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February 23, 2010

Mr. Steven Plunkett
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SUBJECT: **UPDATED SITE CONCEPTUAL MODEL, HEALTH RISK ASSESSMENT, FEASIBILITY STUDY, AND CORRECTIVE ACTION PLAN**

SITE: **FORMER OLYMPIAN SERVICE STATION**
1435 WEBSTER STREET
ALAMEDA, CALIFORNIA
FUEL LEAK CASE #RO0000193

Dear Mr. Plunkett:

On behalf of Olympian JV, Technology, Engineering & Construction, Inc. (TEC) is pleased to submit this updated site conceptual model, health risk assessment, feasibility study, and corrective action plan for the above-referenced location.

Thank you for your cooperation and assistance on this project. If you have any questions, feel free to contact the undersigned at (650) 616-1205 or mreed@tecaccutite.com.

Sincerely,
Technology, Engineering & Construction, Inc.

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Project Manager

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UPDATED SITE CONCEPTUAL MODEL, HEALTH RISK ASSESSMENT, FEASIBILITY STUDY, AND CORRECTIVE ACTION PLAN

FORMER OLYMPIAN SERVICE STATION
1435 WEBSTER STREET
ALAMEDA, CALIFORNIA
FUEL LEAK CASE #RO0000193

PREPARED BY:

TECHNOLOGY, ENGINEERING & CONSTRUCTION, INC.
TEC PROJECT # E-355

PREPARED FOR:

OLYMPIAN JV
AND
ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY

REPORT DATE:

FEBRUARY 23, 2010

TEC ENVIRONMENTAL

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1.0 INTRODUCTION

On behalf of Olympian JV, Technology, Engineering & Construction, Inc. (TEC) conducted a human health risk assessment for the former Olympian Service Station located at 1435 Webster Street in Alameda, California (the "site"). The following document presents the current site conceptual model, a site-specific health risk assessment model with proposed cleanup goals, and recommendations for expedited site closure. A vicinity map and site map are provided as Figures 1 and 2, respectively.

2.0 UPDATED SITE CONCEPTUAL MODEL

2.1 Site Description

The site is located on the corner of Webster Street and Taylor Avenue in a mixed commercial and residential area in Alameda, California. Prior to 1989, the site was occupied by an Olympian Service Station. Station facilities consisted of two 10,000-gallon gasoline USTs, one 7,500-gallon diesel UST, one 500-gallon waste oil UST and two dispenser islands (Figure 2). Until early 2009 the site was leased to the City of Alameda and used as a metered parking lot; the lease has since expired and the property is currently for sale.

2.2 Environmental History

October 1988, Soil Gas Survey

CHIPS Environmental Consultants, Inc. performed soil gas analysis at the subject site. Elevated concentrations of total hydrocarbons as propane were identified on the eastern side of the pump islands, between the pump islands, and from backfill between the gasoline storage tanks.

September 1989, Tank Removal

TEC Accutite removed two 10,000-gallon gasoline USTs, one 7,500-gallon diesel UST and one 500-gallon waste oil UST. Soil samples collected during removal of the USTs contained significant concentrations of TPHg, total petroleum hydrocarbons as diesel (TPHd), and total recoverable petroleum hydrocarbons as oil and grease (TRPHo).

January & September 1991, Soil Excavation

In January 1991, AAA Tank Removal / Forcade Excavations Services over-excavated 550 cubic yards of hydrocarbon impacted soil from the former UST locations. In September 1991 an additional 300 cubic yards of impacted soil were removed. Impacted soil was bioremediated onsite and returned to the former excavation under the oversight of the Alameda County Health Services Agency. Confirmation soil samples did not contain detectable concentrations of TPHg, BTEX compounds or TRPHo, but did contain detectable TPHd.

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 petroleum hydrocarbons. Semi-annual groundwater monitoring was initiated. Dissolved phase hydrocarbons were detected in all wells.

February 1999, Soil Borings

TEC Accutite advanced four borings onsite (B1 through B4) to determine the extent of petroleum hydrocarbon impact to soil and groundwater. In general, soil samples did not contain detectable concentrations of TPHg, BTEX compounds or MTBE.

December 1999, Well Installations

TEC Accutite installed three additional groundwater monitoring wells (MW-4 through MW-6) to define the dissolved-phase hydrocarbon plume and to assess its seasonal stability. Petroleum hydrocarbons were detected in soil from well MW-5 only. Groundwater samples collected from wells MW-3 and MW-6 defined the dissolved phase hydrocarbon plume cross-gradient of the former USTs and up-gradient of the former dispenser islands, respectively.

November 2000, Site Conceptual Model

TEC Accutite submitted a preliminary site conceptual model. Based on historical quarterly monitoring data, TEC Accutite determined that the contaminant plume was unstable and no longer adequately defined in the down-gradient direction. Benzene volatilization and intrusion to indoor and ambient air was identified as a potentially complete exposure pathway.

June 2001, Soil Borings

TEC Accutite advanced an additional four borings (B1 through B4) to assess the extent of the plume offsite. No petroleum hydrocarbons were detected in soil samples collected within the apparent capillary fringe. Groundwater samples collected from cross-gradient and down-gradient soil borings B1 and B4 contained petroleum hydrocarbons at concentrations above the laboratory reporting limits but below Environmental Screening Levels (ESLs)[1].

February 2002, Risk Assessment

To address the potentially complete vapor intrusion exposure pathway identified in the site conceptual model (SCM), TEC Accutite performed a site-specific risk assessment. TEC concluded that concentrations of TPHg in groundwater beneath the site were below the calculated site specific target level concentrations (SSTLs) and therefore did not present an inhalation risk. Representative benzene concentrations in groundwater exceeded the SSTL for a residential scenario (110 ppb) but were less than the SSTL for a commercial scenario (6400 ppb).

May 2003, Soil Vapor Investigation

TEC Accutite collected eight soil vapor samples (SV-1 through SV-7 and duplicate sample SV-7) to evaluate potential human exposure to contaminants volatilizing from impacted groundwater and intruding into indoor air (inhalation risk). Concentrations of petroleum hydrocarbons in soil vapor samples were either non-detectable or detected below ESLs. Vapor intrusion was identified as an incomplete exposure pathway.

September 2005, Updated Site Conceptual Model

TEC Accutite completed an updated site conceptual model as required by Alameda County Environmental Health Services (ACEHS) for site closure review. TEC Accutite determined that the uncertainties in on-site benzene vapor concentrations and off-site groundwater conditions warranted verification sampling before proposing site closure.

June 2006, Soil Investigation

On June 12, 2006, TEC Accutite advanced 8 direct-push soil borings (SP-1 through SP-8) to 12 feet below surface grade (ft bsg) to assess the lateral and vertical extent of petroleum hydrocarbon impact to soil in the vicinity of the former dispenser islands. Samples from all borings except those submitted from boring SP-6 contained petroleum hydrocarbons at concentrations above constituent ESLs.

[1] Environmental Screening Levels, Table F-1a, *Groundwater is a current or potential drinking water resource*, California Regional Water Quality Control Board, Interim Final, November 2007, revised May 2008.

November 2006, Pre-Excavation Soil Investigation

On November 15, 2006, TEC Accutite advanced 17 direct-push soil borings (CB-1 through CB-17) to demarcate the appropriate lateral extent of the planned soil excavation. Borings CB-1 through CB-9 were placed along the edges of the estimated excavation area, and additional borings were "stepped-out" from these edges until photo-ionization detector (PID) readings suggested petroleum hydrocarbon concentrations below ESLs or until the edge of the feasible excavation area was reached.

Soils contained petroleum hydrocarbons at concentrations below ESLs and/or laboratory detection limits at depths shallower than 8 feet bsg, identifying shallow soils as available backfill material. The boundaries of the excavation were expanded to the west to include additional impacted soils between 10 and 12 ft bsg.

December 2006, Confirmation Sampling and Monitoring Well Abandonment

On December 27, 2006, TEC Accutite advanced an additional 5 soil borings (DB-1 through DB-5) in order to collect soil samples for waste disposal classification. Monitoring well MW-1 was within a few feet of the planned excavation limits; monitoring well MW-5 was located within the boundary where shoring was to be installed. Both wells were abandoned on December 27, 2006 by pressure grouting.

February 2007, Soil Excavation, Groundwater Pumping, and Backfill

A total of 992.54 tons of soil were excavated from an area 29 feet wide, 70 feet long, and approximately 14 feet deep. Backfilling was conducted between February 14 and 16, 2007 and incorporated 717.35 tons of Tidewater sand compacted in place to 95% or better, 99.04 tons of drainrock at the deepest level of the excavation, and 1,050 pounds of Oxygen Releasing Compound™ to enhance biodegradation of remaining petroleum hydrocarbons in soil and groundwater.

March 2007, Monitoring Well Installation

On March 9, 2007, TEC Accutite installed new monitoring wells MW-7 and MW-8 near the eastern edge of the subject property. Well MW-7 was located just within the boundary of the soil excavation area and well MW-8 was located approximately 8 feet south of the excavation area.

July 2007, Soil Borings

On July 10 and 11, 2007, thirteen off-site soil borings were advanced (B-6 through B-18) in the public right-of-way on Webster Street and Taylor Avenue. The borings defined the off-site dissolved-phase plume in all directions except cross-gradient to the northeast.

July 2009, Soil Borings, Groundwater Monitoring Well Installation, Vapor Point Installation

On July 7, 2009, six off-site soil borings were advanced (B-19 through B-24) in the public right-of-way on Webster Street. The borings defined the off-site dissolved-phase plume cross-gradient to the northeast. On July 13 and 14, 2009, one groundwater monitoring well (MW-9) was installed in the southbound right hand lane of Webster Street and five nested vapor monitoring points (VMP-1 through VMP-5) were installed onsite. Petroleum hydrocarbons were not detected in vapor samples collected from any of the vapor monitoring points. Elevated concentrations of COCs were detected in grab groundwater samples collected from the exploratory borings before vapor monitoring point installation.

2.3 Site Geology and Hydrogeology

The site is located on the bay plain deposits of the San Francisco Bay which consist of shallow marine and continental deposits known as bay sediments. Observed sediments consist primarily of fine- to medium-grained silty sands from near surface grade to a maximum explored depth of 24 ft bsg. Clayey

sands and silty sands with up to 10% clay have also been encountered. A geological cross-section is presented as Figure 3.

The surrounding topography is flat and the site is approximately 20 feet above mean sea level (ft msl). Depth to groundwater at the site varies from approximately 7 to 12 ft bsg. The apparent groundwater flow direction ranges from the southeast to southwest. A summary of historical groundwater elevation data is presented as Table 1. Groundwater beneath the site has been designated by the San Francisco Bay Water Quality Control Board as potentially suitable for municipal and industrial use (San Francisco Bay Basin Water Quality Control Plan, 2007).

2.4 Current Site Condition

The site currently has seven monitoring wells in its network (MW-2 through MW-4 and MW-6 through MW-9) and five onsite soil vapor monitoring points (VMP-1 through VMP-5). At present, TEC monitors wells MW-4 and MW-9 on a quarterly basis; all other wells are sampled semi-annually. Locations of site monitoring wells and vapor monitoring points are presented in Figure 2. The groundwater monitoring well construction details and activity schedule are presented in Table 2.

2.5 Extent and Stability of Contaminants of Concern

2.5.1 Hydrocarbon Source and Contaminants of Concern

Chemicals of concern are TPHg, BTEX compounds and MTBE. The source of the petroleum hydrocarbon release is the former UST system, which included tanks, dispenser islands and product piping trenches, and which was removed in 1989 under the supervision of the Alameda County Health Agency. The petroleum hydrocarbon impacted soil surrounding the former UST excavation boundary was over-excavated and bioremediated onsite in 1991. Following bioremediation, representative samples of the over-excavated soil were collected and analyzed before it was used to backfill the tank pit.

In 2007, approximately 1,000 tons of impacted soils were excavated from the area of the former dispenser islands, in the northeast portion of the site. Clean sand was used for backfill.

Free product has not been observed in any site monitoring wells. Concentrations of COCs appear to be decreasing or within historical ranges. Contaminant sources have been removed and source soils have been excavated. Residual sources that remain in soil, in the vapor or sorbed phases, are limited in extent. A summary of historical soil analytical results is presented as Table 3.

2.5.2 Extent and Stability of Petroleum Hydrocarbons in Soil

Soil impacted by TPHg occurs in two known areas at the site, shown on Figure 5:

1) in the zone between the 1991 and 2007 excavation areas in the vicinity of boring CB-17, and
2) on the east side of the 2007 excavation area near borings CB-10 and B-6.

Additionally, grab groundwater results indicate a potentially impacted soil area in the vicinity of vapor monitoring point VMP-4; no smear zone soil data is available in this area. Evidence of petroleum hydrocarbon impact to soil, when encountered, is generally not observed above 10 ft bsg or below 15 ft bsg. This depth range represents the smear zone, and is within the historic range of groundwater table fluctuations.

Based on available data, TEC calculated the mass of TPHg in soil to be approximately 160 lbs. The mass calculation methods and results are presented in Table 4.

2.5.3 Extent and Stability of Petroleum Hydrocarbons in Groundwater

At present, the site monitoring network consists of 7 groundwater wells, which are monitored on a semi-annual basis. Concentrations of TPHg and benzene in all impacted monitoring wells (excluding newly installed well MW-9 for which there is limited temporal data) appear to be either stable or decreasing. Since the fourth quarter 2007, well MW-8 has been the only well in the network containing elevated concentrations of TPHg and BTEX compounds. A summary of historical groundwater analytical results is presented in Table 5. Graphs depicting groundwater COC concentration changes over time for all wells are presented as Charts 1 through 6. Groundwater elevation trends are presented in Chart 7.

The lateral distributions of dissolved-phase TPHg and benzene are defined in all directions. The lateral distribution of MTBE in groundwater is constrained except to the southwest. Contour maps depicting the extents of TPHg, benzene and MTBE in groundwater are presented as Figures 6, 7 and 8, respectively.

The dissolved phase plume is located primarily on the southeast quadrant of the site. Elevated concentrations of dissolved-phase TPHg, benzene and MTBE exist to the south of the 2007 excavation boundary and to the east of the 1991 excavation boundary (well MW-8 and vapor points VMP-3 and VMP-4). Elevated concentrations of petroleum hydrocarbons were also detected in grab groundwater samples collected during the installation of vapor points VMP-1, located west of the 2007 excavation boundary, and VMP-2, located within the footprint of the 2007 excavation boundary. A summary of historical grab groundwater analytical results is presented in Table 6.

Based on available data, TEC calculated that 7 lbs TPHg and less than one pound each of benzene and MTBE are present in groundwater. The mass calculation methods and results are presented in Table 4.

2.5.4 Extent and Stability of Petroleum Hydrocarbons in Soil Vapor

Data from the *2009 Additional Site Investigation* indicate that petroleum hydrocarbons are not significant in soil vapor; samples collected from the unsaturated zone (4-5 ft bsg) and from just above the smear zone (7.5-8.5 ft bsg) contained no petroleum hydrocarbons at concentrations above laboratory reporting limits. These results are consistent with historical soil vapor samples SV-1 through SV-7, collected from 3.5 ft bsg in 2003. Although grab groundwater samples collected from the exploratory borings for soil vapor monitoring points VMP-1 through VMP-4 contained elevated concentrations of petroleum hydrocarbons, the soil vapor samples indicate that contaminants are not readily migrating from groundwater to subsurface vapor. A summary of historical soil vapor analytical results is included in Table 7.

3.0 HUMAN HEALTH RISK ASSESSMENT

In order to evaluate the appropriateness of site regulatory closure and/or the potential need for supplemental site remediation, TEC has prepared a site-specific risk assessment using *RBCA Tool Kit for Chemical Releases*, version 2.5 (2009). This model returns quantitative goals for concentrations of COCs in soil and groundwater that are protective of human health and the environment based on the parameters and assumptions described below.

3.1 Model Setup

3.1.1 Receptor Scenario and Site Use

TEC performed a limited sensitive receptor survey within a 1,000 ft radius of the subject site. The nearest surface water body, San Francisco Bay, is located approximately 1,500 ft to the south-southwest. Three schools have been identified at approximately 1,000 ft from the subject site.

As of 2005, California Department of Water Resources (DWR) records indicated that no domestic, industrial, or municipal wells existed within a 1,000 ft radius of the site.

The site has recently been used as a metered parking lot and as a venue for the Alameda farmers market. However, the current owner intends to sell the property, and re-development as either a commercial or a residential property is likely in the near future.

TEC selected the following receptor points to model these considerations:

1. An on-site residential receptor conservatively models potential site development after property transfer;
2. An on-site construction worker receptor models potential exposures due to site re-development;
3. An off-site residential receptor scenario, at a distance of 100 ft from the source area, is intended to evaluate potential exposures to neighboring residential properties under current site development.
4. An off-site residential receptor scenario, at a distance of 1,000 ft from the source area, models potential exposures at identified sensitive receptors (schools);
5. A surface water receptor, located 1,500 ft from the source area, models potential impacts to San Francisco Bay.

3.1.2 Selection of Acceptable Risk and Hazard Levels

TEC considers an exposure pathway "complete" if the calculated risks associated with that pathway exceed a cumulative, incremental lifetime risk of $1x10^{-6}$ or a cumulative hazard index of 1.0 or greater for the applicable site use scenario.

3.1.3 Toxicity Parameters

TEC utilizes the most conservative toxicity standards from the California Office of Environmental Health Hazard Assessment (OEHHA) and the United States Environmental Protection Agency, Integrated Risk Information System (EPA-IRIS). Table 8 summarizes the toxicity parameters used.

3.1.4 Site-Specific Modeling Parameters

In order to develop appropriate health-protective goals for the specific conditions on- and near-site, TEC used site-specific field and laboratory results during health risk modeling whenever feasible. TEC obtained data for both groundwater biodegradation capacity and soil physical properties in order to reduce the uncertainty in risk analysis. Current and comprehensive data were used to calculate the groundwater gradient as well as representative concentrations and masses for each modeled COC.

Risk and hazard estimates are based on site-specific physical and chemical parameters whenever possible. Soil physical and hydraulic properties, including dry bulk density, permeability to air, air filled porosity, total porosity and fraction organic carbon are taken from geotechnical laboratory results from the 2009 installation of vapor monitoring point VMP-5 and monitoring well MW-9 (Table 9). The hydraulic gradient is the calculated average of groundwater monitoring data collected since 2001. Model inputs for which quantitative site-specific data are not available, including hydraulic conductivity, effective porosity and capillary zone thickness, are assumed to be USCS defaults for the site soil type (SM). Model inputs are summarized in Table 10.

Biodegradation rates are estimated by calculating site-specific biodegradation capacity using background and source area electron acceptor and metabolic byproduct concentrations to quantify bioactivity. *RBCA*

Tool Kit provides a calculator for biodegradation capacity, which is appropriate for BTEX compounds. TEC collected the required data for electron acceptor analysis during the third quarter 2009 groundwater sampling event and used results to estimate biodegradation rates for BTEX compounds. Results collected for biodegradation capacity analysis are summarized in Table 11. Default utilization factors were applied for each compound.

TEC calculated current representative concentrations for BTEX compounds using a combination of the most recent available groundwater monitoring data (August 2009) and grab groundwater results from the September 2009 subsurface investigation and from offsite soil borings from the July 2007 subsurface investigations. All available results were averaged for each of the BTEX compounds within the plume area presented for benzene in the *2009 Additional Site Investigation,* included as Figure 7. For MTBE, the available results were averaged within the MTBE plume area presented in the same report and included in this report as Figure 8. Calculations of representative concentrations in groundwater and soil are detailed in Tables 12 and 13.

TEC selected the Xu and Eckstein model for groundwater dispersion, which is recommended for use in combination with biodegradation capacity calculations based on electron acceptors and metabolic byproducts. The Johnson and Ettinger model was used for vapor intrusion calculations.

3.1.5 Potentially Complete Exposure Pathways

TEC considered four potentially complete exposure pathways for site-specific assessment, including direct contact with soil, inhalation of particulates in outdoor air, direct contact with groundwater, and discharge to surface water.

Direct contact with soil (ingestion and/or absorption) is not a potentially significant exposure pathway because impacted soils are present at or below 10 ft bsg. Residential site users would be extremely unlikely to directly contact soils below this depth. Similarly, impacted deep soils are extremely unlikely to generate soil particulates which pose an inhalation exposure risk. However for completeness, TEC included potential exposure to soils in a hypothetical site redevelopment (construction worker) scenario.

Soil vapor samples have not identified significant levels of COCs in soil vapor, indicating that contaminant volatilization is limited and unlikely to cause inhalation exposure via vapor intrusion; these results have been reproduced during two separate sampling events. Therefore, TEC excluded the vapor intrusion / inhalation exposure pathway from risk evaluation. However, since offsite vapor samples were not collected and analyzed, TEC modeled the vapor intrusion / inhalation exposure pathway at two offsite residential receptor locations (Scenarios 3 and 4) for completeness. TEC also modeled particulate exposure from outdoor air in a hypothetical site redevelopment (construction worker) scenario.

Groundwater beneath the site vicinity is considered a potentially significant resource for municipal or industrial use. However, no extant wells have been identified within 1,000 ft of the site, and the area is expected to access municipal water supplies for the foreseeable future. Because the groundwater table is found between 7 and 12 ft bsg, site users are most likely to directly contact groundwater extracted from a well for domestic use. TEC models this potential application using a 100 ft compliance point (receptor #3 listed in Section 3.1.1). Additionally, TEC modeled potential plume discharge to San Francisco Bay, located 1,500 ft off-site (receptor #5 listed in Section 3.1.1). A table of receptor scenarios and exposure pathways is included as Table 14.

3.2 Petroleum Hydrocarbon Risk and Hazard Evaluation

Risk pertains to the probability that an individual may develop cancer over a 70-year lifetime as a result of exposure to a carcinogenic compound. In the current study, the carcinogens considered included benzene, ethylbenzene and MTBE. The risks posed by all three carcinogens were summed to calculate

the total carcinogenic risk for each exposure pathway evaluated. Calculated risks are summarized in Table 15.

Carcinogenic risk exceeds the acceptable risk threshold (10^{-6}) for the groundwater ingestion exposure pathway at the offsite receptor located 100 ft downgradient (Scenario 3). Risks at the residential receptor located 1,000 ft downgradient (school, Scenario 4) and at the San Francisco Bay (located 1,500 ft offsite) are within acceptable levels.
Hazard quotients relate chemical concentrations to a reference dose (RfD) which represents a daily intake rate at which no adverse effects are expected to occur. A cumulative hazard quotient less than 1.0 indicates that non-cancer adverse effects are not expected to occur, and is generally considered acceptable. Calculated hazard quotients are summarized in Table 16.

Hazard quotients exceed unity in the groundwater ingestion exposure pathway at the offsite receptor located 100 ft downgradient (Scenario 3). Hazard quotients do not exceed unity for Scenarios 1, 2, 4 or 5.

4.0 MODEL UNCERTAINTIES AND POTENTIAL SOURCES OF ERROR

TEC identified possible sources of error in risk and hazard quotient calculation that could bias the calculated risk and hazard quotients.

4.1 Historical Smear Zone Saturation

Analytical data used to calculate a representative source zone soil concentration were collected from the smear zone, within the range of historic groundwater table fluctuations. Impacted soils were encountered at or possibly below the water table and are likely saturated for at least part of the year. The RBCA software package model does not account for COC concentrations in saturated soils; therefore, TEC used the apparent historical smear zone soil results for the unsaturated source soil area. TEC modeled contamination "in soils leaching to groundwater" for completeness, however, soil contamination has not been observed in the unsaturated zone following excavation activities. The inclusion of soil leaching in the model may overestimate onsite risk and hazard quotients.

4.2 Contaminant Concentrations in Soil

The lack of recent soil data and the lack of available soil data on the southeast part of the site contribute to the uncertainty in the estimation of remaining hydrocarbon mass in soil. Soil borings advanced during the September 2009 investigation and July 2007 investigation were intended for plume delineation and were not located within the heart of the plume area. Source zone soil borings advanced prior to the 2007 excavation include only three sampling locations (from borings CB-10, CB-11 and CB-17) that were impacted and not later excavated. Moreover, historical soil COC concentrations in the vicinity of CB-10, CB-11 and CB-17 may no longer be relevant; present concentrations may be significantly lower because smear zone soils in the vicinity of the excavation area were affected by enhanced bioremediation (ORC addition) during 2007 excavation activities.

4.3 Contaminant Concentrations in Groundwater

Data from both wells and soil borings were used to calculate a representative contaminant concentration across the plume area. However, grab groundwater samples collected during the 2009 vapor monitoring point installation contained concentrations of COCs an order of magnitude higher than samples collected the same quarter from nearby wells. Monitoring well data indicate that significant BTEX impact to groundwater is limited to the vicinity of well MW-8 and that significant MTBE impact exists in the vicinity of wells MW-4, MW-8 and MW-9. TEC included grab groundwater data in the calculation of representative dissolved-phase COC concentrations; however, including these data 1) increases the apparent plume size, 2) likely overestimates COC concentrations in the impacted area, and 3) subsequently

overestimates associated risk and hazard levels. Agitation during sample collection may cause COC desorption and may be responsible for the discrepancy between groundwater data from grab groundwater samples and monitoring well samples. Including the grab samples in site averages may overestimate actual contaminant concentrations in groundwater.

5.0 SITE-SPECIFIC TREATMENT LEVELS (SSTLs)

5.1 Proposed SSTLs

TEC calculated site-specific treatment levels (SSTLs) representing concentrations of BTEX compounds and MTBE at which the risks and hazards associated with all modeled exposure pathways would be reduced to acceptable levels. Proposed SSTLs are summarized below; SSTLs based on each exposure pathway are detailed in Table 17.

Proposed SSTLs (exclude onsite vapor intrusion pathway)

Phase	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Soil (mg/kg)	**6.1E-1**	**3.3E+0**	**6.8E-1**	**6.6E+0**	**6.3E-1**
Groundwater (mg/L)	**9.4E-1**	4.3E+0	7.6E-1	7.1E+0	**1.3E+0**

Values shown in bold indicate that current representative concentrations onsite exceed the proposed SSTL.

Model SSTL outputs are based on site-specific soil properties and climatic conditions and are not dependent on actual contaminant concentrations in soil or groundwater. Therefore, the proposed SSTLs are not affected by the contaminant concentration uncertainties presented in Section 4.0, above.

5.2 Discussion

Representative soil concentrations in the source zone exceed proposed soil SSTLs for all modeled constituents. However, the calculated representative soil concentrations for both benzene and MTBE are influenced by elevated laboratory detection limits. TEC estimated non-detect concentrations as half the laboratory detection limit, although neither benzene nor MTBE were detected in samples from the impacted soil area.

Average groundwater concentrations in the source zone (which include results from both wells and grab samples) exceed proposed groundwater SSTLs for benzene only. However, if current COC concentrations are calculated based only on the average results from groundwater monitoring wells, only MTBE exceeds proposed SSTLs.

TEC calculated reduction factors for all modeled constituents. The reduction factor is the amount a given constituent concentration must be reduced to meet the proposed SSTL. The constituent with the highest reduction factor is ethylbenzene in soil, which would have to be reduced by 84 times its present concentration to meet the proposed SSTLs. Reduction factors are included in Table 17.
Based on observed trends in petroleum hydrocarbon concentrations and measured bioactivity in the site area, TEC expects COCs in groundwater to naturally degrade from proposed SSTLs to Basin Plan goals within a reasonable amount of time (less than 20 years). Therefore, the proposed SSTLs are protective of natural resource degradation in the medium and long term as well as of human health risk in the short term. Average soil and groundwater concentrations are compared to the proposed SSTLs in Table 18.

6.0 CLOSURE PROGRESS ASSESSMENT AND LIMITED FEASIBILITY STUDY

6.1 Closure Progress Assessment

The vast majority of contamination at the subject site has been removed by excavation and bioremediation. TEC estimates that approximately 160 lbs TPHg remain in soil located in at least two small (approximately 300 ft^2 each) areas. Both remaining impacted areas were inaccessible for remediation in 2007 because they underlie trees, landscaping, and public facilities (parking meters, etc.). Despite being limited in extent, impacted soil represents a potential ongoing source of BTEX compounds to groundwater (benzene was not detected in available soil samples, but the laboratory detection limit exceeded the proposed SSTL by around an order of magnitude). Groundwater impact extends over a larger area (nearly 7,500 ft2) but is generally collocated with soil contamination. As discussed in Section 5.2, above, TEC expects COC concentrations in groundwater to naturally degrade rapidly in the absence of an ongoing soil source. 'Polishing' corrective action in the remaining soil source area may be a cost-effective means to reduce risks to human health and the environment and to facilitate regulatory closure.

6.2 Remedial Objectives and Constraints

Corrective action is intended to achieve concentrations of COCs at or below the site-specific goals presented in Section 5.1, above, which represent levels that are protective of human health and the environment, across the remaining impacted soil source area.

The following site-specific conditions are significant considerations for the selection of an appropriate remedial technology for the offsite area of the subject site:

1. *Soil is the primary targeted media.* The primary targets for corrective action are the remaining impacted soil areas, which may represent an ongoing source of COCs to groundwater. Grab groundwater collected during the installation of vapor monitoring point VMP-4 suggests that additional COC impact to soil may exist in the southeast corner of the site; currently available soil data in this area is inconclusive.

2. *Targeted remediation zone is limited in size.* Each known area of residual soil contamination is approximately 412 ft^2 (825 ft^2 total), and contamination is localized between 10 and 15 ft bsg. The total mass of known TPHg remaining in soil on-site is approximately 160 lbs.

3. *Targeted soils are typically saturated.* Depth to groundwater ranges from 7 to 12 ft bsg. The targeted soil areas are therefore saturated for at least part of the year, and most likely represent a historical smear zone generated during a drought period.

4. *Site intended for redevelopment.* The current site owner intends to sell the property and redevelopment as either a residential or commercial property is likely. Expedited corrective action is a priority.

6.3 Identification of Potentially Effective Remedial Action Alternatives

Based on the above conditions, TEC completed an initial screening of nine common technologies for remediation of petroleum hydrocarbon contamination. Any technology that is incompatible with the site conditions is excluded from further consideration in Section 6.4, below.

Groundwater Extraction and Treatment — Incompatible with condition #1. Groundwater extraction does not efficiently address sorbed contamination.

Soil Vapor Extraction	Incompatible with condition #3. Soil vapor extraction alone will not effectively access saturated soil pores.
Dual-Phase Extraction	Potentially feasible. Groundwater extraction could provide water table drawdown, allowing air to access pore spaces and sorbed contaminants.
Air Sparging	Potentially feasible in combination with vapor extraction only. Although air sparging primarily targets dissolved-phase contamination (incompatible with condition #1), it can enhance removal of sorbed contaminants, especially in combination with vapor extraction.
In-Situ Chemical Oxidation	Potentially feasible.
Soil Excavation with Dewatering	Not feasible. Residual soil contamination is located beyond the feasible extent of previous soil excavations.
Enhanced Biodegradation	Potentially feasible.
Monitored Natural Attenuation	Incompatible with short-term remedial objective. Soils appear to act as a source of COCs in groundwater, which is associated with complete exposure pathways.
Enhanced Fluid Recovery	Incompatible with condition #1. Enhanced fluid recovery is best suited for removal of free-, dissolved-, or vapor-phase hydrocarbons and addresses sorbed contamination only indirectly and inefficiently.

