aqua science engineers inc.

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December 13, 2002

Alameda County
JAN 13 2003
Environmental Health

6/23/03

WORKPLAN
for
SOIL AND GROUNDWATER ASSESSMENT
at
1310 Central Avenue
Alameda, California

Submitted by:
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1.0 INTRODUCTION

This submittal presents Aqua Science Engineers, Inc. (ASE)'s area conduit study and workplan for an additional soil and groundwater assessment at 1310 Central Avenue in Alameda, California (Figure 1). The proposed site assessment activities were initiated by Mr. Nissan Saidian, property owner, as required by the Alameda County Health Care Services Agency (ACHCSA).

2.0 BACKGROUND INFORMATION

The subject site is currently a small operating gasoline service station.

In May 1996, Petrotek removed one 10,000-gallon gasoline underground storage tank (UST), one 7,500-gallon gasoline UST, and one 5,000-gallon gasoline UST from the western corner of the site. All associated piping and dispensers were also removed. In addition, one 500-gallon waste-oil UST was removed from a location adjacent to the building. Soil samples collected during the UST removal contained elevated hydrocarbon concentrations, and free-product was observed on groundwater within the UST excavation. Apparently, 600 tons of contaminated soil were removed from the site and disposed of off-site, and approximately 15,000 gallons of water and product were pumped from the excavation, treated and discharged into the storm sewer. Two new USTs were installed in the former UST excavations. New dispensers and piping were also installed. It is ASE's understanding that Petrotek did not issue a report regarding these activities.

In November 1998, All Environmental, Inc. (AEI) drilled 14 soil borings at the site and collected soil and groundwater samples for analysis. Up to 5,900 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G) were detected in soil samples collected from the borings. Up to 120,000 parts per billion (ppb) TPH-G and 7,200 ppb benzene were detected in groundwater samples collected from the borings.

In December 1999, HerSchy Environmental of Bass Lake, California installed three groundwater monitoring wells at the site (Figure 2). Up to 43,000 ppb TPH-G, 8,700 ppb total petroleum hydrocarbons as diesel (TPH-D), 1,300 ppb benzene and 120,000 ppb methyl tertiary butyl ether (MTBE) were detected in groundwater samples collected from the monitoring wells. The groundwater flow direction was to the southwest at a gradient of 0.0085-feet/foot.

On May 16, 2000, ASE collected groundwater samples from the three site monitoring wells. Groundwater samples collected from monitoring well MW-1 contained 2,000 ppb TPH-G, 38 ppb benzene, 6.3 ppb toluene, 740 ppb ethyl benzene, and 1,600 ppb total xylenes. No MTBE or other oxygenates were detected in this groundwater sample. The groundwater samples collected from monitoring well MW-3 contained 17,000 ppb TPH-G, 2,800 ppb benzene, 60 ppb toluene, 380 ppb ethyl benzene, 190 ppb total xylenes, 990 ppb MTBE, 9.1 ppb tert-amyl methyl ether (TAME) and 350 ppb tert-butanol (TBA). No hydrocarbons were detected in groundwater samples collected from monitoring well MW-2. These results are significantly different to the previous results, especially in respect to hydrocarbon concentrations in monitoring well MW-2, and the MTBE concentrations throughout the site. The radically different MTBE concentrations this sampling period are probably related to the use of EPA Method 8260 this period which is a much more reliable method for MTBE identification than EPA Method 8020, which was used during the December 1999 sampling. It appears that the very high MTBE concentrations detected in December 1999 were a false positive. The groundwater flow direction on May 16, 2000 was to the west-southwest.

