Technology, Engineering & Construction, Inc.
262 Michelle Court • So. San Francisco, CA 94080-6201 • Contractor's Lic. #762034
Tel: (650) 616-1200 • Fax: (650) 616-1244 • www.tecaccutite.com

RECEIVED
By lopprojectop at 8:47 am, Dec 22, 2005

September 30, 2005

Mr. Amir K. Gholami, REHS
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Division of Environmental Protection
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502-6577

SUBJECT: **UPDATED SITE CONCEPTUAL MODEL**

SITE: **Former Olympian Service Station**
1435 Webster Street
Alameda, California
Fuel Leak Case #RO0000193

Dear Mr. Gholami:

On behalf of Olympian, TEC Accutite is pleased to submit this Updated Site Conceptual Model report for the above referenced site.

If you have any questions or require additional information, please contact the undersigned at (650) 616-1208.

Sincerely,
TEC Accutite

Jing Heisler, PG, CHG

Cc: Ms. Janet Heikel, Olympian
Mr. David Harris, Esq.
Mr. Jeff Farrar

RECEIVED
By lopprojectop at 8:48 am, Dec 22, 2005

UPDATED SITE CONCEPTUAL MODEL

FORMER OLYMPIAN SERVICE STATION
1435 WEBSTER STREET
ALAMEDA, CA

SEPTEMBER 2005

PREPARED FOR:

OLYMPIAN
AND
ALAMEDA COUNTY ENVIRONMENTAL HEALTH

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

On behalf of Olympian, TEC Accutite prepared this Updated Site Conceptural Model (SCM) for the former Olympian service station located at 1435 Webster Street in Alameda, California (Figure 1). This updated SCM addresses the requests of the Alameda County Environmental Health regulatory letter, dated April 28, 2005 (ACEH, 2005). Presented below are the site background and the updated environmental site conditions since the preparation of the last SCM (TEC, 2000).

2.0 SITE BACKGROUND AND ENVIRONMENTAL CONDITIONS

2.1 Site Description

The site is located on the corner of Webster Street and Taylor Avenue in Alameda, CA. Prior to 1989, the site was occupied by an Olympian Service Station. Station facilities consisted of two 10,000-gallon gasoline underground storage tanks (USTs), one 7,500-gallon diesel UST, one 500-gallon waste oil UST and two dispenser islands (Figure 2).

The surrounding topography is flat and the site is approximately 20 feet above mean sea level. The site is situated in a mixed commercial and residential area. The site is currently leased by the City of Alameda and operated as a metered parking lot.

2.2 Environmental Background

October 1988, Soil Gas Survey: CHIPS Environmental Consultants, Inc. performed soil gas analysis at the subject site. High soil gas readings were found on the eastern side of one of the pump islands, between the pump islands, and from backfill between the gasoline storage tanks.

September 1989, Tank Removal: In September 1989, TEC Accutite removed two 10,000-gallon gasoline USTs, one 7,500-gallon diesel UST and one 500-gallon waste oil UST. Analysis of soil samples collected during removal of the USTs detected hydrocarbons at a maximum concentration of 220 parts per million (ppm) Total Petroleum Hydrocarbons as gasoline (TPHg), 430 ppm Total Petroleum Hydrocarbons as diesel (TPHd), and 650 ppm Total Recoverable Petroleum Hydrocarbons as Oil and Grease (TRPH).

January & September 1991, Soil Excavation: Remedial excavation of the hydrocarbon impacted soil was conducted by AAA Tank Removal / Forcade Excavations Services. In January 1991, approximately 550 cubic yards of soil were removed from the former location of the USTs. This soil was bioremediated onsite. In September 1991 (following the bioremediation of the previously excavated soil), additional 300 cubic yards of contaminated soil were removed. Confirmation soil samples were free of detectable concentrations of TPH-g, benzene, toluene, ethyl-benzene, xylenes (BTEX), and TPH-oil but contained 21 to 24 ppm TPH in the diesel range. This “non-standard” TPH-d range material detected was composed of partially-degraded, extractable hydrocarbons which comprise of a portion of the tar wrap material. The majority of the excavated soil had been biologically detoxified and returned to the former excavation under the approval of the Alameda County Health Care Services Agency.

January 1993, Well Installation: Uriah Environmental Services, Inc. installed three monitoring wells onsite (MW-1 through MW-3). Soil samples collected during the well installation contained no detectable concentrations of petroleum hydrocarbons. Bi-annual groundwater monitoring was initiated. Dissolved phase hydrocarbons have been detected in all wells at varying concentrations.

February 1999, Soil Borings: TEC Accutite advanced four borings onsite (B1 through B4) to determine the extent of hydrocarbon impact to soil and groundwater. The soil analytical results detected non-

significant concentrations of TPHg, BTEX, and methyl tert-butyl ether (MTBE). The groundwater samples detected hydrocarbon concentrations up to 6,000 parts per billion (ppb) MTBE and 38,000 ppb benzene.

December 1999, Well Installations: TEC Accutite installed three additional wells MW-4 through MW-6 to define the dissolved phase hydrocarbons and assess plume stability. Analysis of soil samples detected hydrocarbon concentrations of 1,100 ppm TPHg, 200 ppm TPHd and 3.4 ppm benzene from soil collected at 9.5 feet below grade (fbg) in well MW-5. No hydrocarbons were detected in the soil samples collected during the installation of wells MW-4 and MW-6. Groundwater sampling from wells MW-6 and MW-3 defined the dissolved phase hydrocarbon plume upgradient of the former dispenser islands and cross-gradient of the former USTs.

November 2000, Site Conceptual Model: TEC Accutite completed a site conceptual model. Based on historical quarterly monitoring data, it was determined that the contaminant plume is unstable and is undefined downgradient. An assessment of hydrological conditions, proximity to sensitive receptors and current groundwater usage, suggest that MTBE in groundwater is not the primary chemical of concern. Given the shallow groundwater elevation (9 fbg), estimated high permeability of soils beneath the site, the potential for benzene vapor phase migration from hydrocarbon affected groundwater to indoor and ambient air was identified as an exposure pathway requiring future evaluation.

June 2001, Soil Borings: TEC Accutite drilled additional four borings (B1 through B4) to assess the extent of the plume and sampled all wells. Soil samples were collected approximately 9 fbg within the capillary fringe from soil borings B1 through B4. No petroleum hydrocarbons were detected in the soil above laboratory reporting limits. Insignificant concentrations of petroleum hydrocarbons were detected in groundwater samples collected from downgradient and cross gradient soil borings B1 through B4. The greatest concentration of petroleum hydrocarbons was detected in boring B3 at 400 ppb TPHg and 3 ppb MTBE. MTBE was detected in all soil boring groundwater samples below 5 ppb.

The greatest concentration of dissolved phase petroleum hydrocarbons were detected in monitoring well MW-1 at 18,000 ppb TPHg, 1,200 ppb benzene, and 1,500 ppb MTBE. Dissolved phase concentrations of TPHg, benzene, and MTBE in surrounding monitoring wells were either non-detect or insignificant.

February 2002, Risk Assessment: To address the potential exposure pathway identified in the SCM, TEC Accutite performed a site-specific risk assessment. The risk assessment addressed the potential inhalation risk posed by hydrocarbon impacted groundwater beneath the site assuming both residential and commercial land use scenarios. The compounds of concern were identified as TPHg and benzene. TPHg was assessed using the TPH fractional methodology developed by TPH Criteria Working Group. The calculated annual regional mean concentrations for benzene and TPHg were 2,988 ppb and 23,137 ppb, respectively. The results of the risk assessment found that concentrations of TPHg in groundwater beneath the site were below the calculated site specific target level concentrations (SSTL's) for residential and commercial scenarios. Therefore, TPHg remaining in groundwater beneath the site does not present an inhalation risk. Benzene concentrations in groundwater exceed the SSTL for a residential scenario (110 ppb) but are less than the SSTL for a commercial scenario (6400 ppb).

The results of the risk assessment suggest that benzene in groundwater beneath the site may present an inhalation risk, assuming residential land use. The risk assessment was based on the Johnson & Ettinger Vapor Fate and Transport Model, which often overestimates actual vapor concentrations at the point of exposure by factors of 10 to 100. Rather than proceed with site closure under restricted commercial land use, a soil vapor survey was recommended to validate the exposure pathway.

May 2003, Soil Vapor Investigation: In May 2003, TEC Accutite conducted a soil vapor investigation at the site. Eight soil vapor samples (SV1 through SV7, duplicate sample SV7) were collected at selected locations by advancing a 1-inch diameter chrome-moly steel probe equipped with a steel drop tip into the ground to a depth of 3.5 fbg. The objective of the soil vapor investigation was to evaluate potential human exposure to site contaminants created by vapors emanating off impacted groundwater and

intruding into indoor air (inhalation risk). Soil vapor was withdrawn from the formation into a small calibrated syringe connected with an on-off valve. Following sample collection, the valve was closed and the sample immediately transferred to a State Certified onsite laboratory for analysis.

Soil vapor sampling results were either non-detectable or detected below the Environmental Screening Levels (ESLs). Inhalation risk associated with exposure to vapors emanating off impacted groundwater beneath the site determined to be an invalid exposure pathway.

October 2003, Case Closure Summary: TEC Accutite submitted the completed closure summary forms for the site to the Alameda County Environmental Health (ACEH). In a letter dated April 28, 2005, the ACEH requested a stand-alone document for closure review.

In response to this request, TEC Accutite has prepared this report to summarize overall site investigation results and evaluate the appropriateness for site closure.

3.0 UPDATED SITE CONCEPTUAL MODEL

3.1 Site Geology and Hydrogeology

The site is located on the bay plain deposits of the San Francisco Bay consisting of shallow marine and continental deposits known as the “Bay Mud”. Sediments beneath the site consist mainly of fine grained brown sand to a maximum explored depth of 20 fbg. Figure 3 depicts the geological cross-section for the site according to the boring and well logs (Attachment A).

Depth to groundwater at the site varies from 8 to 11 fbg. Groundwater flow direction has consistently been toward the south to southeast at an average gradient of 0.005 ft/ft (Figure 4). Groundwater beneath the site has been designated as potentially suitable for municipal and industrial use (San Francisco Bay Water Quality Control Plan, 1995).

3.2 Hydrocarbon Source

Primary source of fuel hydrocarbons (FHCs) releases associated with the former USTs had been removed. Hydrocarbon impacted soil surrounding the UST excavation was removed and bioremediated onsite. Analysis of the excavated soil following bioremediation found the concentrations of hydrocarbons in soil had been remediated to undetectable levels before it was placed back into the tank excavation. Effective remediation was further confirmed by analysis of soil samples collected during installation of well MW-2 (post tank removal), and by insignificant hydrocarbon concentrations detected in groundwater samples collected from well MW-2 (immediately down-gradient of the former tanks location).

Residual sources that remain in soil, either as vapor or residual (sorbed) phase, are limited in extent. These residuals may release small amounts of FHC constituents through volatilization and/or advection, but are not themselves mobile, and generally cannot supply enough FHC to act as a major source of hazard. They exist at low concentrations and they are not considered a source for continued degradation of soil and groundwater.

No free product has been observed at any of the on site wells. Chemical concentrations have been decreasing or within the historical ranges, suggesting that there’s no residual hydrocarbon material that provides mass to the dissolved hydrocarbon plume.

3.3 Plume Conceptual Model

Soil

A total of 22 soil samples were collected at this site since soil excavation. As shown in Table 1, elevated hydrocarbon concentrations (1,100 ppm TPHg, 200 ppm TPHd, 3.4 ppm benzene) were detected in one soil sample from MW-5 at 9.5 fbg. A review of drill logs and groundwater elevations suggests the sample was collected from the saturated zone. Based on the moderate estimated permeability of soils beneath the site and shallow groundwater elevation, any past release of hydrocarbons from the dispenser islands or product piping would have migrated to groundwater. Past investigations (well installations MW-1, MW-5, and soil borings B1-B4) surrounding the dispensers have found soil hydrocarbon concentrations to be non-detect. Based on past boring investigations and subsurface characteristics, large concentrations of hydrocarbons are unlikely to be residual in soil.

Groundwater

A total of 6 groundwater monitoring wells were installed and monitored onsite, and 4 grab groundwater samples were collected offsite. The stability of groundwater contaminant plume is examined by concentration-time plots for benzene and MTBE (indicator compounds) and concentration distribution map (Figures 5 & 6).

The most recent groundwater data in July 2005 indicated that elevated concentrations had been observed at two onsite wells MW-1 and MW-5 and non-detectable or non-significant concentrations were shown in other wells (Table 2, Figure 5). Groundwater monitoring at this site was continuous from year 1999 to 2001, over two to three years period of time. Groundwater concentration changes over time for monitoring wells MW-1 and MW-5 are presented in Figure 5. At well MW-1, peak concentrations of benzene and MTBE were occurred around the time of the beginning of 1999 (2/11/1999) and are now decreasing. At well MW-5, the highest detected concentrations of benzene and MTBE occurred in 1999 (12/6/1999). Since well MW-5 was not installed until November 1999, the occurrence of the real peak concentration at this well might be earlier and is not known exactly. A decreasing trend is noted at well MW-5. Low concentrations were shown in the most recent (2005) groundwater sample (Table 2). Overall, chemical concentrations are now decreasing and much lower than the historical high, suggesting that the dissolved hydrocarbon plume is stable onsite.