6.4 Detailed Evaluation of Potentially Effective Remedial Action Alternatives

Potentially feasible technologies, including dual-phase extraction (with or without air sparging), in-situ chemical oxidation, and enhanced biodegradation, are evaluated below.

6.4.1 Dual-Phase Extraction

Dual-phase extraction (DPE) simultaneously removes liquids and vapors from the subsurface, either as a mixed fluid stream under vacuum or in combination with a submersible groundwater pump. Groundwater extraction removes contaminants in the dissolved-phase and lowers the water table near the extraction well, exposing formerly saturated soils near the natural water table which are often reservoirs for sorbed contaminants that float in water. Volatile contaminants are then extracted in the vapor phase by the vacuum system.

The DPE process is applicable at most sites including those with relatively low soil permeability. It also provides a measure of hydraulic control of the impacted groundwater plume, enhances aerobic degradation through the introduction of air into the subsurface, and provides a means of source reduction by addressing both the unsaturated and saturated zones simultaneously.

Air sparging (AS) can enhance the DPE process by increasing airflow in the subsurface and by “stripping” dissolved and sorbed contaminants, moving them into the vapor phase for collection. Air sparging injects air into the saturated zone to enhance partitioning of dissolved / adsorbed petroleum hydrocarbons into air, effectively “stripping” the hydrocarbons from the impacted groundwater and soils.
The sandy soils onsite are conducive to dual-phase extraction. Sands typically support relatively high groundwater and soil vapor flow rates, and a high groundwater extraction rate was sustained at this site

during excavation activities in 2007 (15,000 gallons over 2 days). Contaminants in shallow saturated soils could be efficiently removed by a combination of groundwater table drawdown and vacuum extraction. Air sparging could enhance the rate of contaminant extraction from saturated soils that are not exposed by groundwater extraction. Installation of a DPE system at the subject site would require significant setup time and costs for well installation, equipment procurement, utility service, and permitting; the addition of air sparging would marginally increase those costs.

6.4.2 In-Situ Chemical Oxidation

Chemical oxidizers react with chemically reduced compounds such as petroleum hydrocarbons. Ideally, petroleum hydrocarbon compounds can be oxidized to carbon dioxide and water. Oxidizers commonly used for petroleum hydrocarbon remediation include gases (ozone), liquids (hydrogen peroxide or Fenton's reagent), or slurries.
Ozone (O_3) is a highly reactive gas and decomposes fairly rapidly, so ozone is typically generated in close proximity to the treatment area and delivered under pressure to the subsurface through a network of closely-spaced injection points. In typical applications, air containing up to five percent ozone is injected into the groundwater where it dissolves in the water, decomposes to release hydroxyl and other free radicals (strong nonspecific oxidants). Because ozone decomposes into oxygen, ozone is also effective in delivering oxygen to enhance subsurface bioremediation of petroleum hydrocarbon-impacted areas. Ozone injection technology has proven to be highly effective in remediating vadose zone and dissolved-phase petroleum hydrocarbon contamination in sands. As an *in-situ* remedial method, it has the added benefit of avoiding the expenses of waste disposal and aboveground storage and treatment. However, it requires on-site gas generation, intensive monitoring, and mitigation of potential plume destabilization concerns, which can increase implementation costs.

Hydrogen peroxide (H_2O_2) is a strong liquid-phase oxidizer that is commonly combined with chelated ferrous iron (Fe(II)) to form a modified Fenton's reagent and increase its reactive potential. Both Fenton's reagent and hydrogen peroxide are stable under ambient conditions and do not need to be generated onsite. However, their persistence in the subsurface is only slightly longer than ozone's. Like ozone, hydrogen peroxide produces oxygen during breakdown and can enhance aerobic microbial activity. The exothermic hydrogen peroxide reaction may also produce a significant amount of heat that should be managed or regulated.

Oxidizer injection is well suited for sites with localized contamination, such as the subject site, because the effective radius of influence for a single injection point is typically small (less than 10 ft) due to rapid oxidizer breakdown. Because sorbed contaminants are found within the saturated zone, it should be more effectively accessed by liquid oxidizers like Fenton's reagent rather than gases like ozone. Liquid oxidizers also provide the additional benefit of requiring less equipment and fewer utilities than ozone.

Injection of any material into the subsurface may cause mobilization of dissolved-phase contamination due to displacement. Because the majority of contaminants remaining onsite are sorbed to soils, this effect is expected to be limited; however, careful monitoring would be required to determine appropriate injection rates and pressures. Often, concentrations of dissolved organic contaminant levels increase immediately following an injection event, after which they permanently decrease as the contaminant mass is degraded and the dissolved phase re-equilibrates with the saturated soil. Although this temporary 'spike' in dissolved-phase contaminant concentrations can cause COC displacement, it typically affects a minor quantity of contaminant mass that is easily degraded under natural conditions.

Certain redox-sensitive metals, such as arsenic, cadmium, chromium, lead, and selenium, can be oxidized during *in-situ* chemical oxidation, which may increase solubility (chromium and selenium) or cause precipitation (iron and arsenic). Based on available literature and previous experience, metals liberated by oxidation generally return to pre-injection reduced states in a relatively short period of time. However, redox-state-specific metal concentrations in groundwater should be monitored to minimize any mobilization of redox-sensitive metals.

Remediation of the subject site by Fenton's reagent could be accomplished using either single-use boreholes or semi-permanent injection wells within the impacted area. Remediation could likely be completed over several rounds of injection followed by monitoring and verification. No permanent equipment or utility service would be required.

6.4.3 Enhanced Bioremediation

Hydrocarbon constituents dissolved in groundwater and adsorbed to soil particles may be destroyed in-situ by metabolic activities of naturally-occurring microbes. The rate of contaminant breakdown can be increased by improving the thermodynamic or kinetic favorability of the metabolic reaction, typically by providing oxygen as an electron acceptor via chemical additives such as hydrogen peroxide, magnesium peroxide, oxygen release compound (ORC®), or through direct subsurface introduction of oxygen by sparging or passive inlet. A successful bioremediation program must also consider pH, temperature, nutrient supply (such as nitrogen and phosphorus), contaminant concentration, bioavailability of the contaminant, presence of toxic chemicals, and susceptibility of the contaminant to biodegradation.

Oxygen releasing compounds can be used at sites with petroleum hydrocarbon impacted groundwater to stimulate microbial activity. A slurry mixture of ORC® and water can be introduced into the aquifer using high-pressure injection. The injection locations and spacing are site-specific and take into account the formation permeability, the estimated radius of influence from the injection points, and the overall area of impact to be treated.

Chemical additives may be less practical or cost-effective when introduced at sites with low permeability formations or large treatment areas. The cost increases significantly if the injection spacing is reduced and multiple injections are necessary. The size of the impacted area, access for injection points within the impacted area, and the proximity of sensitive receptors may limit the feasibility of chemical additives as a remedial approach.

Recent soil gas analyses indicate high to very high levels of oxygen in soil vapor, indicating that oxygen availability may not be a limiting factor for microbial metabolism. However, TEC has a low level of confidence in the available fixed gas results as no mechanism has been identified for the higher-than-atmospheric oxygen levels reported. During the 2007 soil excavation, 1,050 lbs of ORC® were added below the typical water table during backfill in order to enhance ongoing microbial activity. Monitoring wells located near the excavation area (and/or recently installed wells placed near historical well locations) have not indicated any significant drop in dissolved-phase petroleum hydrocarbon concentration since this addition. For example, benzene and MTBE concentrations in well MW-8 (installed post-excavation) remain within historical ranges from well MW-1 (destroyed during excavation and located adjacent to current well MW-8).

Available data suggest that oxygen is not currently limiting microbial growth and that enhancement would therefore not cause rapid degradation of site contamination. Therefore, despite its generic applicability for contaminant degradation in saturated sands, oxygen enhancement for bioremediation is not considered appropriate for this site.

6.5 Selection of Best Remedial Action Alternative

Both dual-phase extraction and in-situ chemical oxidation are feasible technologies to remediate the subject site. Of the two, dual-phase extraction requires higher permitting and equipment costs, and may also involve higher operation costs and/or longer project duration. Therefore, TEC recommends applying in-situ chemical oxidation via catalyzed hydrogen peroxide (Fenton's reagent) to mitigate residual petroleum hydrocarbon contamination at the site.

7.0 CORRECTIVE ACTION WORKPLAN

7.1 Corrective Action Conceptual Design

Petroleum hydrocarbons in soil are targeted in two known and one suspected areas of the site (Figure 9). TEC assumes that each catalyzed hydrogen peroxide injection point can reasonably achieve a 5 ft radius of influence (ROI) using field-adjusted injection pressure and flow rate, equivalent to an area of 78 ft^2. Area A, located northeast of the former USTs and west of the 2007 excavation area, is approximately 375 ft^2 and is therefore targeted with 5 evenly spaced injection points; Area B is approximately 450 ft^2 and is therefore targeted by 6 evenly spaced injection points.

No soil data is available between 10 and 15 ft bsg for the on-site area south of the 2007 excavation. Grab groundwater results from vapor monitoring point VMP-4 and, to a lesser extent, VMP-3, indicate that significant contamination may exist in this area. The following workplan integrates investigation of this possible target area, referred to as target area C, with active remediation based on field results in order to ensure that the proposed corrective action comprehensively addresses risks to human health and the environment and facilitates site regulatory closure.

The proposed injection activities are slightly "over-engineered" because TEC believes it will be more cost-effective to complete fewer, more extensive rounds of catalyzed hydrogen peroxide injection rather than a larger number of minimal injection events. Corrective action and verification are expected to require approximately three field mobilization events. More events will be added if appropriate

7.2 Remediation Activities

7.2.1 Pre-Field Activities

TEC will complete the following tasks prior to field mobilization:

- As required by the Occupational Health and Safety Administration (OSHA), and by the California OSHA, TEC will prepare a site-specific Health and Safety Plan prior to the commencement of fieldwork. The plan will be reviewed and signed by field staff and contractors before beginning field operations, and will be in the possession of TEC personnel while conducting activities at the site.

- TEC will obtain a drilling permit from ACEHS and will negotiate any additional required permits for hydrogen peroxide injection prior to commencing fieldwork.

- More than 48 hours prior to the initiation of fieldwork, TEC will mark the soil boring locations with white paint and contact Underground Service Alert (USA). TEC will also contract a private subsurface utility locator to perform a detailed survey of the proposed soil boring locations and identify any subsurface obstructions.

- TEC will contract a direct-push drilling company with experience working with catalyzed hydrogen peroxide to complete two to three rounds of field mobilization.

- Prior to Round One injection activities, TEC will complete a full groundwater monitoring event (see Section 7.3, below).

7.2.2 Oxidizer Injection, Round One

The first round of injection will involve approximately 15 boring locations, including points I-A1 through I-A5 in target area A, points I-B1 through I-B6 in target area B, and points I-C1 through I-C4 in potential target area C as shown on Figure 9. Each soil boring will be cleared by hand auger to at least 5 ft bsg and then advanced to a total depth of 16 ft bsg by direct-push drill rig. Soils will be viewed continuously, and samples will be collected every 2 ft by capping cut sections of the acetate liners. Splits of each soil sample will be screened for volatile organic compounds (VOCs) by sealing the soil within a plastic bag, placing the bag in a warm location, allowing volatiles to accumulate in the bag headspace, and analyzing the bag headspace for VOCs by a calibrated PID meter. Approximately two soil samples from the remediation target zone (10 to 15 ft bsg) will be selected and retained for laboratory analysis based on PID results and field observations.

PID results will also be used to determine whether catalyzed hydrogen peroxide injection is appropriate at boring locations within potential target area C. Based on a comparison between PID results and laboratory analytical results for historical borings at this site, soils returning a PID value of greater than 50 parts per million (ppm) are likely to contain concentrations of BTEX compounds above proposed SSTLs. Therefore, soil borings where at least 2 soil sample PID results exceed 50 ppm (i.e. where at least one third of the targeted depth interval likely exceeds SSTLs) will be used as injection locations.

After reaching total boring depth, the drill rods will be pulled back to 10 ft bsg. A grab groundwater sample will be collected from each boring location by peristaltic pump or disposable bailer and stored in HCl-preserved volatile organic analysis vials (VOAs) in a chilled, insulated container. For injection borings I-A1 through I-A5, I-B1 through I-B6, and any of the borings in area C that have been selected as injection locations, TEC will then inject a solution of approximately 7% catalyzed hydrogen peroxide. Approximately 1,000 gallons of groundwater exist within the cylinder defined by the assumed 5 ft ROI and the 5 ft depth interval for each injection point. As shown on Figure 9, these idealized ROIs overlap among each round of injection borings. Because contaminant mass is present primarily in the sorbed phase, displacement of impacted groundwater is not a primary concern. TEC expects mixing to significantly expand the effective range of the hydrogen peroxide solution, as it is fully miscible with the groundwater and because these materials are collocated with the targeted contamination. Therefore, TEC estimates that a maximum of 200 gallons of catalyzed hydrogen peroxide solution should be added to each injection boring.

Injection will end either when injection pressures increase significantly, when 200 gallons of liquid have been accepted by the host formation, or if surface breaching is observed. Soil borings will be backfilled with hydrated, compacted bentonite to 4 ft bsg and with grout thereafter in order to reduce the likelihood of breaching from these locations during subsequent rounds of injection.

All grab groundwater and selected soil samples will be submitted for laboratory analysis with chain-of-custody documentation and analyzed for TPHg, BTEX compounds, and fuel oxygenates by EPA Method 8260B.

7.2.3 Oxidizer Injection, Round Two

The second field mobilization will occur at least three weeks after the completion of Round One activities. Injection will occur at a minimum of 9 boring locations, including points I-A6 through I-A9 in target area A and points I-B7 through I-B11 in target area B. If COC concentrations in soil from borings I-C1 through I-C4 exceed SSTLs, additional injection borings will be placed within target area C based on those results. Borings will be advanced and sampled using the methods described in Section 7.2.2, above. PID readings and analytical results from this round of activity are intended to describe the effectiveness of Round One injection activities, and will be used to anticipate whether a third round of injection would be appropriate to reach site cleanup goals.

Up to 200 gallons of 7% catalyzed hydrogen peroxide will be injected in each of the Round Two boring locations. Injection will end either when injection pressures increase significantly, when 200 gallons of liquid have been accepted by the host formation, or if surface breaching is observed. Soil borings will be backfilled with hydrated, compacted bentonite to 4 ft bsg and with grout to surface grade.

All grab groundwater and selected soil samples will be submitted for laboratory analysis with chain-of-custody documentation and analyzed for TPHg, BTEX compounds, and fuel oxygenates by EPA Method 8260B.

7.2.4 Verification Sampling, Round Three

Based on a comparison of field and analytical data, particularly COC concentrations in soil collected during Rounds One and Two (Sections 7.2.2 and 7.2.3, above), TEC will estimate the destruction efficiency of injected catalyzed hydrogen peroxide solution by volume and will assess the appropriateness of a third round of injection on site. Any Round Three injection borings will be targeted to directly address apparent residual COCs in soil. If additional injection is deemed appropriate, TEC will apply the methods described for Round Two activities and will conduct verification sampling (described below) thereafter.

If remedial goals are likely to have been achieved, TEC will advance a minimum of six soil borings in target areas A and B to verify remediation completeness. If catalyzed hydrogen peroxide was injected in potential target area C during Round Two, a minimum of three verification borings will be advanced in that area also. Verification borings will be advanced a minimum of four weeks after the conclusion of injection activities to allow equilibration in the subsurface. Boring locations will be finalized after completion of Round Two activities in order to target locations with the greatest uncertainty or priority based on empirical data.

Verification borings will be advanced and sampled using the methods described in Section 7.2.2, above. Soil borings will be backfilled with hydrated, compacted bentonite to 4 ft bsg and with grout to surface grade. All grab groundwater and selected soil samples will be submitted for laboratory analysis with chain-of-custody documentation and analyzed for TPHg, BTEX compounds, and fuel oxygenates by EPA Method 8260B.

7.3 Monitoring and Verification

As mentioned in Section 6.4.2, displacement of contaminants away from injection points and liberation of metals into solution are potential concerns associated with the proposed corrective action. To confirm that the remedial process is performing as designed, TEC will monitor both groundwater and soil vapor throughout the corrective action process. Prior to Round One injection activities, TEC will complete full groundwater and soil vapor monitoring events using standard groundwater gauging and sampling procedures for this site. Groundwater samples collected from wells MW-2 through MW-4 and MW-6 through MW-9 will be analyzed for TPHg, BTEX and fuel oxygenates by EPA Method 8260B, selected dissolved metals (including iron, chromium, selenium, and arsenic) by EPA Method 6020B, hexavalent chromium by EPA Method 7196, and ferrous iron by SM3500D. Soil vapor samples will be collected from both zones of vapor monitoring points VMP-1 through VMP-5 and analyzed for TPHg by TO-3 and BTEX and fuel oxygenates by TO-15. The same suite of analytes will be collected and analyzed no sooner than two weeks after each injection event and again 60 days after the final injection event. To ensure that the performance of the remediation technology is accurately represented, unpreserved VOAs will be used to collect groundwater samples for EPA 8260B analysis; the presence of a strong oxidant (HCl preservative) will reduce concentrations of contaminants over time.

As part of process monitoring, TEC will measure pH, temperature and pressure at each injection location. In addition, process parameters including pH, temperature, ORP, DO, and conductivity will be monitored in nearby groundwater monitoring wells during injection of the catalyzed hydrogen peroxide. To

determine if unsafe levels of explosive gases are being generated during the injection process, grab soil vapor samples will collected from select vapor monitoring points in Tedlar bags using a lung sampler and analyzed with an LEL meter.

8.0 SUMMARY OF CONCLUSIONS

- TEC calculated risk and hazard quotients for petroleum hydrocarbons in soil and groundwater, considering four potentially complete exposure pathways: direct contact with soil, inhalation of particulates in outdoor air, direct contact with groundwater, and discharge to surface water. Carcinogenic risk and hazard quotients exceed acceptable thresholds for the groundwater ingestion exposure pathway at the offsite receptor located 100 ft downgradient (Scenario 3).

- TEC calculated SSTLs for petroleum hydrocarbons in soil and groundwater, considering potential exposures due to particulate inhalation, ingestion, and absorption both on and off site. These proposed goals are based on both updated analytical results and site-specific physical and chemical parameters. The proposed SSTLs are protective of both human health in the short term (shown by *RBCA Tool Kit* model results) and of resource protection in the long term. TEC recommends adhering to these proposed SSTLs as standards for site closure assessment, assuming that future onsite vapor monitoring returns concentrations below ESLs:

Proposed SSTLs

Phase	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Soil (mg/kg)	**6.1E-1**	**3.3E+0**	**6.8E-1**	**6.6E+0**	**6.3E-1**
Groundwater (mg/L)	**9.4E-1**	4.3E+0	7.6E-1	7.1E+0	**1.3E+0**

- Representative soil concentrations in the source zone exceed proposed soil SSTLs for BTEX compounds and MTBE.

- Average groundwater concentrations in the BTEX and MTBE plume areas exceed proposed groundwater SSTLs for benzene only. Additionally, monitoring well MW-8 contains concentrations of MTBE above proposed groundwater SSTLs.

- Since the 2007 soil excavation, the only regularly monitored field point to contain petroleum hydrocarbons at concentrations above the proposed groundwater SSTLs is onsite well MW-8. Grab groundwater samples collected during the 2009 additional subsurface investigation contained elevated concentrations of petroleum hydrocarbons at least an order of magnitude higher than groundwater samples collected from nearby monitoring wells. Significant uncertainty exists in the calculation of representative sorbed and dissolved COC concentrations; however, this should not impact the validity of proposed SSTLs.

- In order to bring the site into compliance with proposed SSTLs, remediation must target a small area (approximately 825 ft^2) of primarily saturated soils prior to intended site redevelopment. TEC concludes that the best remedial technology for site-specific conditions is catalyzed hydrogen peroxide (Fenton's reagent) injection.

- TEC proposes to achieve the conditions for regulatory closure by conducting a series of catalyzed hydrogen peroxide injection events and verifying COC concentration reduction in soil.

9.0 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. Technology, Engineering & Construction Inc.'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, nor the use of segregated portions of this report.

Thank you for your cooperation with this project. If you have any questions, please call the undersigned at (650) 616-1200.

Sincerely,
Technology, Engineering
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TABLES

Table 1
Summary of Historical Groundwater Elevation Data
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	TOC Elevation (ft msl)	Sample Date	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-1	19.53	6/3/1993	(1)	---
		9/14/1994	11.46	8.07
		12/30/1994	9.22	10.31
		3/26/1995	6.76	12.77
		7/9/1995	8.92	10.61
		7/31/1998	8.30	11.23
		2/11/1999	7.91	11.62
		6/23/1999	9.03	10.50
		12/6/1999	10.86	8.67
		3/16/2000	6.93	12.60
		6/13/2000	8.73	10.80
		9/29/2000	10.18	9.35
		3/22/2001	8.24	11.29
		6/25/2001	9.73	9.80
		9/28/2001	11.06	8.47
		12/26/2001	8.11	11.42
		07/0705	8.69	10.84
		10/19/2005	10.25	9.28
		1/13/2006	7.09	12.44
		5/5/2006	6.40	13.13
		7/19/2006	8.28	11.25
		10/5/2006	9.67	9.86
		****************Abandoned 12/27/2006****************		
MW-2	19.80	6/3/1993	9.54	10.26
		9/14/1994	11.82	7.98
		12/30/1994	9.46	10.34
		3/26/1995	6.82	12.98
		7/9/1995	9.22	10.58
		7/31/1998	8.56	11.24
		2/11/1999	8.12	11.68
		6/23/1999	9.33	10.47
		12/6/1999	11.20	8.60
		3/16/2000	6.88	12.92
		6/13/2000	8.99	10.81
		9/29/2000	10.40	9.40
		3/22/2001	8.46	11.34
		6/25/2001	10.11	9.69
		9/28/2001	11.40	8.40
		12/26/2001	8.28	11.52
		7/7/2005	8.99	10.81
		10/19/2005	10.63	9.17
		1/13/2006	7.15	12.65
		5/5/2006	6.43	13.37
		7/19/2006	8.57	11.23
		10/5/2006	10.05	9.75
		3/29/2007	8.83	10.97
		6/27/2007	9.86	9.94
		9/19/2007	10.89	8.91
		12/19/2007	10.78	9.02
		3/6/2008	8.48	11.32
		6/18/2008	10.23	9.57
		9/10/2008	11.36	8.44
		12/10/2008	11.89	7.91
		3/4/2009	8.68	11.12
		6/3/2009	9.91	9.89
		8/27/2009	11.16	8.64
		12/10/2009	11.32	8.48

Table 1
Summary of Historical Groundwater Elevation Data
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	TOC Elevation (ft msl)	Sample Date	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-3	19.79	6/3/1993	9.80	9.99
		9/14/1994	12.19	7.60
		12/30/1994	9.72	10.07
		3/26/1995	6.88	12.91
		7/9/1995	9.52	10.27
		7/31/1998	8.40	11.39
		2/11/1999	7.77	12.02
		6/23/1999	9.21	10.58
		12/6/1999	11.12	8.67
		3/16/2000	6.48	13.31
		6/13/2000	8.76	11.03
		9/29/2000	10.20	9.59
		3/22/2001	8.24	11.55
		6/25/2001	10.04	9.75
		9/28/2001	11.34	8.45
		12/26/2001	8.01	11.78
		7/7/2005	8.84	10.95
		10/19/2005	10.58	9.21
		1/13/2006	6.85	12.94
		5/5/2006	6.11	13.68
		7/19/2006	8.41	11.38
		10/5/2006	10.02	9.77
		3/29/2007	9.71	10.08
		6/27/2007	9.82	9.97
		9/19/2007	10.88	8.91
		12/19/2007	10.68	9.11
		3/6/2008	8.30	11.49
		6/18/2008	10.18	9.61
		9/10/2008	11.33	8.46
		12/10/2008	11.89	7.90
		3/4/2009	8.40	11.39
		6/3/2009	9.81	9.98
		8/27/2009	11.18	8.61
		12/10/2009	11.30	8.49
MW-4	19.30	12/6/1999	10.79	8.51
		3/16/2000	6.86	12.44
		6/13/2000	8.18	11.12
		9/29/2000	10.11	9.19
		4/5/2001	8.26	11.04
		6/25/2001	9.68	9.62
		9/28/2001	10.98	8.32
		12/26/2001	8.18	11.12
		7/7/2005	8.77	10.53
		10/19/2005	10.24	9.06
		1/13/2006	(1)	(1)
		5/5/2006	(1)	(1)
		7/19/2006	8.38	10.92
		10/5/2006	9.65	9.65
		3/29/2007	8.55	10.75
		6/27/2007	9.40	9.90
		9/19/2007	10.45	8.85
		12/19/2007	10.35	8.95
		3/6/2008	8.25	11.05
		6/18/2008	9.80	9.50
		9/10/2008	10.89	8.41
		12/10/2008	11.43	7.87
		3/4/2009	8.47	10.83
		6/3/2009	9.53	9.77
		8/27/2009	10.72	8.58
		12/10/2009	10.85	8.45

Table 1
Summary of Historical Groundwater Elevation Data
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	TOC Elevation (ft msl)	Sample Date	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-5	18.99	12/6/1999	10.17	8.82
		3/16/2000	6.28	12.71
		6/13/2000	7.95	11.04
		9/29/2000	9.54	9.45
		3/22/2001	7.48	11.51
		6/25/2001	9.05	9.94
		9/28/2001	10.39	8.60
		12/26/2001	7.28	11.71
		8/24/2005	7.87	11.12
		10/19/2005	9.51	9.48
		1/13/2006	6.35	12.64
		5/5/2006	5.64	13.35
		7/19/2006	7.41	11.58
		10/5/2006	8.89	10.10
		***************Abandoned 12/27/2006***************		
MW-6	20.27	12/6/1999	11.46	8.81
		3/16/2000	8.32	11.95
		6/13/2000	9.14	11.13
		9/29/2000	10.81	9.46
		3/22/2001	8.64	11.63
		6/25/2001	10.39	9.88
		9/28/2001	11.70	8.57
		12/26/2001	8.40	11.87
		7/7/2005	9.10	11.17
		10/19/2005	10.88	9.39
		1/13/2006	7.33	12.94
		5/5/2006	6.53	13.74
		7/19/2006	8.64	11.63
		10/5/2006	10.29	9.98
		3/29/2007	9.01	11.26
		6/27/2007	10.14	10.13
		9/19/2007	11.17	9.10
		12/19/2007	10.99	9.28
		3/6/2008	8.65	11.62
		6/18/2008	10.46	9.81
		9/10/2008	11.64	8.63
		12/10/2008	12.18	8.09
		3/4/2009	8.86	11.41
		6/3/2009	10.07	10.20
		8/27/2009	11.45	8.82
		12/10/2009	11.61	8.66
MW-7	18.93	3/29/2007	7.90	11.03
		6/27/2007	8.87	10.06
		9/19/2007	9.88	9.05
		12/19/2007	9.72	9.21
		3/6/2008	7.52	11.41
		6/18/2008	9.13	9.80
		9/10/2008	10.29	8.64
		12/10/2008	10.81	8.12
		3/4/2009	7.89	11.04
		6/3/2009	8.70	10.23
		8/27/2009	10.05	8.88
		12/10/2009	10.21	8.72

Table 1
Summary of Historical Groundwater Elevation Data
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	TOC Elevation (ft msl)	Sample Date	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-8	19.33	3/29/2007	8.40	10.93
		6/27/2007	9.33	10.00
		9/19/2007	10.31	9.02
		12/19/2007	10.23	9.10
		3/6/2008	9.14	10.19
		6/18/2008	9.74	9.59
		9/10/2008	10.76	8.57
		12/10/2008	11.31	8.02
		3/4/2009	8.59	10.74
		6/3/2009	9.51	9.82
		8/27/2009	10.57	8.76
		12/10/2009	10.72	8.61
MW-9	18.83	8/27/2009	10.01	8.82
		12/10/2009	10.16	8.67

Notes:
TOC = Top of Casing
ft msl = Feet referenced to mean sea level
--- = Not Available
(1) = Well not accessible due to obstruction by a parked car
yellow row = most recent data

Table 2
Groundwater Monitoring Well Construction Details and Activity Schedule
Former Olympian Service Station
1435 Webster Street
Alameda, California

Monitoring Well Construction Details									Activity Schedule	
Well ID	Date Installed [1]	Total Depth	Diameter	Top of Screen	Bottom of Screen	Screen Length	Top of Casing [2]	Monitoring Status	Gauging	Sampling [3]
		(ft bsg)	(inches)	(ft bsg)	(ft bsg)	(feet)	(ft msl)		(semi-annually)	
MW-1	1/1/1993	24	2	6	24	18	19.53	Destroyed		
MW-2	1/1/1993	24	2	6	24	18	19.80	Active	√	√
MW-3	1/1/1993	24	2	6	24	18	19.79	Active	√	√
MW-4	12/1/1999	20	2	5	20	15	19.30	Active	√	√
MW-5	12/1/1999	20	2	5	20	15	18.99	Destroyed		
MW-6	12/1/1999	20	2	5	20	15	20.27	Active	√	√
MW-7	3/9/2007	20	4	10	20	10	18.93	Active	√	√
MW-8	3/9/2007	20	4	10	20	10	19.33	Active	√	√
MW-9	7/13/2009	20	4	5	20	15	18.83	Active	√	√

Notes

ft = feet
bsg = below surface grade
msl = mean sea level
[1] = Well installation date is given as first day of the installation month when exact well installation date is unknown
[2] = survey performed by Virgil Chavez Land Surveying (PLS #6323)
[3] = groundwater samples are routinely analyzed for total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl-tert-butyl ether (MTBE), di-isopropyl ether (DIPE), tert-butyl alcohol (TBA), and 1,2-dichloroethane (1,2-DCA) by EPA Method 8260B
Note: Monitoring well MW-9 and MW-4 to be sampled quarterly for one full year from the date of installation of well MW-9.

