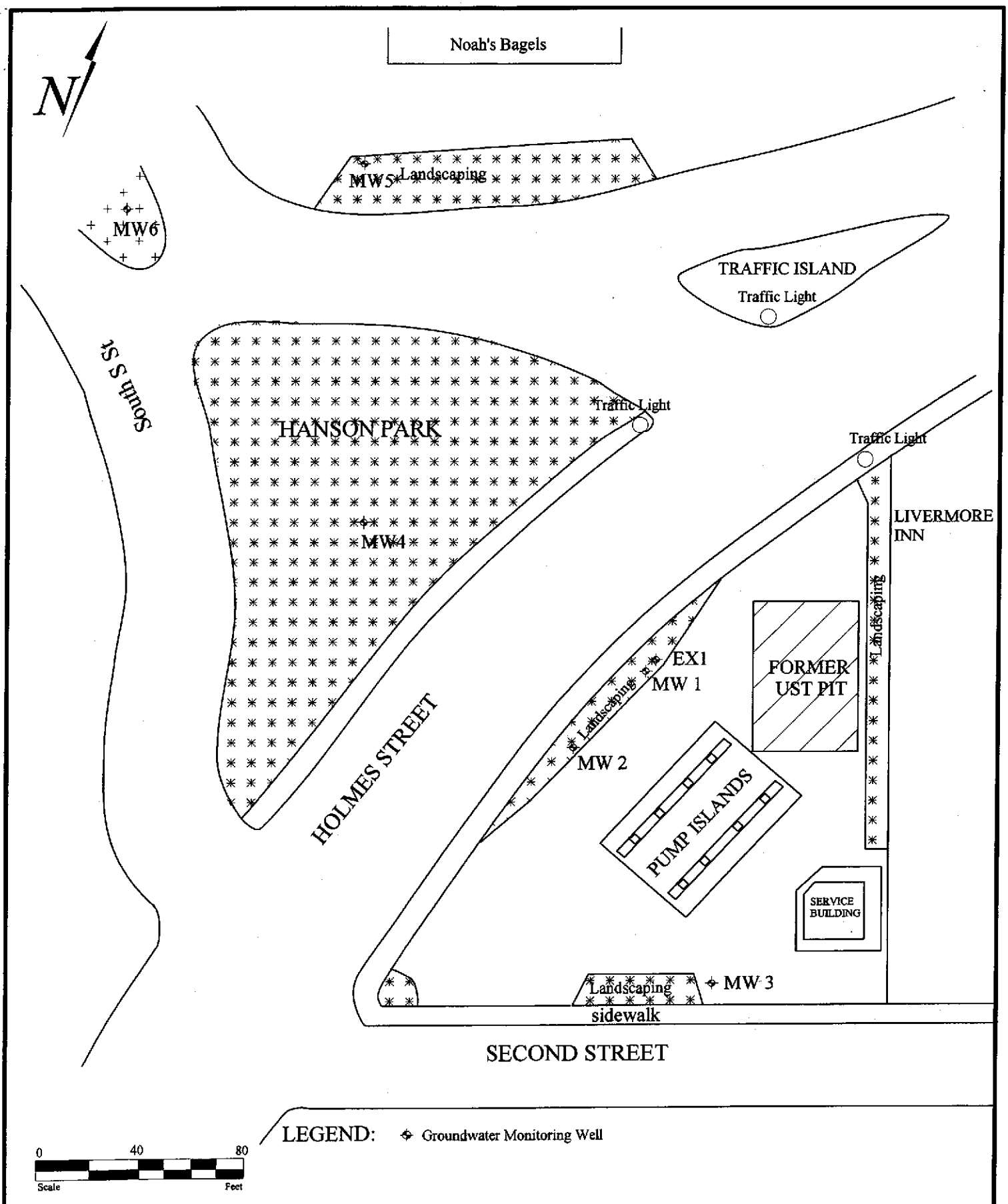
GET
Geo Environmental Technologies

Site Vicinity Map

