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Supplemental Investigation and Risk Assessment Report

San Francisco Electric Reliability Project (SFERP 04-AFC-1)
25th and Maryland Street
San Francisco, California

Submitted by:

City and County of San Francisco

August 2006

Project No. 12415.000



Geomatrix



August 30, 2006
Project 12415.000

Ms. Nancy L. Katyl, R.G.
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Subject: Submittal of Supplemental Investigation and Risk Assessment Report
San Francisco Electric Reliability Project (SFERP)
San Francisco, California

Dear Ms. Katyl:

On behalf of the City and County of San Francisco and the San Francisco Public Utilities Commission, Geomatrix Consultants, Inc., (Geomatrix), is enclosing two copies of the above-mentioned report and two compact disks (CD) each containing an electronic copy of the report. The report summarizes the June 2006 environmental investigation and presents the results of the health risk assessment.

Please call either of the undersigned if you have any questions or require additional information.

Sincerely yours,
GEOMATRIX CONSULTANTS, INC.

A handwritten signature in black ink that reads "Robert H. Cheung".

Robert H. Cheung
Senior Toxicologist

A handwritten signature in black ink that reads "Susan M. Gallardo".

Susan M. Gallardo, PE
Principal Engineer

RHC/SMG/cw
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Supplemental Investigation and Risk Assessment Report

San Francisco Electric Reliability Project (SFERP 04-AFC-1)
25th and Maryland Street
San Francisco, California

Submitted by:

City and County of San Francisco

Prepared by:

Geomatrix Consultants, Inc.
2101 Webster Street, 12th Floor
Oakland, California 94612

August 2006

Project No. 12415.000



Geomatrix

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**SUPPLEMENTAL INVESTIGATION AND
RISK ASSESSMENT REPORT**
San Francisco Electric Reliability Project (SFERP)
25th and Maryland Streets
San Francisco, California

EXECUTIVE SUMMARY

The City and County of San Francisco (City) is proposing to construct and operate a simple-cycle peaking power plant, referred to as the San Francisco Electric Reliability Project (SFERP), on an approximately 4-acre site (the Site) on City-owned land, located near the San Francisco Bay (the Bay) in the Potrero District of San Francisco, California. The Site is a reclaimed area with fill of unknown origin and formerly was used for industrial purposes. As such, the potential that chemicals present in subsurface soil, soil vapor, or groundwater underlying the Site could pose a risk to human health or the environment during or following construction of the proposed power plant was considered. Therefore, the City retained Geomatrix Consultants, Inc. (Geomatrix), to conduct a supplemental investigation and health risk assessment (HRA) of the Site to address these concerns.

This document presents the results of the HRA for both human and ecological receptors from possible exposure to chemicals in soil, shallow groundwater, and soil vapor for the SFERP, which is located at 25th and Maryland Streets in San Francisco. The human health risk assessment (HHRA) and the screening-level ecological risk assessment (ERA) are based on data collected during investigations conducted at the Site since 2000 and the supplemental investigation conducted in July 2006, which also is reported herein.

The purpose of the HRA is to evaluate whether chemicals detected at the Site warrant further consideration in terms of mitigating potential threats to human health and the environment through active remedial and/or risk management measures. The HRA was prepared in accordance with the U.S. Environmental Protection Agency (U.S. EPA) and the California Environmental Protection Agency (Cal-EPA) guidelines.

The California Regional Water Quality Control Board, San Francisco Bay (Water Board) has been designated by the Cal-EPA Site Designation Committee as the “administering agency” for the Site and neighboring properties to supervise environmental investigations and remedial actions, and, upon determining that the site investigation and remedial actions have been

satisfactorily completed, to issue a certification of completion. In the process of the licensing proceedings before the California Energy Commission (CEC), the City and CEC staff have agreed on proposed conditions of certification, acceptable to the Water Board, that provide for an assessment to evaluate the potential for adverse human health and ecological effects that may result from exposure to constituents detected in soil, soil vapor, and groundwater if no remedial actions were to take place. The proposed conditions of certification additionally require development of remedial action and/or risk management measures to reduce any significant human health or ecological risks identified to less than significant. In addition, because the Site is located bayward of the 1851 high tide line, the provisions of Article 22A, San Francisco Health and Safety Code, apply.

In general, the HRA conservatively quantifies possible health impacts to future human populations and ecological receptors associated with exposure to site-related chemicals. The results of the HHRA are compared to U.S. EPA and Cal-EPA's acceptable risk levels, as well as to the levels prescribed in the proposed conditions of certification agreed to by the City, the CEC, and the Water Board. Specifically, the risk to off-site receptors shall not exceed 1×10^{-6} and the hazard index shall not exceed 1.0, and the risk to construction/utility and industrial workers shall not exceed 1×10^{-5} and a hazard index of 1.0. If estimated health impacts exceed these regulatory threshold levels of concern, remediation of some or all site-related chemicals and/or implementation of risk management procedures may be necessary.

Evaluation of the potential health risk at the Site involved a four-step process; selection of chemicals of concern, exposure assessment, toxicity assessment, and risk characterization, as described below:

Data Evaluation and Selection of Chemicals of Potential Concern – In this step, chemical concentration data were summarized and evaluated to identify chemicals of potential concern (COPCs) for quantitative analysis in the HHRA. All analytical data collected since 2000, when the previous health risk assessment was performed, were considered, because these data represent current environmental conditions at the Site. Chemicals detected in at least one sample were identified as COPCs. Background concentrations of metals were not used to distinguish site-related constituents from naturally occurring constituents in the identification of COPCs. Consequently, some chemicals selected as COPCs in soil and groundwater may actually be naturally occurring.

Exposure Assessment – This step involved the identification of possible exposed populations and quantitative estimates of the magnitude, frequency, and duration of exposure. The Site is

located in a predominantly industrial area of southeast San Francisco. The City, through the San Francisco Public Utilities Commission (SFPUC), submitted an Application for Certification (AFC) to the CEC to construct and operate a power plant on the Site. Potential future receptors considered in this HHRA include construction workers involved in construction-related activities, off-site residents during construction, and future industrial workers.

Design plans for the power plant were reviewed to identify areas and media at the Site that may be accessed during construction and present a possible risk to receptors. Based on the design plans, soil in the upper 7 to 8 feet across the Site could be accessed during installation of utilities and reworking of the soil to meet specific geotechnical requirements. Therefore, analytical data for soil samples collected to a depth of 10 feet below ground surface were included in the evaluation, as well as soil vapor and groundwater data for samples collected across the Site.

The following exposure pathways for each receptor were quantitatively evaluated:

- Construction Worker¹ – (a) incidental ingestion and dermal contact with soil; (b) inhalation of particulates or volatile organic compounds (VOCs) in ambient air; (c) inhalation of VOCs in a trench from soil vapor and shallow groundwater; and (d) dermal contact with shallow groundwater.
- Off-Site Resident – inhalation of particulates or VOCs in ambient air during construction-related activities.
- Future Industrial Worker – inhalation of VOCs in indoor air volatilized from soil vapor.

Potential impacts on off-site residents were assessed but not quantitatively evaluated. Potential exposures to chemicals present in subsurface soil, soil vapor, or groundwater underlying the Site to off-site residents following the completion of construction activities are incomplete because the Site will be covered by buildings, an electrical switchyard, gas-fired turbine generators and associated infrastructure and equipment, and paved hardscape (e.g., asphalt concrete parking). Off-site workers were not specifically evaluated in this assessment because

¹ The health hazard evaluation for construction workers focused on hazards associated with possible exposure to chemicals and did not address possible physical hazards associated with construction. Chemical hazards identified include exposure to chemicals detected in soil, groundwater, and soil vapor as a result of subsurface intrusive construction-related activities.

potential exposures and health risks to residents are generally greater than to workers because of longer exposure frequencies and exposure durations.

The overall approach of the HRA is consistent with the Reasonable Maximum Exposure (RME) approach as defined by U.S. EPA (1989). The RME approach is defined as the “highest exposure that is reasonably expected to occur at the site.” Exposure point concentrations for COPCs in soil were estimated based on the 95 percent upper confidence limit (UCL) on the arithmetic mean of the analytical data (top 10 feet of soil) or the maximum concentration, whichever was lower. Volatile COPCs potentially migrating from the subsurface to indoor or ambient air were evaluated based on a series of U.S. EPA emission models, including the Johnson and Ettinger spreadsheet model (J&E model) issued by U.S. EPA and modified by Cal-EPA Department of Toxic Substances Control (DTSC) for vapor intrusion. Geomatrix obtained measurements of physical properties of the soil at the Site for application as input parameters for emissions modeling.

Toxicity Assessment – In this step, information was collected to assess the potential for a particular chemical to cause adverse health effects in exposed individuals, including cancer and noncancer health effects. Cal-EPA- or U.S. EPA-approved toxicity criteria were used in the assessment.

Risk Characterization – This last step described the likelihood and degree of chemical exposure and the possible adverse health effects associated with such exposure. The quantitative analysis was performed in this step. Cancer risks and noncancer hazard indices (HIs) were calculated according to regulatory guidance for each receptor. Because of the number of assumptions required during the risk assessment process, some degree of uncertainty is inevitably associated with the risk and hazard estimates. A summary of these uncertainties is presented in the HRA.

For the construction worker, both the HI (3) and the theoretical excess lifetime cancer risk estimate (2×10^{-4}) are above the target levels. Dermal contact and incidental ingestion of primarily polynuclear aromatic hydrocarbons (PAHs) in soil, and to a lesser degree arsenic, are the primary exposure pathways and chemicals contributing to the hazard index and risk.

The estimated 99th percentile blood lead levels are below the level of concern established in California’s Lead in Construction standard (30 micrograms per deciliter [$\mu\text{g}/\text{dl}$]) for construction workers, indicating that exposure to lead in soil should not pose an unacceptable health risk. For potential acute and sub-chronic construction/excavation worker exposures,

health risk management criteria applied by the Occupational Safety and Health Administration (OSHA) and Cal/OSHA are applicable. None of the exposure point concentration estimates developed to represent short-term or intermediate-term maximum exposures during construction activity exceeded their respective toxicity threshold limits (acute reference exposure levels [RELS] or permissible exposure limits [PELs]).

For the off-site residential receptor, the HI (0.02) and the lifetime excess carcinogenic risk estimate (1×10^{-6}) are below the target hazard index of 1 and at the 1×10^{-6} *de minimis* risk level, respectively.

For the future industrial worker, the HI (0.02) and the lifetime excess carcinogenic risk estimate (4×10^{-6}) based on the subsurface vapor intrusion pathway are below the target hazard index of 1.0 and the target risk level of 1×10^{-5} , respectively.

Screening-Level Ecological Risk Assessment – A screening-level ERA was performed to evaluate whether constituents suspected to be derived from the Site pose a potential risk to plants, animals, and ecologically valuable habitats in the vicinity of the property.

Representative concentrations in groundwater were compared to applicable ecological environmental screening levels (ESLs) developed by the Water Board.

Several chemicals in groundwater were detected in discrete borings in the interior of the site; however, analytical results of samples collected from borings bordering the eastern perimeter of the Site along the downgradient edge were judged to be representative of groundwater potentially migrating from the Site into the Bay. In addition, only results following filtration and silica gel preparation were judged to be representative of dissolved organic constituents, and only analytical results following filtration were judged to be representative of dissolved metals.

Based on this subset of data, the results indicate that copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene exceed applicable objectives and criteria. However, the aquatic screening criteria used in this analysis are conservative and do not take into account dilution and/or attenuation of groundwater upon discharge to surface water. The detected concentrations of dissolved copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene in groundwater prior to entering the Bay would be reduced 10-fold or greater due to factors such as adsorption of dissolved constituents to soil and dilution effects from tidal influence. Based on an attenuation factor of 10 that has been used at other bayfront sites (e.g., Mission Bay, San Francisco International Airport, and East Bay Regional Shoreline Park), the predicted

concentrations for copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene in groundwater are below applicable screening criteria. Furthermore, the results from off-site downgradient borings SB-54 and SB-55 suggest that chemicals are not migrating from the Site to the Bay at concentrations of ecological concern.

Therefore, compounds detected in groundwater are not considered to represent a significant risk to aquatic organisms. No further investigations or remedial action are recommended.

As in any risk assessment, the estimates of risk have many associated uncertainties. The procedures used in the HRA result in conditional estimates of risk that incorporate assumptions concerning chemical toxicity and human exposure and unavoidable uncertainties. These elements may result in the underestimation or overestimation of risks and hazards. To be health protective, the types of assumptions used in the HRA were conservative. To the extent possible, site-specific factors were incorporated into the HRA. As a result of these inherent uncertainties, the risk assessment should not be construed as presenting absolute risks or hazards. Rather, it is a conservative analysis intended to indicate the potential for adverse health impacts to occur based on a reasonable maximum exposure.

**SUPPLEMENTAL INVESTIGATION AND
RISK ASSESSMENT REPORT**
San Francisco Electric Reliability Project (SFERP)
25th and Maryland Streets
San Francisco, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix), has prepared this report on behalf of the San Francisco Public Utilities Commission (SFPUC) to supplement investigation activities and results and set forth the results of a human health risk assessment (HHRA) and a screening-level ecological risk assessment (ERA) for the San Francisco Electric Reliability Project Site (the Site), which is located at 25th and Maryland Streets in San Francisco, California (Figure 1).

This report: (1) summarizes historical analytical data, (2) describes supplemental sample collection activities, (3) presents recent sample collection results, (4) presents the results of the site-specific HHRA, and (5) presents the results of the site-specific ERA.

1.1 PURPOSE

The City and County of San Francisco (the City), through the SFPUC, submitted an Application for Certification (AFC) to the California Energy Commission (CEC) to construct and operate a proposed natural gas-fired power plant at the Site (the San Francisco Electric Reliability Project [SFERP]). The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board) has been designated by the California Environmental Protection Agency (Cal-EPA) Site Designation Committee as the “administering agency” for the Site and neighboring properties to supervise the site investigations and remedial actions, and, upon determining that the site investigation and remedial actions have been satisfactorily completed, to issue a certification of completion. In the process of the licensing proceedings before the CEC, the City and CEC staff have agreed on proposed conditions of certification, acceptable to the Water Board, that provide for an assessment to evaluate the potential for adverse human health and ecological effects that may result from exposure to constituents detected in soil and groundwater if no remedial actions were to take place. The proposed conditions of certification additionally require development of remedial action and/or risk management measures to reduce any significant human health or ecological risks identified to less than significant. In addition, because the Site is located bayward of the 1851 high tide line, the provisions of Article 22A, San Francisco Health and Safety Code, apply.

The supplemental investigation activities and results, HHRA and ERA presented herein, are a step in complying with the proposed conditions of certifications.

In addition, field activities described in this report were conducted to address the requirements of the Water Board, as stated in its June 22, 2006 letter to the SFPUC. The supplemental investigation was performed in accordance with the June 21, 2006 Supplemental Investigation Work Plan (Work Plan; Geomatrix, 2006).

2.0 BACKGROUND

Information regarding Site history and previous environmental investigations conducted at and in the vicinity of the Site is presented in this section. Soil, groundwater, and soil vapor conditions based on the results of these investigative activities also are discussed.