TEC ENVIRONMENTAL

Table 3
Summary of Historical Soil Analytical Results
Former Olympian Service Station
1435 Webster Avenue
Alameda, California

Field Point ID	Date	Depth (ft bsg)	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Pb
			Concentrations in parts per million (ppm) (mg/kg)							
		Proposed SSTL	**--**	**--**	**0.39**	**3.3**	**0.68**	**6.6**	**0.63**	**--**
MW-1	6/12/1993	?	ND	ND	ND	ND	ND	ND	NA	NA
MW-2	6/12/1993	?	ND	ND	ND	ND	ND	ND	NA	NA
MW-3	6/12/1993	?	ND	ND	ND	ND	ND	ND	NA	NA
B1	2/11/1999	7.5	0.65	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	<1.0
B2	2/11/1999	7.5	<0.5	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	2.0
B3	2/11/1999	6	<0.5	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	1.2
B4	2/11/1999	7.5	<0.5	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	1.2
MW-4	11/11/1999	9.5	<0.5	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	---
MW-5	11/10/1999	9.5	1,100	200	**3.4**	**21**	**14**	**70**	<0.005	---
MW-6	11/10/1999	9	<0.5	<1.0	<0.005	<0.005	<0.005	<0.010	<0.005	---
B1	6/27/2001	9	<0.5	---	<0.005	<0.005	<0.005	<0.01	<0.005	---
B2	6/27/2001	9	<0.5	---	<0.005	<0.005	<0.005	<0.01	<0.005	---
B3	6/27/2001	9	<0.5	---	<0.005	<0.005	<0.005	<0.01	<0.005	---
B4	6/27/2001	9	<0.5	---	<0.005	<0.005	<0.005	<0.01	<0.005	---
SP-1	6/12/2006	7.5	1,600 [2]	9.5 [4]	**0.44**	**5**	**38**	**190**	<4	---
SP-1	6/12/2006	10	1,530	12 [4]	**3.5**[J]	**23**	**28**	**150**	<4	---
SP-2	6/12/2006	7	586 [3]	8.8 [4]	0.033	<1	3.1	**13**	<2	---
SP-2	6/12/2006	10	360 [3]	8.8 [4]	**0.4**	0.58[J]	**4.9**	**23**	<2	---
SP-3	6/12/2006	8	114 [3]	2.4 [4]	<1	2.2	1.7[J]	**9.4**	<2	---
SP-3	6/12/2006	10	96.3 [3]	5.5 [4]	**0.46**	1.4[J]	1.2[J]	**7**	<2	---
SP-4	6/12/2006	4	0.0308	<2	<0.01	0.01	0.01	0.051	<0.01	---
SP-4	6/12/2006	7.5	1,240	29 [4]	**0.72**	2	**12**	**61**	<4	---
SP-4	6/12/2006	10	1,410	150 [4]	**6.30**	**45**	**18**	**93**	<4	---
SP-5	6/12/2006	7	758 [2]	42 [4]	**0.24**	1.7[J]	**4**	**35**	<4	---
SP-5	6/12/2006	10	1,100 [2]	68 [4]	**0.39**	**16**	**23**	**140**	<4	---
SP-6	6/12/2006	7	5.83 [3]	64 [4]	0.019[J]	0.037	0.48	0.71	<0.025	---
SP-6	6/12/2006	10	2.78 [3]	3.8 [4]	<0.02	0.0066	0.027	0.053	<0.02	---
SP-7	6/12/2006	7.5	1,100 [3]	200 [4]	0.032	0.027	0.066	0.29	<0.02	---
SP-7	6/12/2006	10	328 [3]	8.5 [4]	0.019[J]	2.1[J]	**3.3**[J]	**18**	<4	---
SP-8	6/12/2006	7	3,430	270 [4]	0.21	**4.8**[J]	**40**	**160**	<20	---
SP-8	6/12/2006	10	1,350	160 [4]	<10	**20**	**31**	**160**	<20	---

Table 3
Summary of Historical Soil Analytical Results
Former Olympian Service Station
1435 Webster Avenue
Alameda, California

Field Point ID	Date	Depth (ft bsg)	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Pb
			Concentrations in parts per million (ppm) (mg/kg)							
CB-2	11/15/2006	6	<0.5	<2.5 [1]	< 0.01	<0.01	<0.01	<0.01	<0.05	---
CB-2	11/15/2006	10	8,800	<120 [1]	<20	**190**	**92**	**490**	<100	---
CB-4	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-4	11/15/2006	12	2,100	<120 [1]	<5.0	**14**	**21**	**52**	<25	---
CB-5	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-5	11/15/2006	12	0.7	<2.5 [1]	<0.01	<0.01	0.013	0.067	<0.05	---
CB-6	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-6	11/15/2006	12	8,000	<12 [1]	**57**	**190**	**94**	**500**	<50	---
CB-7	11/15/2006	12	---	---	---	---	---	---	---	11
CB-8	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-8	11/15/2006	10	1,800	<5.0 [1]	<5.0	<5.0	**26**	**150**	<25	4.8
CB-9	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-9	11/15/2006	10	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-10	11/15/2006	8	2.2	<2.5 [1]	<0.01	<0.01	0.012	<0.01	<0.05	---
CB-10	11/15/2006	12	2,800	<12 [1]	<10	**34**	**45**	**200**	<50	---
CB-11	11/15/2006	8	0.53	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-11	11/15/2006	12	300	<62 [1]	<2.0	**3.8**	**4.8**	**25**	<10	---
CB-12	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-12	11/15/2006	12	<0.50	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-14	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-14	11/15/2006	12	1.0	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-16	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-17	11/15/2006	8	<0.5	<2.5	<0.01	<0.01	<0.01	<0.01	<0.05	---
CB-17	11/15/2006	12	10,000	<50 [1]	<20	**170**	**120**	**640**	<100	---
MW-8	3/9/2007	10	<0.1	<2.5	<.005	<.005	<.005	<.010	<.005	---
B-6	7/11/2007	8	0.196 [3]	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-6	7/11/2007	11	11.2 [5]	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-7	7/11/2007	6	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-7	7/11/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-8	7/11/2007	6	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-8	7/11/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-9	7/11/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-9	7/11/2007	11	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-10	7/11/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-10	7/11/2007	11	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---

Table 3
Summary of Historical Soil Analytical Results
Former Olympian Service Station
1435 Webster Avenue
Alameda, California

Field Point ID	Date	Depth (ft bsg)	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Pb
			Concentrations in parts per million (ppm) (mg/kg)							
B-11	7/11/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-11	7/11/2007	11	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-12	7/11/2007	10	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-12	7/11/2007	12	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-13	7/10/2007	10	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-13	7/10/2007	12	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-14	7/10/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-14	7/10/2007	10	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-17	7/10/2007	8	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-17	7/10/2007	10	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-18	7/10/2007	10	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---
B-18	7/10/2007	12	<0.1	---	<0.05	<0.05	<0.05	<0.05	<0.01	---

B-19	7/7/2009	8	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-19	7/7/2009	12	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-20	7/7/2009	6	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-21	7/7/2009	6	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-21	7/7/2009	11	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-22	7/7/2009	8	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-22	7/7/2009	14	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-23	7/7/2009	8	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-23	7/7/2009	14	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-24	7/7/2009	8	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
B-24	7/7/2009	14	<1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
MW-9	7/13/2009	8	<0.1	---	<0.01	<0.01	<0.01	<0.015	<0.01	---
MW-9	7/13/2009	20*	<0.1	---	<0.011	<0.011	<0.011	<0.017	<0.011	---

Notes:
SSTL = Site-Specific Treatment Level
--- = Not Analyzed ? = Depth unknown
ND = No Detection at or above laboratory reporting limits
TPHg = Total petroleum hydrocarbons as gasoline, EPA Method 8015; 2009 samples by EPA Method 8260.
TPHd = Total petroleum hydrocarbons as diesel, EPA Method 8015.
Benzene, Ethylbenzene, Toluene, Xylenes, EPA Method 8020; 2009 samples by EPA Method 8260.
MTBE = Methyl tert-butyl ether, EPA Method 8020; 2009 samples by EPA Method 8260.
Pb = Lead, Method 7420
* = dry weight analysis.
[1] No diesel pattern present.
[2] Hydrocarbons responded in gasoline range, but pattern does not match typical gasoline (possibly aged gasoline).
[3] Hydrocarbons responded in gasoline range, but pattern does not match typical gasoline (heavy end).
[4] Sample chromatogram does not resemble typical diesel pattern. Unidentified lighter end hydrocarbons within the diesel range quantitated as diesel.
[5] Hydrocarbons responded in gasoline range, but pattern does not match typical gasoline (includes non-target compounds).
[J] Value should be considered estimated.

Table 4
Mass Calculation
Former Olympian Service Station
1435 Webster Street
Alameda, California

Constituent	Contour	Isolated Area	Thickness	Total Volume	Total Volume	Fluid Volume	Representative Concentration	Contaminant Mass	Contaminant Mass
Dissolved-Phase	**ug/L**	**ft^2**	**ft**	**ft^3**	**L**	**L**	**ug/L**	**grams**	**pounds**
TPHg	100	2,220	5	11,100	314,319	113,155	325	37	0.1
	1,000	2,347	5	11,735	332,300	119,628	5,427	649	1.4
	10,000	1,564	5	7,820	221,439	79,718	29,000	2,312	5.1
	100,000	128	5	640	18,123	6,524	110,000	718	1.6
							subtotal	**2,998**	**6.6**
Benzene	1	4,800	5	24,000	679,608	244,659	19	4.6	0.0
	100	2,520	5	12,600	356,794	128,446	655	84.1	0.2
	1,000	161	5	805	22,795	8,206	2,800	23.0	0.1
							subtotal	**89**	**0.2**
MTBE	5	2,323	5	11,615	328,902	118,405	9	1.1	0.0
	50	3,057	5	15,285	432,825	155,817	306	47.7	0.1
	500	1,909	5	9,545	270,286	97,303	1,425	138.7	0.3
	5,000	392	5	1,960	55,501	19,980	8,900	177.8	0.4
							subtotal	**365**	**0.8**
	Contour	**Isolated Area**	**Thickness**	**Total Volume**	**Total Volume**	**Soil Mass**	**Representative Concentration**	**Contaminant Mass**	**Contaminant Mass**
Sorbed-Phase	**mg/kg**	**ft^2**	**ft**	**ft^3**	**yd^3**	**kg**	**mg/kg**	**grams**	**pounds**
TPHg	100	466	5	2,330	86	101,752	300	30,526	67.30
	1,000	67	5	335	12	14,630	2,800	40,963	90.31
	10,000	47	5	235	9	10,263	10,000	102,625	226.25
							subtotal	**71,488**	**158**

Notes:
ug/L = micrograms per liter
ft = feet; ft^2 = square feet; f^3 = cubic feet
L = liters
yd^3 = cubic yard
mg/kg = milligrams per kilogram
Contours and contour areas taken from Figures 5 through 8
Fluid volume (L) = 36% (site specific porosity) * 28.317(L/ft^3) * Isolated Area (ft^2) * Thickness (ft)
Dissolved-Phase Contaminant mass (lbs) = 0.0022 (lbs/g) * 0.000001 (g/ug) * Fluid volume (L) * Representative Concentration (ug/L)
Sorbed-Phase Contaminant mass (lbs) = 0.0022 (lbs/g) * Soil Mass (kg) * 0.001 (g/mg) * Representative Concentration (mg/kg)
Soil mass (kg) = 1.3 (tons/cubic yard) * 907 (kg/ton) * Total Volume (cubic yards)
Representative Concentration = average of all current data points within isolated contour area

TEC ENVIRONMENTAL

Table 5
Summary of Groundwater Monitoring Analytical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	Sample Date	TPHd	TPHg	B	T	E	X	MTBE	TRPH	DIPE	TBA	1,2-DCA
		Concentrations in micrograms per liter (µg/L)										
ESL		*100*	*100*	*1.0*	*40*	*30*	*20*	*5.0*	*---*	*---*	*12*	*0.5*
MW-1	6/3/1993	---	---	---	---	---	---	---	---	---	---	---
	9/14/1994	<50	14,000	44	28	25	50	---	800	---	---	---
	12/30/1994	<50	4,000	12	9	6.8	30	---	<500	---	---	---
	3/26/1995	<50	1,000	21	10	7.1	25	---	2,100	---	---	---
	7/9/1995	<50	16,000	57	28	25	53	---	---	---	---	---
	7/31/1998	1,700	4,700	1,300	48	140	150	6,600	<5000	---	---	---
	2/11/1999	2000	25,000	18,000	1,600	1,400	500	28,000	---	---	---	---
	6/23/1999	4,900	42,000	11,000	1,100	1,500	2,300	15,000	---	---	---	---
	12/6/1999	4,000	44,000	8,900	3,400	1,900	5,100	11,000	---	---	---	---
	3/16/2000	700	5,100	2,400	100	280	460	2,700 [2]	---	---	---	---
	6/13/2000	2,800	17,000	5,300	260	720	790	7,000 [2]	---	---	---	---
	9/29/2000	5,200 [1]	50,000	11,000	2,900	1,900	4,600	7,200 [2]	---	---	---	---
	3/22/2001	1,500 [1]	8,600	2,600	750	250	950	3,200 [2]	---	---	---	---
	6/25/2001	---	18,000	1,200	1,800	970	3,200	1,500 [2]	---	---	---	---
	9/28/2001	---	48,000	5,200	6100	2200	8100	4000	---	---	---	---
	12/26/2001	---	524	216	1.2	8.6	7.4	721	---	---	---	---
	7/7/2005	---	1,500	190	15	36	29	1,100	---	<20	---	**50**
	10/19/2005	---	11,000	2,100	45	370	82	4,600	---	<250	<500	**200**
	1/13/2006	---	5,400	680	37	83	41	3,900	---	<250	<500	**180**
	5/5/2006	---	<25	2	<0.5	<0.5	<0.5	2.2	---	<5.0	<10	<0.5
	7/19/2006	---	5,000	836	22.3	107	81.8	1,130	---	<4.2	<84	**54.1**
	10/5/2006	---	23,000	3,740	112	395	161	6,020	---	13.5	546	**219**
				**************************************Well Abandoned 12/27/2006**************************************					
MW-2	6/3/1993	<50	<50	5.8	<0.5	<0.5	<0.5	---	<500	---	---	---
	9/14/1994	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	12/30/1994	<50	160	1.4	1.4	0.8	5	---	<500	---	---	---
	3/26/1995	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	7/9/1995	---	---	---	---	---	---	---	---	---	---	---
	7/31/1998	220	<50	<0.5	<0.5	<0.5	<0.5	73	<500	---	---	---
	2/11/1999	<50	<50	<0.5	<0.5	<0.5	<0.5	75	---	---	---	---
	6/23/1999	420	<50	<0.5	<0.5	<0.5	<0.5	96	---	---	---	---
	12/6/1999	<110	300	28	45	6	37	210	---	---	---	---
	3/16/2000	<50	<50	1	<0.5	0.5	1	3	---	---	---	---
	6/13/2000	<50	68	0.8	<0.5	<0.5	<0.5	38	---	---	---	---
	9/29/2000	<50	67	0.8	0.5	<0.5	1	86 [2]	---	---	---	---
	3/22/2001	<50	<50	1	0.5	<0.5	1	14	---	---	---	---
	6/25/2001	---	<50	<0.5	<0.5	<0.5	<1.0	13	---	---	---	---
	9/28/2001	---	300	4	6	3	10	130	---	---	---	---
	12/26/2001	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	---	---	---
	7/7/2005	---	<50	<0.5	<0.5	<0.5	<1.0	**20**	---	<1.0	---	**1.1**
	10/19/2005	---	29	1.4	<0.5 [3]	<0.5	<0.5	**19**	---	<5.0	<10	**0.95**
	1/13/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	5/5/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	7/19/2006	---	<50	<0.5	<0.5	<0.5	<1.5	16.6	---	<0.5	<10	**1.24**
	10/5/2006	---	<50	<0.5	<0.5	<0.5	<1.5	11.9	---	<0.5	<10	**0.750**
Post excavation	3/29/2007	---	<50	<0.5	<0.5	<0.5	<1.5	3.36	---	<0.5	<10	<0.5
	6/27/2007	---	<50	<0.5	<0.5	<0.5	<1.5	**10.5**	---	<0.5	<10	**0.820**
	9/19/2007	---	52 [4]	<0.5	<0.5	<0.5	<1.5	**18.1**	---	<0.5	<10	**0.710**
	12/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	**22.9**	---	<0.5	<10	**0.840**
	3/6/2008	---	<50	<0.5	<0.5	<0.5	<1.5	1.02	---	<0.5	<10	<0.5
	6/18/2008	---	<50	<0.5	<0.5	<0.5	<1.5	**36.9**	---	<0.5	<10	**0.880**
	9/10/2008	---	69 [4]	<0.5	<0.5	<0.5	<1.5	**24.6**	---	<0.5	<10	**0.810**
	12/10/2008	---	84 [4]	<0.5	<0.5	<0.5	<1.5	**30.2**	---	<0.5	<10	**0.650**
	3/4/2009	---	<50	<0.5	<0.5	<0.5	<1.5	3.15	---	<0.5	<10	<0.5
	6/3/2009	---	<55	<0.55	<0.55	<0.55	<1.6	**35**	---	<0.55	<11	**0.55**
	8/27/2009	---	<50	<0.5	<0.5	<0.5	<1.5	**73**	---	<0.5	**23**	**1.1**

Table 5
Summary of Groundwater Monitoring Analytical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	Sample Date	TPHd	TPHg	B	T	E	X	MTBE	TRPH	DIPE	TBA	1,2-DCA
		Concentrations in micrograms per liter (µg/L)										
ESL		*100*	*100*	*1.0*	*40*	*30*	*20*	*5.0*	*---*	*---*	*12*	*0.5*
MW-3	6/3/1993	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	9/14/1994	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	12/30/1994	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	3/26/1995	<50	<50	<0.5	<0.5	<0.5	<0.5	---	<500	---	---	---
	7/9/1995	---	---	---	---	---	---	---	---	---	---	---
	7/31/1998	<50	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<5000	---	---	---
	2/11/1999	<50	<50	<0.5	<0.5	<0.5	<0.5	<0.5	---	---	---	---
	6/23/1999	<50	<50	<0.5	<0.5	<0.5	<0.5	3	---	---	---	---
	12/6/1999	<110	<50	3	1	<0.5	1	0.6	---	---	---	---
	3/16/2000	<50	<50	<0.5	<0.5	<0.5	<1.0	1	---	---	---	---
	6/13/2000	<50	490	0.8	<0.5	<0.5	9	2	---	---	---	---
	9/29/2000	<50	57	<0.5	<0.5	<0.5	<1.0	<1.0 [2]	---	---	---	---
	3/22/2001	<50	<50	<0.5	<0.5	<0.5	<1.0	2	---	---	---	---
	6/25/2001	---	<50	<0.5	<0.5	<0.5	<1.0	0.8	---	---	---	---
	9/28/2001	---	91	<0.5	<0.5	<0.5	2	2	---	---	---	---
	12/26/2001	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	---	---	---
	7/7/2005	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	<1.0	---	<0.5
	10/19/2005	---	<25	<0.5	<0.5 [3]	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	1/13/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	5/5/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	7/19/2006	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	10/5/2006	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
Post excavation	3/29/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/27/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	12/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	3/6/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/18/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	12/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	3/4/2009	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/3/2009	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	8/27/2009	---	<55	<0.55	<0.55	<0.55	<1.6	<0.55	---	<1.55	<11	<0.55
MW-4	12/6/1999	160	<50	**3**	2	0.6	4	140	---	---	---	---
	3/16/2000	90	<50	0.5	0.5	<0.5	2	34	---	---	---	---
	6/13/2000	<50	56	<0.5	<0.5	<0.5	<1.0	1	---	---	---	---
	9/29/2000	<50	92	0.7	<0.5	<0.5	3	<1.0 [2]	---	---	---	---
	4/5/2001	<50	51	<0.5	0.5	<0.5	1	6 [2]	---	---	---	---
	6/25/2001	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	---	---	---
	9/28/2001	---	<50	<0.5	<0.5	<0.5	2	2	---	---	---	---
	12/26/2001	---	<50	1.6	1.7	1.6	4.4	2.7	---	---	---	---
	7/7/2005	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	<1.0	---	<0.5
	10/19/2005	---	<25	<0.5	<0.5 [3]	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	1/13/2006	********** Not sampled **********										
	5/5/2006	********** Not sampled **********										
	7/19/2006	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	10/5/2006	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
Post excavation	3/29/2007	---	<50	<0.5	<0.5	<0.5	<1.5	0.69	---	<0.5	<10	<0.5
	6/27/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	1.38	---	<0.5	<10	<0.5
	12/19/2007	---	63 [5]	<0.5	<0.5	<0.5	<1.5	2.20	---	<0.5	<10	**0.590**
	3/6/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/18/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	0.700	---	<0.5	<10	<0.5
	12/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	2.04	---	<0.5	<10	<0.5
	3/4/2009	---	<50	<0.5	<0.5	<0.5	<1.5	2.96	---	<0.5	<10	<0.5
	6/3/2009	---	<50	<0.5	<0.5	<0.5	<1.5	1.5	---	<0.5	<10	<0.5
	8/27/2009	---	<50	<0.5	<0.5	<0.5	<1.5	4.9	---	<0.5	11	**1.3**
	12/10/2009	---	<50	<0.5	<0.5	<0.5	<1.5	4.1	---	<0.5	<5	**0.71**
MW-5	12/6/1999	2,800	30,000	2,200	3,300	910	7000	670	---	---	---	---
	3/16/2000	1,100	3,500	1,100	260	210	6300	260	---	---	---	---
	6/13/2000	1,100	6,500	2200	360	360	730	480	---	---	---	---
	9/29/2000	700 [1]	3,900	990	120	300	340	390 [2]	---	---	---	---
	3/22/2001	380 [1]	4,300	780	240	250	530	190	---	---	---	---
	6/25/2001	---	3,100	1000	110	200	320	140	---	---	---	---
	9/28/2001	---	3,000	1200	77	120	170	770	---	---	---	---
	12/26/2001	---	3,240	738	262	218	626	66.4	---	---	---	---
	8/24/2005	---	150	57	3	8	3.9	67	---	<1.0	18	**3.0**
	10/19/2005	---	560	130	3.8	23	9.3	230	---	<25	<50	**11**
	1/13/2006	---	2,300	570	18	120	140	220	---	<25	<50	**14**
	5/5/2006	---	130	35	1.7	7.8	7.4	8	---	<5.0	<10	**0.55**
	7/19/2006	---	210	102	1.54	15.8	3.85	27.6	---	<0.5	<10	**2.06**
	10/5/2006	---	410	105	1.06	9.05	2.24	101	---	0.640	11.3	**6.65**
		********** **Well Abandoned 12/27/2006** **********										

Table 5
Summary of Groundwater Monitoring Analytical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Well ID	Sample Date	TPHd	TPHg	B	T	E	X	MTBE	TRPH	DIPE	TBA	1,2-DCA
		Concentrations in micrograms per liter (µg/L)										
ESL		*100*	*100*	*1.0*	*40*	*30*	*20*	*5.0*	*---*	*---*	*12*	*0.5*
MW-6	12/6/1999	**110**	<50	**2**	2	0.8	8	1	---	---	---	---
	3/16/2000	<50	<50	**8**	8	5	18	<0.5	---	---	---	---
	6/13/2000	<50	75	0.7	1	0.9	2	0.6	---	---	---	---
	9/29/2000	<50	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	---	---	---
	3/22/2001	<50	66	0.5	<0.5	<0.5	<1.0	3	---	---	---	---
	6/25/2001	---	<50	<0.5	<0.5	<0.5	<1.0	4	---	---	---	---
	9/28/2001	---	63	**2**	ND	ND	1	3	---	---	---	---
	12/26/2001	---	<50	<0.5	<0.5	<0.5	1.4	<0.5	---	---	---	---
	7/7/2005	---	<50	<0.5	<0.5	<0.5	<1.0	<0.5	---	<1.0	---	<0.5
	10/19/2005	---	<25	<0.5	<0.5 [3]	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	1/13/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	5/5/2006	---	<25	<0.5	<0.5	<0.5	<0.5	<1.0	---	<5.0	<10	<0.5
	7/19/2006	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	10/5/2006	---	<50	<05	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
Post excavation	3/29/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/27/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	12/19/2007	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	3/6/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/18/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	9/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	12/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	3/4/2009	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	6/3/2009	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
	8/27/2009	---	<50	<0.5	<0.5	<0.5	<1.5	<0.5	---	<0.5	<10	<0.5
MW-7	3/29/2007	---	**840**	**50.8**	9.33	2.54	**162**	**39.9**	---	<0.5	<10	**2.26**
	6/27/2007	---	**270**	**126**	<0.5	7.11	<1.5	**94.4**	---	0.550	**58.4**	**6.21**
	9/19/2007	---	**191** [4]	0.5	<0.5	5.38	<1.5	**49.6**	---	<0.5	**28.5**	**4.37**
	12/19/2007	---	54 [4]	<0.5	<0.5	<0.5	<1.5	**11.4**	---	<0.5	<10	**1.09**
	3/6/2008	---	<50	<0.5	<0.5	<0.5	<1.5	4.83	---	<0.5	<10	**0.59**
	6/18/2008	---	<50	0.840	<0.5	0.500	<1.5	**52.5**	---	<0.5	**15.3**	**5.70**
	9/10/2008	---	55 [4]	<0.5	<0.5	<0.5	<1.5	**15.3**	---	<0.5	<10	**1.98**
	12/10/2008	---	<50	<0.5	<0.5	<0.5	<1.5	2.43	---	<0.5	<10	<0.5
	3/4/2009	---	<50	<0.5	<0.5	<0.5	<1.5	0.530	---	<0.5	<10	<0.5
	6/3/2009	---	<50	0.62	<0.5	<0.5	<1.5	**5.2**	---	<0.5	<10	<0.5
	8/27/2009	---	<50	<0.5	<0.5	<0.5	<1.5	4.8	---	<0.5	<10	**0.55**
MW-8	4/6/2007	---	**27,000**	**2,460**	**1,520**	**210**	**1,810**	**16,000**	---	24.3	**1,050**	**459**
	6/27/2007	---	**20,000**	**2,460**	**382**	**611**	**1,040**	**7,310**	---	11.1	**3,400**	**319**
	9/19/2007	---	**20,400** [4]	**814**	16.2	**219**	**21.6**	**10,300**	---	<4.40	**7,080**	**194**
	12/19/2007	---	**14,100** [4]	**426**	10.6	**115**	**22.4**	**12,700**	---	25.0	**864**	**289**
	3/6/2008	---	**19,000** [5]	**639**	19.5	**268**	**152**	**11,200**	---	<4.4	<88	**227**
	6/18/2008	---	**5,800** [4]	**496**	11.7	**258**	**24.4**	**9,730**	---	15.7	**468**	**209**
	9/10/2008	---	**9,900**	**299**	11.1	**73.0**	13.6	**11,600**	---	27.1	**1,670**	**240**
	12/10/2008	---	**6,900**	**477**	3.98	**57.9**	22.6	**11,600**	---	23.1	**634**	**287**
	3/4/2009	---	**8,500** [4]	**168**	1.35	17.3	8.59	**8,190**	---	7.00	**2,050**	**238**
	6/3/2009	---	**11,000** [5]	**490**	3.90	**57**	16	**14,000**	---	<0.5	<10	**310**
	8/27/2009	---	**5,400** [5]	**340**	8.3	**67**	**37**	**8,900**	---	21	**2,900**	**300**
MW-9	8/27/2009	---	<50	<0.5	<0.5	<0.5	<1.5	**12**	---	<0.5	<10	**0.76**
	12/10/2009	---	<50	<0.5	0.50	<0.5	<1.5	4.8	---	<0.5	<5.0	<0.5

Notes:

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

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

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

Fuel Additives = Methyl-tert-butyl ether (MTBE), Di-isopropyl ether (DIPE), tert-Butyl alcohol (TBA), 1,2-Dichloroethane (1,2-DCA) by EPA Method 8260B

TRPH = Total Recoverable Petroleum Hydrocarbons

<X = Concentration less than laboratory reporting limit

--- = Not Analyzed

[1] = Does not match diesel chromatogram pattern

[2] = Confirmed by EPA Method 8260

[3] = Toluene was detected at concentrations of 1 ppb in sample from well MW-2, 0.74 ppb in sample from well MW-3, 0.9 ppb in sample from well MW-4, and 0.66 ppb in sample from well MW-6. Data were adjusted to non-detect because of the presence of toluene (0.81 ppb) in method blank and the sample results were less than 5 times in the blank (EPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, December 1994).

[4] = TPH Gasoline value is primarily due to individual peaks / non-target compounds within gasoline quantitative range.

[5] = TPH value partially due to individual peak (MTBE) within gasoline quantitative range.

ESLs = Environmental Screening Levels **(Table F-1a)**, groundwater is a current or potential drinking water resource (CRWQCB, Interim Final, November 2007, revised May 2008).

yellow row = most recent data

Table 6
Summary of Grab Groundwater Analytical Results
Former Olympian Service Station
1435 Webster Avenue
Alameda, California

Sample ID	Date	TPHg	B	T	E	X	MTBE	EDB	EDC	Ethanol	ETBE	DIPE	t-Butanol	TAME
		Concentrations in micrograms per liter (µg/L)												
ESL		***100***	***1***	***40***	***30***	***20***	***5***	***0.05***	***0.5***	***---***	***---***	***---***	***12***	***---***
B-1	6/27/2001	<50	<0.005	3	<0.005	<0.01	4	---	---	---	---	---	---	---
B-2	6/27/2001	<50	<0.005	0.9	0.5	2	4	---	---	---	---	---	---	---
B-3	6/27/2001	**400**	<0.005	1	0.6	1	3	---	---	---	---	---	---	---
B-4	6/27/2001	96	**2**	3	0.6	2	2	---	---	---	---	---	---	---
B-6	7/11/2007	**1,180** [1]	<1.50	<1.32	**50.7**	<3.26	<1.72	<1.58	<1.58	<220	<1.85	<1.98	<6.60	<1.41
B-7	7/11/2007	**250** [1]	**8.79**	0.52	13.6	<1.16	2.9	<0.565	<0.565	<78.5	<0.659	<0.706	<2.36	<0.502
B-8	7/11/2007	<73.5	<0.534	<0.471	<0.392	<1.16	**6.83**	<0.565	**0.64**	<78.5	<0.659	<0.706	<2.36	<0.502
B-9	7/11/2007	**400** [1]	**2.20**	<1.32	<1.10	<3.26	**433**	<1.58	**33.2**	<220	<1.85	<1.98	**164**	<1.41
B-10	7/11/2007	<100	<0.598	<0.528	<0.440	<1.30	**66.2**	<0.634	**5.44**	<88.0	<0.739	<0.792	**23.5**	<0.563
B-11	7/11/2007	<91.5	<0.622	<0.549	<0.458	<1.35	<0.714	<0.659	<0.659	<91.5	<0.769	<0.824	<2.74	<0.586
B-12	7/10/2007	**290** [2]	<0.598	<0.528	<0.440	<1.30	<0.686	<0.634	<0.634	<88.0	<0.739	<0.792	<2.64	<0.563
B-13	7/10/2007	<78.5	<0.534	<0.471	<0.392	<1.16	<0.612	<0.565	<0.565	<78.5	<0.659	<0.706	<2.36	<0.502
B-14	7/10/2007	<63.0	<0.394	<0.348	<0.290	<0.858	2.77	<0.418	<0.418	<58.0	<0.487	<0.522	<1.74	<0.371
B-15	7/10/2007	**142** [1]	<0.68	<0.68	<0.68	<2.04	<0.68	<0.68	<0.68	<136	<0.68	<0.68	<13.6	<0.68
B-17	7/10/2007	<100	<0.622	<0.549	<0.458	<1.35	<0.714	<0.659	<0.659	<91.5	<0.769	<0.824	<2.74	<0.586
B-18	7/10/2007	<81.5	<0.575	<0.507	<0.422	<1.25	<0.659	<0.608	<0.608	<84.5	<0.710	<0.760	<2.54	<0.541
B-19	7/7/2009	<76	<0.76	<0.76	<0.76	<2.3	<0.76	---	---	---	<0.76	<0.76	<15	<0.76
B-20	7/7/2009	<69	<0.69	<0.69	<0.69	<2.1	<0.69	---	---	---	<0.69	<0.69	<14	<0.69
B-21	7/7/2009	<74	<0.74	<0.74	<0.74	<2.2	<0.74	---	---	---	<0.74	<0.74	<15	<0.74
B-22	7/7/2009	<82	<0.82	<0.82	<0.82	<2.4	<0.82	---	---	---	<0.82	<0.82	<16	<0.82
B-23	7/7/2009	<74	<0.74	<0.74	<0.74	<2.2	<0.74	---	---	---	<0.74	<0.74	<15	<0.74
B-24	7/7/2009	<76	<0.76	<0.76	<0.76	<2.3	1.0	---	---	---	<0.76	<0.76	<15	<0.76
VMP-1	7/13/2009	**47,000**	**1,500**	**1,200**	**1,900**	**6,300**	<22	---	---	---	<22	<22	<440	<22
VMP-2	7/14/2009	**11,000** [2]	**970**	**500**	**370**	**1,000**	**420**	---	---	---	<4.4	<4.4	**120**	<4.4
VMP-3	7/14/2009	**9,700** [1]	**61**	<5.5	**280**	16	**1,900**	---	---	---	<5.5	<5.5	<110	<5.5
VMP-4	7/13/2009	**110,000** [2]	**4,100**	**1,500**	**3,000**	**17,000**	**950**	---	---	---	<44	<44	<880	<44
VMP-5	7/14/2009	<50	**2.6**	1.3	1.0	2.5	1.1	---	---	---	<0.5	<0.5	<10	<0.5

Notes and Abbreviations:

Bold = Concentration at or above respective ESL.