Figure 6 shows the estimated area where historical groundwater sample results exceeded the respective ESLs. Based on the hydrocarbon concentration distribution, it is evident that the source of hydrocarbons is from the former dispenser islands and/or from the former product piping trench. High concentrations of hydrocarbons in groundwater were observed close to the source area near the dispenser islands. Groundwater data collected from monitoring wells and borings on 6/27/2001 indicated that petroleum hydrocarbon concentrations decrease with distance from the source.

Based on the calculated flow velocity, it would take about 7 years for groundwater to move to the offsite groundwater sampling location B3 or B4 (Attachment B). The sorption of chemicals to the aquifer solids causes them to move slower on average than groundwater. This effect is called retardation. Since MTBE has very low retardation and minimal biodegradation in groundwater, MTBE is a good indicator of how far the plume has traveled. The high concentration of MTBE detected at well MW-1 in 1999 and low concentrations of MTBE shown at downgradient sampling location B3 or B4, suggest that petroleum plumes had not traveled very far. In other words, the dissolved plume was transported in a low groundwater velocity aquifer. Chemical concentrations are decreasing with time and distance; the dissolved hydrocarbon plume seems to be stable. However, no groundwater data have been obtained at downgradient locations off-site since 2001. The stability of the plume can be verified by collecting current groundwater sample(s) at these downgradient locations.

Soil Vapor

Two rounds of soil gas surveys have been conducted at this site. The 1988 soil gas survey indicated that high soil gas readings were found adjacent to the UST locations, on the eastern side of one of the dispenser islands and in-between the dispenser's islands (Table 3) (CHIPS, 1988). Note that soil vapor samples collected in 1988 were analyzed by an FID hydrocarbon monitor (Beckman 400), so all vapor-phase hydrocarbons were detected as one result including methane and heavier hydrocarbons. Since methane would be included in the result, gasoline hydrocarbon values can be vastly overestimated.

The second round of soil vapor survey was conducted in 2003 (TEC, 2003). The soil gas concentrations were either non-detectable or below the ESLs. However, the detection limit for benzene (1 mg/m^3) was greater than the ESL value (0.085 mg/m^3). Therefore, benzene may or may not be an issue and compliance with the ESL cannot be demonstrated based on available data.

3.4 Risk Conceptual Model

3.4.1 Potential Sensitive Receptors

Sensitive receptor survey conducted in year 2000 identified two sensitive receptors within a 1,000 feet (ft) radius of the site (Figure 1) (TEC, 2000).

1. Saint Barnabas Elementary School, located at 1400-6th Street, is approximately 500 ft west-southwest of the site in a cross-gradient direction.

2. News Maker Home Day Care Center, located on the corner of Taylor and 6th Street is approximately 500 ft west of the site in an up cross-gradient direction.

Given the groundwater flow direction and historical hydrocarbon concentrations in cross-gradient wells MW-2, MW-3, MW-6, it is unlikely that site hydrocarbons present any risk to the above sensitive receptors. In other words, cross-gradient receptors are under no threat from site hydrocarbons.

A review of records at the Department of Water Resources (DWR) indicated that no domestic, municipal or industrial wells exist within a 1,000 ft radius of the site. Nine groundwater monitoring wells were identified during the review including the six wells located at 1435 Webster Street, and 3 up-gradient wells used for groundwater monitoring at the Shell Gas Station located at 1601 Webster Street (approximately 1,000 ft north of the site) (Figure 1).

There is no surface water within a 1,000 ft radius of the site. The nearest surface water is the San Francisco Bay located approximately 1,500 ft south of the site. Since the most down-gradient collected groundwater sample (B4), located approximately 200 ft from the site, was not significantly impacted by the dissolved phase petroleum hydrocarbon plume; the plume is unlikely to reach the nearby creek/lagoon located more than 1,500 ft away. Given the distance to San Francisco Bay, site hydrocarbons pose no threat to surrounding surface water.

Therefore, no sensitive receptors would likely be impacted by the contaminants on-site according to the available information.

3.4.2 Potential Exposure Pathways

Inhalation Pathway

Due to the elevated groundwater concentrations at wells MW-1 and MW-5, on-site trespassers or future residents are the primary receptors of potential inhalation concern at the site. For protection of trespassers and potential future residents from inhalation of outdoor and indoor air, inhalation is considered to be a complete pathway.

Ingestion Pathway

Incidental soil ingestion for site trespassers is unlikely because the site is covered with asphalt.

Groundwater directly beneath the site is not used as a current or potential drinking water resource; no water wells exist within 1,000 ft radius of the site, as such the ingestion exposure pathway is not relevant.

Direct Contact Pathway

Direct contact with chemicals in soil is assumed to occur during outdoor activities. However, the likelihood of trespassers directly contacting outdoor surface soil is unlikely since the site is covered by asphalt. Nonetheless, the possibility of direct contact with chemicals in soil is considered for construction workers. To address the possibility of future short-term but intensive exposures to chemicals in subsurface soil, a construction worker is assumed to have skin contact with chemicals in soil ranging from the surface to 10 fbg. Direct contact with chemicals of concern in groundwater is possible for construction worker(s).

Direct contact with chemicals of concern in surface water is unlikely. Since low concentrations were observed at about 200 ft away down-gradient of the site, the nearest surface water located approximately 1,500 ft away, is unlikely to be impacted.

In summary, the following exposure pathways are assumed to be complete:

- Inhalation of chemicals in outdoor air for trespassers and indoor air for potential future residents.
- Skin contact of chemicals for construction workers.

Inhalation of vapor in indoor air is believed to be the most significant exposure pathway at the site.

3.4.3 *Potential Risks to Human Health*

Quantification of potential human exposure in relation to the contamination by petroleum hydrocarbons in soil and groundwater, baseline human health risks are evaluated using the computer software "RBCA Tool Kit for Chemical Releases" (Groundwater Services Inc., 2000) designed to meet the requirements of the ASTM PS 104 Standard Provisional Guide for Risk Based Corrective Action. The site is a commercial site, but might be used for residential in the future. The cancer risks and noncancer hazard indices were calculated using RBCA model default exposure parameters and site-specific characteristics for the identified exposure pathways. The chemical-specific physical parameters were obtained from RBCA database and its toxicological parameters were modified to reflect CalEPA-specific toxicity factors. A conservative approach was adopted by using the lowest toxicity value to calculate the risks.

Since the USTs were removed in 1989 and no continuous fresh spills exist at the site, weathered product is assumed in the risk assessment. Based on the type of petroleum used at the site, benzene and MTBE were identified as carcinogenic "indicator compounds"to evaluate risks associated with petroleum hydrocarbons in soil and groundwater. Other petroleum compounds exist within the subsurface at concentrations above ESLs, however considering the range of physical, chemical and toxicological properties of benzene and MTBE, evaluation of risk based on these two compounds (benzene and MTBE) is adequate to be protective of other petroleum compounds.

Data used to calculate exposures to chemicals in on-site indoor air and on-site soil and groundwater are the site averaged concentrations. Site averaged concentration was calculated using ProUCL software developed by EPA (USEPA, 2004) and presented in Attachment C. Note that data from the last four groundwater sampling events at the site were averaged in the calculation to obtain more representative data. One-half of the detection limit was used in the calculation of the non-detected sampling results.

The cancer risks were calculated as 3.5×10^{-5} for "hypothetical" building occupants, conservatively estimated to be in the range of one hundred-in-a-million (10^{-4}) to one-in-a-million (10^{-6}). This risk is more

than the 10^{-6} target cancer risk level. Indoor air and soil exposure pathways exceeded acceptable risks. The non-carcinogenic hazard index is less than the target level (i.e., value of 1) for receptors in all pathways. Therefore, the chemicals in soil vapor, soil, and groundwater at the site pose no non-carcinogenic hazard under current conditions. Details of the model input parameters and risk calculation are presented in Attachment C.

It should be noted that the calculated risk estimates are likely to over-predict actual risk because of the conservative nature of the fate and transport models used in the analysis. Based on the current conditions at the site, the actual risks are probably lower than the modeled risk level due to the fact that the site is covered with asphalt and currently used as a parking lot and only trespassers might be exposed to the potential vapor and the estimated cancer risk for outdoor exposure scenario is 6.5×10^{-7}, below the acceptable level.

In conclusion, there is no risk for trespassers based on current site conditions. However, future building occupants might be at risk for contracting cancer. The primary reason for the elevated risk is inhalation of indoor air containing chemicals of potential concern.

4.0 CONCLUSIONS

Due to the uncertainty of benzene vapor concentration on-site and present groundwater concentrations off-site, and the risks calculated to be above the acceptable level, TEC Accutite recommends submitting a workplan to:

1) Verify vapor intrusion pathway by collecting soil vapor samples using Summa Canisters and analyzing for benzene using low detection limits (equal to or less than ESL).

2) Obtain a geotechnical sample in the unsaturated zone to facilitate site-specific evaluation of vapor volatilization at the site.

3) Evaluate stability of the dissolved-phase hydrocarbon plume concentrations at down-gradient locations by collecting groundwater samples.

Pending results from these vapor sampling and off-site groundwater investigations, TEC Accutite will determine the course of action for this site, be it closure or further corrective actions.

5.0 LIMITATIONS

Our services consist of professional opinions, conclusions and recommendations made today in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. TEC Accutite's liability is limited to the dollar amount of the work performed.

This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk. Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

TEC Accutite would like to thank you in advance for your assistance and prompt attention to this matter. If you have any questions or comments, please feel free to contact Jing Heisler at (650) 616-1208.

Sincerely,
TEC Accutite

Prepared by:

Jing Heisler, PG, CHG.
Project Manager

PROFESSIONAL GEOLOGIST
JING HEISLER
No. 666
CERTIFIED
HYDROGEOLOGIST
Exp. 2/28/07
STATE OF CALIFORNIA

Reviewed by:

Nicholas B. Haddad
Environmental Director

cc: Ms. Janet Heikel, Olympian
Mr. David Harris, Esq.
Mr. Jeff Farrar

6.0 REFERENCES

- ACEH, 2005. Alameda County Environmental Health, "*Fuel Leak Case #RO0000193, Environmental Investigation at Former Olympian, 1435 Webster Street, Alameda, CA*", April 28, 2005.

- California Regional Water Quality Control Board, "*Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater*", Interim Final – February 2005.

- CHIPS, 1988. Chips Environmental Consultants, Inc., "*Field Sampling and Analysis of Soil Gases at 1435 Webster, Alameda, California*", October, 1988.

- Groundwater Services Inc., *RBCA Tool Kit for Chemical Releases*, Computer Software, 2000

- TEC, 2000. TEC Accutite, "*Quarterly Groundwater Monitoring, Sensitive Receptor Survey and Site Conceptual Model*", November 29, 2000.

- TEC, 2002. TEC Accutite, "*Quarterly Monitoring Report for December 2001, Tier 2 RBCA Report*", February 15, 2003.

- TEC, 2003. TEC Accutite, "*Soil Vapor Investigation Report*", May 2003.

- USEPA, 2004. United States Environmental Protection Agency, "*ProUCL Version 3.0 User Guide*", April, 2004

- URIAH, 1991. Uriah Inc., "*Interim Report of Remedial Activities at 1435 Webster Street, Alameda, California*", October, 1991.

- URIAH, 1993. Uriah Inc., "*The Installation of Three Groundwater Monitoring Wells at 1435 Webster Street, Alameda, California*", March 25, 1993.