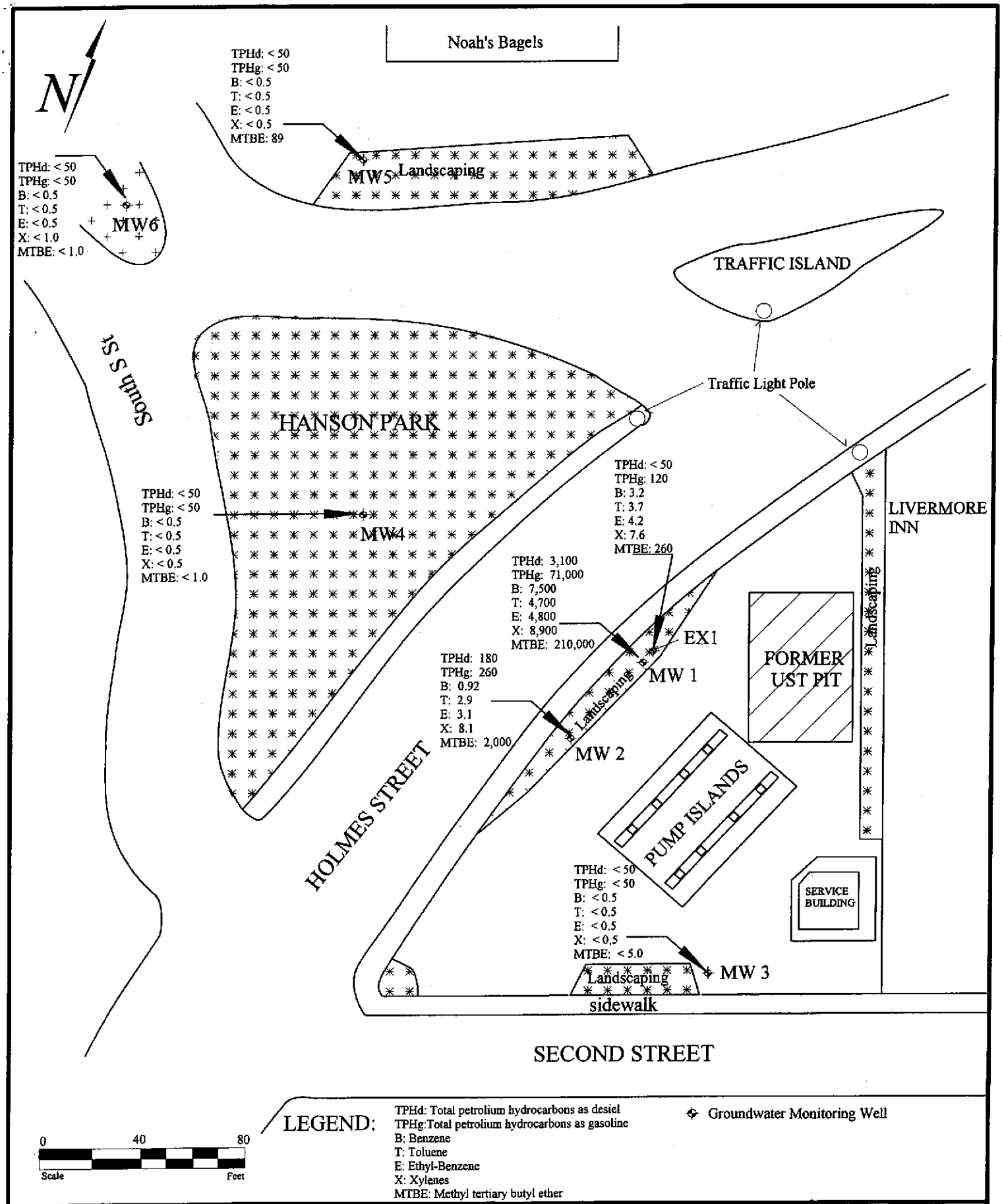
Livermore Gas and Mini Mart
160 Holmes Street
Livermore, California