TPHg = Total petroleum hydrocarbons as gasoline, EPA Method 8015.

B T E X = Benzene, Ethylbenzene, Toluene, Xylenes, EPA Method 8260.

MTBE = Methyl tert-butyl ether, EDB = 1,2-Dibromoethane, EDC = 1,2-Dichloroethane, Ethanol, ETBE = Ethyl tert-butyl ether, DIPE = Isopropyl ether, t-Butanol = t-Butyl alcohol, TAME = tert-Amyl methyl ether, EPA Method 8260.

[1] = Hydrocarbons responded in gasoline range, but pattern does not match typical gasoline.

[2] = The pattern does not match typical gasoline; TPH value includes significant amount of non-target compounds.

<X = Concentration less than respective laboratory reporting limit.

--- = No data available.

Boring B-5 not advanced.

ESL = Environmental Screening Levels of CRWQCB, Table F-1a - (groundwater IS a current or potential drinking water resource), Interm Final - 2007, Revised May 2008.

TEC ENVIRONMENTAL

Table 7
Summary of Soil Vapor Sampling Analytical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Sample Point	Date	Sampling Duration	Sampling Depth	TPHg	B	T	E	X (m,p)	X (o)	MTBE	DIPE	ETBE	TAME	tBA	PCE	Isopropanol	Acetone	O_2	CH_4	CO_2
		min	ft	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	ug/m³	%	%	%
SV-1	5/14/2003	--	3.5	5,400	<1,000	1,900	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-2	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-3	5/14/2003	--	3.5	5,800	<1,000	3,700	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-4	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-5	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-6	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-7	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
SV-7 dupl.	5/14/2003	--	3.5	<1,000	<1,000	<1,000	<1,000	<1,000	--	<1,000	<1,000	<1,000	<1,000	<5,000	--	--	--	--	--	--
VMP-1 (4)	8/11/2009	6	4	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	10	<33	22	15	<0.0023	4.8
	12/22/2009	9	4	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	16	<0.0012	3.4
VMP-1 (8)	8/11/2009	6	8	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	9	97	46	21	<0.0022	4.6
dupl.	8/11/2009	10	8	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	8	110	51	25	<0.0024	3.6
	12/22/2009	6	8	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	16	<0.0012	5.4
VMP-2 (4)	8/11/2009	15	4	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	32	<33	19	26	<0.0019	2.5
	12/22/2009	8	4	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	15	<0.0012	3.7
VMP-2 (8)	8/11/2009	11	8	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	15	170	<19	33	<0.0014	1.5
	12/22/2009	10	8	<2,800	<3.2	<3.8	<4.3	<4.1	11	<3.6	--	--	--	--	--	<33	--	13	<0.0011	4.3
VMP-3 (4)	8/11/2009	6	4	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	24	38	30	29	<0.0018	3.3
	12/22/2009	9	4	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	22	<0.0011	4.5
VMP-3 (8)	8/11/2009	5	8	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	21	<33	23	23	<0.0019	6.4
	12/22/2009	7	8	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	7.4	<0.0011	9.5
VMP-4 (4)	8/11/2009	6	4	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	7.7	39	45	34	<0.0016	1.4
	12/22/2009	12	4	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	38	--	16	<0.0013	4.5
VMP-4 (8)	8/11/2009	7	8	<2,800	<3.2	<3.8	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	13	<33	38	16	<0.0015	5.0
	12/22/2009	8	8	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	17	<0.0015	4.1
VMP-5 (4)	8/11/2009	12	4	<3,000	<3.4	<4.1	<4.7	<4.4	<4.7	<3.9	<4.5	<4.5	<4.5	<13	30	<35	46	22	<0.0027	4.5
	12/22/2009	9	4	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	33	<0.0011	1.5
VMP-5 (8)	8/11/2009	8	8	<2,800	<3.2	6.7	<4.3	<4.1	<4.3	<3.6	<4.2	<4.2	<4.2	<12	14	<33	40	36	<0.0024	1.9
	12/22/2009	7	8	<2,800	<3.2	<3.8	<4.3	<4.1	<5.4	<3.6	--	--	--	--	--	<33	--	22	<0.0016	3.5
Atmosphere #1 (ATM-01)	8/11/2009	---	--	---	---	---	---	---	---	---	---	---	---	---	---	1,700,000E	---	---	---	---
Standard for Comparison:				**ESLs:** 29,000	140	180,000	3,300	58,000		31,000	---	---	---	---	1,400	**DTSC Limit:** 10,000		**Atmospheric Conc.:** 21.9	0.00018	0.039

Table 7
Summary of Soil Vapor Sampling Analytical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Sample Point	Date	Sampling Duration	Sampling Depth	TPHg	B	T	E	X (m,p)	X (o)	MTBE	DIPE	ETBE	TAME	tBA	PCE	Isopropanol	Acetone	O_2	CH_4	CO_2
		min	ft	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	%	%	%

Notes and Abbreviations:
-- = not analyzed or data not available
min = minutes
ug/m^3 = micrograms per cubic meter
B, T, E, X = benzene, toluene, ethyl benzene, xylenes
MTBE = methyl tert-butyl ether
DIPE = Diisopropyl ether
ETBE = Ethyl tert-butyl ether
TAME = tert-Amyl methyl ether
tBA = tert-Butyl alcohol
PCE = tetrachloroethene
O_2 = oxygen, CH_4 = methane, and CO_2 = carbon dioxide, by Method ASTM D-1946
dupl. = laboratory split and duplicate
2003 samples were collected in a calibrated syringe and analyzed by EPA Method 8260B.
2009 samples were collected in Summa canisters and analyzed by EPA Method TO-15, Torrent Laboratory.
E = estimated value; the amount exceeds the calibration range but is within linear working range of the instrument.

ESLs = Environmental Screening Levels, Table E-2 (Soil Gas in Shallow Soils, commercial/industrial land use scenario, lowest levels), California Regional Water Quality Control Board, Interim Final, November 2007, revised May 2008.
Concentrations above ESLs for soil gas are shown in **bold**
DTSC Limit = a standard, issued by the Department of Toxic Substances Control (2003), representing significant Isopropanol contamination
Atmospheric Conc. = average atmospheric concentration of each gas

TEC ENVIRONMENTAL

Table 8
Toxicity Parameters Used for Human Health Risk Assessment
Former Olympian Service Station
1435 Webster Street
Alameda, California

Constituent	Oral Slope Factor SF_o	Source	Dermal Slope Factor SF_d	Source	Inhalation Unit Risk Factor	Source	Oral Reference Dose RfD_o	Source	Dermal Reference Dose RfD_d	Source
	1/(mg/kg-day)		1/(mg/kg-day)		1/(ug/m^3)		mg/kg-day		mg/kg-day	
Benzene	**0.1**	OEHHA	**0.1**	=SF_o, OEHHA	**0.000029**	OEHHA	0.004	OEHHA / USEPA	0.004	USEPA, =RfD_o, OEHHA
Toluene	n/a	n/a	n/a	n/a	n/a	n/a	**0.2**	OEHHA	**0.2**	=RfD_o, OEHHA
Ethylbenzene	**0.011**	OEHHA	**0.011**	=SF_o, OEHHA	**0.0000025**	OEHHA	0.1	OEHHA / USEPA	0.1	USEPA, =RfD_o, OEHHA
Xylenes	n/a	n/a	n/a	n/a	n/a	n/a	0.2	OEHHA / USEPA	0.2	USEPA, =RfD_o, OEHHA
MTBE	0.0018	OEHHA / USEPA	0.0018	USEPA, =SFo, OEHHA	0.00000026	OEHHA	0.01	USEPA	0.01	USEPA

Notes:
mg/kg-day = milligrams per kilogram-day
ug/m^3 = micrograms per cubic meter
n/a = not applicable (constituent is not a carcinogen)
OEHHA = Office of Environmental Health Hazard Assessment, 2009
USEPA = United States Environmental Protection Agency
Sfo = Oral Slope Factor; Sfd = dermal slope factor
RfDo = Oral Reference Dose; RfDd = Dermal Reference Dose

TEC ENVIRONMENTAL

Table 9
Summary of Soil Geotechnical Results
Former Olympian Service Station
1435 Webster Street
Alameda, California

Sample ID	MW-9	VMP-5	Average
Depth (ft)	5-5.5	5-5.5	
Sample Date	7/13/2009	7/14/2009	
Sample Orientation	vertical	vertical	
Soil Properties			
Moisture Content (% weight)	12.2	10.2	**11.2**
Bulk Density (g/cc)	1.7	1.71	**1.71**
Grain Density (g/cc)	2.68	2.67	**2.68**
Total Porosity (%Vb)	36.7	36.0	**36.4**
Air Filled Porosity (%Vb)	16.1	18.6	**17.4**
Total Pore Fluid Saturations (%Pv)	56.1	48.3	**52.2**
Effective Permeability to Air (m^2)	5.4 E-13	1.4 E-13	
Organic Carbon Data			
Fraction Organic Carbon (g/g)	0.00045	0.00026	**0.00036**
Total Organic Carbon (mg/kg)	450	260	**355**
Particle Size Summary			
Mean Grain Size Description	Fine sand	Fine Sand	**Fine Sand**
Median Grain Size (mm)	0.132	0.197	**0.165**
Particle Size Distribution (wt %)			
Medium Sand	10.22	13.06	
Fine Sand	53.97	66.48	
Silt	26.57	12.44	
Clay	9.24	8.02	

Notes:

ft = feet

g/cc = grams per cubic centimeter

Vb = Bulk Volume

Pv = Pore Volume

m^2 = meters squared

g/g = gram per gram

mg/kg = milligrams per kilogram

"---" = not analyzed

Moisture Content by Method API RP 40/ASTM D2216; Density, Porosity, Pore Fluid Saturations and Effective Permeability to Air by Method API RP 40

Fraction Organic Carbon and Total Organic Carbon by Walkley-Black Method

Particle Sizes by Method ASTM D422/D4464M

TEC ENVIRONMENTAL

Table 10
Summary of Input Parameters for RBCA Tool Kit Model
Former Olympian Service Station
1435 Webster Street
Alameda, California

Exposure Pathways	
Groundwater Receptor #1	Onsite, Residential/Commercial (Scenario 1)
Groundwater Receptor #2	30 m offsite, Residential (Scenario 3)
Groundwater Receptor #3	450 m offsite, Surface Water (Scenario 5)
Soil Receptor #1	Onsite, Residential/Commercial (Scenario 2)
Indoor Vapor Receptor #3	Onsite, Residential/Commerical (Scenario 1)
Indoor Vapor Receptor #3	30 m offsite, Residential (Scenario 3)
Indoor Vapor Receptor #3	300 m offsite, Residential (Scenario 4)
Exposure Factors	Default Values
Residential Receptor (Non-Carc)	Child
Offsite Receptor	Residential
Onsite Receptor	Construction Worker Residential
Surface water quality criteria	Environmental Screening Levels, Table F-2c (Surface Water Screening Levels, Estuary Habitats), California Regional Water Quality Control Board, Interim Final, November 2007, revised May 2008
Target Risk Level	$1.0 * 10^{-6}$ (Cumulative)
Target Hazard Quotient	1.0 (Cumulative)
Source Zone Characteristics	
Soil COC Concentrations	Average concentration over affected soil zone (Table 13)
Groundwater BTEX Concentrations	Average concentration over dissolved-phase benzene area; field points used include groundwater monitoring wells (third quarter 2009), and grab groundwater samples collected from soil borings in the plume area
Groundwater MTBE Concentration	Average concentration over dissolved-phase MTBE plume area; field points used include groundwater monitoring wells (third quarter 2009), and grab groundwater samples collected from soil borings in the plume area
Chemical Parameters	RBCA database defaults
Biodegradation Rate - BTEX	Site-specific electron acceptor data with default utilization factors (Table 11)
Soil Parameters	
Depth to Groundwater	3 m
Depth of Impacted Soil Zone	2.3 to 3 m (smear zone soils)
Length of Impacted Soil Zone	15 m parallel to groundwater flow direction
Area of Impacted Soil Zone	55 m^2
Volumetric Water Content -Vadose Zone	Calculated from average of laboratory results, (porosity - air filled porosity) 0.19
Volumetric Water Content -Capillary Fringe	Assumed saturated from average total porosity laboratory result, 0.36
Total Porosity	Average of laboratory results, 0.36
Dry Bulk Density	Average of laboratory results, 1.71 kg/L (= 1.71 g/cm3)
Vertical Hydraulic Conductivity	USCS default for soil type SM, 86.4 cm/day
Vapor Permeability	Average of laboratory results, $3.4 * 10^{-13}$ m^2
Capillary Zone Thickness	USCS Default for Soil Type SM, 0.09 m
Fraction Organic Carbon	Average of laboratory results, 0.00036
Net Infiltration Estimate	Average annual precipitation for Alameda (22.9 inches/yr), calculated infiltration for USCS default soil type SM (6.1 cm/yr)
Soil / water pH	Average stabilized groundwater monitoring result, Third Quarter 2009, 6.2
Groundwater Parameters	
Hydraulic Conductivity	USCS default for soil type SM, 86 cm/day
Hydraulic Gradient	Average onsite gradient (quarterly groundwater monitoring data), 0.006 ft/ft
Effective Porosity	Default for soil type SM, 0.38
Fraction Organic Carbon- Saturated Zone	Average of unsaturated zone laboratory results, 0.00036
Groundwater pH	Average stabilized groundwater monitoring result, Third Quarter 2009, 6.2
Groundwater Plume Width at Source	Benzene plume dimensions, Figure 7, 30 m
Plume Thickness at Source	Observed impact to soils in the saturated zone, 1.5 m
Groundwater Dispersion Model	Xu and Eckstein
Dimensions of Plume at Discharge Point	Groundwater has not reached surface water discharge point; current benzene plume dimension used, Figure 7, 30 m
Air Parameters	
Average Wind Speed	8.7 mph, average annual wind speed for San Francisco, NOAA comparative climatic database
Other Outdoor Air Pathway Parameters	RBCA default values
Indoor Air Pathway Parameters	RBCA default values

Table 11
Summary of Bio-Attenuation Parameters
1435 Webster Street
Alameda, California

Sample ID	Date Sampled	Location	DO	Methane	pH	NO_3^-	SO_4^{-2}	$Fe^{+2}O$
			mg/L	mg/L	pH units	mg/L	mg/L	mg/L
MW-3	8/27/2009	Background	5.50	0.00011	5.48	17	130	<0.10
MW-6	8/27/2009	Background	4.21	0.00013	6.27	3.3	150	<0.10
MW-8	8/27/2009	Plume area	3.69	0.00848	6.35	<0.50	17	3.5
MW-9	8/27/2009	Plume area	1.38	0.00057	6.50	0.89	47	0.14

Notes:

DO = Dissolved Oxygen, field measurement by mulitparameter meter
pH = pH, field measurement by multiparameter meter
NO^{3-} = Nitrate as N by analytical method E300.0
SO_4^{-2} = Sulfate by analytical method E300.0
$Fe^{+2}O$ = Ferrous Iron by analytical method SM3500-FE D
Methane by analytical method RSK-175
mg/L = milligrams per liter

TEC ENVIRONMENTAL

Table 12
Calculation of Representative Contamination Concentration in Groundwater
Former Olympian Service Station
1435 Webster Street
Alameda, California

Sample ID	Date Collected	TPHg	B	T	E	X	MTBE
		Concentrations in ug/L					
Groundwater							
B-7	7/11/2007	250	8.79	0.52	13.6	*0.58*	--
B-8	7/11/2007	--	--	--	--	--	6.83
B-9	7/11/2007	400	2.20	*0.66*	*0.55*	*1.63*	433
B-10	7/11/2007	--	--	--	--	--	66.2
MW-2	8/27/2009	--	--	--	--	--	73
MW-8	8/27/2009	5,400	340	8	67	37	8,900
MW-9	8/27/2009	--	--	--	--	--	12
VMP-1	7/13/2009	47,000	1,500	1,200	1,900	6,300	*11*
VMP-2	7/14/2009	11,000	970	500	370	1,000	420
VMP-3	7/14/2009	9,700	61	*2.75*	280	16	1,900
VMP-4	7/13/2009	110,000	4,100	1,500	3,000	17,000	950
VMP-5	7/14/2009	*25*	2.6	1.3	1.0	2.5	1.1
Average Concentration in Plume Area:		**22,972**	**873**	**402**	**704**	**3,045**	**1,161**

Notes:

Please see Tables 5 and 6 for notes regarding laboratory analytical data.

Representative COC concentrations are in the benzene and MTBE plume areas depicted on Figures 7 and 8.

ug/L = micrograms per liter

ft bsg - feet below surface grade

italics = constituent not detected; value assumed in averaging is one-half of the laboratory reporting limit

Table 13
Calculation of Representative Contamination Concentration in Soil
Former Olympian Service Station
1435 Webster Street
Alameda, California

Sample ID	Date	Depth	TPHg	B	T	E	X	MTBE
		ft bsg	Concentrations in mg/kg					
CB-10	11/15/2006	12	2,800	*5*	34	45	200	*25*
CB-11	11/15/2006	12	300	*1*	3.8	4.8	25	*5*
CB-17	11/15/2006	12	10,000	*10*	170	120	640	*50*
Representative (average) concentration:			**4,367**	**5**	**69**	**57**	**288**	**27**
Mass in affected soil zone (kg):			**71.5**	**0.7**	**8.9**	**7.2**	**36.9**	**3.4**

Notes:

Please see Table 3 for notes regarding laboratory analytical data.

italics = constituent not detected; value shown equals one-half of the laboratory reporting limit

mg/kg = milligrams per kilogram

ft bsg - feet below surface grade

Note: only field points within the concentration contour area shown on Figure 5 were used in the concentration calculation. Samples collected from within the former excavation area were not used.

The masses of COCs were calculated by multiplying the representative concentration (mg/kg) by the volume of the affected soil zone (largest contour area depicted in Figure 5 by an assumed thickness of 5 ft) and assuming a soil density of 1.3 tons/yd3.

TEC ENVIRONMENTAL

Table 14
Potentially Complete Exposure Pathways
Former Olympian Service Station
1435 Webster Street
Alameda, California

Pathway ID	Exposure Pathway	Transport Mechanism	Receptor Location	Assumed Receptor Point	Exposure Route(s)
1	Shallow Soil Impact	Particulate mobilization	Onsite	Child	Inhalation
2	Shallow Soil Impact	None (current plume dimensions)	Onsite	Construction worker	Dermal contact
3	Groundwater Impact	Groundwater flow, volatilization to indoor air	Offsite residences (100 ft offsite)	Child	Ingestion
4	Groundwater Impact	Groundwater flow, volatilization to indoor air	School (1,000 ft offsite)	Child	Ingestion
5	Groundwater Impact	Groundwater flow	San Francisco Bay (1,500 ft offsite)	Surface water	Direct contact

ft = feet

Table 15
RBCA Tool Kit Model Output: Risk Summary
Former Olympian Service Station
1435 Webster Street
Alameda, California

Exposure Pathway	Pathway ID	Scenario Type	Benzene	Ethylbenzene	MTBE	Cumulative
Groundwater	3	100 ft Offsite - Residential	**9.3E-03**	**8.4E-03**	**1.2E-03**	**1.9E-02**
Surface water	5	1,500 ft Offsite - Surface water	1.7E-12	4.1E-12	--	5.8E-12
Soil	2	Onsite - Construction	5.0E-09	6.3E-09	4.9E-10	1.2E-08
Outdoor Air	1	Onsite - Residential	9.4E-08	5.5E-09	6.8E-10	1.0E-07
	2	Onsite - Construction	1.7E-09	1.6E-09	8.0E-11	3.4E-09
	3	100 ft Offsite - Residential	9.4E-08	5.5E-09	6.8E-10	1.0E-07

Notes:
Pathway IDs defined on Table 14.
bold = Risk level exceeds target level of $1.0 * 10^{-6}$
m = meters
Cumulative Risk is the sum of risks posed by benzene, ethylbenzene, and MTBE.
-- = not calculated or not applicable

TEC ENVIRONMENTAL

Table 16
RBCA Tool Kit Model Output: Hazard Summary
Former Olympian Service Station
1435 Webster Street
Alameda, California

Exposure Pathway	Pathway ID	Scenario Type	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Cumulative
Groundwater	3	100 ft Offsite - Residential	**1.0E+02**	**2.3E+01**	**3.3E+01**	**8.0E+01**	**2.9E+02**	**5.2E+02**
Surface water	5	1,500 ft Offsite - Surface water	1.7E-08	6.0E-09	1.2E-08	3.1E-08	---	6.6E-08
Soil	2	Onsite - Construction	8.8E-04	2.4E-04	4.0E-04	1.0E-03	1.9E-03	4.4E-03
Outdoor Air	1	Onsite - Residential	2.7E-05	6.4E-07	5.2E-06	2.4E-04	2.0E-06	2.7E-04
	2	Onsite - Construction	1.4E-05	1.1E-05	4.6E-05	2.3E-03	7.2E-06	2.4E-03
	3	100 ft Offsite - Residential (school)	2.7E-05	6.4E-07	5.2E-06	2.4E-04	2.0E-06	2.7E-04

Notes:
Pathway IDs defined on Table 14.
bold = hazard quotient exceeds target quotient of 1.0.
ft = feet

TEC ENVIRONMENTAL

Table 17
Proposed Site-Specific Treatment Levels (SSTLs)
Former Olympian Service Station
1435 Webster Street
Alameda, California

Receptor	Exposure Scenario	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	SSTL-Limiting Pathway?
Soil Exposure Pathways		**results in mg/kg**					
Onsite Resident	Volatiles and Particulates in Outdoor Air (inhalation)	saturation	saturation	saturation	saturation	saturation	
Offsite Resident (100 ft off-site)	Particulates in Outdoor Air (inhalation)	saturation	saturation	saturation	saturation	saturation	**yes**
	Leaching to Groundwater as Drinking Water (ingestion)	6.1E-1	3.3E+0	6.8E-1	6.6E+0	6.3E-1	
Surface Water (1,500 ft down-gradient)	Leaching to Groundwater and Surface Water Discharge (absorption, ingestion)	saturation	saturation	saturation	saturation	n/a	
	Proposed SSTL:	6.1E-1	3.3E+0	6.8E-1	6.6E+0	6.3E-1	
	Representative Concentration:	5.0E+0	6.9E+1	5.7E+1	2.9E+2	2.7E+1	
	Reduction Factor	8	21	84	44	43	

Table 17
Proposed Site-Specific Treatment Levels (SSTLs)
Former Olympian Service Station
1435 Webster Street
Alameda, California

Receptor	Exposure Scenario	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	SSTL-Limiting Pathway?
Groundwater Exposure Pathways		**results in mg/L**					
Onsite Resident	Volatiles and Particulates in Outdoor Air (inhalation)	9.3E+0	saturation	1.3E+2	saturation	1.7E+3	
Offsite Resident (100 ft off-site)	**Groundwater: Drinking Water (ingestion, absorption)**	9.4E-1	4.3E+0	7.6E-1	7.1E+0	1.3E+0	**yes**
	Particulates in Outdoor Air (inhalation)	9.3E+0	saturation	1.3E+2	saturation	1.7E+3	
Surface Water (1,500 ft down-gradient)	Surface Water Discharge (absorption, ingestion)	saturation	saturation	saturation	saturation	n/a	
	Proposed SSTL:	9.4E-1	4.3E+0	7.6E-1	7.1E+0	1.3E+0	
	Representative Concentration:	8.7E-1	4.0E-1	7.0E-1	3.0E+0	1.2E+0	
	Reduction Factor	0.9	0.1	0.9	0.4	0.9	

Notes:
mg/L = milligrams per liter
mg/Kg = milligrams per kilogram
SSTL = site-specific treatment level
Bold = exposure scenario exceeds target hazard quotient or risk level
ft = feet

TEC ENVIRONMENTAL

Table 18
Summary of SSTLs and Existing COC Concentrations
Former Olympian Service Station
1435 Webster Street
Alameda, California

Phase		Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Soil (mg/kg)						
	Proposed SSTLs	0.61	3.3	0.68	6.6	0.63
	Average concentration over impacted area	**5***	**68**	**57**	**288**	**27***
Groundwater (ug/L)						
	Proposed SSTLs	940	4,300	760	7,100	1,300
	Basin Plan Goals	1.0	150	700	1,750	5
	Predicted concentration after 90% mass reduction	34.0	0.8	6.7	3.7	299.5
	Average concentration over plume area (monitoring wells only)	340	8	67	37	**2,995**
	Average concentration over plume area (all field points)	**873**	402	704	3,045	1,161

Notes:
mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
SSTL = site specific treatment level
bold = concentration exceeds proposed SSTL
* = constituent not detected in any soil samples; average concentration calculated using half of the laboratory reporting limit

TEC ENVIRONMENTAL

CHARTS

Chart 1
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-2
1435 Webster Street
Alameda, California

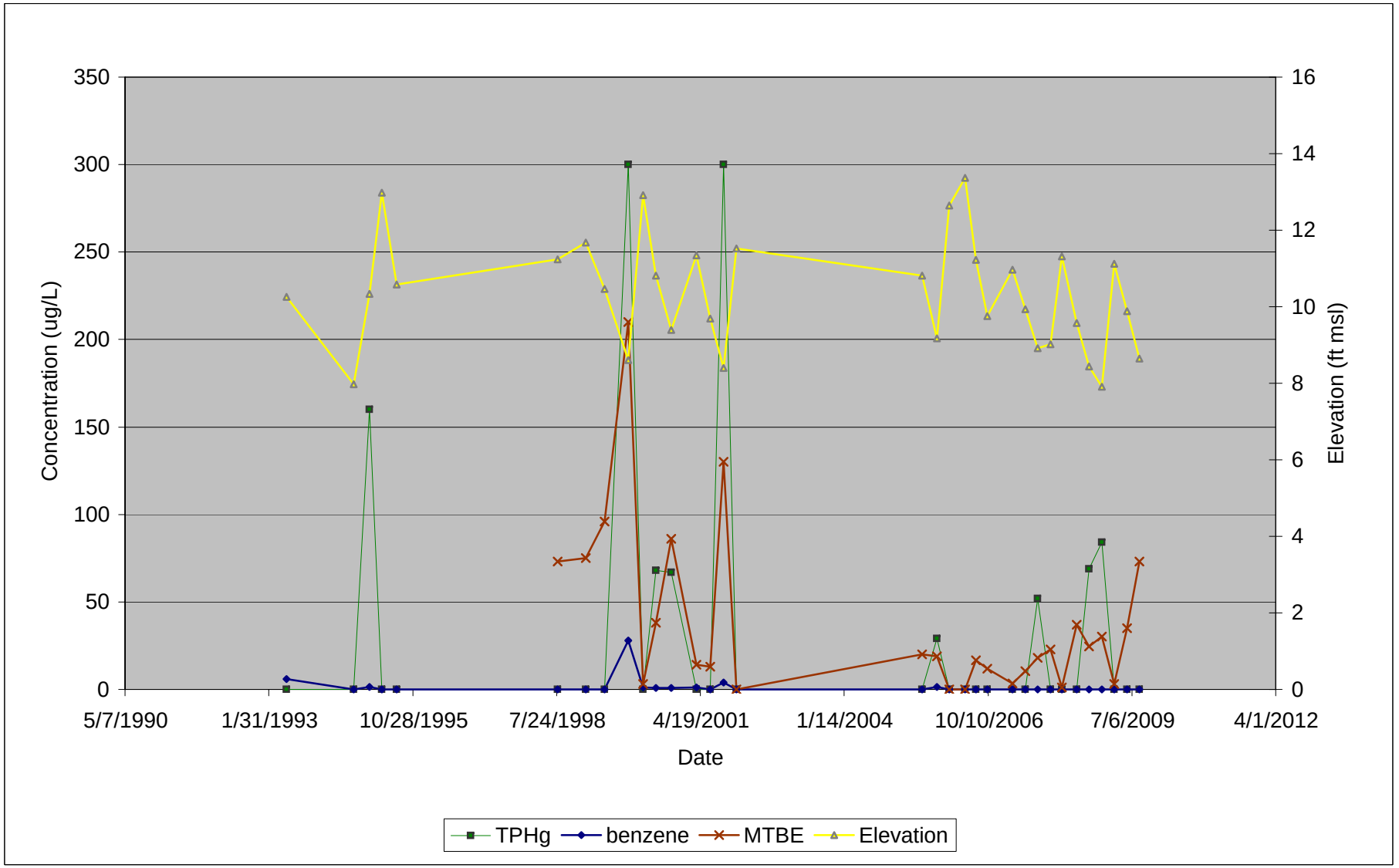


Chart 2
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-3
1435 Webster Street
Alameda, California