TABLES

Table 1: Soil Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Date	Depth (ft bgs)	TPHg	TPHd	TPHo	B	T	E	X	MTBE
			Concentrations in parts per million (ppm)							
Confirmation Soil Samples after Excavation										
WEB1	9/27/1991	15	<1	23	<50	<0.003	<0.003	<0.003	<0.003	NA
WEB2	9/27/1991	15	<1	21	<50	<0.003	<0.003	<0.003	<0.003	NA
WEB3	9/27/1991	15	<1	23	<50	<0.003	<0.003	<0.003	<0.003	NA
WEB4	9/27/1991	15	<1	24	<50	<0.003	<0.003	<0.003	<0.003	NA
FS-18	9/27/1991	18	<1	<10	<50	**0.12**	0.016	<0.003	0.023	NA
On-Site Soil Samples										
MW-1	1/11/1993	5	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
MW-1	1/11/1993	10	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
MW-2	1/11/1993	5	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
MW-2	1/11/1993	10	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
MW-3	1/12/1993	5	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
MW-3	1/12/1993	10	<1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
B1-7.5	2/11/1999	7.5	0.65	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
B2-7.5	2/11/1999	7.5	<0.5	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
B3-6	2/11/1999	6	<0.5	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
B4-7.5	2/11/1999	7.5	<0.5	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
MW-4	11/11/1999	9.5	<0.5	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
MW-5	11/10/1999	9.5	**1,100**	**200**	NA	**3.4**	**21**	**14**	**70**	<0.02
MW-6	11/10/1999	9	<0.5	<1.0	NA	<0.005	<0.005	<0.005	<0.010	<0.005
Off-Site Soil Samples										
B1-9	6/27/2001	9	<0.5	NA	NA	<0.005	<0.005	<0.005	<0.01	<0.005
B2-9	6/27/2001	9	<0.5	NA	NA	<0.005	<0.005	<0.005	<0.01	<0.005
B3-9	6/27/2001	9	<0.5	NA	NA	<0.005	<0.005	<0.005	<0.01	<0.005
B4-9	6/27/2001	9	<0.5	NA	NA	<0.005	<0.005	<0.005	<0.01	<0.005
		ESLs	100	100	500	0.044	2.9	3.3	2.3	0.023

Table 1: Soil Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Abbreviations / Notes

TPHg = Total petroleum hydrocarbons as gasoline, EPA Method 8015.
TPHd = Total petroleum hydrocarbons as diesel, EPA Method 8015.
TPHo = Total petroleum hydrocarbons as oil and grease, SM 5520 E/F
B T E X = Benzene, Toluene, Ethylbenzene, Xylenes, EPA Method 8020.
MTBE = Methyl tert-butyl ether, EPA Method 8020
<X or ND = Concentration less than laboratory reporting limit
NA = not analyzed or not available ft bgs = feet below ground surface
ESLs = Environmental Screening Levels obtained from Table A, assuming residential land use and groundwater is a current or potential drinking water resource (CARWQCB, Interim Final, February 2005).
Numbers in bold exceeded the respective ESL.

Table 2: Groundwater Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Date	Depth to Water (ft bgs)	TPHg	TPHd	B	T	E	X	MTBE	TRPH
			Concentrations in parts per billion (ppb)							
Groundwater Sampes from Monitoring Wells										
MW-1	06/03/1993	NA (1)	NA	NA	NA	NA	NA	NA	NA	NA
	09/14/1994	11.46	14,000	<50	44	28	25	50	NA	800
	12/30/1994	9.22	4,000	<50	12	9	6.8	30	NA	<500
	03/26/1995	6.76	1,000	<50	21	10	7.1	25	NA	2,100
	07/09/1995	8.92	16,000	<50	57	28	25	53	NA	NA
	07/31/1998	8.3	4,700	1,700	1,300	48	140	150	6,600	<5000
	02/11/1999	7.91	25,000	2000	18,000	1,600	1,400	500	28,000	NA
	06/23/1999	9.03	42,000	4,900	11,000	1,100	1,500	2,300	15,000	NA
	12/06/1999	10.86	44,000	4,000	8,900	3,400	1,900	5,100	11,000	NA
	03/16/2000	6.93	5,100	700	2,400	100	280	460	2,700 (2)	NA
	06/13/2000	8.73	17,000	2,800	5,300	260	720	790	7,000 (2)	NA
	09/29/2000	10.18	50,000	5,200*	11,000	2,900	1,900	4,600	7,200 (2)	NA
	03/22/2001	8.24	8,600	1,500*	2,600	750	250	950	3,200 (2)	NA
	06/25/2001	9.73	18,000	NA	1,200	1,800	970	3,200	1,500 (2)	NA
	09/28/2001	11.06	48,000	NA	5,200	6100	2200	8100	4000	NA
	12/26/2001	8.11	524	NA	216	1.2	8.6	7.4	721	NA
	07/07/2005	6.93	1,500	NA	190	15	36	29	1,100	NA
MW-2	06/03/1993	9.54	<50	<50	5.8	<0.5	<0.5	<0.5	NA	<500
	09/14/1994	11.82	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	12/30/1994	9.46	160	<50	1.4	1.4	0.8	5	NA	<500
	03/26/1995	6.82	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	07/09/1995	9.22	NA	NA	NA	NA	NA	NA	NA	NA
	07/31/1998	8.56	<50	220	<0.5	<0.5	<0.5	<0.5	73	<500
	02/11/1999	8.12	<50	<50	<0.5	<0.5	<0.5	<0.5	75	NA
	06/23/1999	9.33	<50	420	<0.5	<0.5	<0.5	<0.5	96	NA
	12/06/1999	11.2	300	<110	28	45	6	37	210	NA
	03/16/2000	6.88	<50	<50	1	<0.5	0.5	1	3	NA
	06/13/2000	8.99	68	<50	0.8	<0.5	<0.5	<0.5	38	NA
	09/29/2000	10.4	67	<50	0.8	0.5	<0.5	1	86 (2)	NA

Table 2: Groundwater Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Date	Depth to Water (ft bgs)	TPHg	TPHd	B	T	E	X	MTBE	TRPH
			Concentrations in parts per billion (ppb)							
MW-2	03/22/2001	8.46	<50	<50	1	0.5	<0.5	1	14	NA
	06/25/2001	10.11	<50	NA	<0.5	<0.5	<0.5	<1.0	13	NA
	09/28/2001	11.4	300	NA	4	6	3	10	130	NA
	12/26/2001	8.28	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	ND
	07/07/2005	6.88	<50	NA	<0.5	<0.5	<0.5	<1.0	20	NA
MW-3	06/03/1993	9.8	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	09/14/1994	12.19	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	12/30/1994	9.72	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	03/26/1995	6.88	<50	<50	<0.5	<0.5	<0.5	<0.5	NA	<500
	07/09/1995	9.52	NA	NA	NA	NA	NA	NA	NA	NA
	07/31/1998	8.4	<50	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<5000
	02/11/1999	7.77	<50	<50	<0.5	<0.5	<0.5	<0.5	<0.5	NA
	06/23/1999	9.21	<50	<50	<0.5	<0.5	<0.5	<0.5	3	NA
	12/06/1999	11.12	<50	<110	3	1	<0.5	1	0.6	NA
	03/16/2000	6.48	<50	<50	<0.5	<0.5	<0.5	<1.0	1	NA
	06/13/2000	8.76	490	<50	0.8	<0.5	<0.5	9	2	NA
	09/29/2000	10.2	57	<50	<0.5	<0.5	<0.5	<1.0	<1.0 (2)	NA
	03/22/2001	8.24	<50	<50	<0.5	<0.5	<0.5	<1.0	2	NA
	06/25/2001	10.04	<50	NA	<0.5	<0.5	<0.5	<1.0	0.8	NA
	09/28/2001	11.34	91	NA	<0.5	<0.5	<0.5	2	2	NA
	12/26/2001	8.01	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	NA
	07/07/2005	6.48	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	NA
MW-4	12/06/1999	10.79	<50	160	3	2	0.6	4	140	NA
	03/16/2000	6.86	<50	90	0.5	0.5	<0.5	2	34	NA
	06/13/2000	8.18	56	<50	<0.5	<0.5	<0.5	<1.0	1	NA
	09/29/2000	10.11	92	<50	0.7	<0.5	<0.5	3	<1.0 (2)	NA
	04/05/2001	8.26	51	<50	<0.5	0.5	<0.5	1	6 (2)	NA
	06/25/2001	9.68	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	NA
	09/28/2001	10.98	<50	NA	<0.5	<0.5	<0.5	2	2	NA

Table 2: Groundwater Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Date	Depth to Water (ft bgs)	TPHg	TPHd	B	T	E	X	MTBE	TRPH
			Concentrations in parts per billion (ppb)							
MW-4	12/26/2001	8.18	<50	NA	1.6	1.7	1.6	4.4	2.7	NA
	07/07/2005	6.86	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	NA
MW-5	12/06/1999	10.17	30,000	2,800	2,200	3,300	910	7,000	670	NA
	03/16/2000	6.28	3,500	1,100	1,100	260	210	6,300	260	NA
	06/13/2000	7.95	6,500	1,100	2,200	360	360	730	480	NA
	09/29/2000	9.54	3,900	700*	990	120	300	340	390 (2)	NA
	03/22/2001	7.48	4,300	380*	780	240	250	530	190	NA
	06/25/2001	9.05	3,100	NA	1,000	110	200	320	140	NA
	09/28/2001	10.39	3,000	NA	1,200	77	120	170	770	NA
	12/26/2001	7.28	3,240	NA	738	262	218	626	66.4	NA
	08/24/2005	8.65	150	NA	57	3	8	3.9	67	NA
MW-6	12/06/1999	11.46	<50	110	2	2	0.8	8	1	NA
	03/16/2000	8.32	<50	<50	8	8	5	18	<0.5	NA
	06/13/2000	9.14	75	<50	0.7	1	0.9	2	0.6	NA
	09/29/2000	10.81	<50	<50	<0.5	<0.5	<0.5	<1.0	<0.5	NA
	03/22/2001	8.64	66	<50	0.5	<0.5	<0.5	<1.0	3	NA
	06/25/2001	10.39	<50	NA	<0.5	<0.5	<0.5	<1.0	4	NA
	09/28/2001	11.7	63	NA	2	ND	ND	1	3	NA
	12/26/2001	8.4	<50	NA	<0.5	<0.5	<0.5	1.4	<0.5	NA
	07/07/2005	8.32	<50	NA	<0.5	<0.5	<0.5	<1.0	<0.5	NA
Grab Groundwater Samples from Soil Borings										
B1	6/27/2001	9	<50	NA	<0.005	3	<0.005	<0.01	4	NA
B2	6/27/2001	9	<50	NA	<0.005	0.9	0.5	2	4 (2)	NA
B3	6/27/2001	9	400	NA	<0.005	1	0.6	1	3	NA
B4	6/27/2001	9	96	NA	2	3	0.6	2	2	NA
		ESLs	100	NA	1	40	30	20	5	NA
		SSTLs	7,200	NA	110	NA	NA	NA	NA	NA

Table 2: Groundwater Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Date	Depth to Water (ft bgs)	TPHg	TPHd	B	T	E	X	MTBE	TRPH
			Concentrations in parts per billion (ppb)							

Abbreviations

TPHg = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015; since July 2005 by EPA 8260

TPHd = Total Petroleum Hydrocarbons as Diesel (EPA Method 8015)

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes by EPA Method 8020; since July 2005 by EPA 8260

MTBE = Methyl tert-butyl Ether by EPA Method 8020; July 2005 by EPA 8260

TRPH = Total Recoverable Petroleum Hydrocarbons

<X = Concentration less than laboratory reporting limit

NA = not available or not analyzed

ESLs = Environmental Screening Levels obtained from Table F-1a, assuming groundwater is a current or potential drinking water resource (CARWQCB, Interim Final, February 2005).

SSTLs = Site Specific Target Level developed by TEC Accutite detailed in a report entitled "Quarterly Monitoring Report for December 2002, Tier 2 RBCA Report", dated February 15, 2002

Notes

(1) Well not accessible because of a car obstruction

(2) Confirmed by EPA Method 8260

* Does not match diesel chromatogram pattern

TABLE 3: Soil Vapor Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Depth (fbg)	Sample Date	TH	TPH	B	T	E	X (mp)	MTBE	TBA	DIPE	ETBE	TAME	Freon 11	Freon 12
			Concentrations in mg/m3												
Pre-Remediation (Soil Excavation)															
1	8	10/11/1988	900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	8	10/11/1988	180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3	11	10/11/1988	90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4	8	10/11/1988	9,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	810	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	8	10/11/1988	50,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	8	10/11/1988	41,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	8	10/11/1988	59,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	8	10/11/1988	72,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	8	10/11/1988	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	810	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10	8	10/11/1988	42,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	2,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	8	10/11/1988	900	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
12	8	10/11/1988	2,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13	8	10/11/1988	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3: Soil Vapor Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Depth (fbg)	Sample Date	TH	TPH	B	T	E	X (mp)	MTBE	TBA	DIPE	ETBE	TAME	Freon 11	Freon 12
			Concentrations in mg/m3												
14	8	10/11/1988	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	8	10/11/1988	56,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
16	8	10/11/1988	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
17	8	10/11/1988	4,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
18	8	10/11/1988	34,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19	8	10/11/1988	270	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
20	8	10/11/1988	43,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
21	8	10/11/1988	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
22	8	10/11/1988	63,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11	10/11/1988	3,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
23	8	10/11/1988	67,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
24	8	10/11/1988	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
25	8	10/11/1988	45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Post-Remediation (Soil Excavation)															
SV-1	3.5	05/14/03	NA	19	<1	1.9	<1	<1	<1	<5	<1	<1	<1	<1	1
SV-2	3.5	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	1.5	1.4
SV-3	3.5	05/14/03	NA	20	<1	3.7	<1	<1	<1	<5	<1	<1	<1	<1	<1
SV-4	3.5	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1

TABLE 3: Soil Vapor Analytical Results - Former Olympian Station, 1435 Webster Street, Alameda, CA

Sample ID	Sample Depth (fbg)	Sample Date	TH	TPH	B	T	E	X (mp)	MTBE	TBA	DIPE	ETBE	TAME	Freon 11	Freon 12
			Concentrations in mg/m3												
SV-5	3.5	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	8.7	7.9
SV-6	3.5	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	1.1	1.9
SV-7	3.5	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1
	3.5dup	05/14/03	NA	<3.5	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1
		ESL (mg/m^3)	NA	26	0.085	63	420	150	9.4	NA	NA	NA	NA	NA	NA

Abbreviations

TH = Total hydrocarbons calibrated as propane, C3. Data obtained from "Field Sampling and Analysis of Soil Gases at 1435 Webster, Alameda, CA", prepared by Chips Environmental Consultants, Inc., dated October 1988.