On July 28, 2000, ASE drilled soil borings BH-A through BH-L at the site using a Geoprobe hydraulic sampling rig (Figure 3). The soil samples collected from 3.0-feet bgs in boring BH-K contained 0.0061 ppm of MTBE. There were no hydrocarbons or oxygenates detected in soil samples from the remaining borings. The groundwater samples collected from boring BH-A contained 0.7 ppb toluene and 0.9 ppb total xylenes. The groundwater samples collected from boring BH-B contained 1,800 ppb TPH-G, 270 ppb benzene, 8.8 ppb toluene, 18 ppb ethyl benzene, 13 ppb total xylenes, 4,100 ppb MTBE, 5.6 ppb TAME, and 440 ppb TBA. The groundwater samples collected from boring BH-C contained 230 ppb TPH-G, 11 ppb benzene, 1.2 ppb toluene, 0.96 ppb total xylenes, 760 ppb MTBE, 6.6 ppb TAME, and 130 ppb TBA. The groundwater samples collected from boring BH-D contained 72 ppb TPH-D and 1.7 ppb MTBE. The groundwater samples collected from boring BH-I contained 0.55 ppb MTBE. The groundwater samples collected from boring BH-J contained 200 ppb TPH-D. The groundwater samples collected from boring BH-K contained 520 ppb TPH-D and 0.77 ppb MTBE. The groundwater samples collected from boring BH-L contained 2.5 ppb MTBE.

The site continues to be sampled on a quarterly basis. Depth to water data and hydrocarbons concentrations in groundwater are tabulated in Tables One and Two. Based on the potentiometric surface contour maps

prepared for the site during historic quarterly monitoring activities, the groundwater flow direction has consistently been to the southwest.

3.0 CONDUIT STUDY

Due to the shallow depth to groundwater in the site vicinity and the unexpected distribution of hydrocarbons to the northwest rather than to the south or southwest as suggested by the potentiometric surface maps prepared for the site, ASE performed a conduit study to determine whether subsurface utility lines could provide a conduit for the movement of groundwater.

ASE contacted Underground Service Alert (USA) to mark underground utility lines in the site vicinity. ASE also reviewed sewer line maps at the Alameda City Department of Public Works office. Phone calls were also placed to agencies whose marks were not visible in the street areas to confirm that no lines were present in these areas. The locations of all lines are shown on Figure 3.

It should be noted that the vast majority of lines are located in Central Avenue, between the site and borings BH-B and BH-C, where most of the contamination was detected. The only line down Encinal Avenue that could act as a conduit for the movement of contamination was a gas line.

ASE also spoke with several of the utility companies regarding backfill material in the trenches. The backfill material used throughout the City of Alameda is the same native sand that was removed to create the trenches. This material is no more or less permeable than the undisturbed native material.

Groundwater beneath the site ranges in depth from 1.9 to 5.6-feet below ground surface. The typical depth to groundwater in the site vicinity ranges from 2.75 to 5.5-feet bgs.

Although groundwater almost certainly exists in the backfill of the utility trenches near the site, it does not appear that the utility lines act as a conduit for the movement of groundwater. ASE bases this opinion on the following: (a) the backfill of the utility trenches is the exact same sandy material as the native material, and (b) the Geoprobe borings containing the highest hydrocarbon concentrations are located beyond the conduits and their associated trenches.

4.0 PROPOSED SCOPE OF WORK (SOW)

The purpose of this assessment is to further define the extent of soil and groundwater contamination off-site. The scope of work for this assessment is to:

1) Obtain a drilling permit from the Alameda County Public Works Agency and an encroachment permit from the City of Alameda to drill in city right of way areas.

2) Contract with a subsurface utility locator to mark underground utility lines in the site vicinity.

3) Drill four (4) soil borings in areas off-site to a depth not to exceed 12-feet below ground surface (bgs). Collect soil and groundwater samples for analysis.

4) Analyze one soil and one groundwater sample from each boring at a CAL-EPA certified analytical laboratory for TPH-D by modified EPA Method 3510/8015, and TPH-G, benzene, toluene, ethylbenzene and total xylenes (collectively known as BTEX) and fuel oxygenates by EPA Method 8260.

5) Following collection of the soil and groundwater samples, each boring will be backfilled with neat cement to the ground surface.

6) Prepare a report presenting results from this assessment.

Details of the assessment are presented below.

TASK 1 - *OBTAIN A DRILLING PERMIT FROM THE ALAMEDA COUNTY PUBLIC WORKS AGENCY AND AN ENCROACHMENT PERMIT FROM THE CITY OF ALAMEDA TO ALLOW FOR DRILLING IN THE CITY STREET*

Prior to drilling, ASE will obtain a drilling permit from the Alameda County Public Works Agency. ASE will also obtain an encroachment permit from the City of Alameda to allow for drilling in the city streets.