2.1 SITE DESCRIPTION AND OPERATIONAL HISTORY

The Site consists of approximately 4 acres of land located at 25th and Maryland Streets in a reclaimed area in the Potrero Hill District of San Francisco, California (Figure 1). The Site is located near the San Francisco Bay (the Bay) in an area reclaimed from the Islais Creek Estuary. The Site is zoned for industrial use and the surrounding land use is industrial. The Site is located directly east of the San Francisco Municipal Railway (MUNI) Metro East Light Rail Vehicle Maintenance and Operations Facility (the MUNI property, currently under construction), and directly west of a parcel of land that borders the San Francisco Bay (the Port parcel) (Figure 2). The shoreline of the Bay is located within approximately 160 feet northeast of the northern Site boundary and 500 feet from the eastern boundary.

A portion of the Site formerly was operated as a switchyard by Western Pacific Railroad (WPRR) for rail cars brought across the bay on a ferry from Oakland. The former WPRR switchyard includes the Site, the adjacent Port parcel to the east and the MUNI property to the west (Figure 2). Major railroad maintenance was not performed at the Site; however, a railroad engine house and a repair track building were present on site (AGS, 2000). Most of the rail cars at the Site contained dry goods. Refueling operations for the train engines reportedly occurred at the adjacent, Port parcel. No major spills from tank cars used at the Site were known to have occurred (Dames & Moore, 1987). Railroad operations at the Site were reduced considerably in about 1975. No major operations have been conducted at the Site since the late 1970s. The Site predominantly has been vacant or used for warehousing since most of the tracks and ties were removed in 1985 and 1986.

Currently, a concrete batch plant is located on the northern portion of the Site; the plant includes trailers, heavy equipment and infrastructure, large (approximately 30-foot-high) piles of concrete tailings, and concrete-block-delineated stockpile areas. The batch plant ceased active operations in February 2006; in July 2005, the City Attorney sued the cement batch plant owner, alleging that the company has polluted the existing Site, adjacent properties, and the San Francisco Bay. The central portion of the Site currently is used as a construction equipment laydown area in support of the MUNI construction project, and the southern portion of the Site is used for construction trailers, parking, and equipment laydown.

2.2 GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

The Site is a reclaimed area of the Bay underlain by fill, the majority of which was placed at the Site between 1930 and 1955. The source of the fill material is unknown. Similar to adjacent and other nearby properties, the fill is composed of a mixture of crushed serpentinite bedrock, building debris (concrete, bricks, rubble, and rocks), sand, silty sand, and silt typical of fill material along the Bay.

Water levels measured in former wells located at the Site indicated depth to groundwater between approximately 5 and 12 feet below ground surface (bgs) (Dames & Moore, 1987). During the supplemental investigation conducted in July 2006, groundwater beneath the Site was measured at depths between approximately 8.7 and 12.8 feet bgs in the temporary well points installed for grab groundwater sampling. Groundwater flow generally is to the northeast toward the Bay at relatively flat gradients, although likely is tidally influenced and, as such, could be variable (AGS, 1999; CH2M Hill, 2006).

2.3 SITE INVESTIGATION SUMMARY

2.3.1 Previous Sampling Programs

Environmental investigations were conducted at the Site and adjacent properties between 1987 and 1989, prior to the City's acquisition of the Site and adjacent properties. Following the City's acquisition of the Site and the designation of the Water Board as the administering agency, additional investigations were undertaken. A brief description of the City's investigation programs is presented below.

- AGS conducted groundwater sampling on the Site in 1999 as part of a larger study across both the Site and adjoining parcels to the east and west (AGS, 1999). Groundwater was analyzed for total petroleum hydrocarbons (TPH) quantified as diesel (TPHd), TPH quantified as motor oil (TPHmo), TPH quantified as bunker oil (TPHb), arsenic, and lead.

- In July and August 2005, Geotechnical Consultants, Inc. (GTC), on behalf of CH2M Hill, advanced 15 geotechnical soil borings, which ranged in depth from 30 to 150 feet bgs, throughout the Site (GTC, 2005). CH2M Hill collected soil samples from the top 10 feet in 8 of the 15 borings to characterize soil. CH2M Hill included the results in a technical memorandum, in which the GTC-designations of the borings from B-1 through B-15 were renamed SB-1 through SB-15 (CH2M Hill, 2005). Soil samples were analyzed for TPHd, TPHmo, TPHb, arsenic, lead, asbestos, and pH.
- CH2M Hill conducted a targeted sampling and analytical program at the Site in February 2006 to collect data from 16 additional borings (SB-16 through SB-31) to further characterize soil, groundwater, and soil vapor conditions at the Site. Soil samples were collected nominally at the surface and from 5 and 10 feet bgs. Grab groundwater samples were collected from shallow groundwater, which was encountered between 9 and 13 feet bgs. Soil and groundwater samples were analyzed for TPHd, TPHmo, TPHb, TPH quantified as gasoline (TPHg), semi-volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), Title 22 metals², and pH. Select soil and groundwater samples also were analyzed for chlorinated herbicides and soil samples also were analyzed for asbestos. Soil vapor samples were collected from 5 feet bgs and were analyzed for volatile organic compounds (VOCs).

2.4 SITE CONDITIONS

The results of the previous investigation programs indicate the general Site conditions described below.

TPHb, TPHd, and TPHmo are present in soil across the Site. TPHg was detected in only a limited number of soil samples (2 of 47). PAHs were detected in soil samples across the Site, but appear to be present at elevated concentrations only in the central portion of the Site (borings SB-24 and SB-28). No chlorinated herbicides were detected in samples collected from the Site. PCBs were detected in 17 of 47 soil samples at concentrations below 3 milligrams per kilogram (mg/kg). Metals were detected across the Site, and asbestos was detected in some samples up to 3 percent (%). The presence of metals and asbestos does not necessarily indicate an anthropogenic impact, but may be naturally occurring on the soil matrix (e.g., asbestos from serpentinite). The pH of the soil samples ranged from 7 to 12.6.

² California Code of Regulations, Title 22, Section 66216.24.

2.4.1 Groundwater Conditions

The results of previous investigations indicate that petroleum hydrocarbons (TPHb, TPHd, and TPHmo) were present in samples collected from shallow groundwater across the Site; TPHg was detected in only one groundwater sample (SB-20) at a low concentration. These petroleum hydrocarbons were detected in groundwater using standard analytical methods without filtration or a silica gel preparation. As such, the detections of TPHb, TPHd, and TPHmo likely are not representative of dissolved petroleum concentrations and are biased high as a result of petroleum adsorbed to soil particles that typically are present in grab groundwater samples (Foote et al., 1997) and biogenic material quantified as petroleum hydrocarbons. Low concentrations of VOCs, including fuel-related constituents (e.g., benzene) and chlorinated VOCs (cis- and trans-1,2,-dichloroethene and vinyl chloride) in groundwater, generally were detected in samples collected from borings located in the southern part of the Site. PAHs, were detected in unfiltered groundwater samples across the Site but only appear to be present at elevated concentrations near the central portion of the Site (boring SB-24). Again, PAHs can adsorb to soil particles that typically are present in grab groundwater samples as an artifact of the sampling methodology; detections of PAHs and non-filtered grab groundwater samples likely do not represent dissolved-phase concentrations and are biased high. No chlorinated herbicides were detected in samples collected from the Site. PCBs were not detected in groundwater samples at or above the laboratory reporting limits. Dissolved arsenic, barium, and vanadium were the most frequently detected metals in groundwater; other metals, including lead and copper, were detected in some samples.

2.4.2 Soil Vapor Conditions

Low concentrations of VOCs in soil vapor generally were detected in samples collected from borings across the Site. Chlorinated VOCs were detected in soil vapor samples primarily in the southern portion of the Site. In this area, relatively higher concentrations of VOCs, including vinyl chloride, were detected in samples from borings SB-17 and SB-18.

3.0 SUPPLEMENTAL INVESTIGATION

A supplemental investigation was conducted in July 2006 to (1) support the preparation of the site-specific HHRA and ERA and (2) evaluate potential remedial alternatives, if warranted based on the results of the HHRA and ERA, that will be presented in a site cleanup plan and risk management plan. The specific objectives of the supplemental sampling program were described in the Work Plan, which was approved by the Water Board on June 27, 2006. The components of the supplemental investigation are presented below.

Soil samples were collected from 15 borings advanced at the Site to:

- evaluate whether chromium detected at the Site is present in the trivalent and/or hexavalent state (borings SB-36, SB-37, SB-39, and SB-43 through SB-45);
- assess the distribution of petroleum hydrocarbons in soil near SB-24 (borings SB-39 through SB-42); and
- confirm the presence of PAHs near SB-28, and if present at elevated concentrations, evaluate the PAH distribution in soil in this area (borings SB-38 and “step-out” borings SB-56 through SB-58).

Three soil samples also were collected from borings SB-32, SB-34, and SB-45 to assess physical parameters to provide data, as necessary, for site-specific risk modeling (see Section 5.0).

Groundwater samples were collected from borings advanced along the eastern and northern boundaries of the Site (SB-32 through SB-37) to evaluate the potential off-site migration of dissolved chemicals of concern. The boring locations were selected based on the predominant groundwater flow direction toward the Bay (to the northeast and east). Two additional borings (SB-54 and SB-55), which were not included in the Work Plan, were advanced adjacent to the Site to the northeast; these borings were added at the request of CEC staff to further assess the quality of groundwater potentially migrating off the Site.

In accordance with the Work Plan, a temporary well point was placed in the borehole of soil boring SB-42 to assess whether LNAPL observed in the soil core is mobile. The temporary well point was allowed to recharge overnight, and then gauged using an oil/water interface probe.

Soil vapor samples were collected from eight soil borings to assess the distribution of vinyl chloride and other VOCs in soil vapor in the southeast area of the Site.

3.1 PRE-FIELD PREPARATION

Prior to initiating field activities, a soil boring permit was obtained from the Environmental Health Management section of the San Francisco Department of Public Health (SFDPH; Appendix A) and a site-specific health and safety plan was developed. Sampling locations were marked with white paint and Underground Service Alert, a regional subsurface utility notification service, was notified of proposed boring locations so that utility owners could mark

utilities. Additionally, Geomatrix subcontracted with a private underground utility locator, Subsurface Locating Service, of Petaluma, California, to clear proposed boring locations of subsurface utilities.

3.2 FIELD PROGRAM

3.2.1 Soil and Grab Groundwater Sampling

A total of 19 soil borings were advanced at the Site (Figure 2) by Resonant Sonic, Inc. (RSI), of Woodland, California, from July 5 through 7, 2006, using direct-push technology to collect soil and/or grab groundwater samples for chemical analysis. Borings were continuously cored and a lithologic log was prepared for each boring by a Geomatrix field geologist using visual-manual procedures of the American Society for Testing and Materials (ASTM) Standard D2488-00 for guidance, which is based on the Unified Soil Classification System (USCS). Select intervals were screened for volatile organic vapors with a photoionization detector (PID). Lithologic logs, which include PID readings, are presented in Appendix B.

Prior to and between coring and sampling at each borehole, non-dedicated down-hole equipment was cleaned by RSI using high-pressure steam. Following sample collection, the boreholes were destroyed with Portland Type I-II neat cement grout placed from total depth to ground surface. Borehole destruction was performed under the supervision of a SFDPH grout inspector.

3.2.1.1 Soil Sampling

Soil samples were collected from various depths, depending on the objective of the sampling. The actual depths of the samples collected varied slightly due to the variable recovery and depth to groundwater in each boring. Soil samples were collected in 1.125-inch-diameter butyrate liners. Sample containers were sealed with Teflon[®] sheets, plastic end caps, and silicone tape; labeled with unique sample identifiers designating the locations and depths (e.g., SB-53-5.0 for location SB-53 from between 4.5 and 5.0 feet bgs); sealed in plastic bags; and placed in coolers with ice prior to delivery to Curtis & Tompkins, Ltd. (C&T), a state-certified analytical laboratory under Geomatrix chain-of-custody procedures. Soil samples were analyzed for PAHs using U.S. EPA Method 8270C select ion monitoring (SIM) mode; TPHd, TPHmo, and TPHb using U.S. EPA Method 8015M; total chromium using U.S. EPA Method 6010B; and hexavalent chromium using U.S. EPA Method 7196A.

Soil samples collected for analysis of physical parameters were submitted to Cooper Testing Laboratory, of Palo Alto, California, under Geomatrix chain-of-custody procedures. Vadose

zone samples were analyzed for total and effective porosity by ASTM Method D2325M, moisture content by ASTM Method D2216, particle size by ASTM Method D422, bulk density by ASTM Method D2937, and specific gravity by ASTM Method D854. Saturated zone samples were analyzed for total and effective porosity by ASTM Method D2325M, moisture content by ASTM Method D2216, particle size by ASTM Method D422, bulk density by ASTM Method D2937, specific gravity by ASTM Method D854, total organic carbon by the Walkley-Black Method, and hydraulic conductivity by ASTM Method D5084. Soil samples SB-32-5.0 and SB-37-15.0 were not analyzed for these physical properties because of insufficient sample volume.

In accordance with the Work Plan, a temporary well point was placed in the borehole of soil boring SB-42 on July 6, 2006, to assess whether light non-aqueous phase liquid (LNAPL), which was observed in the soil core, is mobile. The temporary well point was installed by placing ¾-inch-diameter Schedule 40 polyvinyl chloride (PVC) casing with 10 feet of factory-slotted 0.010-inch well screen in the borehole. The drive casing was then retracted to expose the screen from 4 to 16 feet bgs. The temporary well point was allowed to recharge overnight, and then gauged on July 7, 2006, using an oil/water interface probe. In addition, a new, clean disposable bailer was used to collect water from the air/water interface to assess if a sheen is present.

3.2.1.2 Grab Groundwater Sampling

Grab groundwater samples were collected from each of the borings following installation of temporary well points. Well points were constructed by placing 5 feet of Schedule 40 PVC, 0.010-inch, factory-slotted well screen and up to 12 feet of Schedule 40 PVC blank riser down the borehole; the drive casing was then retracted to expose the screen from 12 to 16 feet bgs (water levels in the temporary well points were recorded between 8.7 and 12.8 feet bgs across the Site). Grab groundwater samples were collected using a peristaltic pump fitted with new, disposable polyethylene and silicone tubing at each boring location. Samples were decanted directly into laboratory-supplied sample bottles, with the exception of samples to be analyzed for metals as described below. All depth-discrete groundwater samples were labeled appropriately and placed in ice-filled coolers, prior to delivery under Geomatrix chain-of-custody procedures to C&T. The groundwater samples were analyzed for select metals (arsenic, copper, lead, mercury, nickel, selenium, vanadium, and zinc) using U.S. EPA Method 6020; PAHs using U.S. EPA Method 8270C SIM; and TPHd, TPHmo, and TPHb using U.S. EPA Method 8015M.

PAHs are relatively immobile in soil and water and fairly insoluble in water. When detected in water, they are primarily sorbed to particles (ASTDR, 1995). Similar to the PAHs, the longer-chained petroleum hydrocarbons are relatively insoluble and immobile in groundwater. To assess the dissolved fractions of TPH in a sample, it is important to remove potential sources (i.e., non-dissolved constituents) and interferences prior to analysis.

As a result of sampling methodologies during grab groundwater sample collection, grab groundwater samples are generally turbid due to the presence of suspended particles in the sample. These particles may be entrained in the groundwater when the subsurface is disturbed, such as when grab groundwater samples are collected from temporary well points (Foote et al., 1997, and U.S. EPA, 2005). Sample turbidity can cause bias in the result.