TPH = Total petroleum hydrocarbons by EPA method 8015M

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes by EPA Method 8260B

Freon 11 = Trichloroluoromethane by EPA Method 8260B

Freon 12 = Dichlorodifluoromethane by EPA Method 8260B

TBA = Tert-Butanol by EPA Method 8260B

MTBE = Methyl-tert-butyl ether by EPA Method 8260B

DIPE = Diisopropyl ether by EPA Method 8260B

ETBE = Ethyl-tert-butyl ether by EPA Method 8260B

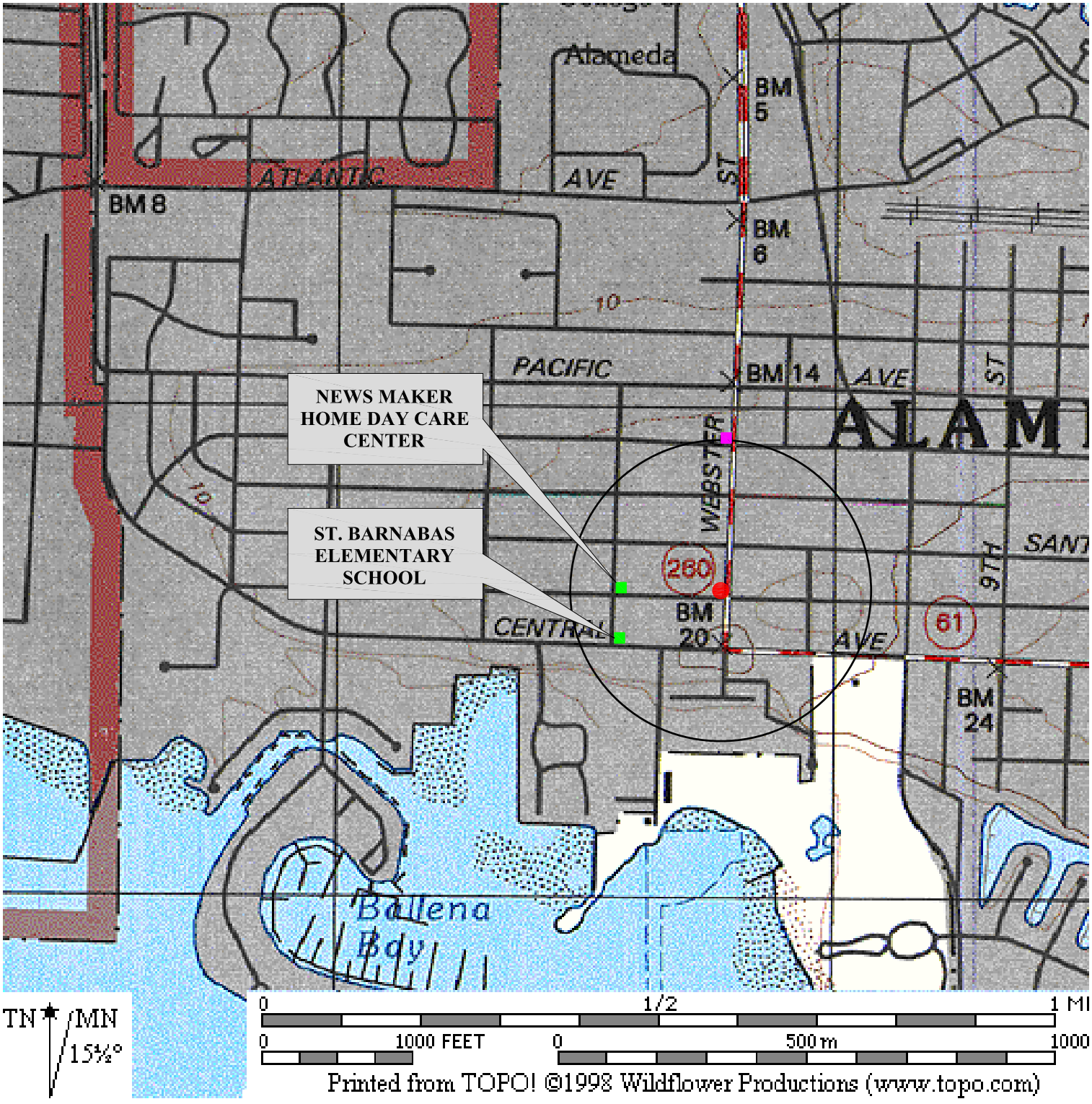
TAME = Tert-amyl methyl ether by EPA Method 8260B

<x = compound not detected above laboratory reporting limits

NA = Not Analyzed or Not Available

ESL= Soil gas screening level for protection of indoor air (emissions from impacted groundwater) assuming coarse soils and residential land use (CRWQCB Interim Final, February 2005, Table E)

FIGURES



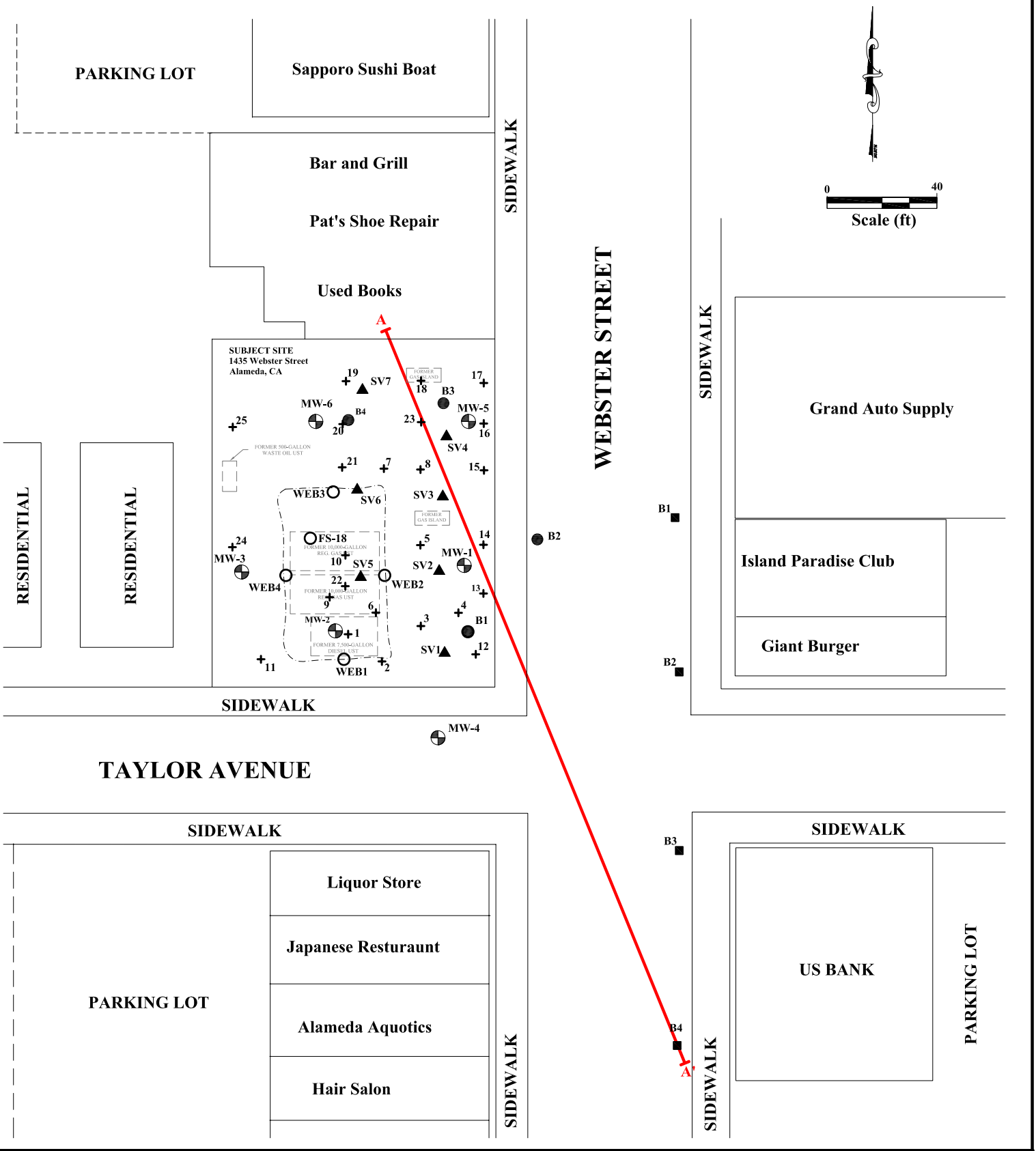
LEGEND:

- SITE LOCATION
- APPROXIMATE 1,000-FT RADIUS
- SENSITIVE RECEPTOR
- SHELL GAS STATION (1601 WEBSTER STREET)

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 1
VICINITY MAP WITH SENSITIVE RECEPTORS

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA



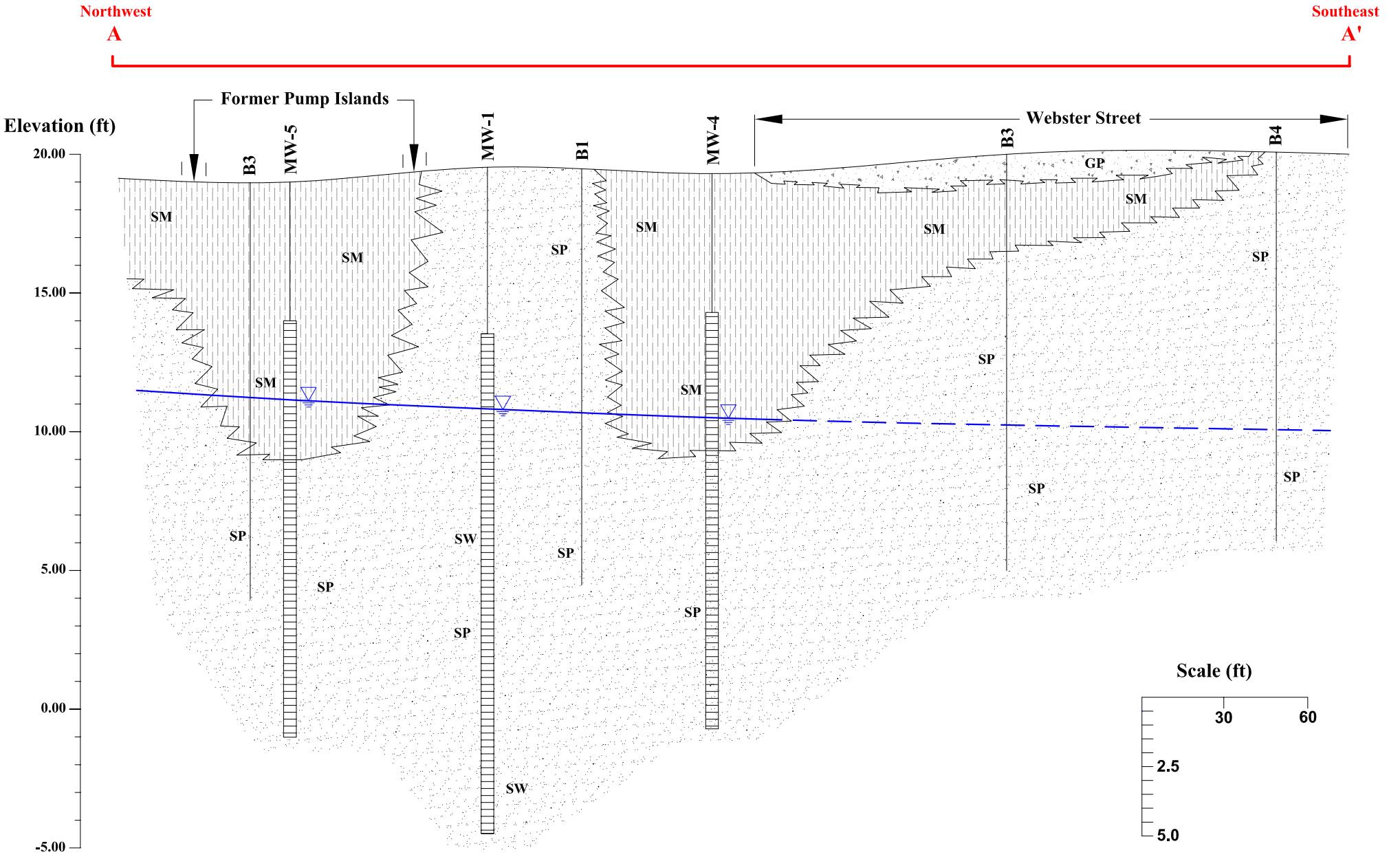
LEGEND:

- Monitoring Well
- Onsite Soil Boring
- OffsiteSoil Boring
- Excavation Boundary
- Vapor Sample (2003)
- Soil Gas Sample (1988)
- Excavation Confirmation Sample
- A A' Cross-section transect