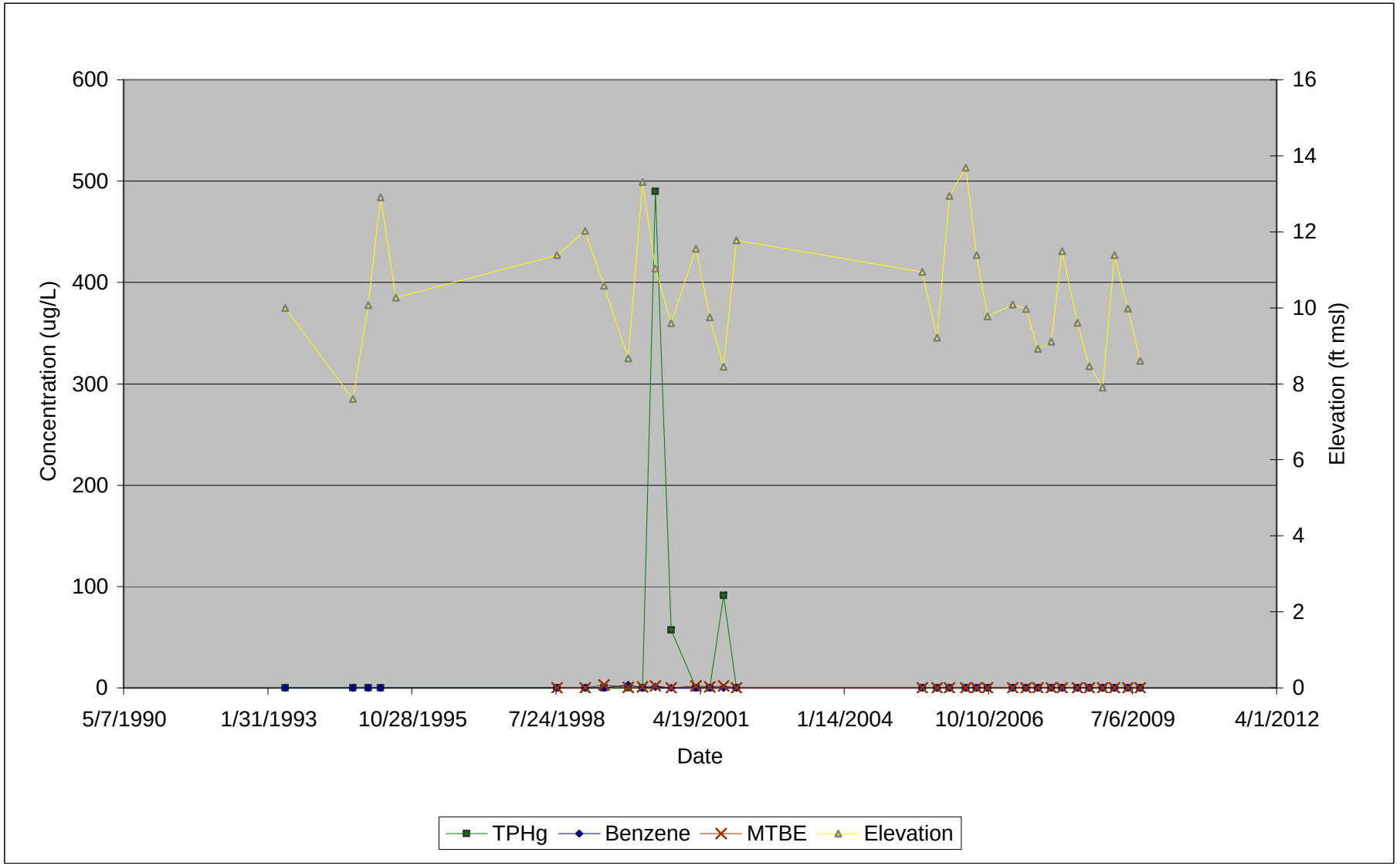


Chart 3
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-4
1435 Webster Street
Alameda, California

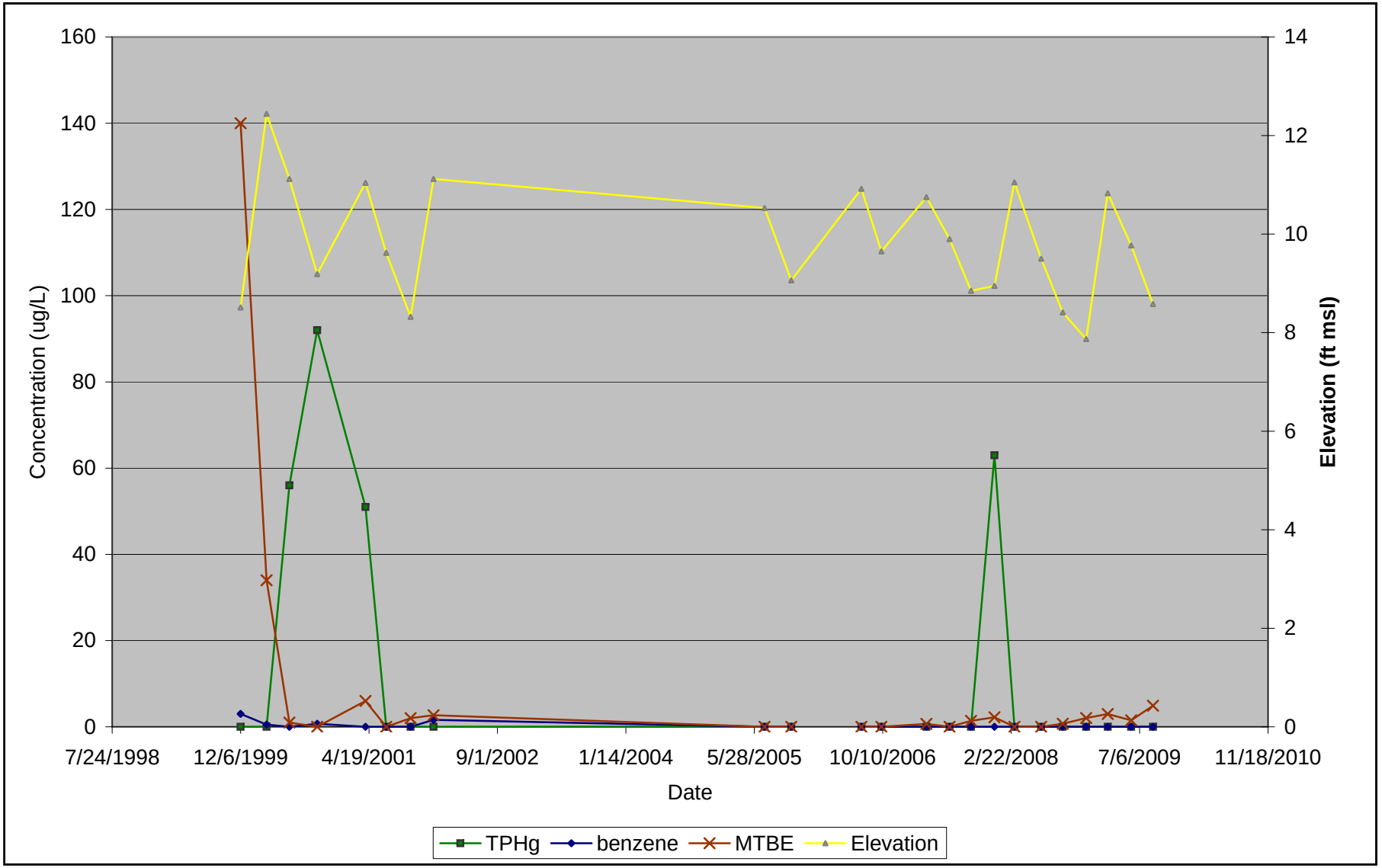


Chart 4
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-5 / MW-7
1435 Webster Street
Alameda, California

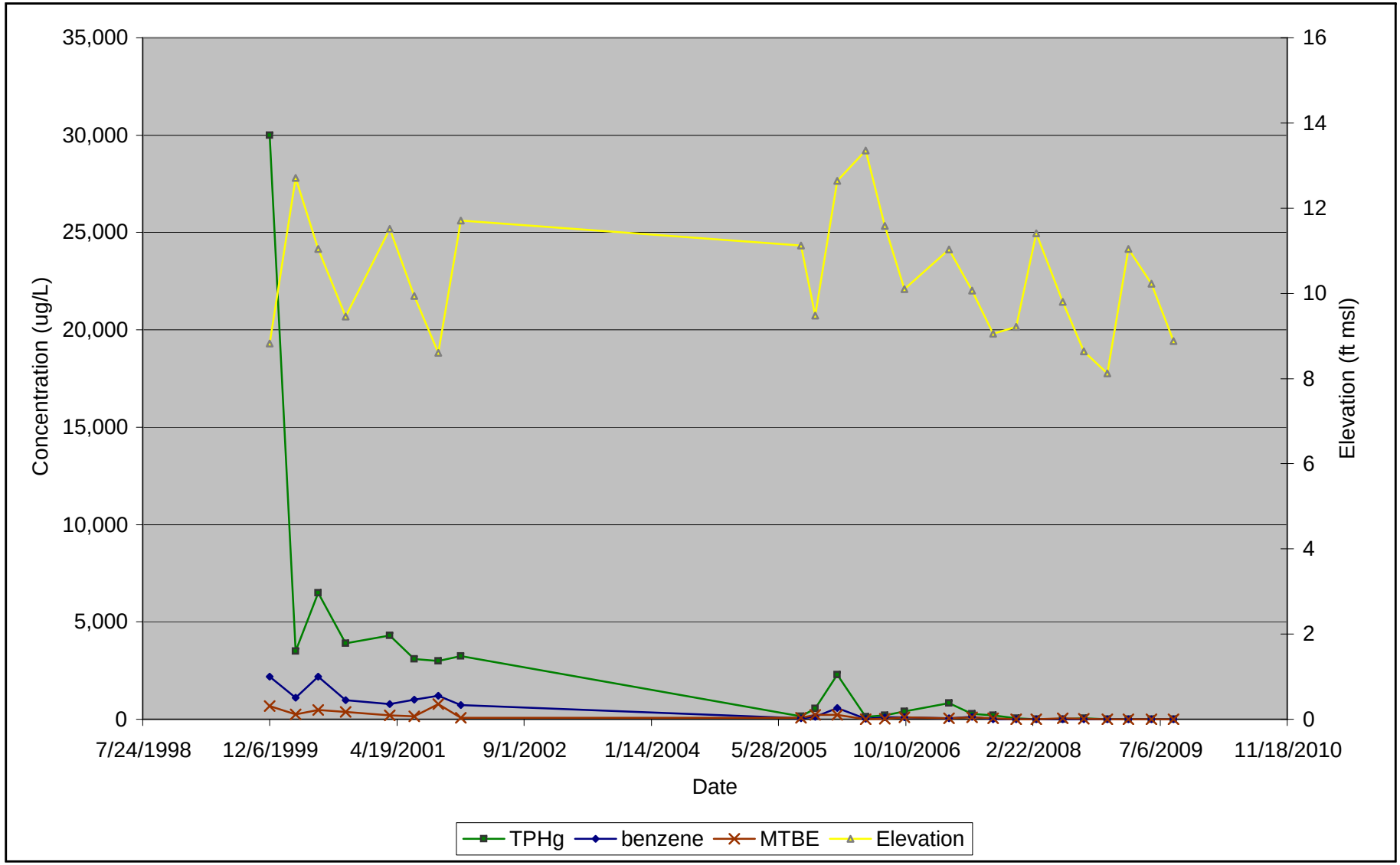


Chart 5
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-6
1435 Webster Street
Alameda, California

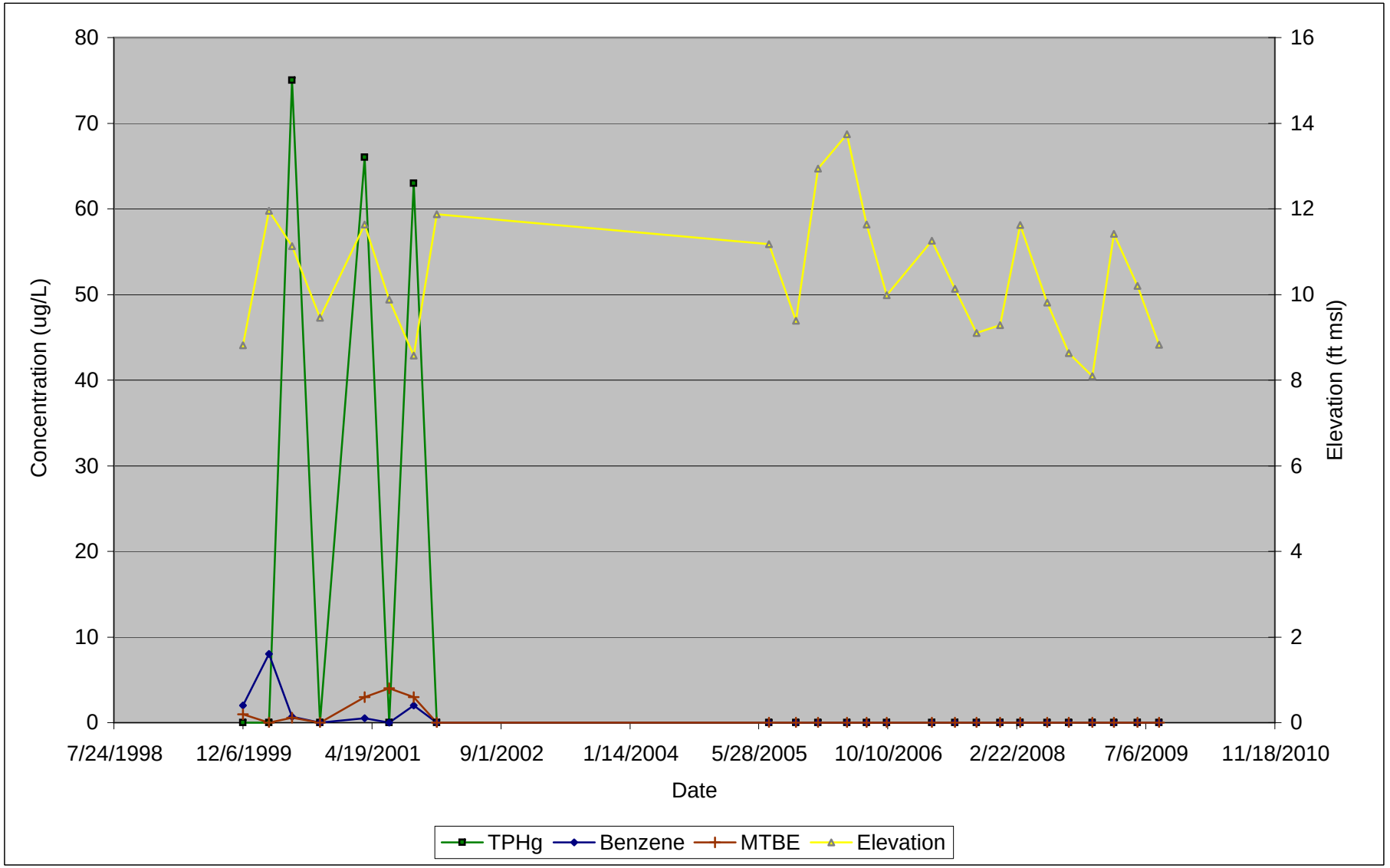


Chart 6
Concentrations of Select COCs and Groundwater Elevations with Time:
Well MW-1 / MW-8
1435 Webster Street
Alameda, California

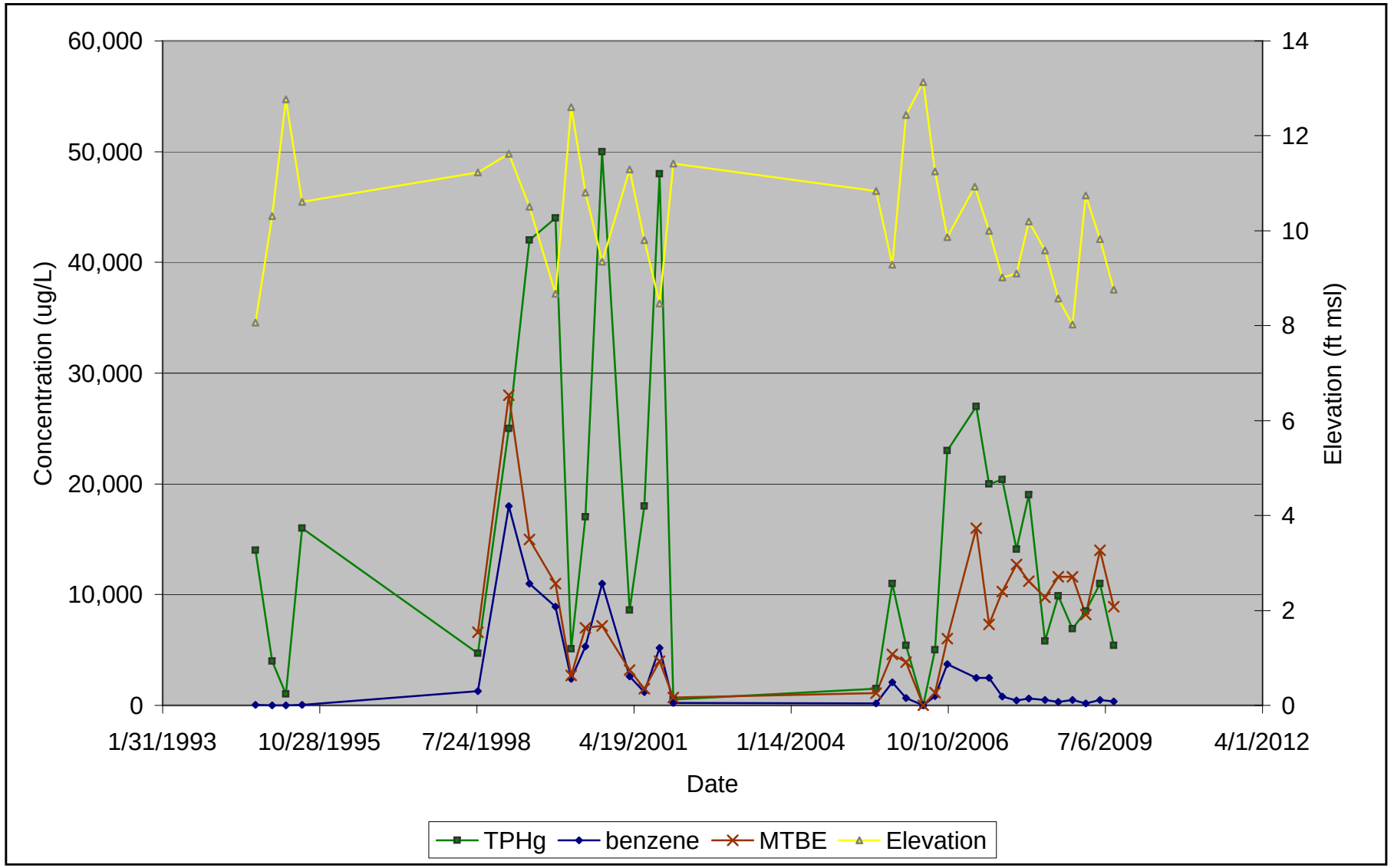
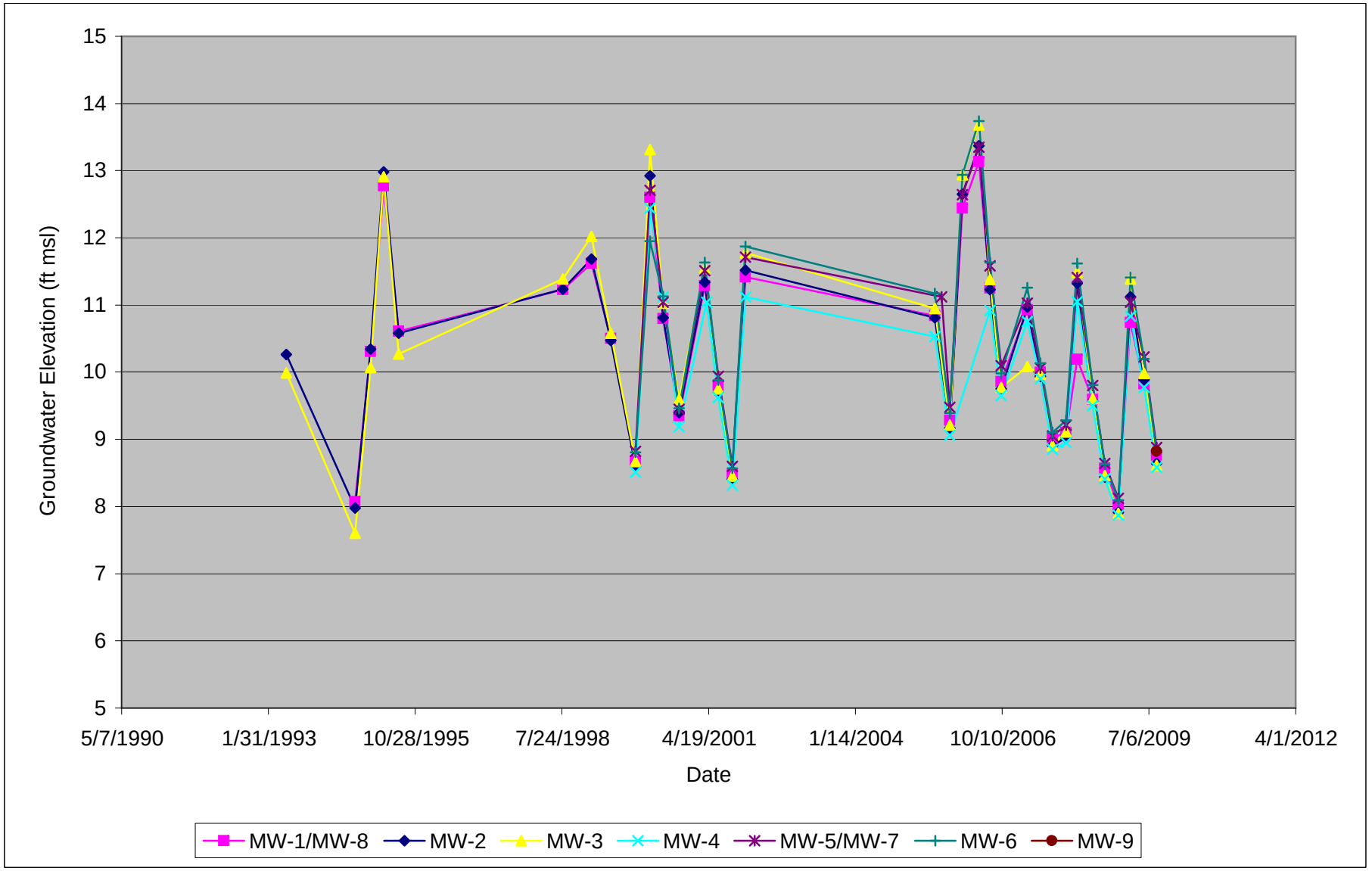
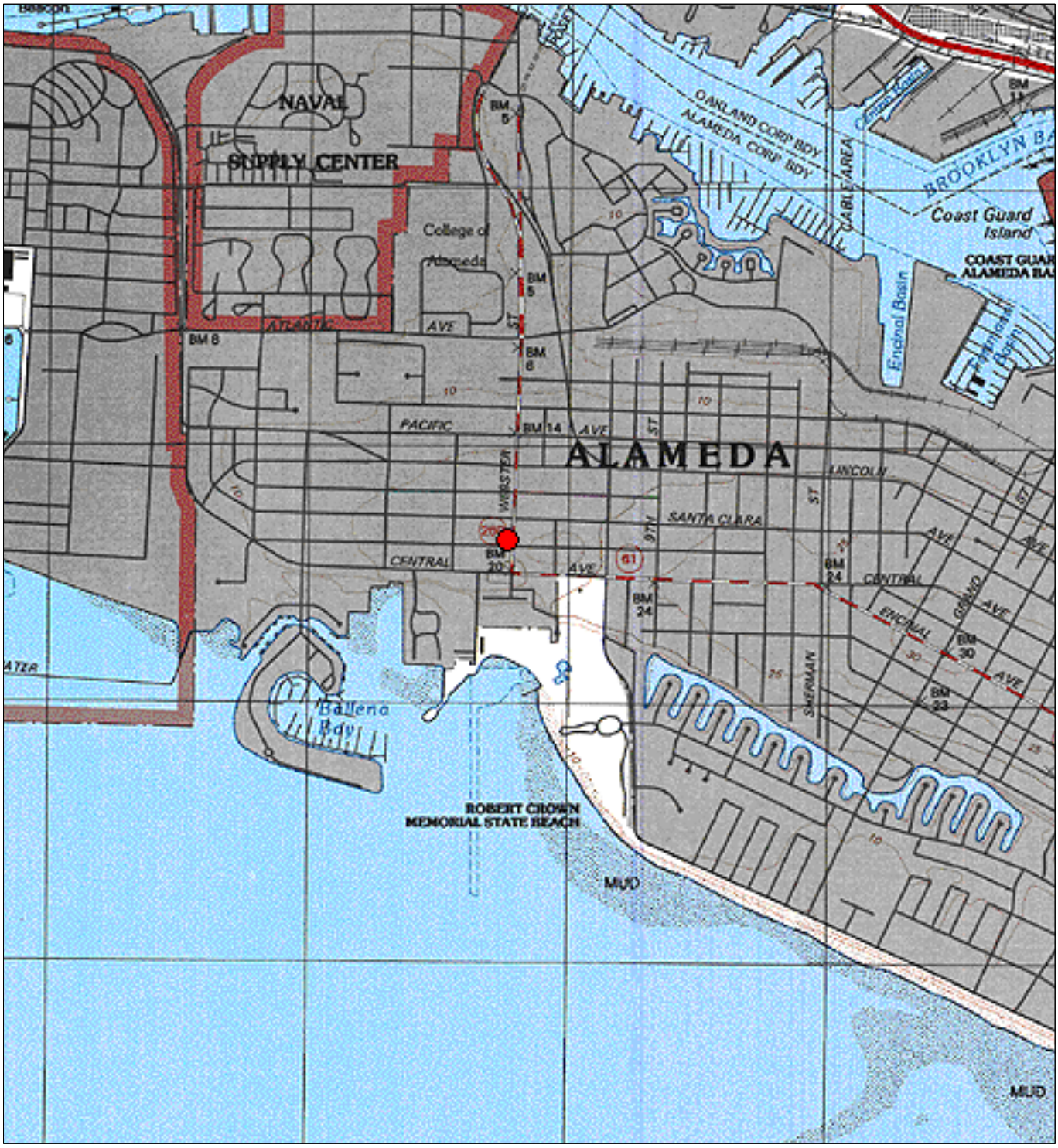


Chart 7
Groundwater Elevations in Site Monitoring Wells
1435 Webster Street
Alameda, California



FIGURES

S:\1 Environmental, Dept\Active Sites\Olympian\1435 Webster, Alameda\FIGURES\QMRs\2009 8 3rd QMR 1435 Webster 322-3-09.dwg, 9/15/2009 8:50:37 AM, E. Sharbori, TEC Accutite



0 1/2 1Mile

0 1,000m

N	Site Location Map By: TOPO! Date: 9/15/2009 Drafted By: LC	**SITE** 1435 Webster Street Alameda, California TEC ACCUTITE 262 Michelle Court So. San Francisco, CA 94080 Main: (650) 616-1200 Fax: (650) 616-1244	**FIGURE** 1	**TITLE** **Vicinity Map**

0 15 30
SCALE (ft)

Revision: 0
Date: 9/28/2009
Drafted By: LC

TEC ACCUTITE
262 Michelle Court
So. San Francisco, CA 94080
Main: (650) 616-1200
Fax: (650) 616-1244

SITE
1435 Webster
Alameda, California

FIGURE
2

Site Map

A

A'

PL

PL

SUBJECT SITE: 1435 Webster Street, Alameda, CA

Sidewalk

Taylor Ave.