Thus, the objective of the analyses was to evaluate the dissolved mobile fractions of metals, TPH, and PAHs that potentially could migrate from the Site to the Bay. To achieve this objective, the samples were field-filtered for metals using 0.45-micron in-line barrel filters. Laboratory filtration using a 0.7-micron glass fiber filter and silica gel preparation were performed on all grab groundwater samples analyzed for PAHs and TPH. Silica gel preparation was used prior to TPH sample analysis due to naturally occurring polar organic constituents that mimic TPH in the analysis (RWQCB, 1999). Note that previous grab groundwater samples collected in March 2006 were not filtered or prepared with silica gel.

Field quality assurance/quality control (QA/QC) samples included laboratory-provided temperature blanks, equipment blanks, and duplicate depth-discrete groundwater samples from borings SB-32 and SB-54. The equipment blank was collected with the same groundwater sampling method described above, using deionized water. The equipment blank and duplicate samples were placed in ice-filled coolers prior to delivery to C&T under Geomatrix chain-of-custody procedures. The QA/QC water samples were analyzed for the same metals as the primary groundwater samples using U.S. EPA Method 6020; PAHs using U.S. EPA Method 8270 SIM; and TPH_d, TPH_{mo}, and TPH_b using U.S. EPA Method 8015M.

3.2.2 Soil Vapor Sampling

Eight soil vapor borings (SB-46 through SB-53) were advanced at the Site (Figure 2) on July 6, 2006, by Transglobal Environmental Geochemistry (TEG) of Rancho Cordova, California, a state-licensed drilling contractor, using an AMS Power Probe 9635TO rig equipped with direct-push technology. The soil vapor survey was conducted following guidance set forth in the January 28, 2003 Advisory for Active Soil Gas Investigations (Advisory), jointly issued by the

California Department of Toxic Substances Control (DTSC) and the California Regional Water Quality Control Board, Los Angeles Region (2003).³

Soil vapor borings were advanced by TEG to 5.0 feet bgs at each location using direct-push technology, a disposable drive tip, and 1-inch-outside-diameter steel drive rods. At one boring location, SB-48, the drive casing was advanced using a generator-powered rota-hammer, due to limited access. Once total depth was reached, the drive rods were retracted approximately 1 inch to expose the soil vapor probe inlet to the formation. A 5-gallon bucket with a hole drilled in the top was placed over the drive casing for leak testing (see below). New, disposable polyethylene tubing was then attached both to a fitting at the bottom of the rods and to a t-valve at the top of the casing. A 50-cubic-centimeter (cc) syringe was attached to the t-valve for testing the vacuum and for purging, and silicone tape was placed over all fittings to prevent leaking. Once TEG determined that vapor flow was possible, hydrated bentonite pellets were placed around the drive rods at ground surface to prevent infiltration of ambient air during sample collection. The sampling points then were allowed to equilibrate for a minimum of 20 minutes prior to soil vapor sample collection.

Following equilibration, approximately three tubing volumes of air were purged from the sampling line using a 50-cc syringe at each sampling location; the purge rate was restricted to between 100 and 200 milliliters per minute (mL/min) to limit stripping and ambient air dilution. The tubing then was connected to a 1-liter SUMMA™ canister equipped with a flow regulator for a consistent sampling rate of no more than 200 mL/min. During sample collection, TEG conducted leak testing by spraying 1,1-difluoroethane (DFA) around the bentonite seal at the ground surface underneath the 5-gallon bucket, and 1,1,1,2-tetrafluoroethene (Freon 134) along the tubing and fittings between the drive rods and the SUMMA™ canister, in general accordance with Advisory guidelines. Initial and final vacuum readings were recorded before and after sample collection, and samples were labeled with unique sample identifiers.

All SUMMA™ canisters, flow regulators, and related equipment were provided by Columbia Analytical Services (CAS) of Simi Valley, California, a state-certified laboratory. Soil vapor samples were shipped under Geomatrix chain-of-custody procedures to CAS, and were analyzed by modified U.S. EPA Method TO-15 for the following target analytes: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-

³ There was no rain for three days prior to the sampling events.

dichloroethene (trans-1,2-DCE), vinyl chloride, naphthalene, and the leak-check compounds 1,1-difluoroethane and 1,1,1,2-tetrafluoroethane.

One blind field duplicate was collected at boring SB-53 (representing approximately 10 percent of the sample locations). This sample was collected simultaneously with the primary sample using a Y-junction in a separate 1-liter SUMMA™ canister. The duplicate was labeled with unique sample identifier that did not correspond to the primary sample identifier.

An ambient air sample was collected in the predominant upwind direction. The sample was collected in a 6-liter SUMMA™ canister equipped with an 8-hour flow regulator to establish 8-hour time-weighted average concentrations for ambient air constituents. The ambient air sample was shipped with the soil vapor samples to CAS for analysis for the target list of VOCs using modified U.S. EPA Method TO-15 following applicable portions of Sections 2.2 through 2.7 of the Advisory.

Following completion of soil vapor sample collection, all boreholes were backfilled with Portland Type I-II neat cement grout from total depth to ground surface. Destruction was performed under the supervision of a SFDPH grout inspector.

4.0 SUPPLEMENTAL INVESTIGATION RESULTS

The results for the supplemental investigation activities conducted at the Site in July 2006 are summarized in this section.

4.1 LITHOLOGY

The Site lithology described herein is based on observations made by Geomatrix during drilling of the 19 soil and grab groundwater borings at the Site. Concrete and/or aggregate base rock was encountered at each boring location from ground surface to approximately 0.5 to 8 feet bgs. Below this layer, soil consisting of predominantly coarse-grained mixtures of gravel, sand, and clay with minor amounts of concrete and brick debris was present to a depth of 16 feet bgs, the maximum depth drilled. This soil is interpreted to be fill material; lithologic observations during the drilling program were consistent with the lithology previously reported for the Site. During the July 2006 investigation, groundwater was encountered in the soil borings between approximately 8.7 and 12.8 feet bgs. Lithologic logs are presented in Appendix B.

4.2 SOIL SAMPLE RESULTS

Chemical analytical results for soil samples are presented in Tables 1 through 6, and analytical laboratory reports are included as Appendix C.

Total chromium was detected in each of the 13 samples analyzed at concentrations that ranged from 25 to 610 mg/kg (Table 1). Typical of fill material, there is no pattern regarding the distribution of chromium in the soil. Hexavalent chromium was detected in four samples at concentrations that ranged from 0.06 mg/kg to 0.75 mg/kg. Low concentrations of hexavalent chromium detected in samples indicate that the total chromium detected in the samples is predominantly in the trivalent state.

PAHs were detected in 19 of the 29 soil samples analyzed (Table 3). PAH detections included:

- Acenaphthene was detected in two samples at concentration of 130 and 6,900 micrograms per kilogram ($\mu\text{g}/\text{kg}$).
- Acenaphthylene was detected in five samples at concentrations that ranged from 7.1 to 4,800 $\mu\text{g}/\text{kg}$.
- Anthracene was detected in 13 samples at concentrations that ranged from 8.9 to 11,000 $\mu\text{g}/\text{kg}$.
- Benzo(a)anthracene was detected in 15 samples at concentrations that ranged from 9.3 to 8,500 $\mu\text{g}/\text{kg}$.
- Benzo(a)pyrene was detected in 15 samples at concentrations that ranged from 12 to 8,300 $\mu\text{g}/\text{kg}$.
- Benzo(b)fluoranthene was detected in 17 samples at concentrations that ranged from 6.2 to 4,500 $\mu\text{g}/\text{kg}$.
- Benzo(g,h,i)perylene was detected in 11 samples at concentrations that ranged from 6.6 to 3,600 $\mu\text{g}/\text{kg}$.
- Benzo(k)fluoranthene was detected in 15 samples at concentrations that ranged from 7.2 to 6,300 $\mu\text{g}/\text{kg}$.
- Chrysene was detected in 18 samples at concentrations that ranged from 8.3 to 8,200 $\mu\text{g}/\text{kg}$.
- Dibenz(a,h)anthracene was detected in five samples at concentrations that ranged from 6.3 to 82 $\mu\text{g}/\text{kg}$.

- Fluoranthene was detected in 19 samples at concentrations that ranged from 8.8 to 16,000 $\mu\text{g}/\text{kg}$.
- Fluorene was detected in 6 samples at concentrations that ranged from 13 to 12,000 $\mu\text{g}/\text{kg}$.
- Indeno(1,2,3-cd)pyrene was detected in nine samples at concentrations that ranged from 5.6 to 3,600 $\mu\text{g}/\text{kg}$.
- Naphthalene was detected in two samples at concentrations of 30 and 77 $\mu\text{g}/\text{kg}$.
- Phenanthrene was detected in 18 samples at concentrations that ranged from 6.7 to 26,000 $\mu\text{g}/\text{kg}$.
- Pyrene was detected in 19 samples at concentrations that ranged from 8.4 to 19,000 $\mu\text{g}/\text{kg}$.

The highest concentrations of PAHs were detected in soil at boring location SB-41; this boring is near former boring location SB-24, where the highest concentrations of PAHs were detected during previous investigations.

TPHd was detected in each of the 16 soil samples analyzed at concentrations that ranged from 21 to 2,200 mg/kg. TPHmo was detected in all 16 samples at concentrations that ranged from 40 to 5,800 mg/kg. TPHb was detected in all 16 samples at concentrations that ranged from 140 to 16,000 mg/kg. The highest concentrations of TPH were detected in soil at SB-42 at a depth of 14 feet bgs.

As described in Section 3.2.1.1 above, a temporary well point was placed in the borehole of soil boring SB-42 on July 6, 2006, to assess whether LNAPL observed in the soil core is mobile. The temporary well point was allowed to recharge overnight, then gauged on July 7, 2006, using an oil/water interface probe. The oil/water interface probe did not indicate the presence of LNAPL. In addition, visual observation of water collected with a bailer did not indicate the presence of a sheen. As such, it does not appear that LNAPL is present as a separate, mobile product in the subsurface.

Soil physical parameter results for soil samples collected in July 2006 are summarized in Table 6 and presented in detail in Appendix C. These soil physical properties are used in the site-specific risk modeling presented in Section 5.0.

4.3 GROUNDWATER SAMPLE RESULTS

Analytical results for grab groundwater sample results are presented in Tables 7 through 11, and analytical laboratory reports are included as Appendix C. On-site groundwater samples were collected from borings SB-32 through SB-37; off-site grab groundwater samples were collected from borings SB-54 and SB-55 at the request of CEC staff. A summary of the sample results is presented below.

Each of the dissolved metals analyzed for, arsenic, copper, lead, mercury, nickel, selenium, vanadium, and zinc, were detected in select groundwater samples.

- Arsenic was detected in grab groundwater samples from five of the six on-site sampling locations (all but SB-33) at concentrations that ranged from 2.1 µg/L to 19 µg/L. Off site, dissolved arsenic was detected in groundwater at concentrations between 17 and 46 µg/L.
- Copper was detected in three on-site and two off-site grab groundwater samples. The maximum on-site and off-site dissolved copper concentrations were 4.9 and 5.4 µg/L, respectively.
- Lead was detected in two on-site and one off-site grab groundwater samples at maximum concentrations of 28 and 2.5 µg/L, respectively.
- Nickel was detected in groundwater from each of the six on-site sampling locations at concentrations that ranged between 1.2 and 15 µg/L. Off site, dissolved nickel was detected at concentrations between 22 and 28 µg/L.
- Selenium was detected in only one sample from an off-site sampling location at a concentration of 11 µg/L.
- Vanadium was detected in grab groundwater samples from each of the on-site and off-site sampling locations. On-site concentrations of vanadium ranged between 1.2 µg/L and 5.5 µg/L. Off-site concentrations of vanadium in grab groundwater samples ranged between 1.7 and 7 µg/L.
- Zinc was detected in each of the on-site and off-site grab groundwater samples. On site, zinc concentrations were detected up to 12 µg/L; off-site zinc concentrations were detected up to 14 µg/L.

Dissolved PAHs were not detected above the laboratory reporting limits in any of the on-site and off-site grab groundwater samples. Because some of the reporting limits for PAHs are

considered high, Geomatrix requested the laboratory to report the results of PAHs down to the method detection limits (MDLs).

The U.S. EPA describes MDLs as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero considering the normal, random noise of the analytical instrument or method (U.S. EPA, 1997c). On the other hand, the laboratory reporting limit, or sample quantitation limit (SQL), is the MDL adjusted to reflect sample-specific actions, such as preparation and dilution; it is considered the lowest level at which a chemical may be accurately and reproducibly quantified, after corrections have been made for sample dilution and matrix interference(s) encountered during the analysis (U.S. EPA, 1989). Chemicals detected above the MDL but below the SQL are considered estimates, and are qualified with a “J” qualifier. Based on the MDLs, a majority of the PAHs were detected in at least one sample, except for benzo(a)pyrene, benzo(b)fluoranthene, and benzo(g,h,i)perylene.

Dissolved-phase TPHd was detected in each of the on- and off-site grab groundwater samples at concentrations that ranged from 55 to 130 µg/L. Dissolved-phase TPHmo was not detected above the laboratory reporting limits in any of the samples. Dissolved-phase TPHb was detected in two on-site grab groundwater samples at concentrations of 350 and 410 µg/L. The concentrations of TPH detected in groundwater samples are generally lower than those detected during previous investigations; as previously stated, the analyses for these petroleum mixtures during the supplemental investigation were conducted following filtration and silica gel preparation to more accurately quantify dissolved, non-biogenic, petroleum-related hydrocarbons in groundwater. Further discussion regarding the potential impacts of TPH in groundwater is presented in the risk assessments in Sections 5 and 6.

4.4 SOIL VAPOR SAMPLE RESULTS

Soil vapor results are presented in Table 12, and the laboratory analytical report is included in Appendix C. Soil vapor samples collected in the southern portion of the Site were analyzed for six VOC analytes. A summary of the primary sample results is presented below. Each of the six analytes were detected; however, not every analyte was detected at each sampling location; specifically:

- Cis-1,2-dichloroethene was detected in five samples at concentrations that ranged from 7.6 to 1,300 micrograms per cubic meter (µg/m³).

- Trans-1,2-dichloroethene was detected in two samples at concentrations of 19 and 370 $\mu\text{g}/\text{m}^3$.
- Naphthalene was detected in one sample at a concentration of 5.7 $\mu\text{g}/\text{m}^3$.
- Tetrachloroethene was detected in two samples at concentrations of 17 and 95 $\mu\text{g}/\text{m}^3$.
- Trichloroethene was detected in five samples at concentrations that ranged from 12 to 380 $\mu\text{g}/\text{m}^3$.
- Vinyl chloride was detected in five samples at concentrations that ranged from 13 to 1,200 $\mu\text{g}/\text{m}^3$.

The concentrations of select VOCs detected in soil vapor samples appear to be consistent with the results of previous investigations.

4.5 QUALITY ASSURANCE/QUALITY CONTROL EVALUATION SUMMARY

The laboratory data generated during this investigation were subjected to a data completeness check of each data package, a transcription check for sample results, and a review of all laboratory reporting forms. Quality assurance/quality control (QA/QC) procedures included laboratory quality control sample/laboratory control sample duplicate (LCS/LCSD) and matrix spike/matrix spike duplicate (MS/MSD) samples. The limited data review (completeness, precision check, hold time, and equipment and trip blank results) was conducted in accordance with U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (U.S. EPA, 1999) and U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (U.S. EPA, 2004a). Based on the QA/QC review, the data are complete. A QA/QC evaluation is presented in Appendix D.