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 2
SITE MAP WITH HISTORICAL SAMPLING LOCATIONS

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA



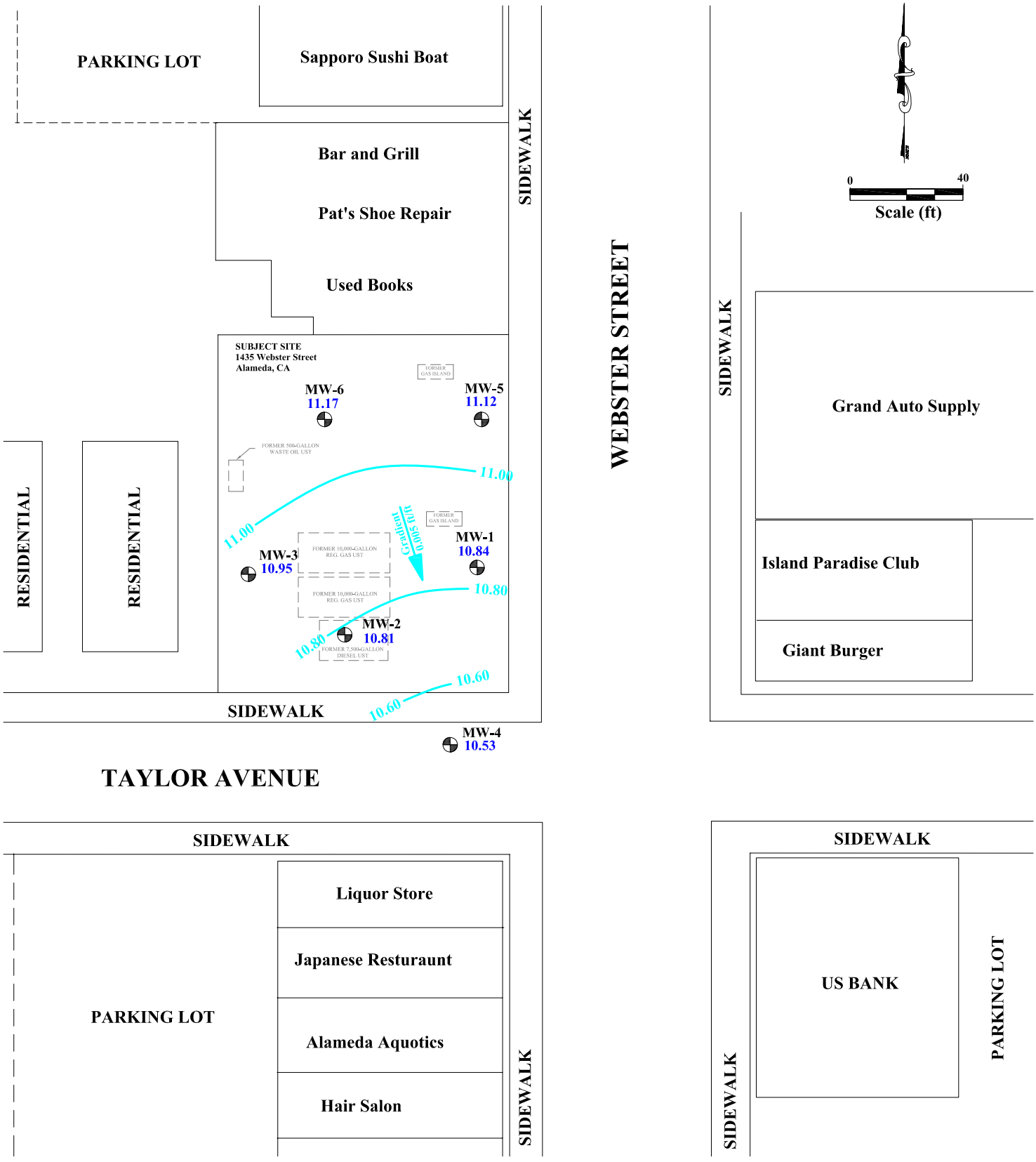
LEGEND:

- SP/SW — Sand; Poorly and Well Graded
- SM — Silty Sand
- GP — Artificial Road Base Gravel (Webster Street)
- Groundwater table based on data collected July 7, 2005; dashed where inferred.
- Well Casing and Screen
- Soil Boring

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 3
GEOLOGIC CROSS SECTION

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA



LEGEND:

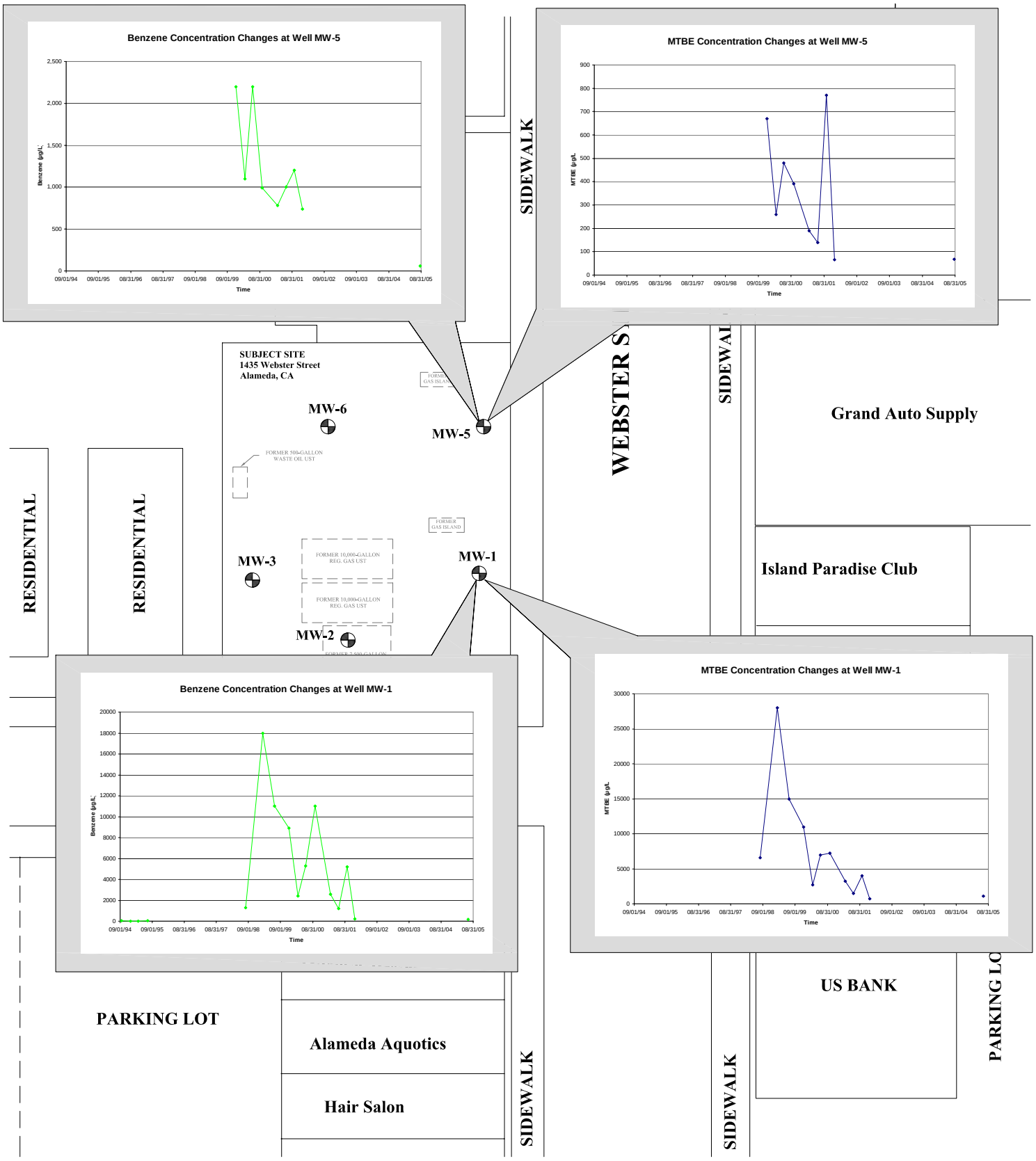
MW-1
10.84 — Monitoring Well and Groundwater Elevation

11.00 — Groundwater Elevation Contour

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 4
GROUNDWATER GRADIENT MAP
(JULY 2005)

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA



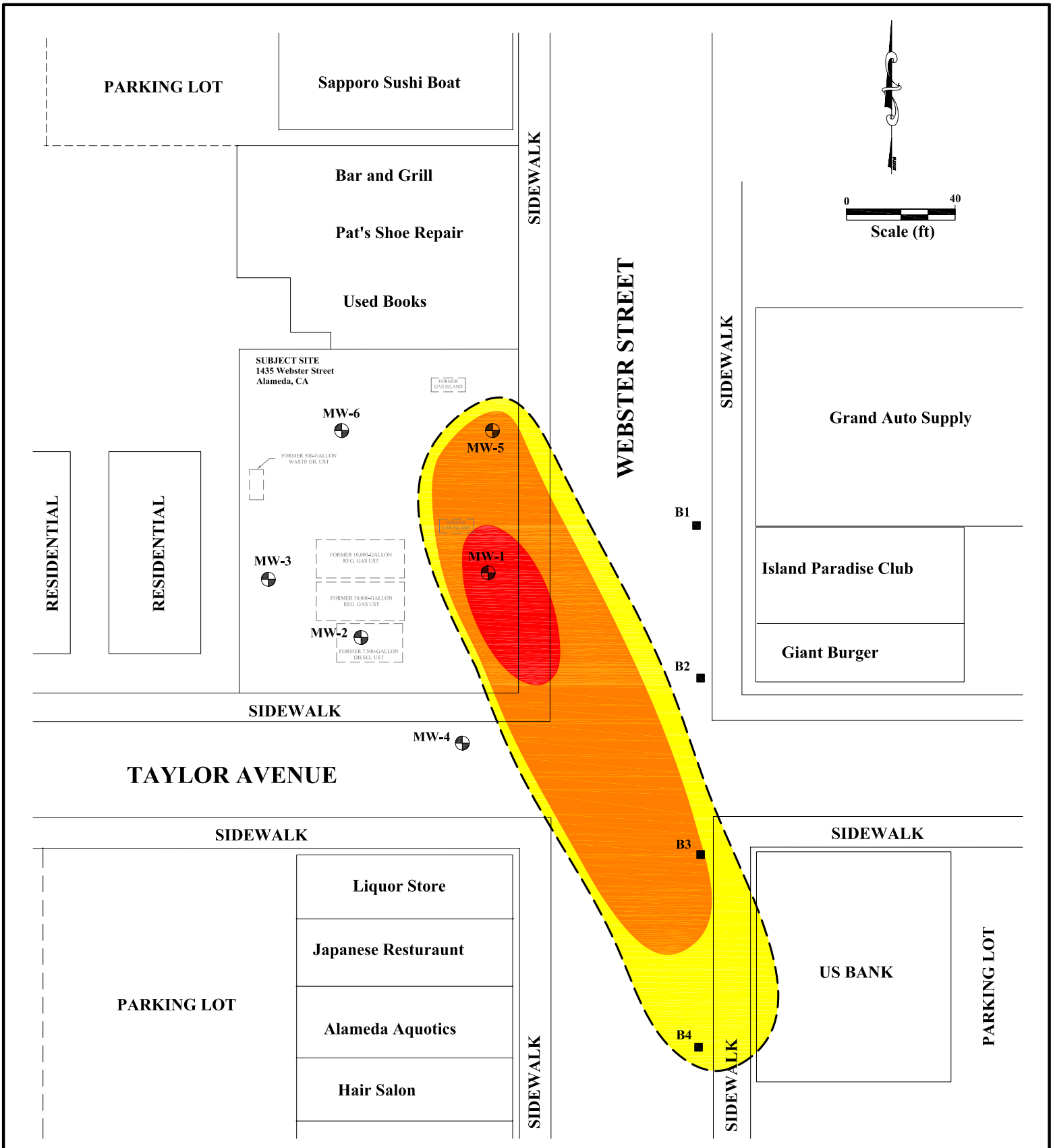
LEGEND:

MW-1 ⊕ Monitoring Well Location

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 5
GROUNWATER CONCENTRATION CHANGES OVER TIME

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA



LEGEND:

- Monitoring Well Location
- Boring Location

Estimated area where groundwater concentrations exceeded ESLs

- TPHg > 1,000 µg/L, Benzene 100 µg/L, MTBE > 1,000 µg/L
- TPHg > 100 µg/L, Benzene 10 µg/L, MTBE > 10 µg/L
- TPHg > 100 µg/L, Benzene 1 µg/L, MTBE > 5 µg/L