TASK 2 - CONTRACT WITH AN UNDERGROUND UTILITY LINE LOCATING SERVICE TO ACCURATELY LOCATE UNDERGROUND UTILITY LINES IN STREET AREAS

ASE will contact Underground Service Alert (USA) at least 48 hours prior to drilling and contract with a private underground utility locating service to pinpoint the location of utility lines in the drilling locations.

TASK 3 - DRILL FOUR SOIL BORINGS IN OFF-SITE LOCATIONS AND COLLECT SOIL AND GROUNDWATER SAMPLES FROM THE BORINGS FOR ANALYSIS

Four soil borings will be drilled in the locations shown on Figure 3 to further define the soil and groundwater contamination in the site vicinity. The borings will be drilled using a Geoprobe or similar type drill rig. The drilling will be directed by a qualified ASE geologist.

Undisturbed soil samples will be collected continuously for subsurface hydrogeologic description and possible chemical analysis. The samples will be described by the geologist according to the Unified Soil Classification System. The samples will be collected in acetate tubes using a drive sampler advanced as the boring progresses. Samples to be retained for analysis will be immediately removed from the sampler, trimmed, sealed with Teflon tape and plastic caps, secured with duct tape, labeled with the site location, sample designation, date and time the sample was collected, and the initials of the person collecting the sample. The samples will be placed into an ice chest containing wet ice for delivery under chain of custody to a CAL-EPA certified analytical laboratory.

Soil from the remaining tubes not sealed for analysis will be removed for hydrogeologic description and will be screened for volatile compounds with a photoionization detector (PID). The soil will be screened by emptying soil from one of the tubes into a plastic bag. The bag will be sealed and placed in the sun for approximately 10 minutes. After the hydrocarbons have been allowed to volatilize, the PID will measure the vapor through a small hole, punched in the bag. These PID readings will be used as a screening tool only since these procedures are not as rigorous as those used in an analytical laboratory.

A groundwater sample will be collected from each boring. Drilling will be halted at the water table and a Hydropunch or similar type device will be utilized to collect groundwater samples from the borings. The

groundwater samples will be contained in 40-ml volatile organic analysis (VOA) vials, preserved with hydrochloric acid, sealed without headspace, labeled with the site location, sample designation, date and time the samples were collected, and the initials of the person collecting the samples, sealed in plastic bags, and cooled in an ice chest with wet ice for transport to a state-certified analytical laboratory under chain-of-custody.

All sampling equipment will be cleaned in buckets with brushes and a TSP or Alconox solution, then rinsed twice with tap water. Rinsates will be contained on-site in 55-gallon steel drums and stored on-site until off-site disposal can be arranged.

TASK 4 - ANALYZE THE SOIL AND GROUNDWATER SAMPLES

At least one soil sample from each boring, as well as each groundwater sample, will be analyzed at a CAL-EPA certified analytical laboratory for TPH-D by modified EPA Method 3510/8015 and TPH-G, BTEX and fuel oxygenates by EPA Method 8260. The soil samples analyzed will be chosen based on field observations such as odors, staining and PID readings. If no field indications of contamination are present, the unsaturated sample closest to the water table (capillary zone) will be analyzed.

TASK 5 - BACKFILL THE BORINGS WITH NEAT CEMENT

Following collection of the soil and groundwater samples, the boreholes will be backfilled with neat cement placed by tremie pipe.

TASK 6 - PREPARE A SUBSURFACE ASSESSMENT REPORT

A report will be prepared outlining the methods and findings of this assessment. The report will be submitted under the seal of state registered civil engineer or geologist. This report will include a summary of all work completed during this assessment including tabulated soil and groundwater analytical results, conclusions and recommendations. Copies of the analytical reports and chain of custody documents will be included as appendices.