Figure No.
1

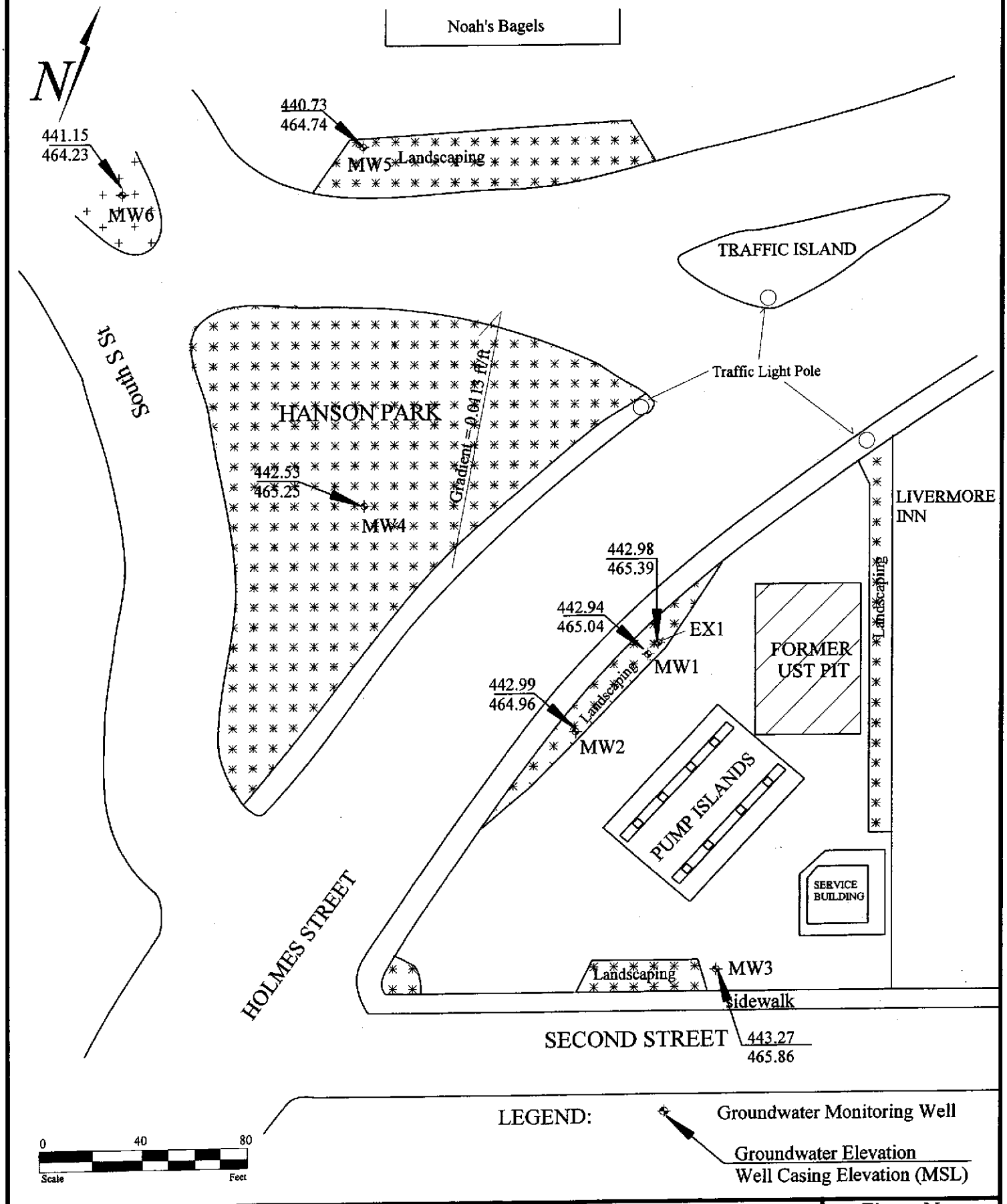
Project
MANWEL



Geo Environmental Technologies	Site Plan 6/25/03 Livermore Gas and Minimart 160 Homes Street, Livermore, CA	Figure No. 2 Project Manwel



Geo Environmental Technologies	Groundwater Analyticals 6/25/03 Livermore Gas and Minimart 160 Homes Street, Livermore, CA	Figure No. 3 Project Manwel



Geo Environmental Technologies	Groundwater Direction and Gradient 6/25/03 Livermore Gas and Minimart 160 Homes Street, Livermore, CA	Figure No. 4 Project Manwel

APPENDIX A

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Manwell

WELL NUMBER MW1

DATE 6/25/03

SAMPLED BY RTF

SHEET 1 OF 1

DIA. X
1" = 0.07
2" = 0.17
4" = 0.66

Well Depth 28.7

Initial Depth to Water 22.10

Water Column 6.6

Casing Vol/Ft 1.2

Casing Volumes 3

Gallons to be Purged 3.4

TIME	DTW	GALS				OBSERVATIONS
0830	22.10					
0955		0				very light milky grey fuel odor
						Sample @ 1030