5.0 HUMAN HEALTH RISK ASSESSMENT

Based on a comparison of analytical results to applicable environmental screening levels (ESLs) for industrial/commercial land uses, as developed by the RWQCB (2005), certain constituents were detected in soil, soil vapor, and groundwater at concentrations exceeding their respective ESLs. Exceedance of an ESL does not necessarily indicate that adverse health effects will occur, but suggests that additional evaluation of the potential risks is warranted. To account for the potential for adverse health effects associated with cumulative exposure to multiple chemicals, a site-specific human health risk assessment (HHRA) was conducted. A screening-level ecological risk assessment (ERA) is presented in Section 6.0.

The purpose of the HHRA is to provide an analysis of the potential for adverse human health effects as a result of exposure to chemicals detected at the Site. The assessment was conducted to identify the potential risks posed by existing conditions and the media and chemicals at the Site that require further risk reduction efforts to limit potential exposures. The results of the HHRA can be used to identify whether corrective action may be needed, which will be documented in the site cleanup plan, risk management plan, and site management plan for the Site. These technical documents will discuss measures to mitigate potential risks identified for possible future receptors for each exposure scenario for each phase of the development (i.e., pre-, during, and post-development).

The Site lies bayward of the 1851 high tide line and is therefore subject to requirements of Article 22A of the City and County of San Francisco Department of Public Health (SFDPH) Code, Section 1200. Article 22A outlines steps required by the SFDPH to assess, investigate, and if necessary, remediate environmental conditions that pose significant environmental or health and safety risks caused or likely to be caused by the presence of chemicals in the soil.⁴ The HHRA presented herein also is intended to address requirements of Article 22A.

The approach used in the risk assessment is consistent with guidelines published by the California Regional Water Quality Control Board, San Francisco Region [RWQCB, 2005], the California Environmental Protection Agency, Department of Toxic Substances Control [Cal-EPA, 1996 and 1999a], and the United States Environmental Protection Agency [U.S. EPA, 1989]. The risk assessment considers potential exposures to site-related chemicals during property redevelopment, as well as post-development. For cases in which Cal-EPA and U.S. EPA criteria differed, Cal-EPA guidance was used.

The risk assessment continues with the following steps, as outlined in U.S. EPA guidance (1989):

- data evaluation;
- exposure assessment;
- toxicity assessment; and
- risk characterization.

⁴ Article 22 only applies to sites at which more than 50 cubic yards of soil will be disturbed during development.

5.1 DATA EVALUATION AND CHEMICALS OF POTENTIAL CONCERN

Data evaluation is the process of analyzing site characteristics and analytical data to identify chemicals of potential concern (COPCs) to be evaluated in the HHRA. The identification of potential chemical hazards is based on the site characterization data described in Sections 2 and 4 of this report. A previous HHRA and ERA were conducted separately for the Site and adjacent Port parcel in 2000. The current HHRA and ERA consider analytical data collected specifically at the Site since 2000 (geotechnical investigation and the most recent investigations in 2006); these data were reviewed for usability and adequacy in risk assessment, and were considered usable and representative of current environmental conditions at the Site.

Tables 13 through 15 provide summaries of the chemicals detected in soil, groundwater, and soil vapor. Analytical results for soil, soil vapor, and groundwater samples from locations outside the periphery of the Site, such as borings SB-31, SB-54, and SB-55, were not included in the quantitative assessment because these sampling locations are outside the exposure area of the Site. Tables 16 through 18 provide the statistical summaries of the data considered in the HHRA (Appendix E). These tables include chemical name, total number of samples analyzed, total number of detections, frequency of detection, range of detection limits, and range of concentrations detected.

5.1.1 Soil Results

Due to the depth of typical footings, utilities, and the need to construct an ammonia sump to depths of approximately 8 feet bgs (Figure 3), it is assumed that future receptors can be exposed to chemicals in the top 10 feet of soil.

Based on the data set presented in Table 16, 77 soil samples from approximately 29 sampling locations were analyzed for metals. As shown, 17 metals were detected in at least one sample. Total chromium was reported in soil at concentrations up to 1,300 mg/kg; hexavalent chromium was detected at concentrations up to 0.75 mg/kg. The speciated chromium results from samples collected by Geomatrix suggest that total (trivalent and hexavalent) chromium reported in soil is predominantly in the form of trivalent chromium (Cr III). The highest percentage of hexavalent chromium to total chromium was reported in the soil sample collected from boring SB-39 at 1.5 feet bgs (0.66 to 28 mg/kg, or about 2.4 percent). For samples where speciated data were available, concentrations reported by the laboratory for hexavalent chromium were used. Trivalent chromium concentrations were estimated by calculating the difference between total and hexavalent chromium concentrations. For samples where speciated data were not available, hexavalent chromium was conservatively assumed to be

present at 2.4 percent of the concentrations for total chromium. The remaining difference (97.6 percent of total chromium) was evaluated as trivalent chromium.

Thirty-one soil samples were analyzed for VOCs. Only five VOCs were detected above the laboratory reporting limits, including acetone, cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 2-butanone, and trichloroethene (TCE). However, these VOCs were detected at low frequencies, ranging from 3 to 16 percent. Among the VOCs, TCE and cis-1,2-DCE were detected at the relatively highest concentrations of 450 and 1,400 µg/kg, respectively.

Semivolatile organic compounds (SVOCs), including PAHs, were analyzed in soil samples collected by CH2M Hill using both U.S. EPA Methods 8270C and 8310 (Appendix F). Soil samples collected by Geomatrix were analyzed for PAHs using EPA Method 8270C-SIM. In cases where the laboratory reported two results using different analytical methods for the same sample, the maximum concentrations were conservatively used to represent that particular sample. If a compound was not detected, the lower reporting limit from the two analyses is presented. Soil collected from boring SB-24 at 10 feet bgs had the highest concentrations of benzo(a)pyrene and naphthalene at 490 and 1,200 mg/kg, respectively. Soil from boring SB-28 at 5 feet bgs had the next highest concentration of benzo(a)pyrene at 5,200 mg/kg.

Different fractions of TPH were analyzed in soil. TPHg (gasoline) was detected in only two samples. TPHb, TPHd, and TPHmo were detected in nearly all of the samples analyzed. TPHb was detected at concentrations ranging from 6 to 57,000 mg/kg, TPHd was detected at levels ranging from 1 to 20,000 mg/kg, and TPHmo was detected from 6 to 9,500 mg/kg.

PCBs were analyzed in 44 soil samples. Aroclor-1254 was detected the most frequently (23 percent) and had the highest concentration at 3 mg/kg.

Asbestos was analyzed in 20 soil samples from eight borings. The laboratory presented the analytical results as either non-detect or in “trace” amounts expressed as a percentage (%). Trace detections of asbestos were reported in six samples from four borings. Three of the samples contained detections greater than “trace” concentrations. These included soil samples from boring SB-29 (5 and 10 feet) at concentrations of 3 and 2 percent, respectively, and the soil sample from 10 feet bgs in boring SB-23. Pieces of serpentinite rock were noted in the boring log for these three samples. The presence of asbestos in soil appears to be associated with construction debris and serpentinite imported as fill material.

Eighty soil samples from 30 borings were analyzed for acidity and alkalinity by pH. The pH scale is a common measurement that expresses the concentration or activity of hydrogen ions (H⁺) in a given media; therefore, it is a measurement of acidity and alkalinity. A pH of 7.0 (unitless) is considered a neutral environment (on a scale of 0 to 14), with increasing values becoming more alkaline (basic). The pH measurements from Site soil ranged from 7.0 to 12.6, with an average value of 10.0. In general, pH measurements are not quantitatively used in health risk assessments but are indicative of the potential for metals to leach from soil to groundwater. The results of the pH analysis indicate that limited migration of metals from soil into groundwater is expected.

5.1.2 Groundwater Results

Groundwater samples were collected from 21 on-site borings. Three groundwater samples were collected off site near the northeast corner of the property. As in the case with soil, SVOCs, including PAHs, were analyzed in groundwater samples collected by CH2M Hill using both EPA Methods 8270C and 8310. The maximum concentrations detected in each sample by these two methods were used for this evaluation. Ten metals, 19 VOCs (including BTEX and chlorinated VOCs), 14 PAHs, and TPH were detected in groundwater. No PCBs were detected in groundwater at the Site.

Sixteen groundwater samples also were analyzed for pH. The pH measurements ranged from 7.2 to 10.7, with an average value of 8.5. Although shallow groundwater underlying the Site is not a current source of drinking water for the foreseeable future, the average pH of 8.5 is within the range (6.5 to 8.5) of the U.S. EPA's secondary maximum contaminant level (MCL), suggesting no significant concerns with respect to pH in groundwater.

5.1.3 Soil Vapor Results

Soil vapor samples were collected from 20 on-site locations at a depth of approximately 5 feet bgs. Thirty-two VOCs were detected in at least one sample. Soil vapor concentrations are summarized in Table 16 and presented in Table F-10 of Appendix F.

5.1.4 Chemicals of Potential Concern

Except for TPH, all chemicals detected in at least one soil, groundwater, or soil vapor sample were considered as COPCs. A summary of COPCs for each medium is presented in Tables 16 through 18. Even though metals occur naturally in the environment, all metals at the Site were included as COPCs.

For the purposes of this evaluation, and as is the practice in California (Cal-EPA, 1999a), total petroleum hydrocarbon (TPH) measurements were not considered COPCs in soil or groundwater (for human health). TPH measurements, such as TPHd, TPHg, TPHmo, and TPHb, represent mixtures of chemicals that, because of highly variable compositions, do not have descriptive health criteria. Therefore, the toxicity of these mixtures is best described by the aggregate toxicity of key individual chemicals in the mixture, such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and PAHs.

5.2 EXPOSURE ASSESSMENT

Exposure assessment is the process of describing, measuring, or estimating the intensity, frequency, and duration of potential human exposure to COPCs in environmental media (e.g., soil, water, and air) at a site. The exposure assessment followed the recommendations for conducting an exposure assessment provided in U.S. EPA's "Risk Assessment Guidance for Superfund" (U.S. EPA, 1989), the more recent guidance provided in U.S. EPA's "Guidelines for Exposure Assessment" (U.S. EPA, 1992a), and other associated guidance. In accordance with U.S. EPA (1989), an exposure assessment consists of three basic steps:

- characterization of the exposure setting (physical environment and potential receptors);
- identification of exposure pathways (potential sources, points of release, and exposure routes); and
- quantification of pathway-specific exposures (exposure point concentrations and intake dose assumptions).

5.2.1 Characterization of Exposure Setting

Potential exposure to COPCs at a site depends on a number of factors related to the physical characteristics of a site and its surroundings. These factors include location, surrounding land use, surface topography, hydrogeology, and vegetation. They also include factors related to the current and future uses of the property, which determine the types of activities that might occur at the site, the degree to which the site is accessible to the general public, and the mechanisms that might result in migration of COPCs to on-site and off-site populations.

The 4-acre Site is located in a heavily industrialized area in southeast San Francisco. The Site is zoned for industrial use and has been cleared of all permanent structures. Currently, there are temporary facilities including construction trailers, a laydown area for construction materials for the adjacent MUNI maintenance yard, and a non-operating concrete batch plant. These

temporary facilities will be removed prior to the construction of the SFERP. The parcel directly east of the Site is currently being used for trucks, chassis, and equipment storage and separates the Site from The Bay, which is located approximately 160 feet from the northeast corner of the Site.

The City and County of San Francisco is proposing to construct and operate a power plant at the Site. The plant will consist of a nominal 145-megawatt (MW) simple-cycle plant, using three gas-fired gas turbine engines and associated infrastructure. Figure 3 depicts the power plant Site layout over the boring locations.

The identification of potential human receptors is based on the characteristics of the Site, the surrounding land uses, and the probable future land uses. Given the future use of the property as a switchyard and power plant, the primary potential human receptors include industrial workers. A construction worker also is included as a potential receptor to address exposures to workers involved in construction and is intended to address potential exposure by short-term maintenance workers, who might be employed at the Site in the future. The relationship between construction worker and short-term maintenance worker exposure is discussed in the RWQCB's ESL document (RWQCB, 2005). Off-site residential receptors are also included in the evaluation in order to evaluate potential adverse health effects of chemicals migrating off-site during construction activities. Off-site residential receptors were not included in the quantitative assessment because potential exposures to chemicals in subsurface soil, soil vapor, and groundwater once the facility is constructed are incomplete. These potential exposures are incomplete because the Site will be covered by buildings, an electrical switchyard, gas-fired turbine generators and associated infrastructure and equipment, and paved hardscape (e.g., asphalt concrete parking). Off-site workers were not specifically evaluated in this assessment because potential exposures and health risks to residents are generally greater than workers due to longer exposure frequencies and exposure durations.

5.2.2 Identification of Exposure Pathways

The HHRA was conducted within the context of the Site Conceptual Model (SCM). As described in U.S. EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (U.S. EPA, 1988), the purpose of the SCM is to describe what is known about chemical sources, migration pathways, exposure routes, and receptors. The SCM depicts the exposure pathways, which are the mechanisms by which a receptor may come into contact with COPCs in the environment. An exposure pathway is defined by four elements (U.S. EPA, 1989):

- a source and mechanism of COPC release to the environment;
- an environmental receiving or transport medium (e.g., air, soil) for the released COPC;
- a point of potential contact with the medium of concern; and
- an exposure route (e.g., ingestion) at the contact point.

An exposure pathway is considered “complete” if all elements are present. Only complete exposure pathways were evaluated. The characterization of the potential exposure pathways at the Site based on existing information is presented in the SCM on Figure 4.

The presence of chemicals in soil at the Site likely resulted from placement of fill material in the Bay margin to create the Site and from historical operations. As described in the investigation results, chemicals detected in soil and groundwater at the Site are volatile (e.g., benzene), semi-volatile (e.g., PAHs), and non-volatile (e.g., lead). Volatile chemicals can migrate from soil and groundwater to indoor or ambient air. Semi-volatile and non-volatile compounds can be resuspended with soil particulates and be present in ambient air. In addition, some chemicals in soil can leach from soil and migrate to groundwater, which is present between approximately 8 and 13 feet below ground surface (bgs). VOCs and metals can move in groundwater, depending on conditions and their physical chemical properties. These release mechanisms result in chemicals potentially being present in the following exposure media: surface and subsurface soil, indoor air, ambient air, groundwater, and surface water in the Bay. Migration of chemicals through groundwater transport is evaluated in the ERA (Section 6.0). All other mechanisms of release and transport are evaluated in this HHRA.

Based on plot plans (Figure 3), future industrial worker exposure pathways will be limited to inhalation of volatile chemicals in indoor air. Based on development plans, direct contact with chemicals in soil is incomplete because the Site will be covered by buildings, an electrical switchyard, gas-fired turbine generators and associated infrastructure and equipment, and paved hardscape (e.g., asphalt concrete parking). Thus, potential direct pathways from inhalation of particulates in ambient air, dermal contact with soil, and incidental ingestion of soil are incomplete for future workers. In addition, use of groundwater as a drinking water source is considered an incomplete exposure pathway because groundwater beneath the Site is not considered a viable drinking water source and municipal drinking water is readily available. Thus, only the indoor inhalation route of exposure to VOCs potentially migrating from the subsurface was considered a complete pathway and evaluated for this receptor. Finally,

migration of volatile chemicals from the subsurface to outdoor ambient air is generally less significant than indoor exposures because of dilution and dispersion in outdoor air.