B-22 (proj: 33' W)

CB-10 (proj: 13' W)

MW-6 (proj: 50' E)

CB-16 (proj: 25' E)

MW-7

VMP-2 (proj: 5' W)

CB-15 (proj: 27' E)

VMP-1 (proj: 27' E)

CB-12 (proj: 11' W)

MW-9 (proj: 37' W)

CB-5 (proj: 10' E)

MW-8 (proj: 8' W)

VMP-3 (proj: 9' E)

VMP-4 (proj: 3' E)

MW-4 (proj: 6' E)

15 5 10 10 5 15 0 20 -5 25

<1 <0.01 <0.01

<82 <0.82 <0.82

<1 <0.01 <0.01

2.2 <0.01 <0.05

2,800 <10 <50

<50 <0.5 <0.5

<0.5 <0.005 <0.005

NR

<0.5 <0.01 <0.05

<50 <0.5 4.8

11,000 970 420

47,000 1,500 <22

<0.5 <0.01 <0.05

<0.1 <0.01 <0.01

NR

<0.5 <0.01 <0.05

<50 <0.5 12

0.7 <0.01 <0.05

<0.1 <0.011 <0.011

<0.1 <0.005 <0.005

5,400 340 8,900

9,700 61 1,900

110,000 4,100 950

<0.5 <0.005 <0.005

<50 <0.5 4.9

0 12 ft

6 ft

SCALE

LEGEND

SW, well graded gravelly sand

SP, poorly graded sand, <5% fines

SM, silty sand with >10% clay and SC, clayey sand

SM, silty sand

2007 Excavation Boundary

PL Property line

NR No recovery

Asphalt

Concrete

TPHg benzene MTBE — Soil sample and contaminant concentrations in mg/kg

TPHg benzene MTBE — Groundwater sample and contaminant concentrations in ug/L (grab samples in italics) 8/27/2009

Groundwater elevation, 8/27/2009

TEC ACCUTITE
262 Michelle Court
So. San Francisco, CA 94080
Main: (650) 616-1200
Fax: (650) 616-1244

Revision:	2
Date:	1/21/2010
Drafted By:	ES

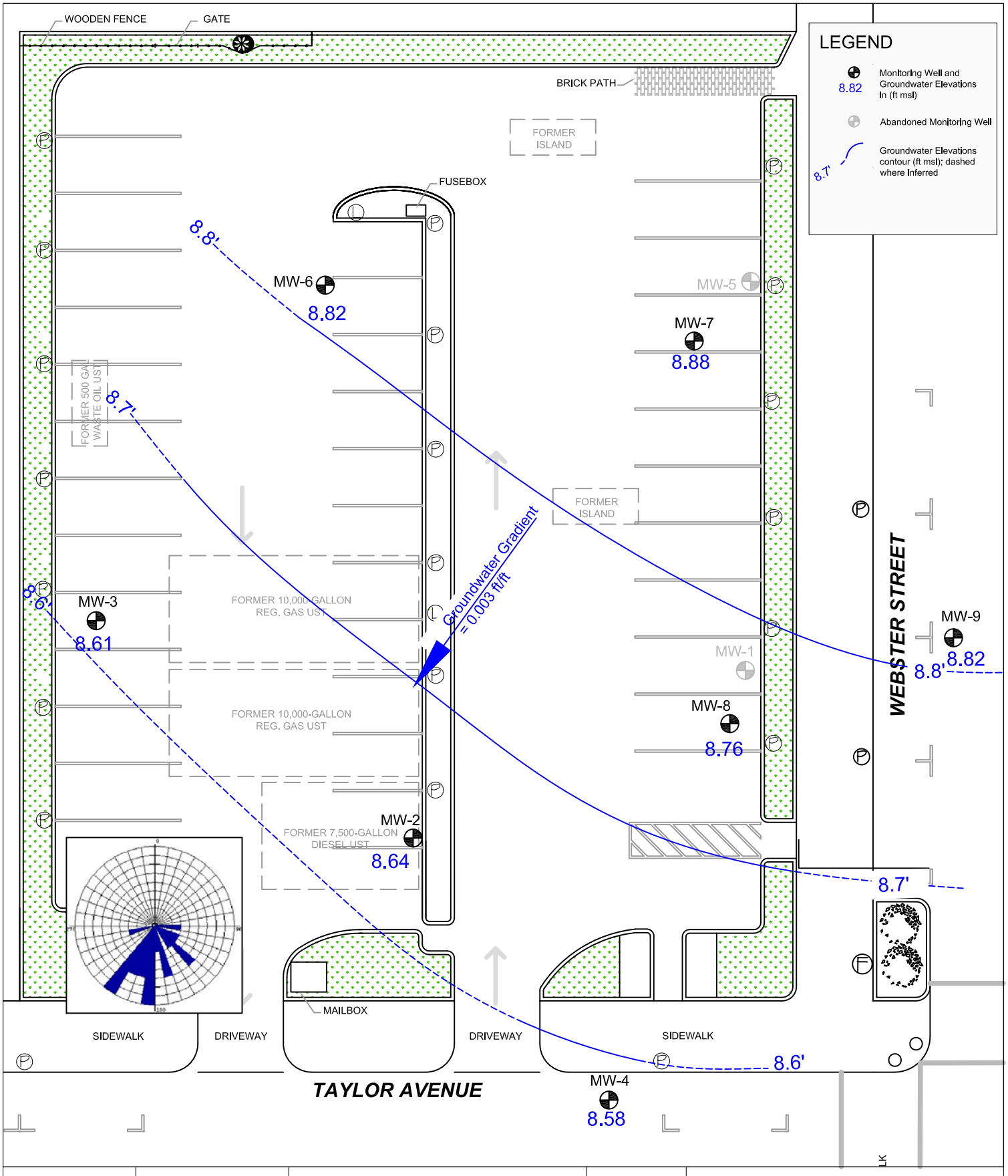
SITE

1435 Webster Street
Alameda, California

FIGURE

3

Geologic Cross Section
A-A'



N	0 9 18 SCALE (ft) Revision: Date: 9/15/2009 Drafted By: ES	262 Michelle Court So. San Francisco, CA 94080 Main: (650) 616-1200 Fax: (650) 616-1244 **SITE** 1435 Webster Street Alameda, California	**FIGURE** **4**	**Groundwater Gradient Map** **August 27, 2009**

PARKING LOT

Sapporo Sushi Boat

Bar and Grill

Shoe Repair

Taqueria Calafia

SUBJECT SITE
1435 Webster Street
Alameda, CA

RESIDENTIAL

SIDEWALK

WEBSTER STREET

SIDEWALK

Dollar Store

Island Paradise Club

Giant Burger

SIDEWALK

TAYLOR AVENUE

Liquor Store

Japanese Resturaunt

Alameda Aquatics

Hair Salon

SIDEWALK

SIDEWALK

(Former Gas Station, 1950)
Existing US Bank

FORMER GAS ISLAND
FORMER 500-GALLON WASTE OIL UST
FORMER 10,000-GALLON REG. GAS UST
FORMER GAS ISLAND
FORMER 10,000-GALLON REG. GAS UST
FORMER 7,500-GALLON DIESEL UST

MW-6 <0.5 (9')
B4 <0.5 (7.5')
MW-3 ND
MW-2 0.65 (7.5')
MW-4 <0.5 (9.5')
MW-7
MW-8 <0.1 (10')
MW-9 <0.1 (8') <0.1 (20')

CB-9
B3
CB-1
CB-10 2.2 (8') 2,800 (10')
CB-8
CB-16
CB-2
CB-7
CB-17 <0.5 (8') 10,000 (10')
CB-15
0.53 (8') 300 (12')
CB-11
CB-3
CB-13
CB-6
CB-13A
CB-14 <0.5 (8') 1.0 (10')
CB-4
CB-12 <0.5 (8') <0.5 (12')
CB-5 <0.5 (8') 0.7 (12')

B-6 0.196 (8') 11.2 (10')
B-7 <0.1 (6') <0.1 (8')
B2 <0.5 (7.5') B-8 <0.1 (8')
B-9 <0.1 (8') <0.1 (11')
B-10 <0.1 (8') <0.1 (11')
B-11 <0.1 (8') <0.1 (11')
B-16 NS

B-21 <1 (6') <1 (11')
B-24 <1 (8') <1 (14')
B-23 <1 (8') <1 (14')
B-22 <1 (8') <1 (14')
B-20 <1 (6')
B-19 <1 (8') <1 (12')
B1 <0.5 (9')
B-17 <0.1 (8') <0.1 (11')
B2 <0.5 (9') B-14 <0.1 (8') <0.1 (10')
B-13 <0.1 (10') <0.1 (12')
B-18 <0.1 (10') <0.1 (12')
B3 <0.5 (9')
B-12 <0.1 (10') <0.1 (12')
B4 <0.5 (9')
B-15 NS

LEGEND

- MW-2 — Monitoring well location
- B-19 - B-24 — Soil boring location (Jun. 2009)
- B-6 - B-18 — Soil boring location (Jul. 2007)
- CB-2 — Pre-excavation boring location (Nov.2006)
- B1-B4 ■ — Soil boring location (2001)
- B1-B4 — Soil boring location (1999)
- <0.1 (10') — Soil TPHg concentration in mg/kg and sample depth in feet below surface grade
- 100 — TPHg concentration contour in milligrams per kilogram; dashed where inferred
- ND — TPHg not detected above laboratory reporting limits; depth of sample unknown
- NS — Not sampled
- ESL — Environmental screening level

* Data from the excavation areas were not considered in contouring.

N

0 15 30
SCALE (ft)

Revision: 0
Date: 9/28/2009
Drafted By: LC

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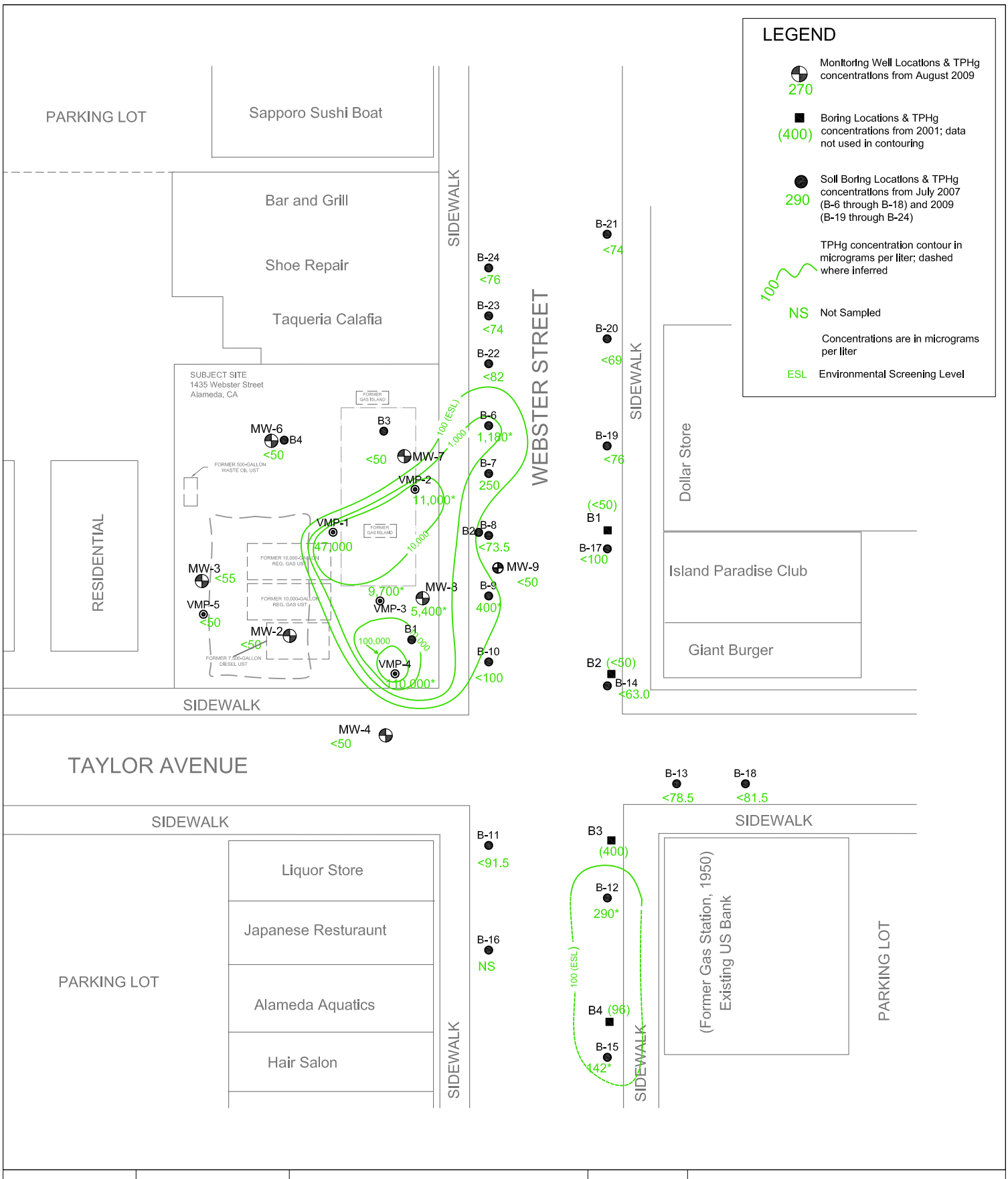
Alameda, California

FIGURE
5

Lateral Distribution of TPHg in Soil



0 25 50
SCALE (ft)

Revision: 1
Date: 09/22/2007
Drafted By: ES

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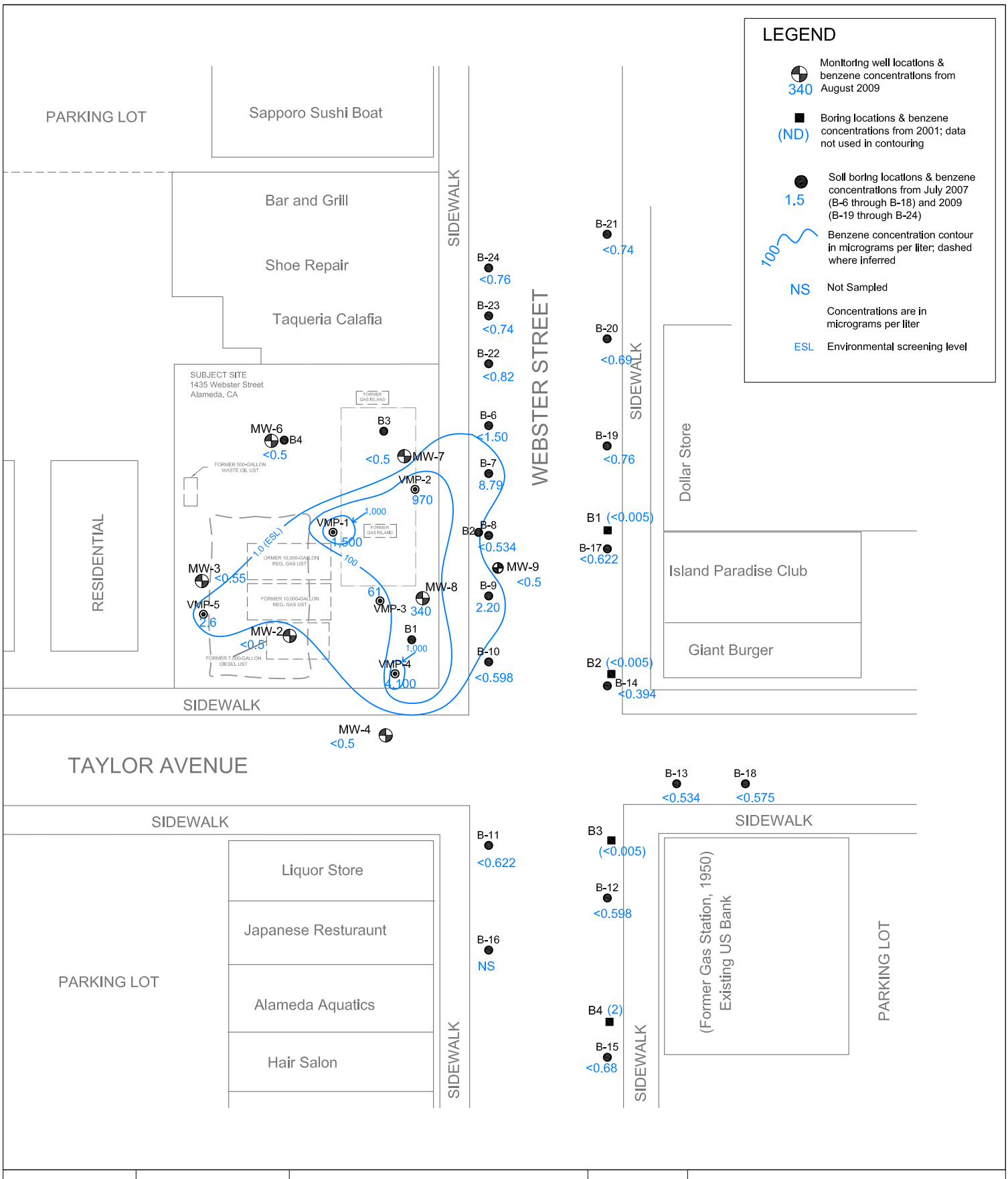
Alameda, California

FIGURE 6

Lateral Distribution of TPHg in Groundwater



N

0 25 50
SCALE (ft)

Revision: 1
Date: 9/22/2009
Drafted By: ES

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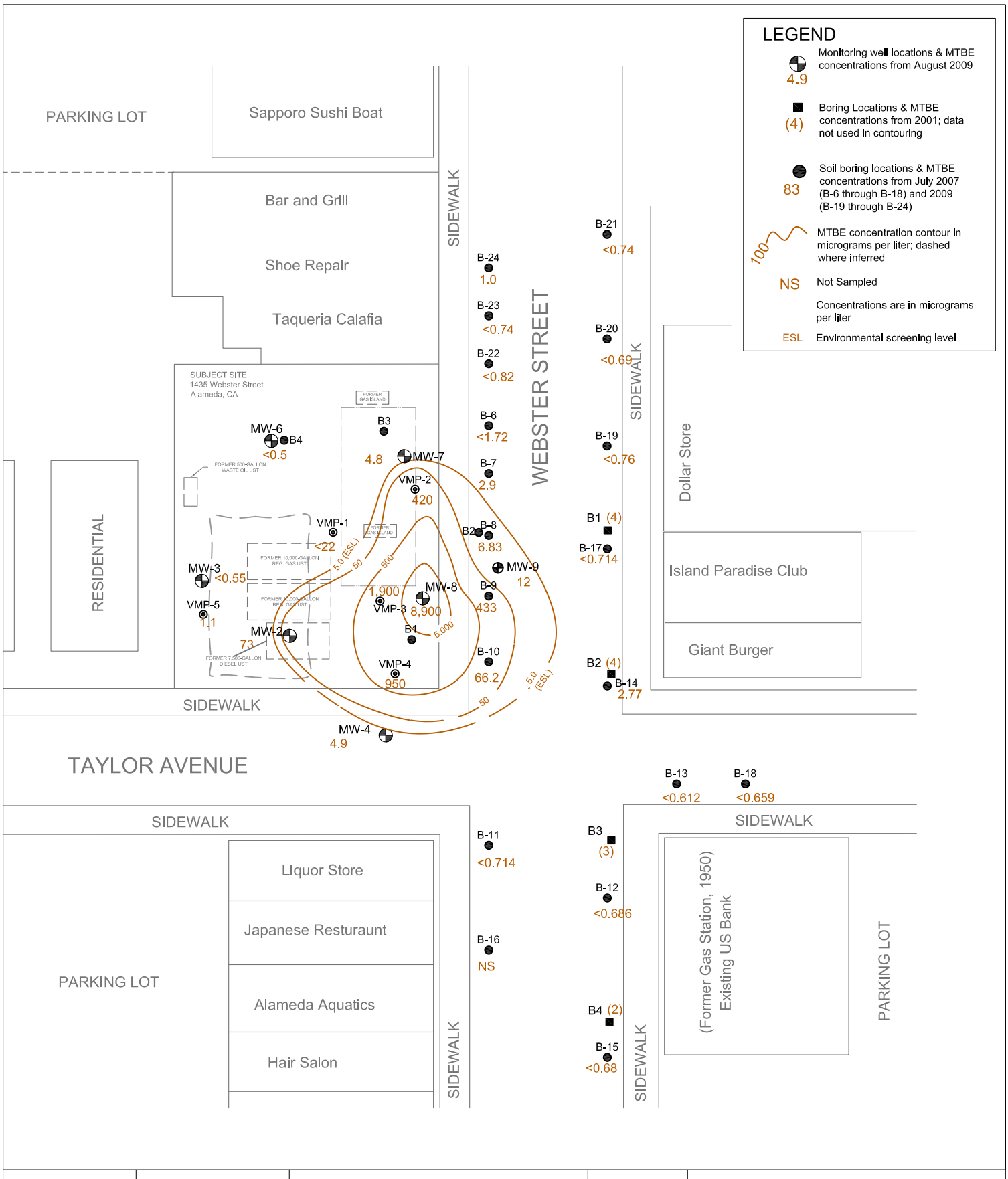
FIGURE 7

Lateral Distribution of Benzene in Groundwater



0 25 50
SCALE (ft)

Revision: 1
Date: 9/22/2009
Drafted By: ES

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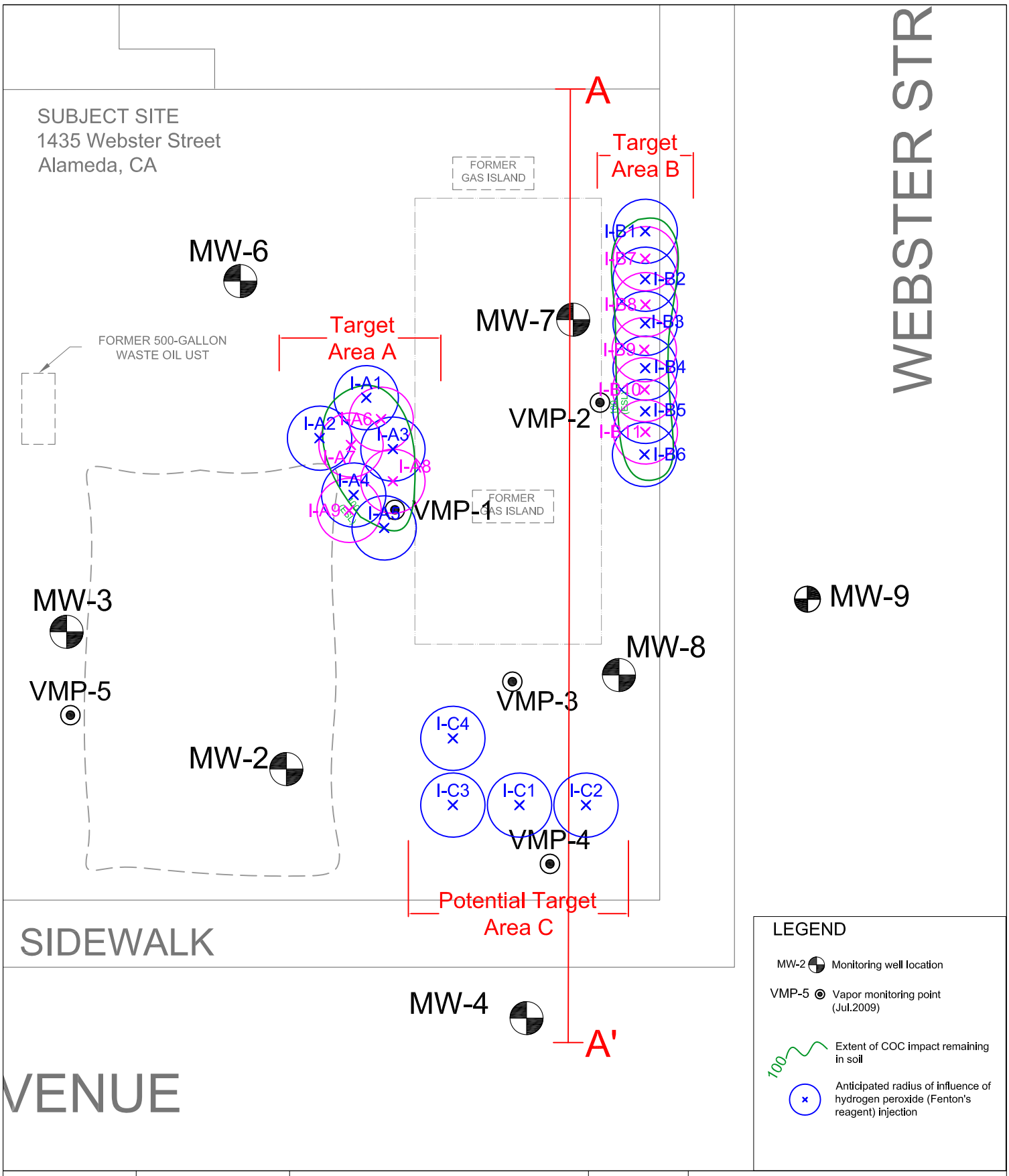
Alameda, California

FIGURE 8

Lateral Distribution of MTBE in Groundwater



-N-	0 10 20 SCALE (ft) Revision: 1 Date: 01/14/2010 Drafted By: LC	TEC ACCUTITE 262 Michelle Court So. San Francisco, CA 94080 Main: (650) 616-1200 Fax: (650) 616-1244 **SITE** 1435 Webster Street Alameda, California	**FIGURE** **9**	**Proposed Targeted Injection Areas**

ATTACHMENT A

RBCA TOOLKIT MODEL INPUTS AND OUTPUTS

Main Screen

RBCA Tool Kit for Chemical Releases
Version 2.52 © 2009 GSI Environmental Inc.

1. Project Information

Site Name:	Former Olympian Service Station
Location:	1435 Webster Street, Alameda, California
Completed By:	ES
Date:	4-Nov-09
Job ID:	E-355

2. Which Type of RBCA Analysis?

○ **Tier 1** — Risk-Based Screening Levels

◉ **Tier 2/3** — Site-Specific Target Levels

3. Calculation Options

Affects which input data are required

☑ ***Baseline Risks (Forward mode)***

☑ ***RBCA Cleanup Levels (Backward mode)***

○ Individual Constituent Risk Goals Only
◉ Individual and Cumulative Risk Goals

☐ Apply Source Depletion Algorithm
Time to Future Exposure 0 *(yr)*

4. RBCA Evaluation Process

Prepare Input Data
Data Complete? (■ = yes, ■ = no)

- ■ Exposure Pathways
- ■ Constituents of Concern (COCs)
- ■ Transport Models
- ■ Soil Parameters
- ■ GW Parameters
- ■ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Levels...

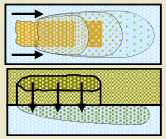
5. Commands and Options

New Site	Load Data...	Save Data As...	User Chemical Database
Set Units	Print Sheet	Print Report	
Help		Quit	

Exposure Pathway Identification

Site Name: Former Olympian Service Station
Location: 1435 Webster Street, Alameda, California
Compl. By: ES
Job ID: E-355 Date: 4-Nov-09

1. Groundwater Exposure



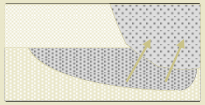
Groundwater Ingestion/ Surface Water Impact

Receptor:	None	Res.	S.W.
	On-site	Off-site1	Off-site2
Distance:	0	30	450 (m)

Source Media:
- [x] Affected Groundwater
- [x] Affected Soils Leaching to Groundwater

Option:
- [ ] Apply MCL value as ingestion RBEL (backward mode only)

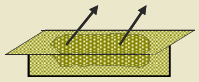
GW Discharge to Surface Water Exposure



- [x] Swimming
- [x] Fish Consumption
- [x] Specified Water Quality Criteria

Enter Criteria

2. Surface Soil Exposure



Combined Exposure

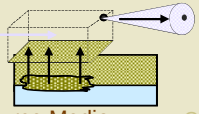
Receptor:	Res.
	On-site
Construction Worker	[x]

Source Media:
- [x] Direct Ingestion
- [x] Dermal Contact
- [x] Inhalation (vol+part)
- [ ] Vegetable Ingestion

Option:
- [x] Apply UK (CLEA) SGV as soil concentration limit

Veg Options

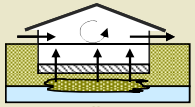
3. Air Exposure



Volatilization and Particulates to Outdoor Air Inhalation

Receptor:	Res.	Res.	None
	On-site	Off-site1	Off-site2
Distance:	0	30	0 (m)

Source Media: Construction worker [x]
- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [x] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [x] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor:	Res.	Res.	Res.
	On-site	Off-site1	Off-site2
Distance:	0	30	300 (m)

Source Media:
- [x] Affected Soils--Volatilization to Enclosed Space
- [x] Affected Soils Leaching to GW--Volatilization to Enclosed Space
- [x] Affected Groundwater--Volatilization to Enclosed Space

Bldg Options

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

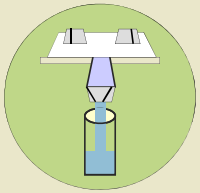
Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Former Olympian Service Station
Location: 1435 Webster Street, Alameda, California
Compl. By: ES
Job ID: E-355 Date: 4-Nov-09

1. Exposure Parameters

	Residential Receptors			Commerical Receptors		User Defined
	Child	Adolescent	Adult	Adult	Construc.	
Averaging time, carcinogens (yr)	70					-
Averaging time, non-carcinogens (yr)	6	12	30	25	1	-
Body weight (kg)	15	35	70	70	70	-
Exposure duration (yr)	6	12	30	25	1	-
Averaging Time for Vapor Flux (yr)	30			30	30	-
Exposure frequency (d/yr)	350			250	180	-
Dermal exposure freq. (d/yr)	350			250	180	-
Seasonal-avg skin surface area (cm^2/d)	2023	2023	3160	3160	3160	-
Soil dermal adherence factor (mg/cm^2)	0.5	0.5	0.5	0.5	0.5	-
Water ingestion rate (L/d)	1	1	2	1	1	-
Soil ingestion rate (mg/d)	200	200	100	50	100	-
Swimming exposure time (hr/event)	1	3	3			
Swimming event frequency (events/yr)	12	12	12			
Swimming water ingestion rate (L/hr)	0.5	0.5	0.05			
Skin surface area, swimming (cm^2)	3500	8100	23000			
Fish consumption rate (kg/d)	0.025	0.025	0.025			
Vegetable ingestion rate (kg/d)						
Above-ground vegetables	0.002	0.002	0.006			
Below-ground vegetables	0.001	0.001	0.002			
Contaminated fish fraction (-)	1					



2. Age Adjustment for Carcinogens

(residential receptor only)

	Adjustment Factor	
☑ Seasonal skin surface area, soil contact	1022.26	(cm^2-yr/kg)
☑ Water ingestion	1.08571	(mg-yr/L-day)
☑ Soil ingestion	165.714	(mg-yr/kg-day)
☑ Swimming water ingestion	4.56	(L/kg)
☑ Skin surface area, swimming	80640	(cm^2-yr/kg)
☑ Fish consumption	0.02286	(kg-yr/kg-day)
☑ Below-ground vegetable ingestion	0.38	(kg-yr/kg-day)
☑ Above-ground vegetable ingestion	0.88	(kg-yr/kg-day)

3. Non-Carcinogenic Receptor

(residential receptor only)

Child

4. Target Health Risk Limits

	Individual	Cumulative
Target Cancer Risk (Carcinogens)	1.0E-6	1.0E-6
Target Hazard Quotient/Index (non-Carc.)	1.0E+0	1.0E+0

5. Commands and Options

Return to Exposure Pathways

Use/Set Default Values

Print Sheet

Help

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

Commands and Options

Return | Print Sheet | Paste Default Values | Help

Surface Water Quality Criteria

Constituent	Concentration (mg/L)
Benzene	4.6E-2
Toluene	4.0E-2
Ethyl benzene	3.0E-2
Xylenes (mixed isomers)	1.0E-1
Methyl t-Butyl ether (MTBE)	1.8E-1

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data)		Soil Source Zone (Enter Directly / Enter Site Data)		Mole Fraction in Source Material
	(mg/L)	note	*(mg/kg)*	note	*(-)*
Benzene	8.7E-1	average over BTEX plume area	5.0E+0	average over affected soils	
Toluene	4.0E-1	average over BTEX plume area	6.9E+1	average over affected soils	
Ethyl benzene	7.0E-1	average over BTEX plume area	5.7E+1	average over affected soils	
Xylenes (mixed isomers)	3.0E+0	average over BTEX plume area	2.9E+2	average over affected soils	
Methyl t-Butyl ether (MTBE)	1.2E+0	average over MTBE plume area	2.7E+1	average over affected soils	

View Chemical Parameters

Transport Modeling Options

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

1. Vertical Transport, Surface Soil Column

Outdoor Air Volatilization Factors

- (●) Surface soil volatilization model only — ASTM Model
- ( ) Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone: 1.00 *(m)*
- ( ) User-specified VF from other model — Enter VF Values

Indoor Air Volatilization Factors

- (●) Johnson & Ettinger model for soil and groundwater volatilization
- ( ) Johnson & Ettinger for soil, Mass Flux model for groundwater
- ( ) User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor

- (●) ASTM Model
  - [ ] Apply Soil Attenuation Model (SAM)
  - [x] Allow first-order biodecay — Enter Decay Rates
- ( ) User-specified LF from other model — Enter LF Values

Modeling Options

- [ ] Disable Mass Balance Limit
- [ ] Apply Dual Equilibrium Desorption Model

2. Lateral Air Dispersion Factor

	Off-site 1	Off-site 2	
(●) 3-D Gaussian dispersion model			
( ) User-Specified ADF	1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor

Calculate DAF using Domenico Model

- ( ) Domenico equation with dispersion only (no biodegradation)
- ( ) Domenico equation first-order decay — Enter Decay Rates
- (●) Modified Domenico equation using electron acceptor superposition — Enter Site Data

Calculate — Biodegradation Capacity: 2.93E+1 *(mg/L)*

— or —

User-Specified DAF Values

- ( ) DAF values from other model or site data — Enter DAF Values

4. Chemical Decay and Source Depletion

Enter Decay Rates
Enter Source Mass

5. Commands and Options

Main Screen | Print Sheet | *Help*

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

Commands and Options

Return | Print Sheet | Paste Default Values | *Help*

Constituent Decay Rates

Constituent	Saturated Zone		Unsaturated Zone	
	Half-Life	First-Order Decay Coefficient	Half-Life	First-Order Decay Coefficient
	(day)	*(1/day)*	*(day)*	*(1/day)*
Benzene	7.2E+2	9.6E-4	7.2E+2	9.6E-4
Toluene	2.8E+1	2.5E-2	2.8E+1	2.5E-2
Ethyl benzene	2.3E+2	3.0E-3	2.3E+2	3.0E-3
Xylenes (mixed isomers)	3.6E+2	1.9E-3	3.6E+2	1.9E-3
Methyl t-Butyl ether (MTBE)	3.6E+2	1.9E-3	1.8E+2	3.9E-3