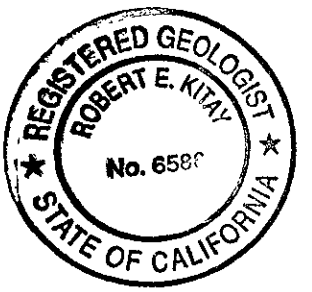
5.0 SCHEDULE

ASE will proceed with this project immediately upon approval of this workplan by the ACHCSA and pre-approval of the costs by the California Underground Storage Tank Cleanup Fund.

Should you have any questions or comments, please call us at (925) 820-9391.

Respectfully submitted,

AQUA SCIENCE ENGINEERS, INC.



Robert E. Kitay, R.G., R.E.A.
Senior Geologist

cc: Mr. Nissan Saidian, 5733 Medallion Court, Castro Valley, CA 94522

Mr. Barney Chan, Alameda County Health Care Services Agency, 1131 Harbor Bay Parkway, Suite 250, Alameda, CA 94502

Mr. Chuck Headlee, California Regional Water Quality Control Board, San Francisco Bay Region, 1515 Clay Street, Suite 1400, Oakland, CA 94612

TABLES

TABLE ONE
Groundwater Elevation Data
Saidian Property-Alameda
Alameda, CA

Well	Date of Measurement	Top of Casing Elevation (msl)	Depth to Water (feet)	Groundwater Elevation (msl)
MW-1	9/6/99	26.85	5.16	21.69
	5/16/00		3.24	23.61
	8/3/00		4.15	22.70
	12/5/00		4.90	21.95
	3/5/01		3.04	23.81
	6/4/01		4.01	22.84
	6/5/02		3.73	23.12
	9/9/02		**5.06**	**21.79**
MW-2	9/6/99	27.18	5.56	21.62
	5/16/00		3.52	23.66
	8/3/00		4.44	22.74
	12/5/00		5.24	21.94
	3/5/01		3.28	23.90
	6/4/01		4.33	22.85
	6/5/02		3.98	23.20
	9/9/02		**5.34**	**21.84**
MW-3	9/6/00	25.30	4.02	21.28
	5/16/00		2.06	23.24
	8/3/00		3.20	22.10
	12/5/00		3.71	21.59
	3/5/01		1.90	23.40
	6/4/01		2.72	22.58
	6/5/02		2.75	22.55
	9/9/02		**3.88**	**21.42**

TABLE TWO

Summary of Chemical Analysis of GROUNDWATER Samples

Saidian Property-Alameda

Petroleum Hydrocarbons

All results are in parts per billion (ppb)

Well/ Date Sampled	TPH Gasoline	TPH Diesel	Benzene	Toluene	Ethyl Benzene	Total Xylenes	MTBE	TAME	TBA	Other Oxygenates
MW-1										
9/6/99	5,700	8,700	170	59	22	85	20,000	NA	NA	NA
5/16/00	20,000	< 7,500	38	6 3	740	1,600	< 5.0	< 5.0	< 50	< 5.0
8/3/00	20,000	< 6,000	56	9.7	920	1,600	< 0.5	< 0 5	< 50	< 0.5
12/5/00	31,000	< 4,000	64	27	820	2,200	< 10	< 5.0	< 50	< 5 0
3/5/01	20,000	<4,000	19	<5.0	480	870	<5 0	<5 0	<50	<5 0
6/4/01	23,000	<7,000	58	50	710	2,100	5 1	<5.0	<50	<5.0
6/5/02	7,400	<1,500	9 3	6.7	180	230	<1.0	<1 0	<10	<1.0
9/9/02	**8,300**	**< 3,500**	**32**	**20**	**390**	**670**	**< 2.0**	**< 2.0**	**< 20**	**< 2.0**
MW-2										
9/6/99	6,000	70	1,300	92	50	400	6,800	NA	NA	NA
5/16/00	< 50	< 50	< 0.5	< 0 5	< 0.5	< 0.5	< 0.5	< 0 5	< 50	< 5.0
8/3/00	< 50	< 50	< 0.5	< 0 5	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5
12/5/00	< 50	1,400	< 0 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5 0	< 0.5
3/5/01	<50	<50	<0.5	< 0.5	< 0.5	< 0.5	< 0 5	< 0.5	< 5.0	< 0 5
6/4/01	<50	<50	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5
6/5/02	< 50	2,300	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5
9/9/02	**< 50**	**1,300**	**< 0.5**	**< 0.5**	**< 0.5**	**< 0.5**	**1.4**	**< 0.5**	**< 5.0**	**< 0.5**
MW-3										
9/6/99	43,000	870	860	70	< 0.5	65	120,000	NA	NA	NA
5/16/00	17,000	< 5,000	2,800	60	380	190	990	9.1	350	< 5.0
8/3/00	16,000	< 2,000	1,600	29	210	53	1,200	21	260	< 2.0
12/5/00	17,000	5,800	1,700	45	460	240	1,100	21	230	< 5.0
3/5/01	29,000	<1300	2,100	68	280	100	180	<8.0	<80	<8.0
6/4/01	17,000	<6,000	2,000	56	340	230	300	<10	130	<10
6/5/02	11,000	<2,000	1,600	46	210	47	790	<10	220	<10
9/9/02	**12,000**	**< 800**	**1,400**	**44**	**130**	**27**	**760**	**< 10**	**160**	**< 10**
RBSL	500	640	46	130	290	13	1,800	NE	NE	VARIES