For construction workers, several complete exposure pathways have been identified, including inhalation of ambient air (particulates and volatiles) and dermal contact with and ingestion of surface and subsurface soil during construction. In addition, construction workers may be required to enter vaults or work in utility trenches that do not have mechanical ventilation making the exposure potentially different than outdoor air (and more similar to an indoor scenario). Potential exposures to groundwater are unlikely because future intrusive activities to the water table likely would require dewatering of trenches or excavations, thereby limiting dermal contact with groundwater by a future construction worker. As an additional measure, any potential impacts associated with dermal contact with groundwater by future construction workers will be managed under a risk management plan. However, for the purpose of this HHRA, potential exposure from dermal contact with shallow groundwater is quantitatively evaluated. The HHRA conservatively assumes that future construction workers would be exposed to chemicals in groundwater via dermal contact and inhalation of volatiles when a trench was filled with shallow groundwater.

The exposure pathways considered complete for the construction worker include: incidental ingestion and dermal contact with soil, inhalation of VOCs and/or airborne particulates as dust, inhalation of VOCs in trenches from soil vapor and shallow groundwater, and dermal contact with groundwater.

The nearest dwelling units are located approximately 1,600 feet from the Site. Off-site residents could potentially be exposed to volatile constituents or dust particulates during construction of the power plant. The exposure pathway considered complete for off-site residents along the fenceline of the property includes inhalation of VOCs and particulates potentially released during construction activities. Potential exposures following the completion of construction activities are incomplete because the Site will be covered by buildings, an electrical switchyard, gas-fired turbine generators and associated infrastructure and equipment, and paved hardscape (e.g., asphalt concrete parking). Off-site workers were not specifically evaluated in this assessment because potential exposures and health risks to residents are generally greater than workers because of longer exposure frequencies and exposure durations.

5.2.3 Exposure Point Concentrations

The concentrations of chemicals at specific exposure points will vary over space and time. However, a single estimate of an exposure point concentration (representative concentration) is required for risk assessment calculations, as currently required by U.S. EPA guidance (1989, 2002a). This single value must be representative of the average concentration to which a person would be exposed over the duration of the exposure.

Exposure point concentrations generally are estimated using measured concentrations in environmental media or estimated based on fate and transport models. Depending on a number of factors, including the distribution of the data (normal versus log-normal), the proportion of the samples reported as non-detect (ND), and the total number of samples, several statistical parameters may be used to estimate exposure point concentrations. U.S. EPA supplemental risk assessment guidance (U.S. EPA, 2002a) stipulates that exposure point concentration estimates should be based on the 95 percent upper confidence limit (UCL) of the mean to estimate a reasonable maximum exposure scenario. In the event that the calculated 95 percent UCLs exceed the maximum detected value, the maximum value will be used as the exposure point concentration.

For this HHRA, U.S. EPA's ProUCL software version 3.0 (U.S. EPA, 2004c) was used to develop 95% UCLs based on the distribution of the data for each chemical. ProUCL provides recommendations for 95% UCLs for (1) normally distributed data sets, (2) log-normally distributed data sets, and (3) data sets that are neither normal nor log-normal (non-parametric data). In the event that the calculated 95% UCL exceed the maximum detected value, the maximum value was used as the exposure point concentration. The data evaluated are presented in Appendix F, and the ProUCL results are presented in Appendix G.

The presence of a chemical in some, but not all, samples suggests that it also may be present in the ND samples (samples in which the specific analyte under consideration was not detected) at some concentration between zero and the SQLs for each sample. The current default position of U.S. EPA (1989) is to substitute one-half the SQL for all NDs, which was used in the HHRA.

5.2.3.1 Soil

Construction workers could potentially access soil to a depth of 10 feet bgs. Thus, for direct soil contact by construction workers, the 95% UCLs were calculated using soil data to depths of 10 feet bgs. Appendix F presents the data used to calculate representative concentrations of

chemicals in soil. The results are summarized in Table 16, and the ProUCL output is presented in Appendix G. The final exposure point concentrations are summarized in Table 19.

5.2.3.2 Groundwater

Similar to soil, exposure to chemicals in groundwater via dermal contact requires direct contact with groundwater. The analytical results from grab groundwater samples collected across the entire Site (data from February and July 2006) were used because this dataset best represents current groundwater conditions. Calculation of representative concentrations for COPCs in groundwater is based on the 95% UCLs for each COPC. Appendix F presents the data used to calculate representative concentrations of chemicals in groundwater. The results are summarized in Table 17, and the ProUCL output is presented in Appendix G.

5.2.3.3 Soil Vapor

As a conservative measure the exposure point concentrations for soil vapor for the construction worker, off-site receptor, and future workers were based on the maximum concentration of each compound detected in on-site samples.

5.2.3.4 Indoor Air

Exposure point concentrations in indoor air for industrial workers were estimated using soil vapor representative concentrations and the Johnson and Ettinger model, as parameterized by U.S. EPA (2004e) and adjusted per Cal-EPA guidance (Cal-EPA, 2005). The model incorporates both advective and diffusive mechanisms for estimating the transport of chemical vapors emanating from the subsurface into indoor spaces located directly above or in close proximity to a source of chemicals. The model is a one-dimensional analytical solution to advective and diffusive vapor transport into indoor spaces and provides an estimated attenuation coefficient that relates the vapor concentration in the indoor space to the vapor concentration at the source.

The model was run independently for VOCs in soil vapor and noncarcinogenic PAHs in soil. Since noncarcinogenic PAHs were not analyzed in soil vapor samples, they were evaluated for vapor intrusion based on bulk soil data. This was conducted in accordance with the DTSC's vapor intrusion guidance document (DTSC, 2005) that recommends an evaluation of volatile constituents for the vapor intrusion pathway.

Site-specific conditions (based on soil parameter data collected during the focused soil vapor investigation and default assumptions regarding future building conditions) were used as inputs

to the model and are summarized in Table H-1 of Appendix H. The Johnson and Ettinger model spreadsheets are presented in Appendix H and results are summarized in Table 19.

Physicochemical properties used in the evaluation of fate and transport are included in Table 23.

5.2.3.5 Ambient Air

Exposure point concentrations for ambient air were estimated separately for particulates and volatile chemicals. For particulates, default particulate emission factors (PEF) for construction workers and off-site residents were used. A site-specific PEF was calculated for the future industrial worker exposure scenario using the dispersion model outlined in the soil screening guidance (Chi/Q model; U.S. EPA, 1996b). For volatile compounds, soil vapor concentrations were used in the volatilization factor model outlined in U.S. EPA's soil screening guidance (2002b) and were adjusted to incorporate soil vapor rather than soil concentrations. The results of both models were applied to the Chi/Q dispersion model (U.S. EPA, 2002b) to estimate ambient air concentrations. The quiescent surface impoundment model was used to estimate concentrations of chemicals migrating from exposed groundwater to ambient outdoor air in a trench. For VOCs in soil, the maximum soil vapor concentrations and the Farmer model (U.S. EPA, 1988) were used to estimate the flux and air concentrations in a trench were calculated using the estimated fluxes and a dispersion box model. Together, the Farmer and box models provide conservative estimates of the contribution of VOCs in soil gas to ambient air in a trench. Further information regarding the ambient air evaluation is presented in Appendix H.

5.2.4 Exposure Equations

The "Annual Average Daily Dose" (AADD) or "Lifetime Average Daily Dose" (LADD) are the general parameters used to quantify exposure doses in site risk assessments. The AADD is used as a standard measure for characterizing long-term noncarcinogenic effects. The LADD addresses exposures that may occur over varying durations from a single event to an average 70-year human lifetime and are used to estimate potential carcinogenic risks.

The equations for calculating AADD and LADD for ingestion and inhalation exposures are those presented by the U.S. EPA in their 1989 RAGS guidance (U.S. EPA, 1989). The AADD and LADD equations for dermal exposures are taken from the 2004 RAGS dermal guidance (U.S. EPA, 2004d).

5.2.5 Exposure Assumptions

Exposure parameters are quantitative estimates of the frequency, duration, and magnitude of exposure to various media. The exposure parameters are based primarily on conservative default values provided by RWQCB, Cal-EPA, or U.S. EPA. However, in some cases, these default values were adjusted to account for site-specific considerations, including exposure frequency and exposure duration. Tables 21 through 23 present the exposure assumptions for the construction worker, off-site resident, and future industrial worker, respectively. For construction workers involved in trenching activities, we have conservatively assumed an exposure time and duration of 4 hours per day and 20 days, respectively.

5.3 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is two-fold (U.S. EPA, 1989):

- Hazard Identification evaluates available information regarding the potential for a chemical to cause adverse health effects in exposed individuals (hazard identification); and
- Dose-Response Assessment estimates the relationship between the extent of exposure and the increased likelihood (e.g., probability or chance) and/or severity of adverse effects.

Hazard identification entails determining if a chemical can cause an increase in a particular adverse effect (e.g., cancer) and the likelihood that the adverse effect will occur in humans. The result of hazard identification is a profile of the available toxicological information and its relevance to human exposure under conditions present in the environment.

Dose-response assessment entails quantifying the relationship between the dose of a chemical and the incidence of adverse effects in the exposed population. The result of the dose-response assessment is toxicity criteria that are used in the risk characterization to estimate the likelihood of adverse effects occurring in humans at different exposure levels. The toxicity criteria used to evaluate noncarcinogenic and carcinogenic health risks commonly are referred to as reference doses (RfDs) and slope factors (SFs), respectively.

The duration of exposure is considered in the development of RfDs. Exposure duration is divided into three categories for purposes of risk assessment (U.S. EPA, 1989):

- **Acute** refers to exposures for short durations measured in seconds, minutes, or hours and to effects that appear promptly after exposure.

- **Subchronic** refers to exposures of intermediate duration from 2 weeks to 7 years.
- **Chronic** refers to prolonged or repeated exposures and effects that develop only after exposures from 7 years to a lifetime.

The exposure durations for complete exposure pathways in this risk assessment include chronic and subchronic exposures. To be conservative, RfDs for chronic (lifetime) exposure have been used in this evaluation for both chronic and subchronic exposure durations.

The toxicity criteria were selected according to the following hierarchy:

- Cal-EPA, 2006, Toxicity Criteria Database (on-line), Office of Environmental Health Hazard Assessment, Sacramento, California;
- U.S. EPA, 2006, Integrated Risk Information System (IRIS): on-line database;
- U.S. EPA, 1997b, Health Effects Assessment Summary Tables, FY-1997 Annual, Office of Solid Waste and Emergency Response, Washington, D.C.; and
- U.S. EPA, 2004b, Region 9 Preliminary Remediation Goals, October.

In the event that an RfD or SF is not available for the oral or inhalation route of exposure, the RfD or SF for the other route (oral if inhalation is absent, inhalation if oral is absent) was used in the calculations. In addition, toxicity values were not available for evaluating dermal exposure; therefore, the oral RfDs or SFs were used. Tables 24 and 25 present toxicity criteria for noncarcinogenic and carcinogenic chemicals, respectively.

The Cal-EPA has developed the LeadSpread model to evaluate potential noncarcinogenic health concerns associated with lead exposure (Cal-EPA, 1999b). This mathematical model estimates blood-lead levels resulting from contact with lead in various media (e.g., soil, air, biota). The blood-lead level is of interest because most adverse human health effects are correlated in terms of blood-lead levels (e.g., a blood-lead level of “x” is associated with a particular adverse health effect). The LeadSpread model was used in this HHRA to evaluate potential health effects associated with exposure to lead in soil for construction workers.

5.4 RISK CHARACTERIZATION

Risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessments are integrated into quantitative or qualitative

estimates of potential health risks. Potential noncarcinogenic health effects, carcinogenic health risks, and lead exposure were characterized separately.

5.4.1 Noncarcinogenic Health Effects

Potential adverse noncarcinogenic health effects were evaluated using the hazard index (also called HI) approach, as recommended by U.S. EPA (1989). The first step in this approach was to compare the AADD for each chemical to the appropriate RfD. This comparison is expressed in terms of a “hazard quotient,” which is calculated as follows:

$$\text{Hazard Quotient}_i = \frac{\text{AADD}_i}{\text{RfD}_i}$$

Where: i = individual chemicals

AADD = Annual average daily dose (mg/kg-day)

RfD = Reference dose (mg/kg-day)

A hazard quotient less than or equal to one indicates that the predicted exposure to that chemical should not result in an adverse noncarcinogenic health effect (U.S. EPA, 1989). In cases where individual chemicals potentially act on the same organs or result in the same health endpoint (e.g., respiratory irritants), potential additive effects may be addressed by calculating a “hazard index” as follows:

$$\text{Hazard Index} = \sum_{i=1}^n \text{Hazard Quotient}_i$$

Where: i = individual chemicals

n = total number of chemicals

A hazard index less than or equal to one indicates acceptable levels of exposure for chemicals having an additive effect. In the HHRA, a screening level hazard index was calculated by summing the hazard quotients for all chemicals, regardless of toxic endpoint, as recommended by agency guidance (U.S. EPA, 1989). This approach generally is believed to overestimate the potential for noncarcinogenic health effects due to simultaneous exposure to multiple chemicals because it does not account for different toxic endpoints (U.S. EPA, 1989; NRC, 1988; Risk Commission, 1997; Seed, et al., 1995). However, it can be used as a screening tool to rapidly identify those exposure scenarios for which exposure to multiple chemicals does not pose a noncarcinogenic health risk.

The acceptable health risk level relative to potential short-term acute and sub-chronic health effects was evaluated by comparing the short-term and intermediate-term exposure point concentration estimates for each COPC to the Office of Environmental Health Hazard Assessment (OEHHA) Acute Reference Exposure Levels (RELs) and the Permissible Exposure Limits (PELs) issued by the United States Occupational Safety and Health Administration (OSHA). The Acute RELs apply to short-term maximum exposure levels over periods of one to eight hours (Cal-EPA, 2003). The PELs are occupational safety standards that apply to eight-hour time weighted average exposures.

The following sections summarize the results of the noncarcinogenic risk characterization; summary hazard indexes are presented in Tables 26A, and 27 through 28; the calculations supporting these values are presented in Appendix I.

5.4.1.1 Construction Worker

For the construction worker, based on the modeled short-term exposure to volatile emissions and intermediate-term exposure to particulate emissions, none of the COPC exposure point concentrations exceed the acute/sub-chronic toxicity threshold criteria (i.e., Acute RELs or PELs). With respect to long-term chronic multi-chemical and multi-pathway exposure, the hazard index is 3, which is above the acceptable level of 1.0. Based on the modeled short-term exposure to volatile emissions and intermediate-term exposure to particulate emissions, none of the COPC exposure point concentrations exceed the acute/sub-chronic toxicity threshold criteria (i.e., Acute RELs or PELs; Table 26B).

5.4.1.2 Off-Site Resident

For the off-site residential receptor, the hazard index is 0.02, which is below the acceptable level.

5.4.1.3 Future Industrial Worker

For the future indoor industrial worker, the hazard index is 0.02, which is below the acceptable level.