Site Name: Former Olympian Service Station Job ID: E-355
Location: 1435 Webster Street, Alameda, California Date: 4-Nov-09
Compl. By: ES

Biodegradation Capacity Calculator

Commands and Options

Return | Print Sheet | Help

Electron Acceptors	Min GW Source Zone Conc. (mg/L)	Mean Background Concentration (mg/L)	Utilization Factor (-)	Estimated Data Distribution
Dissolved Oxygen (O_2)	1.4E+0	4.9E+0	3.14	Normal
Nitrate (NO_3)	2.5E-1	1.0E+1	4.9	Normal
Sulfate (SO_4)	1.7E+1	1.4E+2	4.7	Normal

Calculate | Paste Defaults for BTEX

Metabolic Byproducts	Min. Background Concentration (mg/L)	Mean Source Zone Conc. (mg/L)	Utilization Factor (-)	Estimated Data Distribution
Ferrous Iron (Fe^{2+})	5.0E-2	7.0E-1	21.8	Lognormal
Methane (CH_4)	1.1E-4	2.2E-3	0.78	Lognormal

Biodegradation Capacity 2.9E+1 *(mg/L)*

Enter Analytical Data from Groundwater (up to 10 Data Points)

Background Samples	1	2	3	4	5	6	7	8	9	10
Sample Name	MW-3	MW-6								
Sample Date	27-Aug-09	27-Aug-09								
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
O_2	5.50E+0	4.21E+0								
NO_3	1.70E+1	3.30E+0								
SO_4	1.30E+2	1.50E+2								

Source Zone Samples	1	2	3	4	5	6	7	8	9	10
Sample Name	MW-8	MW-9								
Sample Date	27-Aug-09	27-Aug-09								
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Fe^{2+}	3.50E+0	1.40E-1								
CH_4	8.48E-3	5.70E-4								

Site-Specific Soil Parameters

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

1. Soil Source Zone Characteristics

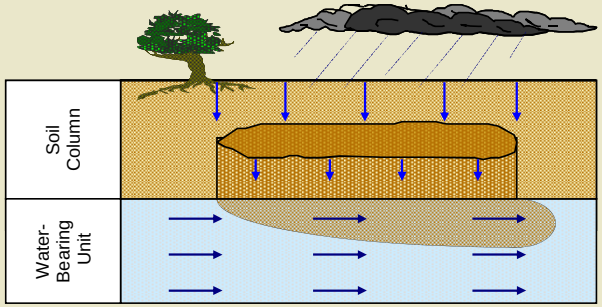
Hydrogeology

Depth to water-bearing unit	3	(m)
Capillary zone thickness	0.09	(m)
Soil column thickness	2.91	(m)

Affected Soil Zone

Depth to top of affected soils	2.3	(m)
Depth to base of affected soils	3	(m)
Length of affected soil parallel to assumed GW flow direction	15	(m)

	Res/Com	Construction	
Affected soil area	55		(m^2)
Length of affected soil parallel to assumed wind direction	0	10	(m)



2. Surface Soil Column

Predominant USCS Soil Type

Enter Directly

	Vadose Zone	Capillary Fringe	
Volumetric water content	0.19	0.36	(-)
Volumetric air content	0.17	0	(-)
Total porosity	0.36		(-)
Dry bulk density	1.71		(kg/L)
Vertical hydraulic conductivity	86.4		(cm/d)
Vapor permeability	3.40E-13		(m^2)
Capillary zone thickness	0.09		(m)

Net Rainfall Infiltration

Net infiltration estimate	6.10	(cm/yr)
or	or	
Average annual precipitation	0	(cm/yr)

Enter Directly

Partitioning Parameters

Fraction organic carbon - entire soil column	0.00036	(-)
Fraction organic carbon - root zone	0.01	(-)
Soil/water pH	6.2	(-)

3. Commands and Options

Main Screen | Use/Set Default Values | Print Sheet
Set Units | | Help

Site-Specific Groundwater Parameters

Site Name: Former Olympian Service Station — Job ID: E-355
Location: 1435 Webster Street, Alameda, California — Date: 4-Nov-09
Compl. By: ES

1. Water-Bearing Unit

Hydrogeology

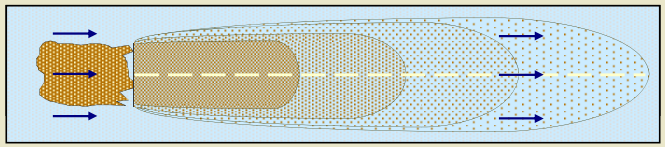
Groundwater Darcy velocity	5.2E-1	(cm/d)
Groundwater seepage velocity	1.4E+0	(cm/d)
or Calculate	or	
Hydraulic conductivity	8.6E+1	(cm/d)
Hydraulic gradient	0.006	(-)
Effective porosity	0.38	(-)

Sorption

Fraction organic carbon--saturated zone	0.003	(-)
Groundwater pH	6.2	(-)

2. Groundwater Source Zone

Groundwater plume width at source	30	(m)
Plume (mixing zone) thickness at source	1.5	(m)
Enter Directly or		
Saturated thickness	2	(m)
Length of source zone	15	(m)



3. Groundwater Dispersion

Model: Xu and Eckstien

	GW Ingestion		GW to Indoor Air		
	Off-site 1	Off-site 2	Off-site 1	Off-site 2	
Distance to GW receptors	30	450	30	300	(m)
Calculate					
Longitudinal dispersivity	2.1283776	8.751123	2.1283776	7.4142426	(m)
Transverse dispersivity	0.2128378	0.8751123	0.2128378	0.7414243	(m)
Vertical dispersivity	0.0212838	0.0875112	0.0212838	0.0741424	(m)

4. Groundwater Discharge to Surface Water

	Off-site 2	
Distance to GW/SW disharge point	450	(m)
Plume width at GW/SW discharge	30	(m)
Plume thickness at GW/SW discharge	1.5	(m)
Surface water flowrate at GW/SW discharge	1.0E+0	(m^3/s)

5. Commands and Options

Main Screen | Use/Set Default Values | Print Sheet
Set Units | | Help

Site-Specific Air Parameters

Site Name: Former Olympian Service Station | Job ID: E-355
Location: 1435 Webster Street, Alameda, California | Date: 4-Nov-09
Compl. By: ES

1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor	30	0	(m)
Horizontal dispersivity	3.380423	0	(m)
Vertical dispersivity	2.287133	0	(m)

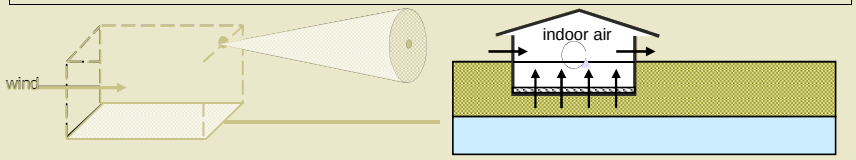
Air Source Zone

Air mixing zone height	2	(m)
Ambient air velocity in mixing zone	3.89	(m/s)
Inverse mean conc. [Q/C term]	79.25	

Particulate Emissions

Model: ASTM Model

Particulate Emission Factor	0	(kg/m^3)
or		
Areal particulate emission flux	6.9E-14	(g/cm^2/s)
Fraction vegetative cover	0.5	(-)
Mean annual air velocity @ 7 m	4.8	
Equivalent 7m air vel. threshold	11.32	(m/s)
Windspeed function [F(x) term]	0.223841466	(-)



2. Indoor Air Pathway

	Residential	Commercial	
Building volume/area ratio	2	3	(m)
Foundation area	70	70	(m^2)
Foundation perimeter	49	34	(m)
Building air exchange rate	1.4E-4	2.3E-4	(1/s)
Depth to bottom of foundation slab	0.15	0.15	(m)
Convective air flow through cracks	0.0E+0	0.0E+0	(m^3/s)
Foundation thickness	0.15		(m)
Foundation crack fraction	0.001		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)
Building Volume	451	451	(m^3)
Building Width Perpendicular to GW flow	9.61	9.61	(m)
Building Length Parallel to GW flow	9.61	9.61	(m)
Saturated Soil Zone Porosity	0.38		(-)
Vertical Dispersivity	0.006		(m)
Groundwater Seepage Velocity	1.4E+00		(cm/d)

3. Commands and Options

Main Screen | Use/Set Default Values | Print Sheet
Set Units | | Help

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

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (2.3 - 3 m)	
	value (mg/L)	note	value (mg/kg)	note
Benzene *	8.7E-1	average over BTEX plume area	5.0E+0	average over affected soils
Toluene *	4.0E-1	average over BTEX plume area	6.9E+1	average over affected soils
Ethyl benzene *	7.0E-1	average over BTEX plume area	5.7E+1	average over affected soils
Xylenes (mixed isomers)	3.0E+0	average over BTEX plume area	2.9E+2	average over affected soils
Methyl t-Butyl ether (MTBE)	1.2E+0	average over MTBE plume area	2.7E+1	average over affected soils

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

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

SURFACE WATER QUALITY CRITERIA

CONSTITUENT	Concentration (mg/L)
Benzene*	0.046
Toluene*	0.04
Ethyl benzene*	0.03
Xylenes (mixed isomers)	0.1
Methyl t-Butyl ether (MTBE)	0.18

Site Name: Former Olympian Service Statior Date Completed: 4-Nov-09
Site Location: 1435 Webster Street, Alameda Job ID: E-355
Completed By: ES

RBCA SITE ASSESSMENT

Input Parameter Summary

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

Completed By: ES
Date Completed: 4-Nov-09

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	250	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	Residential	Surf. Water
Soil Leaching to Groundwater Ingestion	None	Residential	Surf. Water
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	Yes
Fish Consumption	NA	NA	Yes
Aquatic Life Protection	NA	NA	Yes
Soil:			
Direct Contact: Ingestion, Dermal, Inhalation	Res./Constr.	NA	NA
Apply CLEA- UK SGV levels		Yes	
Outdoor Air:			
Particulates from Surface Soils	Res./Constr.	Residential	None
Volatilization from Soils	Res./Constr.	Residential	None
Volatilization from Groundwater	Residential	Residential	None
Indoor Air:			
Volatilization from Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	Residential	Residential
Soil Leaching to Groundwater Volatilization	Residential	Residential	Residential

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	30	450	(m)
Outdoor air inhalation receptor	0	30	NA	(m)
Indoor air inhalation receptor	0	30	300	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-6	1.0E-6
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface model only
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	Yes
Vegetable calculation options	NA
Air dilution factor	3-D Gaussian dispersion
Groundwater dilution-attenuation factor	Domenico model w/ biodeg.

NOTE: NA = Not applicable

RBCA SITE ASSESSMENT

Input Parameter Summary

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

Completed By: ES
Date Completed: 4-Nov-09

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	***0.09***			(m)
h_v	Vadose zone thickness	***2.91***			(m)
ρ_s	Soil bulk density	***1.71***			(g/cm^3)
f_{oc}	Fraction organic carbon	***0.00036***			(-)
θ_T	Soil total porosity	***0.36***			(-)
		capillary	**vadose**	**foundation**	
θ_w	Volumetric water content	***0.36***	***0.19***	0.12	(-)
θ_a	Volumetric air content	***0***	***0.17***	0.26	(-)
K_{vs}	Vertical hydraulic conductivity	***86.4***			(cm/d)
k_v	Vapor permeability	***3.4E-13***			(m^2)
L_{gw}	Depth to groundwater	3			(m)
pH	Soil/groundwater pH	***6.2***			(-)
			Construction		
W	Length of source-zone area parallel to wind	***0***	10		(m)
W_{gw}	Length of source-zone area parallel to GW flow	***15***			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	***55***			(m^2)
L_s	Depth to top of affected soils	***2.3***			(m)
L_{base}	Depth to base of affected soils	3			(m)
L_{subs}	Thickness of affected soils	***0.7***			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	***3.89***	(m/s)
δ_{air}	Air mixing zone height	2	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	6.9E-14	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	0	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	2	NA	(m)
A_b	Foundation area	70	NA	(m^2)
X_{crk}	Foundation perimeter	49	NA	(m)
ER	Building air exchange rate	0.00014	NA	(1/s)
L_{crk}	Foundation thickness	0.15	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	0.15	NA	(m)
η	Foundation crack fraction	0.001	NA	(-)
dP	Indoor/outdoor differential pressure	0	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	0	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	0.12	NA	(-)
θ_{acrack}	Volumetric air content of cracks	0.26	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	***1.5***	(m)
I_f	Net groundwater infiltration rate	***6.1***	(cm/yr)
U_{gw}	Groundwater Darcy velocity	***0.5184***	(cm/d)
V_{gw}	Groundwater seepage velocity	***1.364210526***	(cm/d)
K_s	Saturated hydraulic conductivity	***86.4***	(cm/d)
i	Groundwater gradient	***0.006***	(-)
S_w	Width of groundwater source zone	***30***	(m)
S_d	Depth of groundwater source zone	***1.5***	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.38	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	***0.003***	(-)
pH_{sat}	Groundwater pH	6.2	(-)
	Biodegradation considered?	EA-Limit.	
BC	Biodegradation capacity for EA-limited biodeg.	2.9E+01	(mg/L)

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		**Groundwater Ingestion**		**Groundwater to Indoor Air**		
α_x	Longitudinal dispersivity	2.1E+0	8.8E+0	2.1E+0	7.4E+0	(m)
α_y	Transverse dispersivity	2.1E-1	8.8E-1	2.1E-1	7.4E-1	(m)
α_z	Vertical dispersivity	2.1E-2	8.8E-2	2.1E-2	7.4E-2	(m)
Lateral Outdoor Air Transport		**Soil to Outdoor Air Inhal.**		**GW to Outdoor Air Inhal.**		
σ_y	Transverse dispersion coefficient	3.4E+0	NA	3.4E+0	NA	(m)
σ_z	Vertical dispersion coefficient	2.3E+0	NA	2.3E+0	NA	(m)
ADF	Air dispersion factor	#DIV/0!	NA	1.0E+0	NA	(-)

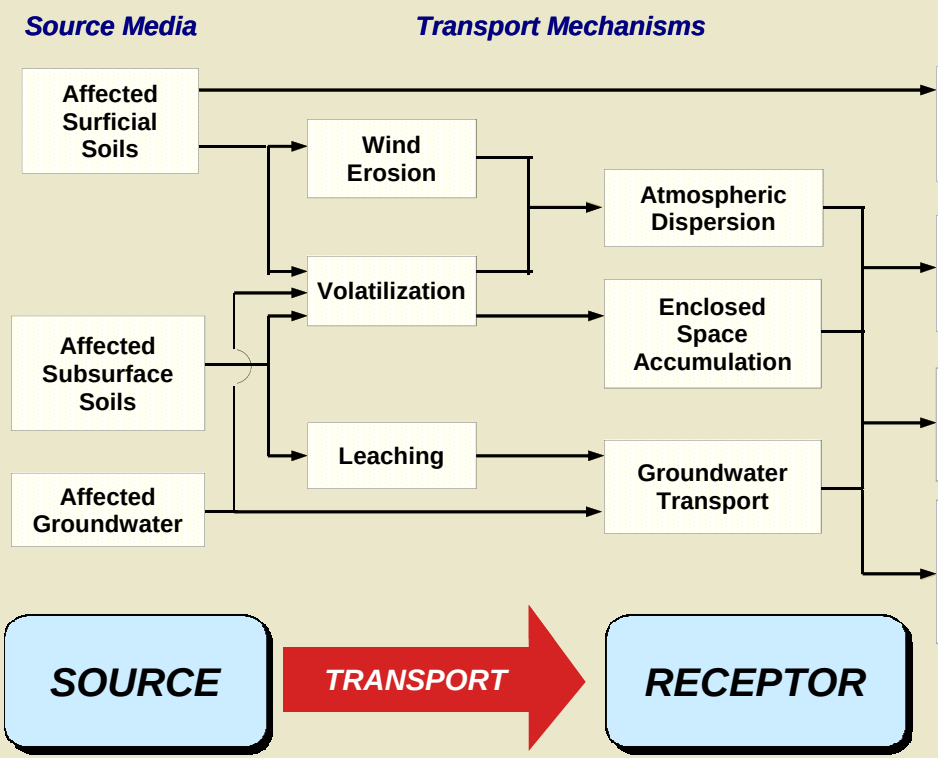
Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	1	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	30	(m)
δ_{pi}	Thickness of GW plume at SW discharge	1.5	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	3.7E+5	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Exposure Pathway Flowchart

Site Name: Former Olympian Service Station — Job ID: E-355
Location: 1435 Webster Street, Alameda, California — Date: 4-Nov-09
Compl. By: ES



Receptors	On-site	Off-site1	Off-site2
Direct Contact Pathways: Ingestion / Dermal / Inhalation	*Res./Constr.*	*NA*	*NA*
Air Inhalation of Vapor and/or Particulates — Outdoor Air:	*Res./Constr.*	*Residential*	*None*
Air Inhalation of Vapor and/or Particulates — Indoor Air:	*Residential*	*Residential*	*Residential*
Groundwater Potable Water Ingestion	*None*	*Residential*	*Surf. Water*
Surface Water Swimming, Fish Consumption, Aquatic Life	*NA*	*NA*	*Swimming, Fishing, Aquatic Life*

Commands and Options

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CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Orange = One or more parameter differs from User Chemical Database Constituent	CAS Number	Type	Molecular Weight (g/mole)		Aqueous Solubility (@ 20 - 25 C) (mg/L)		Soil Saturation Limit Calculated (mg/kg)	Vapor Pressure (@ 20 - 25 C) (mm Hg)		Henry's Constant (@ 20 - 25 C) (unitless)		log (Koc) or log (Kd) (@ 20 - 25 C) log(L/kg)		
Benzene	71-43-2	O	78.11364	TX08	1770	TX08	2.79E+02	9.50E+01	TX08	2.27E-01	TX08	1.82E+00	Koc	TX08
Toluene	108-88-3	O	92.14052	TX08	530	TX08	1.00E+02	2.82E+01	TX08	2.76E-01	TX08	2.15E+00	Koc	TX08
Ethyl benzene	100-41-4	O	106.1674	TX08	169	TX08	3.67E+01	9.60E+00	TX08	3.28E-01	TX08	2.31E+00	Koc	TX08
Xylenes (mixed isomers)	1330-20-7	O	106.1674	TX08	198	TX08	4.49E+01	8.06E+00	TX08	2.93E-01	TX08	2.38E+00	Koc	TX08
Methyl t-Butyl ether (MTBE)	1634-04-4	O	88.14968	TX08	48000	TX08	5.69E+03	2.49E+02	TX08	2.44E-02	TX08	1.15E+00	Koc	TX08

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Orange = One or more parameter differs from User Chemical Database	pH specific Kd for non-organics							log(Kow) (@ 20 - 25 C)		Diffusion Coefficients			
	Surface Soil Column			Water Bearing Unit									
Constituent	Slope	y-Intercept	logKd_pH (L/kg)	Slope	y-Intercept	logKd_pH (L/kg)		log(L/kg)		Air (cm^2/s)		Water (cm^2/s)	
Benzene	-	-	-	-	-	-	-	1.99E+00	TX08	8.80E-02	TX08	9.80E-06	TX08
Toluene	-	-	-	-	-	-	-	2.54E+00	TX08	8.70E-02	TX08	8.60E-06	TX08
Ethyl benzene	-	-	-	-	-	-	-	3.03E+00	TX08	7.50E-02	TX08	7.80E-06	TX08
Xylenes (mixed isomers)	-	-	-	-	-	-	-	3.09E+00	TX08	7.40E-02	TX08	8.50E-06	TX08
Methyl t-Butyl ether (MTBE)	-	-	-	-	-	-	-	1.43E+00	TX08	7.92E-02	TX08	9.41E-05	TX08

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Parameters

Orange = One or more parameter differs from User Chemical Database	Analytical Detection Limits				Half Life (First-Order Decay)			Soil-to-Plant Biotransfer Factors			Relative Bioavailability Factor		Leaf Concen. Factor Calculated	Root Concen. Factor Calculated	Bioconcentration Factor	
Constituent	Groundwater (mg/L)		Soil (mg/kg)		Saturated (days)	Unsaturated (days)		Above-grd (unitless)	Below-grd (unitless)				(mg/kg)/(mg/L)	(mg/kg)/(mg/L)		
Benzene	2.00E-03	S	5.00E-03	S	7.20E+02	7.20E+02	H	-	-	-	1.00E+00	TX08	1.17E+00	1.85E+00	12.6	LY
Toluene	2.00E-03	S	5.00E-03	S	2.80E+01	2.80E+01	H	-	-	-	1.00E+00	TX08	1.94E+00	3.55E+00	70	LY
Ethyl benzene	2.00E-03	S	5.00E-03	S	2.28E+02	2.28E+02	H	-	-	-	1.00E+00	TX08	3.13E+00	7.34E+00	120	LY
Xylenes (mixed isomers)	5.00E-03	S	5.00E-03	S	3.60E+02	3.60E+02	H	-	-	-	1.00E+00	TX08	3.29E+00	8.02E+00	130	LY
Methyl t-Butyl ether (MTBE)	-	-	-	-	3.60E+02	1.80E+02	H	-	-	-	1.00E+00	TX08	7.63E-01	1.20E+00	7.2	LY

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Dermal Exposure

Orange = One or more parameter differs from User Chemical Database	Water Dermal Permeability Data					
Constituent	Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff	Water/Skin Derm Ads. Fact Calculated	
Benzene	0.021	0.26	0.63	0.013	0.073391787	D
Toluene	0.045	0.32	0.77	0.054	0.159834535	D
Ethyl benzene	0.074	0.39	1.3	0.14	0.266633684	D
Xylenes (mixed isomers)	0.08	0.39	1.4	0.16	0.286510345	D
Methyl t-Butyl ether (MTBE)	-	-	-	-	-	-

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Orange = One or more parameter differs from User Chemical Database Constituent	Dermal Relative Abs. Factor Calculated	Absorbtion Fraction		
		Dermal (unitless)	Gastrointestinal (unitless)	
Benzene	0	0	0.97	TX08
Toluene	0	0	0.8	TX08
Ethyl benzene	0	0	0.97	TX08
Xylenes (mixed isomers)	0	0	0.92	TX08
Methyl t-Butyl ether (MTBE)	0	0	0.8	TX08

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Regulatory Standards

Orange = One or more parameter differs from User Chemical Database Constituent	Maximum Contaminant Level (mg/L)		Time-Weighted Average Workplace Criteria (mg/m^3)		UK Soil Guideline Values				
					Residential/Plant mg/kg	Residential/No Plant mg/kg	Allotments mg/kg	Commercial/Ind. mg/kg	
Benzene	0.005	MC	3.19	OS	-	-	-	-	-
Toluene	1	MC	754	OS	4	2	3	2	UK2
Ethyl benzene	0.7	MC	435	OS	3	3	3	1	UK1
Xylenes (mixed isomers)	10	MC	435	OS	-	-	-	-	-
Methyl t-Butyl ether (MTBE)	-	-	144	AC	-	-	-	-	-

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

	Regulatory Standards									
	Surface Water Quality Criteria									
Orange = One or more parameter differs from User Chemical Database	Aquatic Life Protection				Human Health Protection					
Constituent	Freshwater (mg/L)		Marine (mg/L)		Drink & Freshwater Fish (mg/L)		Freshwater Fish (mg/L)		Saltwater Fish (mg/L)	
Benzene	-	-	-	-	0.005	T3	0.106	T3	0.0708	T3
Toluene	-	-	-	-	6.8	E	200	E	200	E
Ethyl benzene	-	-	-	-	3.1	E	29	E	29	E
Xylenes (mixed isomers)	-	-	-	-	-	-	-	-	-	-
Methyl t-Butyl ether (MTBE)	-	-	-	-	-	-	-	-	-	-

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

CHEMICAL DATA FOR SELECTED COCs

Toxicity Parameters

Orange = One or more parameter differs from User Chemical Database Constituent	Oral RfD or TDSI (mg/kg/day)		Dermal RfD or TDSI (mg/kg/day)		Inhalation Equivalent RfC or TCA (mg/m^3)		Oral Equivalent Slope Factor 1/(mg/kg/day)		Dermal Equivalent Slope Factor 1/(mg/kg/day)		Inhalation Equivalent Unit Risk Factor $1/(\mu g/m^3)$	
Benzene	0.004	EPA-I	0.004	D2	0.28	TX08	***0.1***	***OEHHA***	***0.1***	***OEHHA***	***0.000029***	***OEHHA***
Toluene	***0.2***	***OEHHA***	***0.2***	***OEHHA***	5	EPA-I	-	-	-	-	-	-
Ethyl benzene	0.1	EPA-I	0.1	D2	1	EPA-I	***0.011***	***OEHHA***	***0.011***	***OEHHA***	***0.0000025***	***OEHHA***
Xylenes (mixed isomers)	0.2	EPA-I	0.2	D2	0.1	EPA-I	-	-	-	-	-	-
Methyl t-Butyl ether (MTBE)	0.01	OEHHA	0.01	D2	3	EPA-I	0.0018	OEHHA	0.0018	D2	0.00000026	OEHHA

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Job ID: E-355
Date Completed: 4-Nov-09
Completed By: ES

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Former Olympian Service Site Location: 1435 Webster Street, Alameda Completed By: ES Date Completed: 4-Nov-09

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS LEACHING TO GROUNDWATER:

INGESTION

	1) Source Medium	2) Steady-state Exposure Concentration Groundwater: POE Conc. (mg/L)		3) POE Concentration Limit Groundwater: POE Conc. (mg/L)		4) Time to Reach POE Conc. Limit Conc. limit reached? ("■" if yes) ; Time (yr)	
Constituents of Concern	Soil Conc. (mg/kg)	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *	5.0E+0	6.2E+0	1.5E-2	6.7E-4	8.6E+5	■ 6.5E+0	□ NA
Toluene *	6.9E+1	7.2E+1	1.7E-1	3.1E+0	2.8E+7	■ 1.1E+1	□ NA
Ethyl benzene *	5.7E+1	5.2E+1	1.2E-1	6.1E-3	1.0E+7	■ 1.3E+1	□ NA
Xylenes (mixed isomers)	2.9E+2	2.5E+2	5.9E-1	3.1E+0	1.9E+7	■ 1.5E+1	□ NA
Methyl t-Butyl ether (MTBE)	2.7E+1	4.5E+1	1.1E-1	3.7E-2	NC	■ 4.1E+0	□ NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT | **Tier 2 Domenico Groundwater Modeling Summary**

Site Name: Former Olympian Servi Site Location: 1435 Webster Street, Alameda Completed By: ES Date Completed: 4-Nov-09 *2 OF 2*

DOMENICO GROUNDWATER MODELING SUMMARY

OFF-SITE GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER:

INGESTION

	1) Source Medium	2) Steady-state Exposure Concentration Groundwater: POE Conc. (mg/L)		3) POE Concentration Limit Groundwater: POE Conc. (mg/L)		4) Time to Reach POE Conc. Limit Conc reaches limit? ("■" If yes) ; Time (yr)	
Constituents of Concern	Groundwater Conc. (mg/L)	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *	8.7E-1	8.7E-11	8.7E-11	6.7E-4	8.6E+5	☐ NA	☐ NA
Toluene *	4.0E-1	4.0E-11	4.0E-11	3.1E+0	2.8E+7	☐ NA	☐ NA
Ethyl benzene *	7.0E-1	7.0E-11	7.0E-11	6.1E-3	1.0E+7	☐ NA	☐ NA
Xylenes (mixed isomers)	3.0E+0	3.0E-10	3.0E-10	3.1E+0	1.9E+7	☐ NA	☐ NA
Methyl t-Butyl ether (MTBE)	1.2E+0	1.2E-10	1.2E-10	3.7E-2	NC	☐ NA	☐ NA

NOTE: POE = Point of exposure

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOILS (2.3 - 3 m):
VAPOR AND DUST INHALATION

	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
		On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)	On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)
Constituents of Concern	Soil Conc. (mg/kg)	Residential	Construction Worker	Residential	None	Residential	Construction Worker	Residential	None
Benzene *	5.0E+0	NA	6.1E+5	NA			8.1E-6		
Toluene *	6.9E+1	NA	6.1E+5	NA			1.1E-4		
Ethyl benzene *	5.7E+1	NA	6.1E+5	NA			9.3E-5		
Xylenes (mixed isomers)	2.9E+2	NA	6.1E+5	NA			4.7E-4		
Methyl t-Butyl ether (MTBE)	2.7E+1	NA	6.1E+5	NA			4.4E-5		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SOILS (2.3 - 3 m):

VAPOR AND DUST INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)	On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)
	Residential	Construction Worker	Residential	None	Residential	Construction Worker	Residential	None
Benzene *	4.1E-1	7.0E-3	4.1E-1			5.7E-8		
Toluene *	9.6E-1	4.9E-1	9.6E-1			5.5E-5		
Ethyl benzene *	4.1E-1	7.0E-3	4.1E-1			6.5E-7		
Xylenes (mixed isomers)	9.6E-1	4.9E-1	9.6E-1			2.3E-4		
Methyl t-Butyl ether (MTBE)	4.1E-1	7.0E-3	4.1E-1			3.1E-7		

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ **(Checked if Pathway is Complete)**

SUBSURFACE SOILS (2.3 - 3 m):

VAPOR INHALATION

Surface soil model selected.
Subsurface values not calculated

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Soil Conc. (mg/kg)	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None
Benzene *	5.0E+0						
Toluene *	6.9E+1						
Ethyl benzene *	5.7E+1						
Xylenes (mixed isomers)	2.9E+2						
Methyl t-Butyl ether (MTBE)	2.7E+1						

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (2.3 - 3 m):

VAPOR INHALATION (cont'd)

Surface soil model selected.
Subsurface values not calculated

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None
Benzene *						
Toluene *						
Ethyl benzene *						
Xylenes (mixed isomers)						
Methyl t-Butyl ether (MTBE)						

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None
Benzene *	8.7E-1	1.1E+5	1.1E+5		7.9E-6	7.9E-6	
Toluene *	4.0E-1	1.2E+5	1.2E+5		3.3E-6	3.3E-6	
Ethyl benzene *	7.0E-1	1.3E+5	1.3E+5		5.4E-6	5.4E-6	
Xylenes (mixed isomers)	3.0E+0	1.2E+5	1.2E+5		2.5E-5	2.5E-5	
Methyl t-Butyl ether (MTBE)	1.2E+0	1.8E+5	1.8E+5		6.4E-6	6.4E-6	

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None
Benzene *	4.1E-1	4.1E-1		3.2E-6	3.2E-6	
Toluene *	9.6E-1	9.6E-1		3.2E-6	3.2E-6	
Ethyl benzene *	4.1E-1	4.1E-1		2.2E-6	2.2E-6	
Xylenes (mixed isomers)	9.6E-1	9.6E-1		2.4E-5	2.4E-5	
Methyl t-Butyl ether (MTBE)	4.1E-1	4.1E-1		2.6E-6	2.6E-6	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

MAXIMUM PATHWAY EXPOSURE (mg/m^3)

Maximum average expsosure concentration from soil and groundwater routes.)