Notes

MTBE = Methyl-t-butyl ether

TAME = Tert-amyl methyl ether

TBA = Tert-Butanol

RBSL = Risk Based Screening Levels presented in the "Application of Risk-Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater" document prepared by the California Regional Water Quality Control Board, San Francisco Bay Region, dated December 2001

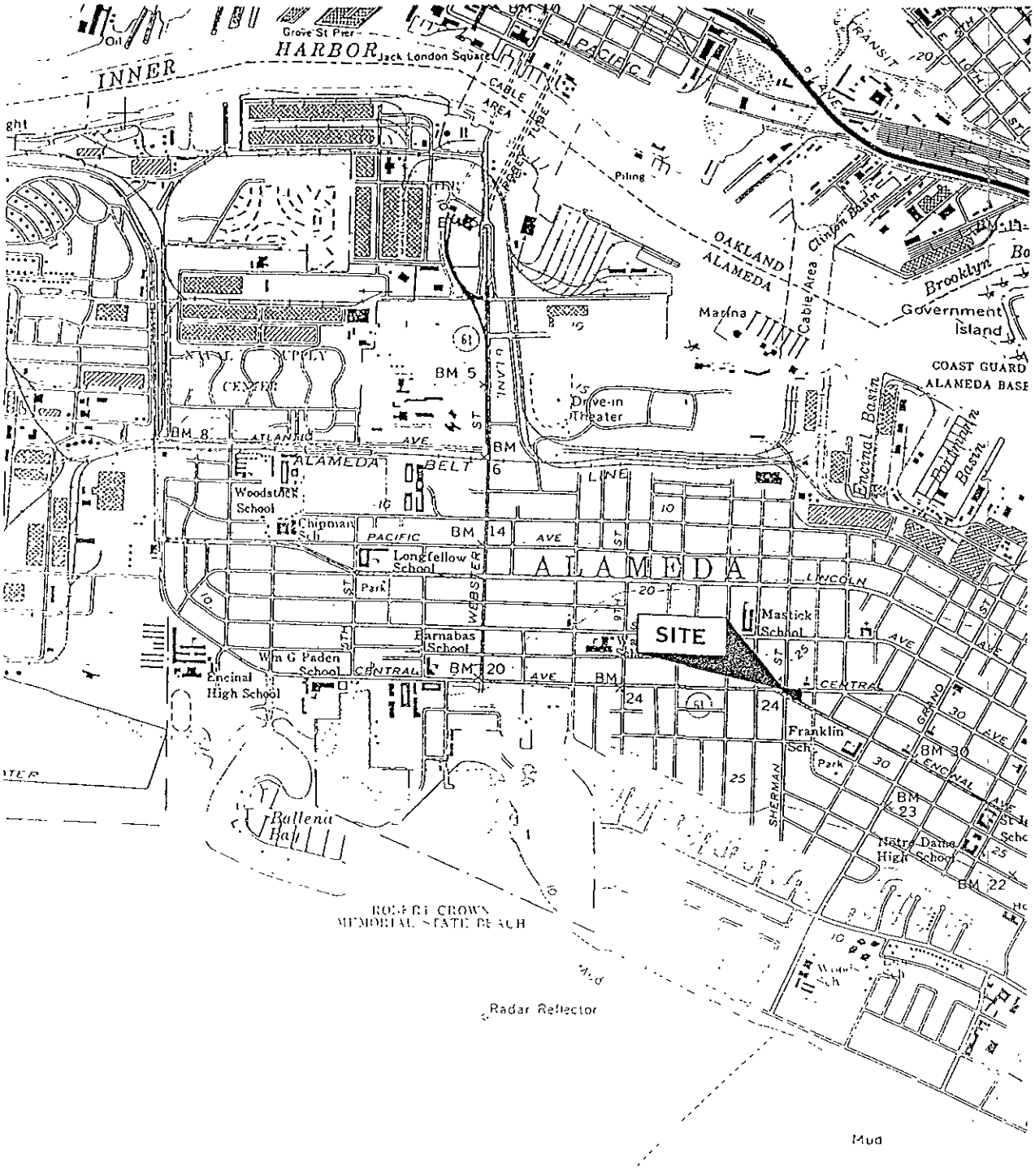
NA = Samples Not Analyzed for this compound