Depth to Water at Sampling 22.10

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Maxwell
WELL NUMBER MW 2

DATE 6/25/03

SAMPLED BY RFFlores

SHEET 1 OF 1

DIA. X
1" = 0.07
2" = 0.17
4" = 0.66

Well Depth 29.5

Initial Depth to Water 21.97

Water Column 7.5

Casing Vol/Ft 1.3

Casing Volumes 3

Gallons to be Purged 3.8

TIME	DTW	GALS				OBSERVATIONS
0845	21.97	—				1st Bailer clear
						milky gray, sl. fetid odor
0925		0				
0935		4				
						Sampled 0950

Depth to Water at Sampling 23.20

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Maxwell
WELL NUMBER MW-3

DATE 6/25/03

SAMPLED BY R. Thay

SHEET 1 OF 1

DIA.	X
1" =	0.07
2" =	0.17
4" =	0.66

Well Depth 28.6

Initial Depth to Water 22.59

Water Column 6.91

Casing Vol/Ft 1.17

Casing Volumes 3

Gallons to be Purged 3.5

TIME	DTW	GALS				OBSERVATIONS
0830	22.59					
0855		0				First bailer clear
						Then milky red brown/silty
0905		4				No odor
						Sampled 0920

Depth to Water at Sampling 23.8

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Monwell
WELL NUMBER MW-1

DATE 6/25/03

SAMPLED BY KTH

SHEET 1 OF 1

DIA.	X
1" =	0.07
2" =	0.17
4" =	0.66

Well Depth 46.01

Initial Depth to Water 22.72

Water Column 23.29

Casing Vol/Ft 3.96

Casing Volumes 3

Gallons to be Purged 11.8

TIME	DTW	GALS				OBSERVATIONS
0835	22.72					
1035		0				milky red brown, no odor
						silty
1049		12				
						Sampled 1050

Depth to Water at Sampling 25.14

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Maxwell
WELL NUMBER MW-5

DATE 6/25/03

SAMPLED BY R. Hoy

SHEET 1 OF 1

DIA. X
1" = 0.07
2" = 0.17
4" = 0.66

Well Depth 46.42

Initial Depth to Water 24.01

Water Column 25.41

Casing Vol/Ft 4.3

Casing Volumes 3

Gallons to be Purged 12.9

TIME	DTW	GALS				OBSERVATIONS
0837	24.01	—				
1210		0				sli milky brown/silty
						no odor
1220		13				
						Sampled 1245

Depth to Water at Sampling 24.8

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Monroe #1

WELL NUMBER MW6

DATE 6/25/03

SAMPLED BY R. Flay

SHEET 1 OF 1

DIA. X
~~1" = 0.07~~
2" = 0.17
4" = 0.66

Well Depth 49.2

Initial Depth to Water 23.08

Water Column 26.12

Casing Vol/Ft 4.4

Casing Volumes 3

Gallons to be Purged 13.3

TIME	DTW	GALS				OBSERVATIONS
0841	23.08	—				
1055		0				sli red brown milky/salty
						No odor
115		14				
						Sampled 1130

Depth to Water at Sampling 25.6

FIELD SHEET FOR QUARTERLY MONITORING

SITE NAME Monsanto
WELL NUMBER EX 1

DATE 6/25/03

SAMPLED BY RTH

SHEET 1 OF 1

DIA. X
1" = 0.07
2" = 0.17
4" = 0.66

Well Depth 56.56

Initial Depth to Water 22.41

Water Column 29.09

Casing Vol/Ft 4.9

Casing Volumes 3

Gallons to be Purged 14.8

TIME	DTW	GALS				OBSERVATIONS
0848	22.41					
1250		0				sli milky, sli fetid odor
1315		25				
1330		45				
1340		56				
						Sampled 1345

Depth to Water at Sampling 25.1

APPENDIX B

McCampbell Analytical Inc.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Geo Environmental Technologies 343 Soquel Avenue #33 Santa Cruz, CA 95062	Client Project ID: Manwell	Date Sampled: 06/25/03
		Date Received: 06/25/03
	Client Contact: CostasOrountiotis	Date Reported: 07/01/03
	Client P.O.:	Date Completed: 07/01/03

WorkOrder: 0306548

July 01, 2003

Enclosed are:

1). the results of 7 analyzed samples from your **Manwell project,**

2). a QC report for the above samples

3). a copy of the chain of custody, and

4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Angela Rydelius, Lab Manager