Constituents of Concern	On-site (0 m) Residential	On-site (0 m) Construction Worker	Off-site 1 (30 m) Residential	Off-site 2 (0 m) None
Benzene *	3.2E-6	5.7E-8	3.2E-6	
Toluene *	3.2E-6	5.5E-5	3.2E-6	
Ethyl benzene *	2.2E-6	6.5E-7	2.2E-6	
Xylenes (mixed isomers)	2.4E-5	2.3E-4	2.4E-5	
Methyl t-Butyl ether (MTBE)	2.6E-6	3.1E-7	2.6E-6	

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

CARCINOGENIC RISK

Constituents of Concern	(1) Is Carcinogenic	(2) Maximum Carcinogenic Exposure (mg/m^3)				(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000			
		On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)		On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)
		Residential	Construction Worker	Residential	None		Residential	Construction Worker	Residential	None
Benzene *	TRUE	3.2E-6	5.7E-8	3.2E-6	-	2.9E-5	9.4E-8	1.7E-9	9.4E-8	
Toluene *	FALSE	-	-	-	-	-				
Ethyl benzene *	TRUE	2.2E-6	6.5E-7	2.2E-6	-	2.5E-6	5.5E-9	1.6E-9	5.5E-9	
Xylenes (mixed isomers)	FALSE	-	-	-	-	-				
Methyl t-Butyl ether (MTBE)	TRUE	2.6E-6	3.1E-7	2.6E-6	-	2.6E-7	6.8E-10	8.0E-11	6.8E-10	
Total Pathway Carcinogenic Risk =							**1.0E-7**	**3.4E-9**	**1.0E-7**	

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

Completed By: ES
Date Completed: 4-Nov-09

Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Exposure (mg/m^3)				(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6)			
	On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)		On-site (0 m)		Off-site 1 (30 m)	Off-site 2 (0 m)
	Residential	Construction Worker	Residential	None		Residential	Construction Worker	Residential	None
Benzene *	7.6E-6	4.0E-6	7.6E-6		2.8E-1	2.7E-5	1.4E-5	2.7E-5	
Toluene *	3.2E-6	5.5E-5	3.2E-6		5.0E+0	6.4E-7	1.1E-5	6.4E-7	
Ethyl benzene *	5.2E-6	4.6E-5	5.2E-6		1.0E+0	5.2E-6	4.6E-5	5.2E-6	
Xylenes (mixed isomers)	2.4E-5	2.3E-4	2.4E-5		1.0E-1	2.4E-4	2.3E-3	2.4E-4	
Methyl t-Butyl ether (MTBE)	6.1E-6	2.2E-5	6.1E-6		3.0E+0	2.0E-6	7.2E-6	2.0E-6	
Total Pathway Hazard Index =						**2.7E-4**	**2.4E-3**	**2.7E-4**	

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

Completed By: ES
Date Completed: 4-Nov-09

Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOILS (2.3 - 3 m): VAPOR INTRUSION INTO BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (L/kg) Receptor On-site (0 m) Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) On-site (0 m) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) On-site (0 m) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) On-site (0 m) Residential
Benzene *	5.0E+0	2.2E+2	2.3E-2	4.1E-1	9.3E-3
Toluene *	6.9E+1	2.2E+2	3.1E-1	9.6E-1	3.0E-1
Ethyl benzene *	5.7E+1	2.2E+2	2.6E-1	4.1E-1	1.1E-1
Xylenes (mixed isomers)	2.9E+2	2.2E+2	1.3E+0	9.6E-1	1.2E+0
Methyl t-Butyl ether (MTBE)	2.7E+1	3.5E+2	7.8E-2	4.1E-1	3.2E-2

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)
Constituents of Concern	Groundwater Conc. (mg/L)	Residential	Residential	Residential	Residential	Residential	Residential
Benzene *	8.7E-1	3.9E+2	3.9E+12	3.9E+12	2.2E-3	2.2E-13	2.2E-13
Toluene *	4.0E-1	3.5E+2	3.5E+12	3.5E+12	1.1E-3	1.1E-13	1.1E-13
Ethyl benzene *	7.0E-1	3.6E+2	3.6E+12	3.6E+12	2.0E-3	2.0E-13	2.0E-13
Xylenes (mixed isomers)	3.0E+0	3.8E+2	3.8E+12	3.8E+12	8.0E-3	8.0E-13	8.0E-13
Methyl t-Butyl ether (MTBE)	1.2E+0	3.0E+3	3.0E+13	3.0E+13	3.9E-4	3.9E-14	3.9E-14

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential
Benzene *	4.1E-1	4.1E-1	4.1E-1	9.2E-4	9.2E-14	9.2E-14
Toluene *	9.6E-1	9.6E-1	9.6E-1	1.1E-3	1.1E-13	1.1E-13
Ethyl benzene *	4.1E-1	4.1E-1	4.1E-1	8.0E-4	8.0E-14	8.0E-14
Xylenes (mixed isomers)	9.6E-1	9.6E-1	9.6E-1	7.6E-3	7.6E-13	7.6E-13
Methyl t-Butyl ether (MTBE)	4.1E-1	4.1E-1	4.1E-1	1.6E-4	1.6E-14	1.6E-14

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOIL LEACHING TO GW- VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)
	Soil Conc. (mg/kg)	Residential	Residential	Residential	Residential	Residential	Residential
Benzene *	5.0E+0	2.5E+2	2.5E+12	2.5E+12	2.0E-2	2.0E-12	2.0E-12
Toluene *	6.9E+1	2.7E+2	2.7E+12	2.7E+12	2.5E-1	2.5E-11	2.5E-11
Ethyl benzene *	5.7E+1	3.2E+2	3.2E+12	3.2E+12	1.8E-1	1.8E-11	1.8E-11
Xylenes (mixed isomers)	2.9E+2	3.5E+2	3.5E+12	3.5E+12	8.1E-1	8.1E-11	8.1E-11
Methyl t-Butyl ether (MTBE)	2.7E+1	1.4E+3	1.4E+13	1.4E+13	1.9E-2	1.9E-12	1.9E-12

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

SOIL LEACHING TO GW- VAPOR INTRUSION INTO BUILDINGS

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential
Benzene *	4.1E-1	4.1E-1	4.1E-1	8.2E-3	8.2E-13	8.2E-13
Toluene *	9.6E-1	9.6E-1	9.6E-1	2.4E-1	2.4E-11	2.4E-11
Ethyl benzene *	4.1E-1	4.1E-1	4.1E-1	7.3E-2	7.3E-12	7.3E-12
Xylenes (mixed isomers)	9.6E-1	9.6E-1	9.6E-1	7.8E-1	7.8E-11	7.8E-11
Methyl t-Butyl ether (MTBE)	4.1E-1	4.1E-1	4.1E-1	7.7E-3	7.7E-13	7.7E-13

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

MAXIMUM PATHWAY EXPOSURE (mg/m^3)

(Maximum average exposure concentration from soil and groundwater routes.)

Constituents of Concern	On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential
Benzene *	9.3E-3	8.2E-13	8.2E-13
Toluene *	3.0E-1	2.4E-11	2.4E-11
Ethyl benzene *	1.1E-1	7.3E-12	7.3E-12
Xylenes (mixed isomers)	1.2E+0	7.8E-11	7.8E-11
Methyl t-Butyl ether (MTBE)	3.2E-2	7.7E-13	7.7E-13

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

CARCINOGENIC RISK

Constituents of Concern	(1) Carcinogenic Classification	(2) Maximum Carcinogenic Exposure (mg/m^3) On-site (0 m) Residential	(2) Off-site 1 (30 m) Residential	(2) Off-site 2 (300 m) Residential	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential
Benzene *	TRUE	9.3E-3	8.2E-13	8.2E-13	2.9E-5	2.7E-4	2.4E-14	2.4E-14
Toluene *	FALSE	-	-	-	-			
Ethyl benzene *	TRUE	1.1E-1	7.3E-12	7.3E-12	2.5E-6	2.6E-4	1.8E-14	1.8E-14
Xylenes (mixed isomers)	FALSE	-	-	-	-			
Methyl t-Butyl ether (MTBE)	TRUE	3.2E-2	7.7E-13	7.7E-13	2.6E-7	8.4E-6	2.0E-16	2.0E-16
Total Pathway Carcinogenic Risk =						**5.4E-4**	**4.2E-14**	**4.2E-14**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Exposure (mg/m^3) On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 m) Residential	Off-site 1 (30 m) Residential	Off-site 2 (300 m) Residential
Benzene *	2.2E-2	1.9E-12	1.9E-12	2.8E-1	7.7E-2	6.8E-12	6.8E-12
Toluene *	3.0E-1	2.4E-11	2.4E-11	5.0E+0	6.0E-2	4.8E-12	4.8E-12
Ethyl benzene *	2.5E-1	1.7E-11	1.7E-11	1.0E+0	2.5E-1	1.7E-11	1.7E-11
Xylenes (mixed isomers)	1.2E+0	7.8E-11	7.8E-11	1.0E-1	1.2E+1	7.8E-10	7.8E-10
Methyl t-Butyl ether (MTBE)	7.5E-2	1.8E-12	1.8E-12	3.0E+0	2.5E-2	6.0E-13	6.0E-13
Total Pathway Hazard Index =					**1.3E+1**	**8.1E-10**	**8.1E-10**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SOIL EXPOSURE PATHWAY ■ **(Checked if Pathway is Complete)**

SURFACE SOILS: ON SITE INGESTION, DERMAL EXPOSURE

	1) Source/Exposure Medium	2) Exposure Multiplier		3) Average Daily Intake Rate (mg/kg/day) (1) x (2)	
Constituents of Concern	Surface Soil Conc. (mg/kg)	Residential	Construction Worker	Residential	Construction Worker
Benzene *	5.0E+0	2.3E-6	1.0E-8	1.1E-5	5.0E-8
Toluene *	6.9E+1	1.3E-5	7.0E-7	8.8E-4	4.9E-5
Ethyl benzene *	5.7E+1	2.3E-6	1.0E-8	1.3E-4	5.7E-7
Xylenes (mixed isomers)	2.9E+2	1.3E-5	7.0E-7	3.7E-3	2.0E-4
Methyl t-Butyl ether (MTBE)	2.7E+1	2.3E-6	1.0E-8	6.1E-5	2.7E-7

NOTE: RAF = Relative absorption factor (-) AT = Averaging time (days) ED = Exposure duration (yrs) IR = Soil ingestion rate (mg/day)
M = Adherence factor (mg/cm^2) BW = Body weight (kg) EF = Exposure frequencey (days/yr) SA = Skin exposure area (cm^2/day)

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

TIER 2 PATHWAY RISK CALCULATION

SOIL EXPOSURE PATHWAY ■ **(Checked if Pathway is Complete)**

CARCINOGENIC RISK

Constituents of Concern	(1) Is Carcinogenic	(2) Total Carcinogenic Intake Rate (mg/kg/day)				(3) Slope Factor (mg/kg/day)^-1		(4) Individual COC Risk	
		(a) via Ingestion	(b) via Dermal Contact	(c) via Ingestion	(d) via Dermal Contact	(a) Oral	(b) Dermal	(2a)x(3a) + (2b)x(3b)	(2c)x(3a) + (2d)x(3b)
		Residential		Construction Worker				Residential	Construction Worker
Benzene *	TRUE	1.1E-5	0.0E+0	5.0E-8	0.0E+0	1.0E-1	1.0E-1	1.1E-6	5.0E-9
Toluene *	FALSE			Missing Sfo	Tox?	-	-		-
Ethyl benzene *	TRUE	1.3E-4	0.0E+0	5.7E-7	0.0E+0	1.1E-2	1.1E-2	1.4E-6	6.3E-9
Xylenes (mixed isomers)	FALSE			Missing Sfo	Tox?	-	-		-
Methyl t-Butyl ether (MTBE)	TRUE	6.1E-5	0.0E+0	2.7E-7	0.0E+0	1.8E-3	1.8E-3	1.1E-7	4.9E-10

* No dermal slope factor available--oral slope factor used.

Total Pathway Carcinogenic Risk = **2.7E-6** **1.2E-8**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

TIER 2 PATHWAY RISK CALCULATION

3 OF 3

SOIL EXPOSURE PATHWAY ■ **(Checked if Pathway is Complete)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Intake Rate (mg/kg/day)				(6) Reference Dose (mg/kg-day)		(7) Individual COC Hazard Quotient	
	(a) via Ingestion	(b) via Dermal Contact	(c) via Ingestion	(d) via Dermal Contact	(a) Oral	(b) Dermal	(5a)/(6a) + (5b)/(6b)	(5c)/(6a) + (5d)/(6b)
	Residential		Construction Worker				Residential	Construction Worker
Benzene *	6.4E-5	0.0E+0	3.5E-6	0.0E+0	4.0E-3	4.0E-3	1.6E-2	8.8E-4
Toluene *	8.8E-4	0.0E+0	4.9E-5	0.0E+0	2.0E-1	2.0E-1	4.4E-3	2.4E-4
Ethyl benzene *	7.3E-4	0.0E+0	4.0E-5	0.0E+0	1.0E-1	1.0E-1	7.3E-3	4.0E-4
Xylenes (mixed isomers)	3.7E-3	0.0E+0	2.0E-4	0.0E+0	2.0E-1	2.0E-1	1.8E-2	1.0E-3
Methyl t-Butyl ether (MTBE)	3.5E-4	0.0E+0	1.9E-5	0.0E+0	1.0E-2	1.0E-2	3.5E-2	1.9E-3

* No dermal reference dose available--oral reference dose used.

Total Pathway Hazard Index = **8.1E-2** **4.4E-3**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOILS (2.3 - 3 m): LEACHING TO GROUNDWATER INGESTION

	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Soil Conc. (mg/kg)	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *	5.0E+0		8.0E-1			6.2E+0	
Toluene *	6.9E+1		9.6E-1			7.2E+1	
Ethyl benzene *	5.7E+1		1.1E+0			5.2E+1	
Xylenes (mixed isomers)	2.9E+2		1.2E+0			2.5E+2	
Methyl t-Butyl ether (MTBE)	2.7E+1		6.0E-1			4.5E+1	

* = Chemical with user-specified data

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS (2.3 - 3 m): LEACHING TO GROUNDWATER INGESTION (cont'd)

	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)
Constituents of Concern	None	Residential	Surf. Water	None	Residential	Surf. Water
Benzene *		1.5E-2			9.3E-2	
Toluene *		6.4E-2			4.6E+0	
Ethyl benzene *		1.5E-2			7.7E-1	
Xylenes (mixed isomers)		6.4E-2			1.6E+1	
Methyl t-Butyl ether (MTBE)		1.5E-2			6.6E-1	

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Former Olympian Service Station Completed By: ES Job ID: E-355
Site Location: 1435 Webster Street, Alameda, California Date Completed: 4-Nov-09

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: INGESTION

	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *	8.7E-1		1.0E+10			8.7E-11	
Toluene *	4.0E-1		1.0E+10			4.0E-11	
Ethyl benzene *	7.0E-1		1.0E+10			7.0E-11	
Xylenes (mixed isomers)	3.0E+0		1.0E+10			3.0E-10	
Methyl t-Butyl ether (MTBE)	1.2E+0		1.0E+10			1.2E-10	

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)
Constituents of Concern	None	Residential	Surf. Water	None	Residential	Surf. Water
Benzene *		1.5E-2			1.3E-12	
Toluene *		6.4E-2			2.6E-12	
Ethyl benzene *		1.5E-2			1.0E-12	
Xylenes (mixed isomers)		6.4E-2			1.9E-11	
Methyl t-Butyl ether (MTBE)		1.5E-2			1.7E-12	

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Former Olympian Service Station Completed By: ES Job ID: E-355
Site Location: 1435 Webster Street, Alameda, California Date Completed: 4-Nov-09

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)

(Maximum intake of active pathways soil leaching & groundwater routes.)

Constituents of Concern	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *		9.3E-2	
Toluene *		4.6E+0	
Ethyl benzene *		7.7E-1	
Xylenes (mixed isomers)		1.6E+1	
Methyl t-Butyl ether (MTBE)		6.6E-1	

* = Chemical with user-specified data

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

CARCINOGENIC RISK

Constituents of Concern	(1) Is Carcinogenic	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		
		On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water		On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *	TRUE		9.3E-2		1.0E-1		9.3E-3	
Toluene *	FALSE				-			
Ethyl benzene *	TRUE		7.7E-1		1.1E-2		8.4E-3	
Xylenes (mixed isomers)	FALSE				-			
Methyl t-Butyl ether (MTBE)	TRUE		6.6E-1		1.8E-3		1.2E-3	
Total Pathway Carcinogenic Risk =							**1.9E-2**	

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water		On-site (0 m) None	Off-site 1 (30 m) Residential	Off-site 2 (450 m) Surf. Water
Benzene *		4.0E-1		4.0E-3		1.0E+2	
Toluene *		4.6E+0		2.0E-1		2.3E+1	
Ethyl benzene *		3.3E+0		1.0E-1		3.3E+1	
Xylenes (mixed isomers)		1.6E+1		2.0E-1		8.0E+1	
Methyl t-Butyl ether (MTBE)		2.9E+0		1.0E-2		2.9E+2	
Total Pathway Hazard Index =						**5.2E+2**	

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOILS (2.3 - 3 m): LEACHING TO GW/ DISCHARGE TO SURFACE WATER / DERMAL CONTACT & INGESTION VIA SWIMMING

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (L/kg) Receptor Off-site 2 (450 m) Surface Water	3) Exposure Medium Surface Water: POE Conc. (mg/L) (1)/(2) Off-site 2 (450 m) Surface Water
Benzene *	5.0E+0	1.3E+8	4.0E-8
Toluene *	6.9E+1	1.5E+8	4.6E-7
Ethyl benzene *	5.7E+1	1.7E+8	3.3E-7
Xylenes (mixed isomers)	2.9E+2	1.8E+8	1.6E-6
Methyl t-Butyl ether (MTBE)	2.7E+1	9.5E+7	2.8E-7

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS

SOILS (2.3 - 3 m): LEACHING TO GW/ DISCHARGE TO SURFACE WATER / DERMAL CONTACT & INGESTION VIA SWIMMING (cont'd)

Constituents of Concern	4) Exposure Multiplier [(IRxET+SAxZ)xEVxED]/(BWxAT) (L/kg/day) Off-site 2 (450 m) Surface Water	5) Average Daily Intake Rate (mg/kg/day) (3) x (4) Off-site 2 (450 m) Surface Water
Benzene *	1.8E-4	7.1E-12
Toluene *	1.1E-3	5.0E-10
Ethyl benzene *	1.8E-4	5.8E-11
Xylenes (mixed isomers)	1.1E-3	1.7E-9
Methyl t-Butyl ether (MTBE)	1.8E-4	5.1E-11

Site Name: Former Olympian Service Station Completed By: ES Job ID: E-355
Site Location: 1435 Webster Street, Alameda, Califo Date Completed: 4-Nov-09

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

SOILS (2.3 - 3 m): LEACHING TO GW/ DISCHARGE TO SURFACE WATER/ FISH CONSUMPTION

Exposure Concentration

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (L/kg) Receptor Off-site 2 (450 m) Surface Water	3) Exposure Medium Surface Water: POE Conc. (mg/L) (1)/(2) Off-site 2 (450 m) Surface Water
Benzene *	5.0E+0	1.3E+8	4.0E-8
Toluene *	6.9E+1	1.5E+8	4.6E-7
Ethyl benzene *	5.7E+1	1.7E+8	3.3E-7
Xylenes (mixed isomers)	2.9E+2	1.8E+8	1.6E-6
Methyl t-Butyl ether (MTBE)	2.7E+1	9.5E+7	2.8E-7

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS

SOILS (2.3 - 3 m): LEACHING TO GW/ DISCHARGE TO SURFACE WATER/ FISH CONSUMPTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxFIxBCFxED)/(BWxAT) (L/kg/day) Off-site 2 (450 m) Surface Water	5) Average Daily Intake Rate (mg/kg/day) (3) x (4) Off-site 2 (450 m) Surface Water
Benzene *	1.1E-5	4.5E-13
Toluene *	3.2E-4	1.5E-10
Ethyl benzene *	1.1E-4	3.5E-11
Xylenes (mixed isomers)	5.9E-4	9.4E-10
Methyl t-Butyl ether (MTBE)	6.4E-6	1.8E-12

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: DISCHARGE TO SURFACE WATER / DERMAL CONTACT & INGESTION VIA SWIMMING

Constituents of Concern	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (unitless) Receptor Off-site 2 (450 m) Surface Water	3) Exposure Medium Surface Water: POE Conc. (mg/L) (1)/(2) Off-site 2 (450 m) Surface Water
Benzene *	8.7E-1	3.7E+15	2.4E-16
Toluene *	4.0E-1	3.7E+15	1.1E-16
Ethyl benzene *	7.0E-1	3.7E+15	1.9E-16
Xylenes (mixed isomers)	3.0E+0	3.7E+15	8.2E-16
Methyl t-Butyl ether (MTBE)	1.2E+0	3.7E+15	3.1E-16

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS

GROUNDWATER: DISCHARGE TO SURFACE WATER / DERMAL CONTACT & INGESTION VIA SWIMMING (cont'd)

Constituents of Concern	4) Exposure Multiplier [(IRxET+SAxZ)xEVxED]/(BWxAT) (L/kg/day) Off-site 2 (450 m) Surface Water	5) Average Daily Intake Rate (mg/kg/day) (3) x (4) Off-site 2 (450 m) Surface Water
Benzene *	4.1E-4	9.7E-20
Toluene *	2.3E-3	2.5E-19
Ethyl benzene *	1.0E-3	1.9E-19
Xylenes (mixed isomers)	3.3E-3	2.7E-18
Methyl t-Butyl ether (MTBE)	1.8E-4	5.6E-20

Site Name: Former Olympian Service Station Completed By: ES Job ID: E-355
Site Location: 1435 Webster Street, Alameda, Ca Date Completed: 4-Nov-09

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: DISCHARGE TO SURFACE WATER / FISH CONSUMPTION

Constituents of Concern	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (unitless) Receptor Off-site 2 (450 m) Surface Water	3) Exposure Medium Surface Water: POE Conc. (mg/L) (1)/(2) Off-site 2 (450 m) Surface Water
Benzene *	8.7E-1	3.7E+15	2.4E-16
Toluene *	4.0E-1	3.7E+15	1.1E-16
Ethyl benzene *	7.0E-1	3.7E+15	1.9E-16
Xylenes (mixed isomers)	3.0E+0	3.7E+15	8.2E-16
Methyl t-Butyl ether (MTBE)	1.2E+0	3.7E+15	3.1E-16

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SURFACE WATER EXPOSURE PATHWAYS

GROUNDWATER: DISCHARGE TO SURFACE WATER / FISH CONSUMPTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxFIxBCFxED)/(BWxAT) (L/kg/day) Off-site 2 (450 m) Surface Water	5) Average Daily Intake Rate (mg/kg/day) (3) x (4) Off-site 2 (450 m) Surface Water	MAXIMUM PATHWAY INTAKE (mg/kg/day) *(Maximum intake of active pathways soil leaching & groundwater routes.)* Off-site 2 (450 m) Surface Water
Benzene *	1.1E-5	2.7E-21	7.5E-12
Toluene *	3.2E-4	3.5E-20	6.4E-10
Ethyl benzene *	1.1E-4	2.0E-20	9.4E-11
Xylenes (mixed isomers)	5.9E-4	4.9E-19	2.7E-9
Methyl t-Butyl ether (MTBE)	6.4E-6	2.0E-21	5.2E-11

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

Completed By: ES
Date Completed: 4-Nov-09

Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

CARCINOGENIC RISK

Constituents of Concern	(1) Is Carcinogenic?	(2) Maximum Carcinogenic Intake Rate (mg/kg/day) (a) via Ingestion — Off-site 2 (450 m) Surface Water	(2) Maximum Carcinogenic Intake Rate (mg/kg/day) (b) via Dermal Contact — Off-site 2 (450 m) Surface Water	(3) Slope Factor (mg/kg/day)^-1 (a) Oral	(3) Slope Factor (mg/kg/day)^-1 (b) Dermal	(4) Individual COC Risk (2a)x(3a) + (2b)x(3b) Off-site 2 (450 m) Surface Water
Benzene *	TRUE	7.5E-12	9.2E-12	1.0E-1	1.0E-1	1.7E-12
Toluene *	FALSE			-	-	
Ethyl benzene *	TRUE	9.4E-11	2.8E-10	1.1E-2	1.1E-2	4.1E-12
Xylenes (mixed isomers)	FALSE			-	-	
Methyl t-Butyl ether (MTBE)	TRUE	5.2E-11	NC	1.8E-3	1.8E-3	NC

* No dermal slope factor available--oral slope factor used.

Total Pathway Carcinogenic Risk = **5.7E-12**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

SURFACE WATER EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

	TOXIC EFFECTS				
	(5) Maximum Toxicant Intake Rate (mg/kg/day)		(6) Reference Dose (mg/kg/day)		(7) Individual COC Hazard Quotient (5a)/(6a) + (5b)/(6b)
	(a) via Ingestion	(b) via Dermal Contact	(a) Oral	(b) Dermal	
Constituents of Concern	Off-site 2 (450 m) Surface Water				Off-site 2 (450 m) Surface Water
Benzene *	4.6E-11	2.2E-11	4.0E-3	4.0E-3	1.7E-8
Toluene *	6.4E-10	5.6E-10	2.0E-1	2.0E-1	6.0E-9
Ethyl benzene *	5.4E-10	6.7E-10	1.0E-1	1.0E-1	1.2E-8
Xylenes (mixed isomers)	2.7E-9	3.5E-9	2.0E-1	2.0E-1	3.1E-8
Methyl t-Butyl ether (MTBE)	3.2E-10	NC	1.0E-2	1.0E-2	NC

* No dermal reference dose available--oral reference dose used.

Total Pathway Hazard Index = **6.6E-8**

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES

Date Completed: 4-Nov-09
Job ID: E-355

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

Site Name: Former Olympian Service Station
Site Location: 1435 Webster Street, Alameda, California
Completed By: ES
Date Completed: 4-Nov-09

BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk	Hazard Quotient		Hazard Index		Toxicity
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk	Limit(s) Exceeded?	Maximum Value	Applicable Limit	Total Value	Applicable Limit	Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
■	9.4E-8	1.0E-6	1.0E-7	1.0E-6	☐	2.3E-3	1.0E+0	2.4E-3	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
■	2.7E-4	1.0E-6	5.4E-4	1.0E-6	■	1.2E+1	1.0E+0	1.3E+1	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
■	1.4E-6	1.0E-6	2.7E-6	1.0E-6	■	3.5E-2	1.0E+0	8.1E-2	1.0E+0	☐
GROUNDWATER EXPOSURE PATHWAYS										
■	9.3E-3	1.0E-6	1.9E-2	1.0E-6	■	2.9E+2	1.0E+0	5.2E+2	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
■	4.1E-12	1.0E-6	5.7E-12	1.0E-6	☐	3.1E-8	1.0E+0	6.6E-8	1.0E+0	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	9.3E-3	***1.0E-6***	***1.9E-2***	***1.0E-6***	■	***2.9E+2***	***1.0E+0***	***5.2E+2***	***1.0E+0***	■
	Groundwater		***Groundwater***			***Groundwater***		***Groundwater***		

RBCA SITE ASSESSMENT

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

Completed By: ES
Date Completed: 4-Nov-09

Job ID: E-355

SUBSURFACE SOIL (2.3 - 3 m) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Elec. Acceptor Super. (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

			■ Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			■ Soil Leaching to Groundwater/ Groundwater Volatilization to Indoor Air			■ Soil Vol. to Indoor Air	■ Soil Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
CONSTITUENTS OF CONCERN		**Representative Concentration**	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)	On-site (0 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/kg)	None	Residential	Surf. Water	Residential	Residential	Residential	Residential	Residential	Residential	None	(mg/kg)	"■" if yes	
71-43-2	Benzene *	5.0E+0		6.1E-1	>2.8E+2	2.1E-2	3.1E+0	3.9E-1	1.9E-2	>2.8E+2	>2.8E+2		1.9E-2	■	2.7E+2
108-88-3	Toluene *	6.9E+1		3.3E+0	>1.0E+2	>1.0E+2	>1.0E+2	>1.0E+2	>1.0E+2	>1.0E+2	>1.0E+2		3.3E+0	■	2.1E+1
100-41-4	Ethyl benzene *	5.7E+1		6.8E-1	>3.7E+1	3.1E-1	>3.7E+1	5.7E+0	2.2E-1	>3.7E+1	>3.7E+1		2.2E-1	■	2.6E+2
1330-20-7	Xylenes (mixed isomers)	2.9E+2		6.6E+0	>4.5E+1	3.7E+1	>4.5E+1	>4.5E+1	2.3E+1	>4.5E+1	>4.5E+1		6.6E+0	■	4.4E+1
1634-04-4	Methyl t-Butyl ether (MTBE)	2.7E+1		6.3E-1	NC	1.4E+1	2.7E+2	error	3.2E+0	>5.7E+3	>5.7E+3		6.3E-1	■	4.3E+1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

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

Completed By: ES
Date Completed: 4-Nov-09

Job ID: E-355

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Elec. Acceptor Super. (One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	■ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			■ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (450 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (300 m)	On-site (0 m)	Off-site 1 (30 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	Residential	Surf. Water	Residential	Residential	Residential	Residential	Residential	None	(mg/L)	"■" if yes	
71-43-2	Benzene *	8.7E-1		9.4E-1	>1.8E+3	3.3E-2	4.8E+0	6.0E-1	9.3E+0	9.3E+0		3.3E-2	■	2.7E+1
108-88-3	Toluene *	4.0E-1		4.3E+0	>5.3E+2	>5.3E+2	>5.3E+2	>5.3E+2	>5.3E+2	>5.3E+2		4.3E+0	□	<1
100-41-4	Ethyl benzene *	7.0E-1		7.6E-1	>1.7E+2	3.5E-1	4.7E+1	6.4E+0	1.3E+2	1.3E+2		3.5E-1	■	2.0E+0
1330-20-7	Xylenes (mixed isomers)	3.0E+0		7.1E+0	>2.0E+2	4.0E+1	9.8E+1	>2.0E+2	>2.0E+2	>2.0E+2		7.1E+0	□	<1
1634-04-4	Methyl t-Butyl ether (MTBE)	1.2E+0		1.3E+0	NC	2.8E+1	5.5E+2	Error	1.7E+3	1.7E+3		1.3E+0	□	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

ATTACHMENT B

GEOTRACKER SUBMISSION CONFIRMATIONS

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER ESI

UPLOADING A GEO_REPORT FILE

SUCCESS

Your GEO_REPORT file has been successfully submitted!

Submittal Type:	**GEO_REPORT**
Report Title:	**Updated Site Conceptual Model, Health Risk Assessment, Feasibility Study, and Corrective Action Plan**
Report Type:	**Corrective Action Plan / Remedial Action Plan**
Report Date:	**2/23/2010**
Facility Global ID:	**T0600100766**
Facility Name:	**OLYMPIAN #112**
File Name:	**2010.01 SCM, HRA, FS, CAP 1435 Webster E-355 FINAL.pdf**
Username:	**TEC Accutite**
Username:	**TEC-OLYMPIAN**
IP Address:	**67.126.45.211**
Submittal Date/Time:	**2/23/2010 3:42:23 PM**
Confirmation Number:	**1241906285**