5.4.2 Carcinogenic Risk

Carcinogenic health risks are defined in terms of the increased probability of an individual developing cancer as the result of exposure to a given chemical at a given concentration. As required by Cal-EPA (1996) and U.S. EPA (1989), lifetime excess cancer risks are estimated as follows:

$$\text{Lifetime Excess Cancer Risk}_i = \text{LADD}_i \times \text{SF}_i$$

Where: i = individual chemicals

LADD = Lifetime average daily dose (mg/kg-day)

SF = Slope factor (mg/kg-day)⁻¹

As with hazard indexes, the estimated excess cancer risks for each chemical and exposure route are summed regardless of toxic endpoint to estimate the total excess cancer risk for the exposed individual.

Regulatory agencies such as U.S. EPA and Cal-EPA have defined what is considered to be an acceptable level of risk in similar, though slightly different, ways. The U.S. EPA considers 1×10^{-6} to 1×10^{-4} to be the target range for acceptable risks at sites where remediation is considered (U.S. EPA, 1990a and 1990b). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than one-in-one-million (1×10^{-6}) are considered to be so low as to not warrant any further investigation or analysis (U.S. EPA, 1990a). Within the State of California, Cal-EPA also tends to work within the same target range for acceptable risks.

In accordance with the proposed conditions of certification agreed to by the City, the CEC, and the Water Board, the risk to off-site receptors shall not exceed 1×10^{-6} and the hazard index shall not exceed 1.0. The risk to construction/utility and industrial workers shall not exceed 1×10^{-5} and a hazard index of 1.0.

It should be noted that cancer risks in the 1×10^{-6} to 1×10^{-4} range or higher do not necessarily mean that adverse health effects will be observed. Current methodology for estimating the carcinogenic potential of chemicals is not believed to underestimate the true risk, but could overestimate the true risk by a considerable degree. In fact, the range of possible risks includes zero (i.e., that exposure to low levels of a carcinogen may not result in any increased risk of cancer).

The following sections summarize the results of the carcinogenic risk characterizations for the receptors evaluated. The summary total estimated lifetime excess cancer risks are presented in Tables 29-31; the calculations supporting these values are presented in Appendix G.

5.4.2.1 Construction Worker

For the construction worker, the carcinogenic risk estimate is 2×10^{-4} , which exceeds the target risk level of 1×10^{-5} , for construction workers.

5.4.2.2 *Off-Site Resident*

For the off-site residential receptor, the carcinogenic risk estimate is 1×10^{-6} , which is at the 1×10^{-6} *de minimis* risk level, indicating that potential exposures to chemicals migrating from the Site into ambient air should not result in adverse health effects.⁵

5.4.2.3 *Future Industrial Worker*

For the future indoor industrial worker, the carcinogenic risk estimate is 4×10^{-6} , which exceeds the 1×10^{-6} *de minimis* risk level, but is below the 1×10^{-5} target risk level used by several agencies for occupational exposures and is the target risk level for this project.

5.4.3 **Lead Exposure**

The Cal-EPA Lead Spread model was used to evaluate potential health risks to lead by construction workers. As recommended in the California Code of Regulations (CCR) Title 8, Section 1532.1, the Lead in Construction standard is 30 micrograms per deciliter ($\mu\text{g}/\text{dL}$).

The output from the Lead Spread model is presented in Appendix J. The estimated 99th percentile blood-lead level for the construction worker from potential exposures to lead is 10.1 $\mu\text{g}/\text{dl}$. This estimated 99th percentile blood-lead level is below the level of concern established in California's Lead in Construction standard (30 $\mu\text{g}/\text{dl}$) for construction workers, indicating that exposure to lead in soil stockpiles and native soil should not pose an unacceptable health risk.

5.4.4 **Asbestos Exposure**

As described in Section 5.1, asbestos, which is naturally occurring in serpentine rock found in many construction projects and areas of California, was detected in three samples. The presence of asbestos serpentine rock observed in the fill soil at the Site. The risk associated with potential exposure to asbestos fibers is related to the potential for the asbestos in the rock to be friable and become airborne as well as the size of the airborne fiber. Because the amount of respirable asbestos in the fill that could become airborne is not known, potential risk to asbestos in soil is not typically quantitatively evaluated. Any potential impacts associated with emissions of respirable asbestos that could be present in the fill will be managed under a risk

⁵ This result is largely attributed to the conservative assumption that hexavalent chromium (CrVI) is present based on the highest percentage of CrVI reported in soil. In samples where CrVI was detected above the laboratory reporting limits, the results indicate that chromium is primarily present in soil as trivalent chromium. Changing this assumption to the average percentage results in a lifetime excess cancer risk of 8×10^{-7} . Moreover, these risks are calculated at the fence line whereas the nearest residential receptor is approximately 1600 feet away from the fence line.

management plan. In addition, workers engaged in construction activities will be subject to the asbestos construction standard.

5.5 UNCERTAINTY ANALYSIS

Uncertainty is inherent in many aspects of the risk assessment process, and generally arises from a lack of knowledge of (1) site conditions, (2) toxicity and dose-response of the COPCs, and (3) the extent to which an individual will be exposed to those chemicals. This lack of knowledge means that assumptions must be made based on information presented in the scientific literature or professional judgment. While some assumptions have significant scientific basis, others have much less.

An understanding of the uncertainties associated with this risk assessment provides the risk manager with additional information considered during risk management. This discussion is generally qualitative in nature, reflecting the difficulty in quantifying the uncertainty in specific assumptions. These uncertainties may result in overestimation or underestimation of the potential health risks and hazards. However, the assumptions generally utilized in this assessment were selected in a manner that purposefully biases the process toward health conservatism.

5.5.1 Data Evaluation and Selection of Chemicals of Potential Concern

The selection of site-related COPCs was based upon the results of the sampling and analytical program established for the Site. The factors that contribute to the uncertainties associated with the identification of COPCs are inherent in the data collection and data evaluation processes, including appropriate sample locations, adequate sample quantities, laboratory analyses, data validation, and treatment of validated samples.

The predominant sources of uncertainty and potential bias associated with site characterization are based on the procedures used for site investigation (including sampling plan design and the methods used for sample collection, handling, and analysis) and from the procedures used for data evaluation. A relatively comprehensive sampling program was implemented to account for the chemicals most likely to be present at the Site as a result of past Site history and activities.

Inorganic metals in soil were identified as site-related COPCs without a formal comparison to site-specific background concentrations. For groundwater, metals were conservatively selected as a COPC if they were detected in at least one sample. Some of the metals selected as COPCs

may actually be naturally occurring. This condition likely resulted in retaining more metals for quantitative risk evaluation rather than eliminating metals as background, which likely overestimates the risk related to chemical impacts from the Site. For example, arsenic is a naturally occurring element; inorganic arsenic is present in many kinds of rock, especially ores that contain copper, lead, iron, nickel, and other metals. Arsenic in naturally occurring rock can leach out into groundwater; however, for the purpose of this HHRA, arsenic is treated as a COPC, unrelated to naturally occurring site-background levels.

5.5.2 Exposure Assessment

Risk assessments require assumptions in order to assess potential human exposure. This risk assessment includes assumptions about general characteristics and potential patterns of human exposure. The assumptions made in this assessment were based on Cal-EPA guidance.

5.5.2.1 Exposure Point Concentrations

For COPCs that were not detected in all samples, one-half the SQL was used as the surrogate concentration in non-detect samples for purposes of calculating the arithmetic average and 95% UCL concentrations. U.S. EPA guidance (1992a) indicates that substitution of one-half the SQL is adequate when the proportion of non-detects is less than 10 to 15 percent. If the fraction of non-detects becomes large, then assuming that the value of each non-detect is equal to one-half the SQL will generally overestimate the expected true mean concentrations, with the degree of overestimation increasing with increasing proportions of non-detects.

In some cases, the maximum detected concentration was used as conservative estimates of average Site concentrations. Specifically, soil vapor exposure point concentrations were based solely on the maximum detected concentrations regardless of the sample location for each compound detected on site. This methodology likely results in an overestimation of exposures and subsequent health risks.

Furthermore, exposure intakes were calculated based on the assumption that current conditions would remain stable throughout the exposure period, even though natural attenuation processes are expected to reduce constituent concentrations over time, especially for vinyl chloride in soil vapor. This would tend to result in an overestimation of the potential health risks.

5.5.2.2 Environmental Fate and Transport

Fate and transport models were used to estimate indoor and ambient air concentrations of COPCs volatilized from soil and groundwater. The Johnson and Ettinger (J&E) model was

used to estimate chemical attenuation factors and indoor air concentrations (U.S. EPA, 2004d). The 2005 Soil Vapor Intrusion Guidance document (DTSC, 2005) was considered for the vapor intrusion pathway. While some site-specific conditions were incorporated into the model, the model results typically are conservative, which likely overestimates risk.

For example, it has been documented that the potential migration of soil vapor into indoor air is highly variable and depends on a number of site-specific factors, including soil type within the vadose zone (e.g., air permeability), porosity, and moisture content. To account for this uncertainty, the modeling effort employed here incorporated a number of default conservative assumptions, including building type, air exchange rates, and areas of infiltration. The use of these parameters likely leads to the overestimation of chemical exposures

When evaluating the inhalation of vapors volatilized from soil, the models assume no soil absorption, an infinite supply of affected soil, and that more than 100 percent of the chemical vapors will be available in the breathing space of future receptors. The model does not take into consideration the potential elimination of chemicals in the vadose zone via biodegradation or other natural attenuation processes during transport. These assumptions are conservative and likely result in an overestimation of exposures and subsequent health risks.

Furthermore, the model assumes a slab-on-grade construction. The area through which VOCs could pass was assumed to be the area of cracks or other breaches in the concrete. This parameter is highly dependent on specific construction characteristics. Well-defined estimates of the fraction of floor space with cracks are generally not available. Therefore, a conservative estimate of the area was employed. However, based on existing building construction standards and different types of foundations that may be employed at the Site, actual infiltration rates of VOCs into indoor air may be much lower than those assumed here. Further, the buildings at the SFERP Site will likely be under positive pressure with a heating ventilation air conditioning (HVAC) system that is operational during working hours, and therefore reducing potential volatilization as a result of advection processes.

5.5.2.3 Exposure Assumptions and Parameters

The exposure assessment is based on a reasonable maximum exposure (RME) scenario, which is defined by U.S. EPA as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site (U.S. EPA, 1989). To achieve this goal, the RME is based on highly conservative exposure assumptions. These assumptions include parameters such as soil ingestion rates, skin surface area exposed to soil, inhalation rates, exposure frequencies, and

exposure durations. Most of the exposure assumptions used in this HRA are recommended default regulatory values that represent the upper 90th or 95th percentiles. The combination of several upper-bound estimates to calculate chemical intake tends to overestimate the resulting risks. For example, the evaluation assumes that a commercial worker will be present on site for 250 days/year for 25 years. This and other upper-bound estimates of exposure most likely overestimate the potential health risks associated with exposure to the COPCs in soil.

5.5.3 Toxicity Assessment

5.5.3.1 Uncertainty in Toxicity Criteria

One of the largest sources of uncertainty in any risk assessment is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. The majority of available toxicity data are from animal studies, which are then extrapolated using mathematical models or multiple uncertainty factors to generate toxicity criteria used to predict what might occur in humans. Sources of conservatism in the toxicity criteria include:

- The use of conservative methods and assumptions to extrapolate from high-dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals;
- The use of dose-response data from experiments on homogeneous, sensitive animal populations to predict effects in heterogeneous human populations with a wide range of sensitivities;
- The assumption that chemicals considered to be carcinogens do not have thresholds except where data support an alternative determination (i.e., for all doses greater than zero, some risk is assumed to be present); and
- Use of single-chemical test data that do not account for multiple exposures or synergistic and antagonistic responses.

The toxicity criteria used in the HHRA are based on an evaluation of noncarcinogenic and carcinogenic health risks that were developed using different methods. The noncarcinogenic criteria (i.e., oral and inhalation RfDs) incorporate multiple uncertainty factors to account for limitations in the quality or quantity of available data (e.g., animal data in lieu of human data).

The carcinogenic toxicity criteria (i.e., oral and inhalation SFs) also are developed using techniques that purposefully bias the criteria toward health protection. For example, most SFs are based on the premise that cancer data from high-dose animal studies will predict cancer

response in humans at dose levels thousands of times lower. The process also assumes that the carcinogenicity of a chemical in an animal model is representative of the response in humans. Finally, the statistical techniques used by regulatory agencies to extrapolate data from animals to human exposures generally assume that the dose-response curve is linear and that the 95% UCL of the slope is representative of the chemical's carcinogenic potency. In aggregate, these assumptions overestimate the actual risk estimates such that they are unlikely to be higher, but could be considerably lower and, in fact, could be non-existent.

One source of uncertainty with assessing the toxicity and risk of chemicals in the environment is that certain substances are sometimes found in mixtures. Assessing the toxicity and health risk of one or even several chemicals in a mixture and not accounting for the others can potentially lead to either overestimating or underestimating potential health effects.

5.5.3.2 Lack of Route-Specific Toxicity Criteria

For some COPCs, there are no toxicity criteria data for the inhalation route of exposure. Therefore, the SF or RfD for the oral route was used to evaluate inhalation exposures. As a result, the health risk estimates for inhalation exposures may be over- or underestimated.

Dermal Exposure to PAHs – The evaluation of potential cancer risks associated with dermal contact with PAHs is a controversial issue. There are currently no technically valid methods to quantitatively evaluate the potential dose-response associated with dermal exposure to PAHs. Dermal exposure pathways are currently evaluated using oral cancer slope factors. This approach, while standard practice in California, is not recommended by the U.S. EPA RAGS guidance (U.S. EPA, 1989). Nevertheless, quantitative estimates of potential risks associated with dermal contact with PAHs were calculated. These values are highly uncertain.

5.5.3.3 Weight-of-Evidence of Carcinogenicity

As shown in Table 25, U.S. EPA assigns weight-of-evidence classifications to potential carcinogens. Constituents evaluated quantitatively in this assessment are classified as Group A, Group B1, Group B2, or Group C, and are defined as follows.

- Group A constituents (known human carcinogens) are agents for which there is sufficient evidence to support a causal association between exposure to the agents in humans and cancer.
- Group B1 constituents (probable human carcinogens) are agents for which there is limited evidence of carcinogenicity in humans.

- Group B2 constituents (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or no evidence in humans.
- Group C constituents (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or no human data.

For this HHRA, three of the chemicals evaluated were identified in Group A, one was identified in Group B1, 14 were identified in Group B2, and two were identified in Group C. The remaining chemicals were classified as insufficient data (Group D) or currently are not assigned to a group by U.S. EPA. Quantitative cancer risk characterization generally is performed for all Group A, B1, and B2 carcinogens identified at a site. A quantitative evaluation of Group C carcinogens and other chemicals identified as carcinogens typically is performed on a case-by-case basis because the weight-of-evidence in support of an association between constituent exposure and cancer is not as strong as for Groups A, B1, and B2. To be conservative, all eight of these chemicals were evaluated quantitatively as carcinogens.

5.5.4 Uncertainty Associated with Risk Characterization

One source of uncertainty that is unique to risk characterization is the assumption that the total risk associated with exposure to multiple chemicals is equal to the sum of the individual risks for each chemical (i.e., the risks are additive). Other possible interactions include synergism, where the total risk is higher than the sum of the individual risks, and antagonism, where the total risk is lower than the sum of the individual risks. Relatively little data are available regarding potential chemical interactions following environmental exposure to chemical mixtures. Some studies have been carried out in rodents given simultaneous doses of multiple chemicals. The results of these studies indicated that no interactive effects were observed for mixtures of chemicals affecting different target organs (i.e., each chemical acted independently), whereas antagonism was observed for mixtures of chemicals affecting the same target organ, but by different mechanisms (Risk Commission, 1997).