TEC ACCUTITE
262 MICHELLE COURT
SOUTH SAN FRANCISCO
Phone: (650) 616-1200
Fax: (650) 616-1244

FIGURE 6
ESTIMATED EXTENT OF PETROLEUM HYDROCARBON IMPACT TO GROUNDWATER

1435 WEBSTER STREET
ALAMEDA, CALIFORNIA

ATTACHMENT A

BORING LOGS AND WELL SPECIFICATIONS

SOIL BORING LOG

LOCATION: *1435 Webster Street, ALAMEDA, CA.*
CLIENT: *John E. Ferrar*
DATE DRILLED: *1/11/93*
DRILLING METHOD: *H.S.Augers*
LOGGED BY: *Adi Constantinescu*
MONITORING WELL: *MW-1*
DRILLED BY: *S. E. S.*
SAMPLE METHOD: *Split Spoon*

Depth Below Surface	Samples Collected INT	Samples Collected Sample No.	SOIL DESCRIPTION Color, Grain size, Texture, Moisture, Consistency, Odor	Unified Soil Classification	Log	Penetration Collected Blows / 18"	Comments
			Asphalt 2".				
5		MW1-5	Brown, medium SAND, well graded, loose, moist, no hydrocarbon odor;	SW		3, 4, 6	
10		MW1-10	Same as above, wet, no hydrocarbon odor;			10, 14, 14	
15			Brown, fine SAND, medium dense, poorly graded, water saturated, no hydrocarbon odor;	SP		10, 10, 12	
20			Light brown, fine to medium SAND, well graded, dense, water saturated, no hydrocarbon odor.	SW		10, 14, 21	
25			Same as above.			10, 20, 28	Hole bottom at 24'. Monitoring well completed at 24' bgs.
30							

SOIL BORING LOG

LOCATION: *1435 Webster Street, ALAMEDA, CA.*
CLIENT: *John E. Ferrar*
MONITORING WELL: *MW-2*
DATE DRILLED: *1/11/93*
DRILLED BY: *S. E. S.*
DRILLING METHOD: *H.S.Augers*
SAMPLE METHOD: *Split Spoon*
LOGGED BY: *Adi Constantinescu*

Depth Below Surface	Samples Collected INT	Samples Collected Sample No.	SOIL DESCRIPTION Color, Grain size, Texture, Moisture, Consistency, Odor	Unified Soil Classification	Log	Penetration Collected Blows / 18"	Comments
			Asphalt 2".				
5		MW2-5	Brown, medium SAND, well graded, medium dense, moist, no hydrocarbon odor;			5, 5, 6	
10		MW2-10	Gray-brown, mottled, medium gravelly SAND, medium dense, wet, well graded, no hydrocarbon odor;	SW		4, 5, 7	
15			Brown, medium SAND, well graded, medium dense, water saturated, no hydrocarbon odor;			7, 11, 13	
20			Brown, fine to medium SAND, well graded, medium dense, water saturated, no hydrocarbon odor;			10, 13, 20	
25			Same as above.			11, 18, 25	Hole bottom at 24'. Monitoring well completed at 24' bgs.
30							

SOIL BORING LOG

LOCATION: *1435 Webster Street, ALAMEDA, CA.*
MONITORING WELL: *MW-3*
CLIENT: *John E. Ferrar*
DRILLED BY: *S. E. S.*
DATE DRILLED: *1/12/93*
SAMPLE METHOD: *Split Spoon*
DRILLING METHOD: *H.S.Augers*
LOGGED BY: *Adi Constantinescu*

Depth Below Surface	Samples Collected INT	Samples Collected Sample No.	SOIL DESCRIPTION Color, Grain size, Texture, Moisture, Consistency, Odor	Unified Soil Classification	Log	Penetration Collected Blows / 18"	Comments
			Asphalt 2".				
5		MW3-5	Brown, medium SAND, well graded, medium dense, moist, no hydrocarbon odor;			3, 5, 7	
10		MW3-10	Brown, fine to medium SAND, medium dense, well graded, wet, no hydrocarbon odor;	SW		14, 14, 15	
15			Brown, fine SAND, well graded, medium dense, no hydrocarbon odor;			10, 11, 12	
20			Light brown, fine to medium SAND, well graded, water saturated, no hydrocarbon odor;			11, 13, 23	
25			Same as above.			11, 19, 23	Hole bottom at 24'. Monitoring well completed at 24' bgs.
30							

EC ACCUTITE SOIL BORING LOG

CLIENT	OLYMPIAN	LOCATION	1435 Webster Street
Contact	DAN KOCH		Alameda, California
BORING NO.	MW-4	MONITORING WELL NO.	MW-4
DATE DRILLED	11/11/99	START	7:00 am
DRILLING METHOD	HOLLOW STEM AUGER	SAMPLING METHOD	SPLIT SPOON

ELEVATION	NA feet msl	FINISH	11:00 am
LOGGED BY	Walter Cuculic		
DRILLED BY	West Hazmat Drilling, Inc.		

DEPTH BELOW SURFACE	SAMPLES COLLECTED: INT	TPHg ppm	SAMPLE ID	LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0 FT				ASPHALT; 3-inches thick	ASPHALT		STREET BOX WITH CONCRETE SEAL; LOCKING CAP
1–10			MW-4 @ 6.0; MW-4 @ 9.5	SILTY SAND; (SM); fine-grained; poorly graded; light brown; moist; no odor; no plasticity, moderate estimated permeability. GW	SM		Portland I/II; 2-inch diameter blank pvc casing schedule 40; Bentonite Seal
11–19				SAND; (SP); fine-grained; poorly graded; tan; damp to wet; no plasticity, high estimated permeability. Bottom of boring at 20 feet bgs	SP		2-inch diameter schedule 40 PVC 0.010" slotted casing; #2/12 MONTEREY SAND; BOTTOM CAP
20–35				Total depth of monitoring well at 20 feet bgs			

EC ACCUTITE SOIL BORING LOG

CLIENT	OLYMPIAN	LOCATION	1435 Webster Street
Contact	DAN KOCH		Alameda, California
BORING N0.	MW-5	MONITORING WELL N0.	MW-5
ELEVATION	NA feet msl		
DATE DRILLED	11/10/99	START	2:30 pm
FINISH	5:00 pm	LOGGED BY	Walter Cuculic
DRILLING METHOD	HOLLOW STEM AUGER	SAMPLING METHOD	SPLIT SPOON
DRILLED BY	West Hazmat Drilling, Inc.		

DEPTH BELOW SURFACE	SAMPLES COLLECTED: INT	TPHg ppm	SAMPLE ID	LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0 FT				ASPHALT; 3-inches thick	ASPHALT		STREET BOX WITH CONCRETE SEAL; LOCKING CAP
1–10			MW-5 @ 6.0; MW-5 @ 9.5	SILTY SAND; (SM); fine-grained; poorly graded; light brown; moist; no odor; no plasticity, moderate estimated permeability. GW	SM		Portland I/II; 2-inch diameter blank pvc casing schedule 40; Bentonite Seal
11–19				SAND; (SP); fine-grained; poorly graded; tan; damp to wet; no plasticity, high estimated permeability. Bottom of boring at 20 feet bgs	SP		2-inch diameter schedule 40 PVC 0.010" slotted casing; #2/12 MONTERREY SAND; BOTTOM CAP
20–35				Total depth of monitoring well at 20 feet bgs			

1435Webste

EC ACCUTITE SOIL BORING LOG

CLIENT	OLYMPIAN	LOCATION	1435 Webster Street
Contact	DAN KOCH		Alameda, California
BORING NO.	MW-6	MONITORING WELL NO.	MW-6
DATE DRILLED	11/10/99	START	10:30 am
DRILLING METHOD	HOLLOW STEM AUGER	SAMPLING METHOD	SPLIT SPOON

ELEVATION	NA feet msl
LOGGED BY	Walter Cuculic
DRILLED BY	West Hazmat Drilling, Inc.

DEPTH BELOW SURFACE	SAMPLES COLLECTED: INT	TPHg ppm	SAMPLE ID	LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0 FT				ASPHALT; 3-inches thick	ASPHALT		STREET BOX WITH CONCRETE SEAL; LOCKING CAP
1–4				SILTY SAND; (SM); fine-grained; poorly graded; light brown; moist; no odor; no plasticity, moderate estimated permeability.	SM		Portland I/II; 2-inch diameter blank pvc casing schedule 40; Bentonite Seal
5–7			MW-6 @ 5.0				
8–19			MW-6 @ 9.0	GW ▽ SAND; (SP); fine-grained; poorly graded; tan; damp to wet; no plasticity, high estimated permeability.	SP		2-inch diameter schedule 40 PVC 0.010" slotted casing; #2/12 MONTEREY SAND; BOTTOM CAP
				Bottom of boring at 20 feet bgs			
20–35				Total depth of monitoring well at 20 feet bgs			

1435Webste

ACCUTITE SOIL BORING LOG

PROJECT NO. _____ LOCATION 1435 WEBSTER STREET

CLIENT OLYMPIAN ALAMEDA, CALIFORNIA

PIEZOMETER NO. B1 MONITORING WELL NO. _____ ELEVATION _____

DATE DRILLED 2/11/99 START _____ FINISH _____ LOGGED BY SAMI MALAEB

DRILLING METHOD HYDRO-PUNCH SAMPLING METHOD _____ DRILLED BY ACCUTITE

DEPTH BELOW SURFACE	SAMPLES COLLECTED			LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG
	INT	OVM ppm	SAMPLE ID			
0 FT						
1						
2						
3						
4			B1-4'	Light brown sands and gravels (SP), dry, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
5						
6						
7						
8			B1-7.5'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
9						
10						
11						
12						
13						
14						
15						

1435B1

ACCUTITE SOIL BORING LOG

PROJECT NO. _____ LOCATION 1435 WEBSTER STREET

CLIENT OLYMPIAN ALAMEDA, CALIFORNIA

PIEZOMETER NO. B2 MONITORING WELL NO. _____ ELEVATION _____

DATE DRILLED 2 /11/99 START _____ FINISH _____ LOGGED BY SAMI MALAEB

DRILLING METHOD HYDRO-PUNCH SAMPLING METHOD _____ DRILLED BY ACCUTITE

DEPTH BELOW SURFACE	SAMPLES COLLECTED			LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG
	INT	OVM ppm	SAMPLE ID			
0 FT						
1						
2						
3						
4			B2-4'	Light brown sands and gravels (SP), dry, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
5						
6						
7						
8			B2-7.5'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
9						
10						
11						
12						
13						
14						
15			B2-15'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	

1435B2

ACCUTITE SOIL BORING LOG

PROJECT NO. _____ LOCATION 1435 WEBSTER STREET

CLIENT OLYMPIAN ALAMEDA, CALIFORNIA

PIEZOMETER NO. B3 MONITORING WELL NO. _____ ELEVATION _____

DATE DRILLED 2/11/99 START _____ FINISH _____ LOGGED BY SAMI MALAEB

DRILLING METHOD HYDRO-PUNCH SAMPLING METHOD _____ DRILLED BY ACCUTITE

DEPTH BELOW SURFACE	SAMPLES COLLECTED			LITHOLOGY	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG
	INT	OVM ppm	SAMPLE ID			
0 FT						
1						
2						
3						
4			B3-4'	Light brown sands and gravels (SP), dry, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
5						
6						
7						
8			B3-6'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
9						
10						
11						
12			B3-12'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
13						
14						
15						

1435B3

ACCUTITE SOIL BORING LOG

PROJECT N0. _____ LOCATION 1435 WEBSTER STREET

CLIENT OLYMPIAN ALAMEDA, CALIFORNIA

PIEZOMETER N0. B4 MONITORING WELL N0. _____ ELEVATION _____

DATE DRILLED 2 /11/99 START _____ FINISH _____ LOGGED BY SAMI MALAEB

DRILLING METHOD HYDRO-PUNCH SAMPLING METHOD _____ DRILLED BY ACCUTITE

DEPTH BELOW SURFACE	SAMPLES COLLECTED			LITHOLOGY	UNIFIED SOIL CLASSI-FICATION	GRAPHIC LOG
	INT	OVM ppm	SAMPLE ID			
0 FT						
1						
2						
3						
4			B4-4'	Light brown sands and gravels (SP), dry, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
5						
6						
7						
8			B4-8'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
9						
10						
11						
12			B4-12'	Light brown sands and gravels (SP), moist, medium stiff, medium dense (no odor of hydrocarbons or staining)	SP	
13						
14						
15						

1435B4

TEC ACCUTITE

BORING LOG

BORING/WELL NUMBER: B1

CLIENT: Olympian
LOCATION: 1435 Webster St., Alameda, CA
DRILLING CO: Gregg
DRILLING METHOD: Geoprobe
BORING DIAMETER: 2-inch
GEOLOGIST: D.Gregory
PE/RG: S.Malaeb PE#60888
DATE STARTED: 6/27/01 DATE COMPLETED: 6/27/01

TOTAL DEPTH: 15 fbg
WELL DEVELOPMENT:
GROUND SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION:
SCREENED INTERVAL:
FIRST ENCOUNTERED WATER 10 fbg
STATIC WATER

DEPTH (ft)	Sample Interval	Sample ID	Water Level	Moisture	Estimated K	TPHg ppm	DESCRIPTION	USCS	WELL INSTALLATION
0.0							ASPHALT:		
				Damp	High		SAND: (SP): Moderate yellowish brown (10YR5/4); 5% silt, 95% fine grained sand.		
-5.0									
		B1-9		Moist	High	ND			
-10.0			▽	Wet	High				
							Hydropunch		
-15.0							EOH		
-20.0									
-25.0									
-30.0									