McCampbell Analytical Inc.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Geo Environmental Technologies	Client Project ID: Manwell	Date Sampled: 06/25/03
343 Soquel Avenue #33		Date Received: 06/25/03
Santa Cruz, CA 95062	Client Contact: CostasOrountiotis	Date Extracted: 06/27/03-06/29/03
	Client P.O.:	Date Analyzed: 06/27/03-06/29/03

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline with BTEX and MTBE*

Extraction method: SW5030B Analytical methods: SW8021B/8015Cm Work Order: 0306548

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	MW1	W	71,000,a	210,000	7500	4700	4800	8900	330	91.0
002A	MW2	W	260,a	2000	0.92	2.9	3.1	8.1	1	92.3
003A	MW3	W	ND	ND	ND	ND	ND	ND	1	90.9
004A	MW4	W	ND	ND	ND	ND	ND	ND	1	89.8
005A	MW5	W	ND,i	89	ND	ND	ND	ND	1	91.9
006A	MW6	W	ND	ND	ND	ND	ND	ND	1	93.4
007A	EX1	W	120,a	260	3.2	3.7	4.2	7.6	1	99.4
Reporting Limit for DF =1; ND means not detected at or above the reporting limit		W	50	5.0	0.5	0.5	0.5	0.5	1	µg/L
		S	NA	NA	NA	NA	NA	NA	1	mg/Kg

* water and vapor samples and all TCLP & SPLP extracts are reported in µg/L, soil/sludge/solid samples in µg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (stoddard solvent / mineral spirit?); f) one to a few isolated non-target peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~2 vol. % sediment; j) reporting limit raised due to high MTBE content; k) TPH pattern that does not appear to be derived from gasoline (aviation gas). m) no recognizable pattern.

DHS Certification No. 1644

Angela Rydelius, Lab Manager

McCampbell Analytical Inc.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Geo Environmental Technologies	Client Project ID: Manwell	Date Sampled: 06/25/03
343 Soquel Avenue #33		Date Received: 06/25/03
Santa Cruz, CA 95062	Client Contact: CostasOrountiotis	Date Extracted: 06/25/03
	Client P.O.:	Date Analyzed: 06/26/03-06/28/03

Diesel Range (C10-C23) Extractable Hydrocarbons as Diesel*

Extraction method: SW3510C Analytical methods: SW8015C Work Order: 0306548

Lab ID	Client ID	Matrix	TPH(d)	DF	% SS
0306548-001B	MW1 .	W	3100,d	1	91.6
0306548-002B	MW2	W	180,d	1	86.7
0306548-003B	MW3	W	ND	1	81.3
0306548-004B	MW4	W	ND	1	87.2
0306548-005B	MW5	W	ND,i	1	83.4
0306548-006B	MW6	W	ND	1	99.6
0306548-007B	EX1	W	ND	1	99.2

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	W	50	µg/L
	S	NA	NA

* water samples are reported in µg/L, wipe samples in µg/wipe, soil/solid/sludge samples in mg/kg, product/oil/non-aqueous liquid samples in mg/L, and all DISTLC / STLC / SPLP / TCLP extracts are reported in µg/L.

cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) unknown medium boiling point pattern that does not appear to be derived from diesel; f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~2 vol. % sediment; k) kerosene/kerosene range; l) bunker oil; m) fuel oil; n) stoddard solvent/mineral spirit.

DHS Certification No. 1644

Angela Rydelius, Lab Manager

McCampbell Analytical Inc.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8021B/8015Cm

Matrix: W WorkOrder: 0306548

EPA Method: SW8021B/8015Cm Extraction: SW5030B BatchID: 7517 Spiked Sample ID: 0306530-002A

	Sample	Spiked	MS*	MSD*	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(btex)£	ND	60	99.8	98.3	1.54	109	115	5.72	70	130
MTBE	ND	10	117	110	6.28	105	112	6.42	70	130
Benzene	ND	10	99.9	97.2	2.73	98.8	103	3.84	70	130
Toluene	ND	10	99.3	96.7	2.59	93.4	97.4	4.27	70	130
Ethylbenzene	ND	10	102	100	2.40	103	106	3.35	70	130
Xylenes	ND	30	107	100	6.45	96.3	100	3.74	70	130
%SS:	96.6	100	99.9	99.2	0.703	97.8	99.2	1.42	70	130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:

NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS – MSD) / (MS + MSD) * 2.