While there are no data on chemical interactions in humans to chemical mixtures at the dose levels typically observed in environmental exposures, animal studies suggest that synergistic and antagonistic effects will not occur at levels of exposure below their individual effect levels (Seed, et al., 1995). As exposure levels approach the individual effect levels, a variety of interactions may occur, including additive, synergistic and antagonistic (Seed, et al., 1995).

Current U.S. EPA guidance for risk assessment of chemical mixtures (U.S. EPA, 2000) recommends assuming an additive effect following exposure to multiple chemicals.

Subsequent recommendations by other parties, such as the National Academy of Sciences (NRC, 1988) and the Presidential/Congressional Commission on Risk Assessment and Risk Management (Risk Commission, 1997) have also advocated a default assumption of additivity. As currently practiced, risk assessments of chemical mixtures generally sum cancer risks regardless of tumor type and sum noncancer HIs regardless of toxic endpoint or mode of action. Given the available experimental data, this approach likely overestimates potential risks associated with simultaneous exposure to multiple chemicals.

5.5.5 Conclusions of Uncertainty Analysis

In summary, the uncertainties in this HHRA are due, in part, to the variability in the site-specific environmental data, variability and limitations inherent in the exposure models, and the uncertainty and conservatism build into estimates of chemical toxicity and potency. An analysis of the uncertainties associated with the HHRA indicates that the noncancer adverse health effects and the theoretical excess cancer risk estimates may overestimate the actual impacts to human health. Although many factors can contribute to the potential for over- or underestimating risk, a mix of conservative, protective, and upper-bound input values was selected to estimate potential exposures. Given that the largest sources of uncertainty generally result in overestimates of exposure or risk, it is believed that the results presented in this document are based on reasonable maximum exposure estimates and that the actual impacts to human health may be less than those estimated in this assessment.

6.0 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

A screening-level ecological risk assessment (ERA) was performed to evaluate whether constituents detected in soil and groundwater from the Site could result in adverse impacts to plants, animals, and ecologically valuable habitats in the vicinity of the Site based on current and future Site use.

6.1 SITE CONCEPTUAL MODEL

The 4-acre Site is located in a heavily industrialized area in southeast San Francisco. The Site has been cleared of all permanent structures, and the only current temporary facilities on the property include construction trailers, a laydown area for construction materials for the adjacent MUNI construction project, and a non-operating concrete batch plant. These temporary facilities will be removed prior to the construction of the SFERP. The parcel directly east of the Site is currently being used for trucks, chassis, and equipment storage and separates the Site from the Bay, which is located approximately 160 feet from the northeast corner of the Site and 500 feet, on average, from the eastern property boundary. The shoreline along the Bay is

protected with rip-rap, and the upper bank is covered with weedy vegetation and other non-native grasses and shrubs. Depth to groundwater underlying the Site, as measured during the February 2006 and July 2006 supplemental investigations, occurs between approximately 8 and 13 feet bgs; groundwater is expected to flow generally to the east and northeast toward the Bay. Based on the groundwater gradient at the Site, grab groundwater samples were collected from borings advanced along the eastern perimeter of the Site to assess current conditions and to evaluate the possibility that groundwater is a transport mechanism for constituents migrating from the Site into the Bay (i.e., Supplemental Investigation described in Sections 3 and 4).

6.2 POTENTIAL ECOLOGICAL RECEPTORS

Potential receptors typically evaluated as part of an ecologic risk evaluation include terrestrial, avian, and aquatic receptors. These receptors would be potentially exposed to chemicals of potential ecological concern (COPECs) in soil and groundwater at the Site.

The Site is characterized by hard-packed dirt that is unvegetated and covered primarily with gravel. Only sparse non-native grasses and forbs are found on the Site. There are no remaining features that provide habitat for native plant and wildlife species. Based on design plans for the plant, much of the Site is expected to be covered by artificial landscaping, buildings, electrical utilities, and/or paved parking lots, thereby eliminating the potential for exposure to soil. The presence of the developed Site and the lack of natural habitats and supporting vegetation within the Site perimeter because of the surrounding industrial setting would limit exposures by terrestrial organisms and avian species to COPECs in soil and groundwater.

The presence of chemicals in soil at the Site likely resulted from placement of fill material in the Bay margin to create the Site and possibly from historical railroad operations. Some chemicals in soil can potentially leach from soil and migrate to groundwater. VOCs and metals can move in groundwater, depending on conditions and their physical chemical properties. For the ERA, it was assumed that chemicals detected in groundwater could potentially at some time migrate off site and discharge into surface water of the Bay, where marine organisms (i.e., water column and benthic organisms) could be exposed. Therefore, the ERA addresses COPECs in groundwater and the potential impacts to marine aquatic organisms in the Bay.

6.3 IDENTIFICATION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN

As previously described, chemicals present in groundwater could potentially impact the aquatic environment if the chemicals migrate from the Site into the Bay. A summary of the chemicals

considered to be COPECs and chemical fate and transport properties for the organic COPECs is provided in this section.

Grab groundwater samples were collected at the Site in February 2006 by CH2M Hill and in July 2006 by Geomatrix. Grab groundwater samples were collected from 21 on-site and three off-site borings (SB-31, SB-54, and SB-55) near the northeast corner in an area hydraulically downgradient of the Site. Analytical results of grab groundwater samples are presented in Tables 7 through 11; statistical summaries of chemicals reported in on-site borings are presented in Table 33 and Tables F-6 to F-9 of Appendix F.

COPECs in grab groundwater samples were identified by comparing the maximum concentrations from on-site borings to established pathway-specific (i.e., surface water screening levels for a marine habitat) environmental screening levels (ESLs) published by the Water Board (Table F-4a, RWQCB, 2005). The ESLs incorporate screening values from numerous sources including the Region 2 Basin Plan (RWQCBSF, 1995); the California Toxics Rule (CTR) as promulgated in 40 CFR Part 131: Water Quality Standards, Establishment of Numerical Criteria for Priority Toxic Pollutants for the State of California (U.S. EPA, 1992b); and the California EPA technical document, A Compilation of Water Quality Goals (RWQCBCV, 2003). Other sources referenced include U.S. EPA's Ecotox Thresholds (U.S. EPA, 1996b) and U.S. EPA's National Recommended Water Quality Criteria (U.S. EPA, 2002c). It should be noted that certain ESLs for surface water in a marine habitat include values protective of fresh water, including drinking water. Criteria based on aquatic organism exposure in a marine environment were the primary values used, when available. Chronic exposures were used for comparison purposes, when available; otherwise, acute exposure values were used.

Based on this comparison, select metals (arsenic, copper, lead, nickel, vanadium, and zinc); PAHs; and TPHb, TPHd, and TPHmo were considered COPECs (Table 33).

6.3.1 Fate and Transport of PAHs and Petroleum Hydrocarbons

Fate and transport mechanisms are physical, chemical, and biological processes that affect the form and distribution of a chemical within the environment. Fate refers to a process that can change the structure of a chemical, such as biodegradation and hydrolysis, and transport refers to a process that dictates the environmental partitioning and movement of a chemical within and between compartments (e.g., air, soil, soil gas, and water) of the environment. Both the properties of a chemical and the characteristics of the environment in which it is found are

important for the understanding and prediction of chemical fate and transport (i.e., for predicting how chemicals might be released from sources and migrate to points in the environment where exposure might occur).

From the perspective of groundwater and surface water interactions, solubility is one of the key factors in determining compound behavior, and thus, the impact of a chemical in the environment. Solubility is expressed in terms of the number of milligrams of pure chemical that can be dissolved in 1 liter of water under standard conditions of 25 °C and 1 atmosphere of pressure. The solubility of an organic compound determines its propensity to dissolve into water. The greater its solubility, the greater the likelihood that a chemical will dissolve in groundwater and migrate away from the release area. Solubility generally decreases with increasing molecular weight of the hydrocarbon compounds.

PAHs are typically associated with heavy-end fuel oils and are commonly found in soil at industrial sites. The physical properties of PAHs, which in turn affect their mobility in the environment, largely depend on the size of the molecules; therefore, molecular weight is a key property. Vapor pressures and solubilities vary widely within the class and can be correlated with molecular weight. Volatilization may be a significant transport mechanism for low molecular weight PAHs such as naphthalene, but is much less significant for the higher molecular weight compounds such as indeno(1,2,3-c,d)pyrene. The relatively high solubilities of the lower molecular weight PAHs can result in some migration to and within groundwater. The higher molecular weight PAHs⁶, such as benzo(a)pyrene, are expected to adhere tightly to soil and are generally not considered very mobile, especially if the soil is high in organic carbon content (ATSDR, 1995). For these constituents, the solubilities are very low and the octanol-water partition coefficient (K_{ow}) is correspondingly high (Table 20). This, coupled with low volatilities (Henry's Law constant) and general chemical stability, means that higher molecular weight PAHs are environmentally persistent compounds that are strongly held to solids. If released to groundwater, PAHs are expected to adsorb strongly to sediments and particulate matter (ASTDR, 1995). It should be noted that most non-dissolved colloidal PAHs (i.e., smaller than 0.7 micron) would be expected to pass through the glass fiber filter used in the analysis of samples collected by Geomatrix in June 2006, as indicated based on detections above the laboratory MDLs (see paragraph below and Section 6.4).

⁶ Higher molecular weight (> 228 g/mol) PAHs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene (ASTDR, 1995).

The tendency of PAHs to adsorb to sediments and particulate matter and the limited mobility of PAHs are strongly supported by data collected at the Site. Although PAHs were detected in soil throughout the Site, PAHs were sporadically detected in groundwater; the higher molecular weight PAHs were detected above the laboratory SQLs in only 8 of 16 unfiltered grab groundwater samples. In samples analyzed following filtration, PAHs were not detected above the laboratory SQL (including duplicates) in six on-site grab (and two off-site) groundwater samples; estimated detections above the laboratory MDLs were reported for some of the higher molecular weight PAHs at up to four on-site samples (SB-32, SB-34, SB-35, and SB-36) and two off-site samples (SB-54 and SB-55).

The limited mobility of PAHs is further evidenced by the concentrations of PAHs reported in unfiltered grab groundwater samples downgradient of boring SB-24 (i.e., SB-23, SB-26, and SB-27). The highest concentrations of PAHs in groundwater were reported in boring SB-24. In downgradient unfiltered grab groundwater samples, the concentrations of PAHs were either below the concentrations reported in SB-24 or were not detected above the laboratory SQLs. Additionally, no PAHs were detected above the laboratory SQLs from the unfiltered groundwater samples in boring SB-28, where the second highest concentrations of PAHs were reported in soil at 5 feet bgs (5,100 µg/kg benzo(a)pyrene) but at lower concentrations in soil from 10 feet bgs (160 µg/kg) near the groundwater table. These data suggest that the PAHs are not mobile and that the detections of PAHs in groundwater at other boring locations, where considerably lower concentrations of PAHs were reported in soil, do not represent dissolved-phase PAHs, but rather PAHs adsorbed to suspended particulate matter that is typically present as a result of sampling methodologies during grab groundwater sample collection (Foote, et al., 1997 and U.S. EPA, 2005).

The fact that PAHs adsorbed to particulate matter represent non-dissolved PAHs is supported by the findings from boring SB-24. According to the boring logs, shallow grab groundwater was collected from a bottom depth of approximately 11.5 feet below grade. As indicated in Table 3, elevated concentrations of PAHs were reported in soil from this same boring at 10 feet bgs. Based on this information, non-dissolved PAHs were likely included in the sample, and the non-dissolved fraction in the sample was likely extracted along with groundwater. Thus, the detections of PAHs in groundwater from boring SB-24 potentially represent a false positive result and are likely attributed to affected soil entrained in the grab groundwater sample rather than dissolved PAHs that are mobile in groundwater.

Similar to PAHs, the longer-chain petroleum hydrocarbons tend to be relatively insoluble and immobile in groundwater. TPHb, TPHd, and TPHmo each were detected in approximately 100 percent of groundwater samples without filtration or silica gel preparation. Silica gel preparation is commonly used prior to TPH sample analysis (RWQCB, 1999) due to naturally occurring organic constituents that mimic TPH in the analysis. To assess the dissolved fractions of TPH in a sample, it is important to remove potential sources (i.e., non-dissolved constituents) and interferences prior to analysis. Studies have shown that the use of silica gel preparation and filtering with a 0.7-micron glass fiber filter generally reduce or remove polar non-hydrocarbons and non-dissolved TPH, respectively, without significantly affecting the dissolved petroleum hydrocarbon in the samples (Foote, et al., 1997 and Zemo and Foote, 2003). The dissolved fractions of TPHb and TPHd were detected in 20 and 80 percent of the samples, respectively, at significantly lower concentrations following filtration and silica gel preparation to remove polar biogenic material. TPHmo was not detected above the laboratory reporting limits following filtration and silica gel preparation.

6.3.2 Data Evaluation

In this step, analytical results that were considered representative of dissolved-phase COPECs flowing from the Site to off-site areas, including the Bay, were evaluated for the ERA.

According to U.S. EPA's Office of Water, concentrations of dissolved metals, rather than total metals, should be used to set and measure compliance with water quality standards because dissolved metal concentrations more closely approximate the bioavailable fraction of metals in the water column (U.S. EPA, 1996c). Because grab groundwater sampling may result in turbid samples (i.e., turbidity refers to the presence of suspended particles in the sample), sample turbidity can cause bias as a result of the adsorption of chemicals onto, or the release of chemicals from, the surface of particles in the sample (Yeskis and Zavala, 2002). Sample collection practices that induce artificially high levels of turbidity have been shown to have the greatest negative impacts on sample quality (Puls and Powell, 1992). The goal of the ERA is to consider groundwater data that are representative of existing conditions that could potentially affect San Francisco Bay. Thus, groundwater samples following filtration and silica gel preparation for PAHs and TPH were considered representative of dissolved COPECs that could potentially migrate from the Site into the Bay.

All results for metals in groundwater were either laboratory filtered (March 2006) or field filtered (June 2006) and were considered representative of dissolved metals. However, as discussed above, filtration and silica gel preparation were not conducted for TPH and PAHs in

samples collected in March 2006 from on-site borings SB-16 through SB-30 and off-site boring SB-31. Analytical results of TPH and PAHs from these locations were not considered representative of groundwater potentially migrating from the Site to the Bay or of dissolved TPH/PAHs, but rather represent non-dissolved TPH/PAHs (i.e., sediment) or polar non-hydrocarbon compounds. Non-dissolved TPH/PAHs are frequently entrained within a sample due to the turbidity of grab groundwater samples. The results of grab groundwater samples containing significant amounts of sediment do not represent dissolved chemical concentrations in groundwater. Thus, it was judged that the results for TPH and PAHs without filtration and silica gel preparation do not provide an accurate assessment of dissolved constituents potentially migrating from the Site into the Bay.

As indicated in Section 6.1, dissolved COPECs detected in at least one grab groundwater sample from on-site borings advanced along the eastern perimeter were considered representative of groundwater conditions flowing from the Site into adjacent off-site areas and ultimately into the Bay. Only dissolved-phase chemicals detected in at least one sample above the laboratory MDL were evaluated in the ERA. Benzo(a)pyrene, benzo(b)fluoranthene, and benzo(g,h,i)perylene were not detected above the laboratory MDLs and were not further considered as COPECs.