TEC ACCUTITE

BORING LOG

BORING/WELL NUMBER: B2

CLIENT: Olympian
LOCATION: 1435 Webster St., Alameda, CA
DRILLING CO: Gregg
DRILLING METHOD: Geoprobe
BORING DIAMETER: 2-inch
GEOLOGIST: D.Gregory
PE/RG: S.Malaeb PE#60888
DATE STARTED: 6/27/01 DATE COMPLETED: 6/27/01

TOTAL DEPTH: 15 fbg
WELL DEVELOPMENT:
GROUND SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION:
SCREENED INTERVAL:
FIRST ENCOUNTERED WATER 10 fbg
STATIC WATER

DEPTH (ft)	Sample Interval	Sample ID	Water Level	Moisture	Estimated K	TPHg ppm	DESCRIPTION	USCS	WELL INSTALLATION
0.0							ASPHALT:		
				Damp	High		SILTY SAND: (SM): Dark yellowish brown (10YR4/2); 15% silt, 85% fine grained sand.		
-5.0							SAND: (SP): Moderate yellowish brown (10YR5/4); 5% silt, 95% fine grained sand.		
		B2-9		Damp	High	ND	CLAYEY SAND: (SC): Dark greenish gray (5G 4/1); 15% clay, 85% fine grained sand, moderate plasticity.		
-10.0				Wet	High		SAND: (SP): Moderate yellowish brown (10YR5/4); 5% silt, 95% fine grained sand.		
							Hydropunch		
-15.0							EOH		
-20.0									
-25.0									
-30.0									

TEC ACCUTITE

BORING LOG

BORING/WELL NUMBER: **B3**

CLIENT: Olympian
LOCATION: 1435 Webster St., Alameda, CA
DRILLING CO: Gregg
DRILLING METHOD: Geoprobe
BORING DIAMETER: 2-inch
GEOLOGIST: D.Gregory
PE/RG: S.Malaeb PE#60888
DATE STARTED: 6/27/01 DATE COMPLETED: 6/27/01

TOTAL DEPTH: 15 fbg
WELL DEVELOPMENT:
GROUND SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION:
SCREENED INTERVAL:
FIRST ENCOUNTERED WATER 10 fbg
STATIC WATER

DEPTH (ft)	Sample Interval	Sample ID	Water Level	Moisture	Estimated K	TPHg ppm	DESCRIPTION	USCS	WELL INSTALLATION
0.0							ASPHALT:		
							ROAD BASE: Road Base Gravel		
				Damp	High		SILTY SAND: (SM): Dark yellowish brown (10YR4/2); 15% silt, 85% fine grained sand.		
-5.0							SAND: (SP): Moderate yellowish brown (10YR5/4); 5% silt, 95% fine grained sand.		
		B3-9		Moist	High	ND			
-10.0			▽	Wet	High				
							Hydropunch		
-15.0							EOH		
-20.0									
-25.0									
-30.0									

TEC ACCUTITE	BORING LOG	BORING/WELL NUMBER B4

CLIENT: Olympian
LOCATION: 1435 Webster St., Alameda, CA
DRILLING CO: Gregg
DRILLING METHOD: Geoprobe
BORING DIAMETER: 2-inch
GEOLOGIST: D.Gregory
PE/RG: S.Malaeb PE#60888
DATE STARTED: 6/27/01 DATE COMPLETED: 6/27/01

TOTAL DEPTH: 14 fbg
WELL DEVELOPMENT:
GROUND SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION:
SCREENED INTERVAL:
FIRST ENCOUNTERED WATER 9.5 fbg
STATIC WATER

DEPTH (ft)	Sample Interval	Sample ID	Water Level	Moisture	Estimated K	TPHg ppm	DESCRIPTION	USCS	WELL INSTALLATION
0.0							ASPHALT:		
				Damp	High		SAND: (SP): Moderate yellowish brown (10YR5/4); 5% silt, 95% fine grained sand.		
-5.0									
		B4-9		Moist	High	ND			
-10.0				Wet	High				
							Hydropunch		
-15.0							EOH Refusal		
-20.0									
-25.0									
-30.0									

ATTACHMENT B

GROUNDWATER TRAVEL VELOCITY CALCULATION

CALCULATIONS – Groundwater Travel Velocity

SEEPAGE VELOCITY

Equation:

$$v_s = \frac{k\ i}{n_e} = \frac{0.57\,ft/day \times 0.005}{0.2} = 0.014\,ft/day = 5.1\,ft/yr$$

where

v_s = seepage velocity
k = hydraulic conductivity
i = hydraulic gradient
ne = effective porosity

Assuming k = 0.57 ft/day (literature value for find sand, obtained from Domenico, P.A. and F.W. Schwartz, 1990. "Physical and Chemical Hydrogeology", John Wiley & Sons, New York, 824 p.)

i = 0.005 (determined from quarterly groundwater monitoring data)

n_e = 0.20 (literature value, Driscoll, 1989)

CALCULATED SEEPAGE VELOCITY – 5.1 ft/yr

ATTACHMENT C

SITE AVERAGED CONCENTRATION CALCULATION

Mean Concentration (95% UCL) of Benzene in Soil (mg/Kg)

Data File	S:\1 Environmental. Dept\Active Sites\Olympi	Variable:	Benzene_S	

Raw Statistics	
Number of Valid Samples	22
Number of Unique Samples	4
Minimum	0.0015
Maximum	3.4
Mean	0.162091
Median	0.0025
Standard Deviation	0.723631
Variance	0.523643
Coefficient of Variation	4.464356
Skewness	4.681325

Gamma Statistics	
k hat	0.196257
k star (bias corrected)	0.199798
Theta hat	0.82591
Theta star	0.811274
nu hat	8.635325
nu star	8.791114
Approx.Chi Square Value (.05)	3.200538
Adjusted Level of Significance	0.0386
Adjusted Chi Square Value	2.952998

Log-transformed Statistics	
Minimum of log data	-6.50229
Maximum of log data	1.223775
Mean of log data	-5.580413
Standard Deviation of log data	1.750816
Variance of log data	3.065355

RECOMMENDATION
Data are Non-parametric (0.05)
Use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.232156
Shapiro-Wilk 5% Critical Value	0.911
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	0.427565
Gamma Distribution Test	
A-D Test Statistic	7.315897
A-D 5% Critical Value	0.893319
K-S Test Statistic	0.56074
K-S 5% Critical Value	0.205668
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	0.445225
Adjusted Gamma UCL	0.482547
Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.41513
Shapiro-Wilk 5% Critical Value	0.911
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	0.071567
95% Chebyshev (MVUE) UCL	0.045381
97.5% Chebyshev (MVUE) UCL	0.058519
99% Chebyshev (MVUE) UCL	0.084325
95% Non-parametric UCLs	
CLT UCL	0.415857
Adj-CLT UCL (Adjusted for skewness)	0.580386
Mod-t UCL (Adjusted for skewness)	0.453228
Jackknife UCL	0.427565
Standard Bootstrap UCL	N/R
Bootstrap-t UCL	N/R
Hall's Bootstrap UCL	N/R
Percentile Bootstrap UCL	N/R
BCA Bootstrap UCL	N/R
95% Chebyshev (Mean, Sd) UCL	0.834576
97.5% Chebyshev (Mean, Sd) UCL	1.125561
99% Chebyshev (Mean, Sd) UCL	1.697145

Mean Concentration (95% UCL) of Benzene in Groundwater (µg/L)

Data File	S:\1 Environmental. Dept\Active Sites\Olympi	Variable:	Benzene_GW

Raw Statistics	
Number of Valid Samples	24
Number of Unique Samples	11
Minimum	0.25
Maximum	5200
Mean	408.8271
Median	0.25
Standard Deviation	1094.24
Variance	1197362
Coefficient of Variation	2.676536
Skewness	3.984542

Gamma Statistics	
k hat	0.166788
k star (bias corrected)	0.173717
Theta hat	2451.179
Theta star	2353.406
nu hat	8.005819
nu star	8.338425
Approx.Chi Square Value (.05)	2.93182
Adjusted Level of Significance	0.0392
Adjusted Chi Square Value	2.710353

Log-transformed Statistics	
Minimum of log data	-1.386294
Maximum of log data	8.556414
Mean of log data	1.476718
Standard Deviation of log data	3.689709
Variance of log data	13.61395

RECOMMENDATION
Data are Non-parametric (0.05)
Use Hall's Bootstrap UCL
In case Hall's Bootstrap method yields an erratic, unreasonably large UCL value, use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.425818
Shapiro-Wilk 5% Critical Value	0.916
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	791.6388

Gamma Distribution Test	
A-D Test Statistic	2.931411
A-D 5% Critical Value	0.908363
K-S Test Statistic	0.308926
K-S 5% Critical Value	0.198259
Data do not follow gamma distribution at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	1162.75
Adjusted Gamma UCL	1257.76

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.743115
Shapiro-Wilk 5% Critical Value	0.916
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	842066.7
95% Chebyshev (MVUE) UCL	4850.293
97.5% Chebyshev (MVUE) UCL	6515.623
99% Chebyshev (MVUE) UCL	9786.84

95% Non-parametric UCLs	
CLT UCL	776.223
Adj-CLT UCL (Adjusted for skewness)	970.3385
Mod-t UCL (Adjusted for skewness)	821.9169
Jackknife UCL	791.6388
Standard Bootstrap UCL	775.9761
Bootstrap-t UCL	1417.732
Hall's Bootstrap UCL	**1941.678**
Percentile Bootstrap UCL	837.5
BCA Bootstrap UCL	1100.925
95% Chebyshev (Mean, Sd) UCL	1382.435
97.5% Chebyshev (Mean, Sd) UCL	1803.715
99% Chebyshev (Mean, Sd) UCL	2631.24

Mean Concentration (95% UCL) of MTBE in Groundwater (µg/L)

Data File	S:\1 Environmental. Dept\Active Sites\Olympi	Variable:	MTBE_GW	

Raw Statistics	
Number of Valid Samples	24
Number of Unique Samples	17
Minimum	0.25
Maximum	4000
Mean	355.9854
Median	3.5
Standard Deviation	874.2036
Variance	764231.9
Coefficient of Variation	2.455729
Skewness	3.527586

Gamma Statistics	
k hat	0.203712
k star (bias corrected)	0.206026
Theta hat	1747.493
Theta star	1727.868
nu hat	9.778179
nu star	9.88924
Approx.Chi Square Value (.05)	3.87182
Adjusted Level of Significance	0.0392
Adjusted Chi Square Value	3.610128

Log-transformed Statistics	
Minimum of log data	-1.386294
Maximum of log data	8.29405
Mean of log data	2.272703
Standard Deviation of log data	3.312431
Variance of log data	10.9722

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.474523
Shapiro-Wilk 5% Critical Value	0.916
Data not normal at 5% significance level	
95% UCL (Assuming Normal Distribution)	
Student's-t UCL	661.819

Gamma Distribution Test	
A-D Test Statistic	1.550862
A-D 5% Critical Value	0.892181
K-S Test Statistic	0.225803
K-S 5% Critical Value	0.196906
Data do not follow gamma distribution	
at 5% significance level	
95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	909.2431
Adjusted Gamma UCL	975.1526

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.888237
Shapiro-Wilk 5% Critical Value	0.916
Data not lognormal at 5% significance level	
95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	181613.3
95% Chebyshev (MVUE) UCL	4030.876
97.5% Chebyshev (MVUE) UCL	5396.77
99% Chebyshev (MVUE) UCL	8079.804

95% Non-parametric UCLs	
CLT UCL	649.5031
Adj-CLT UCL (Adjusted for skewness)	786.7995
Mod-t UCL (Adjusted for skewness)	683.2345
Jackknife UCL	661.819
Standard Bootstrap UCL	639.6447
Bootstrap-t UCL	1132.46
Hall's Bootstrap UCL	**1624.059**
Percentile Bootstrap UCL	667.3229
BCA Bootstrap UCL	809.1229
95% Chebyshev (Mean, Sd) UCL	1133.814
97.5% Chebyshev (Mean, Sd) UCL	1470.381
99% Chebyshev (Mean, Sd) UCL	2131.501