* MS and / or MSD spike recoveries may not be near 100% or the RPDs near 0% if: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

cluttered chromatogram; sample peak coelutes with surrogate peak.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.
NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

McCampbell Analytical Inc.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8015C

Matrix: W WorkOrder: 0306548

EPA Method: SW8015C	Extraction: SW3510C			BatchID: 7519		Spiked Sample ID: N/A				
	Sample	Spiked	MS*	MSD*	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(d)	N/A	7500	N/A	N/A	N/A	102	103	1.21	70	130
%SS:	N/A	100	N/A	N/A	N/A	109	111	1.35	70	130

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:

NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS – MSD) / (MS + MSD) * 2.

* MS and / or MSD spike recoveries may not be near 100% or the RPDs near 0% if: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.
NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

GET (K100748)

McCAMPBELL ANALYTICAL INC.

110 2nd AVENUE SOUTH, #D7
PACHECO, CA 94553-5560
Telephone: (925) 798-1620 Fax: (925) 798-1622

CHAIN OF CUSTODY RECORD

TURN AROUND TIME ☐ RUSH ☐ 24 HR ☐ 48 HR ☐ 72 HR ☑ 5 DAY

EDF Required? Coelt (Normal) No Write On (DW) No

Report To: Costas Orantiotis **Bill To:** Same

Company: GET
343 Soquel Ave #53
Santa Cruz, CA 95062 **E-Mail:**

Tele: ( ) 831-423-8780 **Fax:** ( )

Project #: Manuel **Project Name:**

Project Location: Live Oak

Sampler Signature:

SAMPLE ID (Field Point Name)	LOCATION	SAMPLING Date	SAMPLING Time	# Containers	Type Containers	MATRIX Water	MATRIX Soil	MATRIX Air	MATRIX Sludge	MATRIX Other	METHOD PRESERVED Ice	METHOD PRESERVED HCl	METHOD PRESERVED HNO_3	METHOD PRESERVED Other	BTEX & TPH as Gas (602/8020 + 8015)/MTBE	TPH as Diesel (8015)	Total Petroleum Oil & Grease (5520 E&F/B&F)	Total Petroleum Hydrocarbons (418.1)	EPA 601 / 8010	BTEX ONLY (EPA 602 / 8020)	EPA 608 / 8080	EPA 608 / 8080 PCB's ONLY	EPA 624 / 8240 / 8260	EPA 625 / 8270	PAH's / PNA's by EPA 625 / 8270 / 8310	CAM-17 Metals	LUFT 5 Metals	Lead (7240/7421/239.2/6010)	RCI	Other	Comments
MW1		6/25/03	1030	3 VOA		X					X	X			X	X															
MW2			0950			X					X	X			X	X															
MW3			0920			X					X	X			X	X															
MW4			1050			X					X	X			X	X															
MW5			1245			X					X	X			X	X															
MW6			1130			X					X	X			X	X															
EX1			1345			X					X	X			X	X															

Relinquished By:	Date:	Time:	Received By:
	6/25/03	1610	
Relinquished By:	Date:	Time:	Received By:
Relinquished By:	Date:	Time:	Received By:

ICE/t° ✓
GOOD CONDITION ✓
HEAD SPACE ABSENT ____
DECHLORINATED IN LAB ____ PERSERVED IN LAB ____

PRESERVATION APPROPRIATE CONTAINERS ✓	VOAS ✓	O&G	METALS	OTHER

McCampbell Analytical Inc.
110 Second Avenue South, #D7
Pacheco, CA 94553-5560
(925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0306548

Client:
Geo Environmental Technologies
343 Soquel Avenue #33
Santa Cruz, CA 95062

TEL:
FAX:
ProjectNo: Manwell
PO:

Date Received: **06/25/2003**
Date Printed: **06/25/2003**

Sample ID	ClientSampID	Matrix	Collection Date	Hold	Requested Tests						
					SW8015C	V8021B/8015C					
0306548-001	MW1	Water	06/25/2003 10:30:00	☐	B	A					
0306548-002	MW2	Water	06/25/2003 9:50:00 AM	☐	B	A					
0306548-003	MW3	Water	06/25/2003 9:20:00 AM	☐	B	A					
0306548-004	MW4	Water	06/25/2003 10:50:00	☐	B	A					
0306548-005	MW5	Water	06/25/2003 12:45:00	☐	B	A					
0306548-006	MW6	Water	06/25/2003 11:30:00	☐	B	A					
0306548-007	EX1	Water	06/25/2003 1:45:00 PM	☐	B	A					

Prepared by: Elisa Venegas

Comments:

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.