NE = DHS MCLs are not established

Non-detectable concentrations are noted by the less than symbol (<) followed by the detection limit.

Most recent data in bold.

FIGURES



NORTH

LOCATION MAP

SAIDIAN PROPERTY
1310 CENTRAL AVENUE
ALAMEDA, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | Figure 1

RESIDENTIAL

RESIDENTIAL

SIDEWALK

CENTRAL AVENUE

APPROXIMATE LOCATION OF FORMER AND CURRENT USTs

ISLAND

SIDEWALK

MW-3 (22.55')

22.6'

CANOPY

MW-1 (23.12')

22.8'

23.0'

CASHIER

SERVICE BAYS

SIDEWALK

MW-2 (23.20')

RESIDENTIAL

RESIDENTIAL

SHERMAN STREET

ENCINAL AVENUE

SIDEWALK

RESIDENTIAL

LEGEND

MW-3 (22.55') — MONITORING WELL WITH GROUNDWATER ELEVATION IN FEET, ABOVE MEAN SEA LEVEL

22.6' — POTENTIOMETRIC SURFACE CONTOUR

GROUNDWATER FLOW DIRECTION

NORTH

0 30 60 90

SCALE IN FEET

POTENTIOMETRIC SURFACE CONTOUR MAP JUNE 6, 2002

SAIDIAN PROPERTY
1310 CENTRAL AVENUE
ALAMEDA, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | FIGURE 2

RESIDENTIAL

Telephone

8" Sewer

RESIDENTIAL

SIDEWALK

BH-B

BH-C

BH-D

Telephone

BH-E

Telephone

Water

BH-F

6" Sewer Line
Approx. 4.5' BGS

6" Sewer Line
Approx. 4.15' BGS

Gas

CENTRAL AVENUE

Gas

ISLAND

SIDEWALK

BH-L

MW-3

APPROXIMATE LOCATION OF FORMER AND CURRENT USTs

CANOPY

MW-1

BH-A

CASHIER

SERVICE BAYS

MW-2

Groundwater Flow Direction Based on Potentiometric Contours

RESIDENTIAL

Gas

SHERMAN STREET

Approx. 4.06' BGS

BH-K

BH-J

BH-I

SIDEWALK

ENCINAL AVENUE

BH-H

SIDEWALK

RESIDENTIAL

6" Sewer Line
Approx. 3.48' BGS

BH-G

LEGEND

WATER LINE

SEWER LINE

GAS LINE

TELEPONE LINE

PROPOSED BORING LOCATION

BH-K BORING LOCATION

MW-3 MONITORING WELL

NORTH

0 30 60 90

SCALE IN FEET

UNDERGROUND UTILITY & PROPOSED BORING LOCATION MAP

SAIDIAN PROPERTY
1310 CENTRAL AVENUE
ALAMEDA, CALIFORNIA

AQUA SCIENCE ENGINEERS, INC. | FIGURE 3