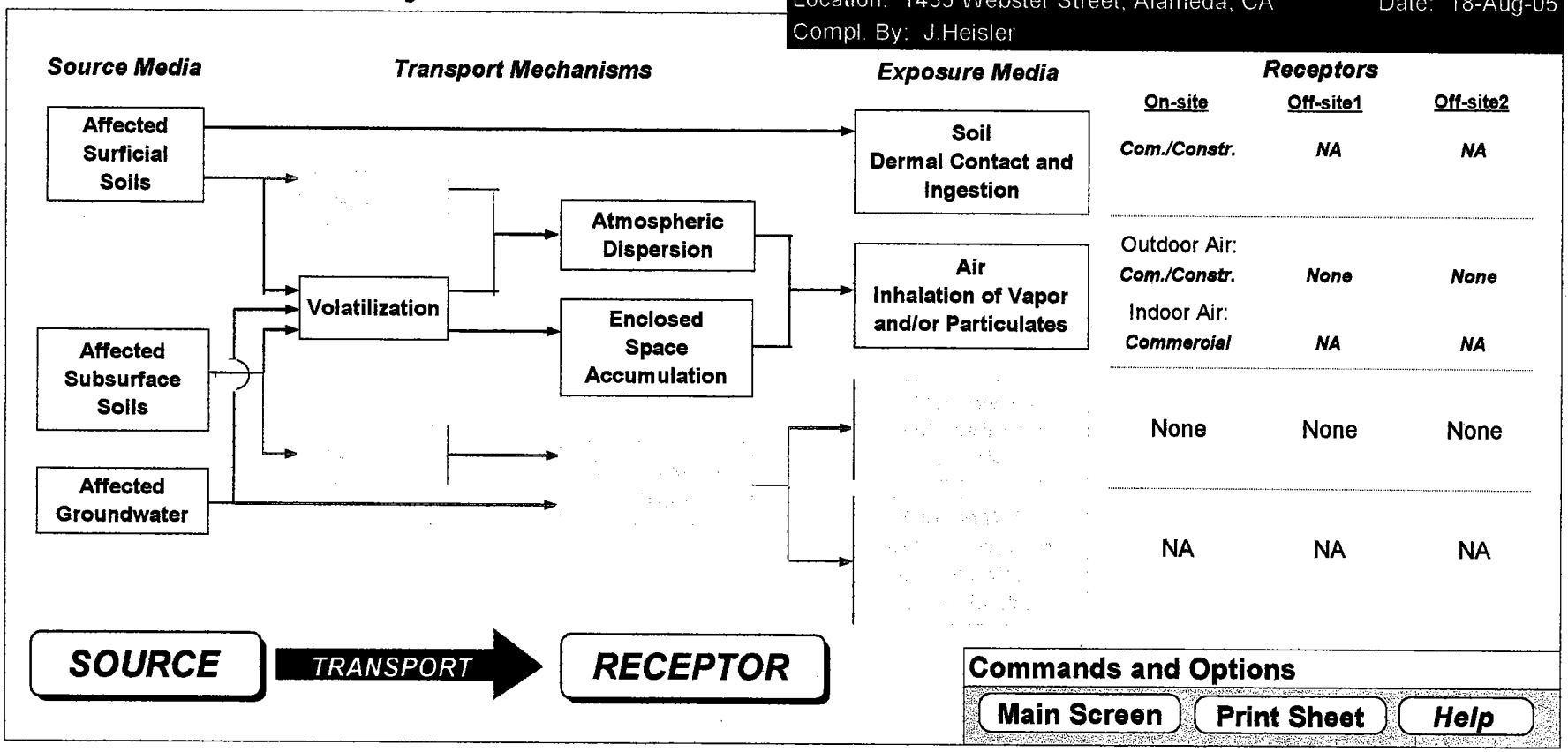
RECOMMENDATION
Data are Non-parametric (0.05)
Use Hall's Bootstrap UCL
In case Hall's Bootstrap method yields an erratic, unreasonably large UCL value, use 99% Chebyshev (Mean, Sd) UCL

ATTACHMENT D

RISK CALCULATION

Exposure Pathway Flowchart

Site Name: Former Olympian Service Station
Location: 1435 Webster Street, Alameda, CA
Compl. By: J.Heisler
Job ID:
Date: 18-Aug-05



Receptors	On-site	Off-site1	Off-site2
	Com./Constr.	*NA*	*NA*
Outdoor Air:			
	Com./Constr.	*None*	*None*
Indoor Air:			
	Commercial	*NA*	*NA*
	None	None	None
	NA	NA	NA

Commands and Options

Main Screen | Print Sheet | *Help*

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, CA

Completed By: J.Heisler
Date Completed: 18-Aug-05

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	6.4E-7	1.0E-6	6.5E-7	1.0E-6	☐	1.0E-3	1.0E+0	1.0E-3	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	3.5E-5	1.0E-6	3.5E-5	1.0E-6	■	5.6E-2	1.0E+0	5.6E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	1.8E-6	1.0E-6	1.8E-6	1.0E-6	■	1.6E-2	1.0E+0	1.6E-2	1.0E+0	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	3.5E-5	***1.0E-6***	***3.5E-5***	***1.0E-6***	■	***5.6E-2***	***1.0E+0***	***5.6E-2***	***1.0E+0***	☐
	Indoor Air		***Indoor Air***			***Indoor Air***		***Indoor Air***		

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (9 - 11 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene*	1.9E+0		1.7E+0	
Methyl t-Butyl ether*	1.6E+0		0.0E+0	

*** = Chemical with user-specified data**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, CA
Completed By: J.Heisler

Date Completed: 18-Aug-05
Job ID:

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, CA

Completed By: J.Heisler
Date Completed: 18-Aug-05

Job ID:

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	Com./Constr.		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Res./Constr.	None	None
Volatilization from Groundwater	Residential	None	None
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-6
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.3E+3	1.3E+3	(ft^2)
W	Length of source-zone area parallel to wind	3.6E+1	3.6E+1	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	6.4E+5		(ft/d)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	1.0E+1		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	8.8E+0			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-4			(-)
θ_T	Soil total porosity	4.1E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1.0E-2			(cm/s)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	9.0E+0			(ft)
L_s	Depth to top of affected soils	9.0E+0			(ft)
L_{base}	Depth to base of affected soils	1.1E+1			(ft)
L_{subs}	Thickness of affected soils	2.0E+0			(ft)
pH	Soil/groundwater pH	6.0E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.389	0.08	0.155	(-)
θ_a	Volumetric air content	0.041	0.33	0.225	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7.53E+2	NA	(ft^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	2.40E+1	NA	(1/d)
L_{crk}	Foundation thickness	4.92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4.92E-1	NA	(ft)
η	Foundation crack fraction	1.00E-3	NA	(-)
dP	Indoor/outdoor differential pressure	0.00E+0	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	0.00E+0	NA	(ft^3/d)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(in/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/s)
V_{gw}	Groundwater seepage velocity	NA	(cm/s)
K_s	Saturated hydraulic conductivity	NA	(cm/s)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/d)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg)	partition	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene*	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Methyl t-Butyl ether*	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-

* = Chemical with user-specified data

Site Name: Former Olympian Service Station

Site Location: 1435 Webster Street, Alameda, CA

Completed By: J.Heisler

Date Completed: 18-Aug-05

Job ID:

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	(mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene*	3.00E-03	CA	-	-	6.00E-02	CA	1.00E-01	CA	1.00E-01	CA	2.90E-05	CA	A	TRUE
Methyl t-Butyl ether*	8.60E-01	CA	8.00E-03	0.01	8.00E+00	CA	1.80E-03	CA	-	-	2.60E-07	CA	-	TRUE

* = Chemical with user-specified

Site Name: Former Olympian Se

Site Location: 1435 Webster

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Benzene*	5.00E-03	-	3.25E+00	-	-	-	12.6
Methyl t-Butyl ether*	1.30E-02	-	6.00E+01	NIOSH	1.80E-01	-	1

* = Chemical with user-specified

Site Name: Former Olympian Se

Site Location: 1435 Webster

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene*	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Methyl t-Butyl ether*	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H

* = Chemical with user-specified

Site Name: Former Olympian Se

Site Location: 1435 Webster

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, CA

Completed By: J.Heisler
Date Completed: 18-Aug-05

Definitions

Site-Specific Target Level Concentrations	
SSTLgw	Site-specific target level for groundwater (mg/L)
SSTLs	Site-specific target level for soil (mg/kg)
RBELair	Risk-based exposure limit for air (µg/m3)
THQ	Target hazard quotient
TR	Target risk

Cross-Media Transfer Factors	
VF_{ss}	Volatilization factor, surface soil to outdoor air (kg-soil/L-air)
VF_{samb}	Volatilization factor, subsurface soil to outdoor air (kg-soil/L-air)
VF_{wamb}	Volatilization factor, groundwater to outdoor air (L-wat/L-air)
VF_{sesp}	Volatilization factor, subsurface soil to indoor air (kg-soil/L-air)
VF_{wesp}	Volatilization factor, groundwater to indoor air (L-wat/L-air)
LF	Leaching factor, soil to groundwater (kg-soil/L-wat)

Cross-Media Transfer Factors	
DAF_{gw}	Dilution-attenuation factor, groundwater (-)
$DAF_{s/gw}$	Dilution-attenuation factor, soil leaching to groundwater (-)

Physical Properties	
MW	Molecular weight (g/mol)
Sol	Aqueous solubility limit (mg/L)
P_{vap}	Vapor pressure (mmHg)
H_{atm}	Henry's Law constant (atm-m^3/mol)
pK_a	Acid ionization constant (log[mol/mol])
pK_b	Base ionization constant (log[mol/mol])
K_{oc}	Organic carbon/Water partition coeffiecient (L/kg)
K_d	Soil/Water distribution coeffient (L/kg)
D_{air}	Molecular diffusion coeffient in air (cm^2/sec)
D_{wat}	Molecular diffusion coeffient in water (cm^2/sec)

Toxicity Data	
Wt of Evd.	Weight of evidence
SF_o	Oral slope factor for carcinogens (1/[mg/kg/day])
SF_d	Dermal slope factor for carcinogens (1/[mg/kg/day])
URF_I	Inhalation unit risk facor for carcinogens (1/[µg/m^3])
RfD_o	Oral reference dose (mg/kg/day)
RfD_d	Dermal reference dose (mg/kg/day)
RfC_I	Inhalation reference concentration (mg/m^3)

Dermal Exposure Parameters	
RAF_d	Dermal relative absorption factor (mg/mg)
K_p	Dermal permeability coeff. (cm/hr)
tau_d	Lag time for dermal exposure (hr/event)
t_{crit}	Critical exposure time (hr)
B	Relative contribution of permeability coeff. (-)

Regulatory Standards	
MCL	Maximum contaminant level for drinking water protection (mg/L)
TWA	Time-weighted average workplace air criterion (mg/m^3)
AQL	Aquatic life protection criterion (mg/L)

Miscellaneous Parameters	
ADL_{gw}	Analytical detection limit in groundwater (mg/L)
ADL_s	Analytical detection limit in soil (mg/kg)
$t_{1/2,sat}$	Half life, saturated zone (d)
$t_{1/2,unsat}$	Half life, unsaturated zone (d)

Derived Parameters	
H	Dimensionless Henry's Law contant (L-wat/L-air)
K_{sw}	Soil to pore-water partitioning factor (L-wat/kg-soil)
C_{sat}	Saturated residual conc. in vadose zone soils (mg/kg-soil)
$C_{sat,vap}$	Saturated concentration in vapors (mg/m3-air)
$D_{eff,s}$	Effective diffusion coeff. in vadose zone soils (cm^2/sec)
$D_{eff,crk}$	Effective diffusion coeff. in foundation cracks (cm^2/sec)
$D_{eff,cap}$	Effective diffusion coeff. in capillary zone (cm^2/sec)
$D_{eff,ws}$	Effective diffusion coeff., water table to ground surface (cm^2/sec)
R_{sat}	Retardation factor, saturated zone (-)
R_{unsat}	Retardation factor, unsaturated zone (-)
Z	Water to skin dermal absorption factor (cm/event)

Chemical Parameter References

PS	Standard Provisional Guide for Risk-Based Corrective Action, ASTM PS 104-98.
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites,
D	USEPA, Dermal Exposure Assessment: Principles and Applications, ORD, EPA/600/8-91/011B.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
T	TPH Criteria Working Group, 1996.
TX	TNRCC Risk-Based Corrective Action for Leaking Storage Tank Sites, January 1994.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pcchem-pcgems, 1988, ref no. 255435 in Enirofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Greundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005,
26	NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	USEPA, 1996: Soil Screening Guidance: Technical Background Doc., (EPA/540/R-95/128)
31	TNRCC Risk Reduction Rule Implementation, July 23, 1998. (update to Reference "TX")
32	USEPA, Method 8270C, Revision 3, "Semivolatile Organic Compounds by GC/MS", December 1996.
33	40 CFR 131.36, July 1, 1997
34	40 CFR 141.23, July 1, 1997
35	USEPA, Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997
36	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (15).
37	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (23).
38	Calculated using Chiou et al. equation reported in (9); S (µmol/L) from (4).

CA Table J ESL, RWQCB, February 2005
ZR USEPA IRIS Database

Electronic Submittal Information

Main Menu | View/Add Facilities | Upload EDD | Check EDD

UPLOADING A GEO_REPORT FILE

YOUR DOCUMENT UPLOAD WAS SUCCESSFUL!

Facility Name:	JIFFY LUBE
Global ID:	T0600100766
Title:	UPDATED SITE CONCEPTUAL MODEL
Document Type:	Reports - Risk Assessment Related Rpt.
Submittal Type:	GEO_REPORT
Submittal Date/Time:	9/30/2005 12:56:29 PM
Confirmation Number:	7585447013

Click here to view the document.

Back to Main Menu

Logged in as TEC-OLYMPIAN (AUTH_RP) CONTACT SITE ADMINISTRATOR.