6.4 DISCUSSION OF POTENTIAL ECOLOGICAL IMPACTS

As a screening-level evaluation, the potential for COPECs in groundwater to pose a risk to aquatic organisms in the Bay was evaluated by comparing representative dissolved-phase groundwater data to published environmental screening levels for aquatic receptors to assess the potential adverse impacts on the marine habitat. This section is separated into an evaluation of groundwater data collected from on-site borings and off-site borings.

The non-dissolved TPH and PAHs reported in groundwater from on-site borings SB-16 through SB-30 and off-site boring SB-31 are likely indicative of chemicals adsorbed to soil. As described in Section 5, an exposure pathway is complete if there is a source and transport mechanism, an environmental medium (e.g., sediment) for the released chemical, a point of potential contact with the medium, and an exposure route (e.g., ingestion and dermal contact). All four elements must be present for an exposure pathway to be complete. Potential exposures to aquatic receptors from PAHs adsorbed to soil at depth are incomplete under current conditions because an environmental transport mechanism does not exist that would transport insoluble PAHs from soil at depth to sediments along the shoreline of the Bay. Furthermore,

the results from downgradient borings SB-54 and SB-55 suggest that the mobile fractions are not migrating to the Bay at concentrations of concern.

It should be noted that the comparison of groundwater concentrations to surface water criteria is provided for screening-level purposes, and actual surface water concentrations would likely be significantly less due to surface water (i.e., San Francisco Bay)–groundwater interactions in the tidal zone. This method of evaluating chemicals also should be considered very conservative because it does not take into account the potential dilution of groundwater from the Site as it enters the Bay. In addition, the criteria used in this evaluation assume that the aquatic organisms are living in the water being evaluated. In this analysis, applicable aquatic screening criteria are being compared directly to groundwater chemical concentrations from locations well removed from a point of potential receptor exposure and without accounting for the attenuation that will likely occur as groundwater is discharged into the Bay. Therefore, exceedance of these levels in groundwater is not necessarily indicative of a significant risk to aquatic organisms in the Bay.

6.4.1 On-Site Evaluation

Dissolved COPECs identified in groundwater from on-site borings along the eastern perimeter were evaluated by comparing the maximum detected concentrations to the Water Board ESLs for marine aquatic organisms (RWQCB, 2005). The use of a maximum concentration is considered conservative because a single measurement of a chemical concentration is not representative of the concentration to which an individual organism would be exposed across an affected area or over time. In addition, if groundwater discharge occurs, it likely occurs along the broad interface of the Site (i.e., the eastern perimeter) with the Bay.

As shown in Table 33, the maximum concentrations for all COPECs, except for copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene, are less than the applicable objectives and criteria (Table 33).

The chronic aquatic criteria used in this screening evaluation are considered conservative. The detected concentrations of dissolved copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene in groundwater prior to entering the Bay likely would be reduced 10-fold or greater due to tidal influence. Based on an attenuation factor of 10 that has been used at other bayfront sites (e.g., Mission Bay, San Francisco International Airport, East Bay Shoreline Park; personal communication, Water Board, 2006), the maximum concentrations for copper, lead,

benzo(a)anthracene, and indeno(1,2,3-cd)pyrene from on-site borings are below applicable screening criteria.

6.4.2 Off-Site Evaluation

Analytical results of grab groundwater samples from off-site borings were evaluated to further assess the potential transport of dissolved COPECs from the Site to the Bay. Analytical results of groundwater samples collected from off-site boring SB-31 indicate that the concentrations of copper, mercury, nickel, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, TPHb, TPHd, and TPHmo are above the marine aquatic ESLs. Based on an attenuation factor of 10, only copper, mercury, and benzo(a)pyrene are present at concentrations above the marine aquatic ESLs. However, the concentration of copper reported in boring SB-31 appears to be an anomaly with no apparent pattern in the distribution of detections. The concentrations of copper in groundwater from adjacent borings (on-site boring SB-35 and off-site and downgradient borings SB-54 and SB-55) are at least 24 times lower than the result reported in SB-31. In addition, the concentrations of mercury, nickel, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, TPHb, TPHd, and TPHmo in the surrounding borings are all below the marine aquatic ESLs based on an attenuation factor of 10.

The lack of an apparent pattern suggests that the presence of copper and mercury in grab groundwater samples from boring SB-31 is localized, which is consistent with the diffuse background source of metals from the fill materials throughout the surrounding areas. Similarly, the lack of detections of benzo(a)pyrene suggest that the chemical is not migrating. Furthermore, the reported MDLs for benzo(a)pyrene for groundwater samples from borings SB-54 and SB-55 are below the marine aquatic ESL and are appropriate for evaluation of ecological risk to aquatic receptors.

The results from off-site boring SB-31 compared to the results from the surrounding borings suggest that the presence of COPECs is localized and further supports the limited migration of COPECs in groundwater.

6.5 SUMMARY OF POTENTIAL ECOLOGICAL IMPACTS

In summary, the COPECs in groundwater are not expected to pose a significant risk to aquatic organisms for the following reasons:

- Detections of PAHs, particularly benzo(a)pyrene, in unfiltered grab groundwater above the marine aquatic ESLs are likely representative of non-dissolved PAHs adsorbed to suspended particulate matter that are typically present due to the turbidity of grab groundwater samples. The results of grab groundwater samples without filtration do not represent dissolved chemical concentrations in groundwater and are judged to be not representative of mobile constituents. Analytical results of dissolved COPECs were considered representative of mobile constituents in groundwater that could potentially migrate from the Site to the Bay;
- Potential exposures to aquatic receptors from the non-dissolved insoluble COPECs adsorbed to soil are incomplete under current conditions because an environmental transport mechanism does not exist that would transport insoluble COPECs from soil to sediments along the shoreline of the Bay. Furthermore, the results from downgradient borings SB-54 and SB-55 suggest that the mobile COPECs are not migrating to the Bay at concentrations of concern;
- Except for copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene, the maximum concentrations for dissolved chemicals detected in groundwater along the eastern perimeter are less than the applicable water quality objectives and criteria;
- Concentrations of chemicals detected in groundwater prior to entering the Bay would be reduced 10-fold or greater due to tidal influence. Based on an attenuation factor of 10 that has been applied at other bayfront sites, the concentrations of copper, lead, benzo(a)anthracene, and indeno(1,2,3-cd)pyrene on site along the eastern perimeter are below applicable screening criteria;
- Results from off-site boring SB-31 indicate that copper, lead, mercury, nickel, and several unfiltered PAHs and TPH without silica gel preparation were detected in shallow groundwater at concentrations above the marine aquatic ESLs. Based on an attenuation factor of 10, the concentrations of copper, mercury, and benzo(a)pyrene are above the marine aquatic ESLs. However, a comparison of groundwater data from off-site boring SB-31 and the nearby borings (on-site boring SB-35 and off-site downgradient borings SB-54 and SB-55) indicate that the concentrations of copper are more than 20 times lower in adjacent borings. Likewise, mercury and benzo(a)pyrene were not detected above the laboratory SQLs and MDLs, respectively. The presence of copper and mercury appears localized and is consistent with the diffuse background source of metals from the fill materials throughout the surrounding areas. Similarly, the lack of detections of benzo(a)pyrene suggests that the chemical is not migrating. Furthermore, the laboratory MDLs for benzo(a)pyrene in groundwater samples from borings SB-54 and SB-55 are below the marine aquatic screening criteria and are appropriate for evaluation of ecological risk to aquatic receptors.

Based on the information presented herein, the COPECs in groundwater are not expected to pose a significant risk to aquatic organisms as a result of shallow groundwater potentially migrating from the Site to the Bay. No further investigations or assessments are recommended.

7.0 CONCLUSIONS

Geomatrix conducted a supplemental investigation to collect additional soil, groundwater, and soil vapor data; these data, along with data collected by CH2M Hill in July/August 2005 and February 2006, were used to support a site-specific human health risk assessment and a site-specific screening-level ecological risk assessment for the proposed SFERP. The results of the risk assessments are summarized below.

7.1 HUMAN HEALTH RISK ASSESSMENT CONCLUSIONS

Potential noncarcinogenic hazard indices and theoretical excess lifetime cancer risks were estimated quantitatively for construction/utility workers, off-site residents during construction, and future industrial workers. It was determined that there would be no complete exposure pathway for off-site residents after construction, and that risks to off-site workers would be lower than those to off-site residents. For this project, the risk to off-site receptors shall not exceed 1×10^{-6} and the hazard index shall not exceed 1.0, and the risk to construction/utility and industrial workers shall not exceed 1×10^{-5} and a hazard index of 1.0. The results of the HHRA (Table 32) are summarized below.

7.1.1 Construction/Utility Worker

For the construction worker, both the HI (3) and the theoretical excess lifetime cancer risk estimate (2×10^{-4}) are above the target levels. Dermal contact and incidental ingestion of primarily PAHs in soil, and to a lesser extent arsenic, are the primary exposure pathways and chemicals contributing to the hazard index and risk.

The estimated 99th percentile blood lead levels are below the level of concern established in California's Lead in Construction standard (30 $\mu\text{g}/\text{dl}$) for construction workers, indicating that exposure to lead in soil should not pose an unacceptable health risk.

For potential acute and subchronic construction/excavation worker exposures, health risk management criteria applied by OSHA and Cal/OSHA are applicable. None of the exposure point concentration estimates developed to represent short-term or intermediate-term maximum exposures during construction activity exceeded their respective toxicity threshold limits (acute RELs or PELs).

7.1.2 Off-Site Receptor

For the off-site residential receptor, the HI (0.02) and the lifetime excess carcinogenic risk estimate (1×10^{-6}) are below the target hazard index of 1 and at the 1×10^{-6} *de minimis* risk level, respectively.

7.1.3 Future Industrial Worker

For the future industrial worker, the HI (0.02) and the lifetime excess carcinogenic risk estimate (4×10^{-6}) based on the subsurface vapor intrusion pathway are below the target hazard index of 1.0 and the target risk level of 1×10^{-5} .

7.2 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT CONCLUSIONS

Filtered shallow groundwater data were judged to be representative of dissolved organic constituents potentially migrating from the Site into the Bay. Potential exposures to aquatic receptors from non-dissolved insoluble chemicals adsorbed to soil are incomplete under current conditions because an environmental transport mechanism does not exist that would transport insoluble COPECs from soil to sediments along the shoreline of the Bay.

Potential exposures to aquatic receptors from dissolved COPECs in groundwater are not expected to pose a significant risk to aquatic organisms. Based on an attenuation factor of 10 that has been used at other bayfront sites (e.g., Mission Bay, San Francisco International Airport, and East Bay Regional Shoreline Park), the maximum concentrations of dissolved chemicals in shallow filtered groundwater are below applicable screening criteria and are not considered to represent a significant risk to aquatic organisms. Furthermore, the results from off-site downgradient borings SB-54 and SB-55 do not indicate that dissolved chemicals are migrating from the Site to the Bay at concentrations of ecological concern. No remedial action is anticipated to be protective of ecological receptors.

8.0 RECOMMENDATIONS

Further action to mitigate potential chemical exposure to construction workers to less than a hazard index of 1.0 and a 1×10^{-5} excess lifetime cancer risk, which are primarily driven by detections of carcinogenic PAHs in soil from borings SB-24 and SB-28 and, to a lesser degree, arsenic in soil from borings SB-1 and SB-3, may be appropriate.

Potential mitigation options include appropriate health and safety precautions and risk management measures to protect workers during future construction activities, thereby mitigating any potential exposures and health risk, or remediation could be conducted to

remove chemicals in soil that primarily contribute to the risk. The construction worker's exposure to soil during Site activities involving subsurface intrusion could be limited through the use of appropriate protective equipment, thereby reducing direct contact exposures from incidental soil ingestion and dermal contact. The focused assessment of elevated concentrations of PAHs in soil, which was one of the objectives of the supplemental investigation, indicates that elevated concentrations of PAHs in soil are limited in extent. Removing PAH and arsenic data in soil from the HHRA calculations would result in an estimated lifetime excess cancer risk estimate and hazard index of less than the target levels of 1×10^{-5} and 1.0, respectively, for construction workers.

9.0 LIMITATIONS

As in any risk assessment, the estimates of risk have many associated uncertainties. The procedures used in the HHRA result in conditional estimates of risk that incorporate assumptions concerning chemical toxicity, human exposure, and uncertainties. These elements may result in the underestimation of risks and hazards, as well as those that lead to overestimation. To be health protective, the types of assumptions used in the HHRA were conservative. To the extent possible, site-specific factors were incorporated into the HHRA. However, even the most site-specific risk assessment is still subject to uncertainty. Consequently, it is important that the magnitude of uncertainties and biases is considered when interpreting the health risk results.

The results of the risk evaluation are based on the future industrial use of the Site. A re-evaluation of potential human health risks at the Site may be required if Site use or conditions change. It is possible that currently unrecognized subsurface issues may be present at the Site. However, the health risk assessment has been prepared in a manner consistent with that generally used in agency guidance at the time it was prepared. It is likely that risk assessment methods and data identifying and quantifying the toxicity of chemicals will improve with time. Should Site use, conditions, or toxicity criteria change, the information and conclusions in this report may no longer apply.

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TABLES

TABLE 1

SOIL SAMPLE ANALYTICAL RESULTS - METALS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (total)	Chromium (hexavalent)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
<i>Previous Investigation - CH2M HILL²</i>																			
SB-1	0	7/23/2005	--	5.5	--	--	--	--	--	--	--	10	--	--	--	--	--	--	--
	5	7/23/2005	--	140	--	--	--	--	--	--	--	14	--	--	--	--	--	--	--
	10	7/23/2005	--	4.4	--	--	--	--	--	--	--	0.2	--	--	--	--	--	--	--
SB-2	0	7/30/2005	--	13	--	--	--	--	--	--	--	73	--	--	--	--	--	--	--
	5	7/30/2005	--	7.6	--	--	--	--	--	--	--	3.5	--	--	--	--	--	--	--
	10	7/30/2005	--	10	--	--	--	--	--	--	--	11	--	--	--	--	--	--	--
SB-3	0	7/23/2005	--	6.2	--	--	--	--	--	--	--	19	--	--	--	--	--	--	--
	5	7/23/2005	--	460	--	--	--	--	--	--	--	670	--	--	--	--	--	--	--
	10	7/23/2005	--	140	--	--	--	--	--	--	--	360	--	--	--	--	--	--	--
SB-4	0	7/23/2005	--	5.8	--	--	--	--	--	--	--	8.9	--	--	--	--	--	--	--
	5	7/23/2005	--	26	--	--	--	--	--	--	--	47	--	--	--	--	--	--	--
	10	7/23/2005	--	22	--	--	--	--	--	--	--	2100	--	--	--	--	--	--	--
SB-6	0	7/27/2005	--	8.5	--	--	--	--	--	--	--	46	--	--	--	--	--	--	--
	5	7/27/2005	--	7.5	--	--	--	--	--	--	--	82	--	--	--	--	--	--	--
SB-7	0	8/2/2005	--	5.5	--	--	--	--	--	--	--	230	--	--	--	--	--	--	--
	3	8/2/2005	--	4	--	--	--	--	--	--	--	53	--	--	--	--	--	--	--
SB-13	0	7/25/2005	--	7.1	--	--	--	--	--	--	--	460	--	--	--	--	--	--	--
	3	7/25/2005	--	5	--	--	--	--	--	--	--	280	--	--	--	--	--	--	--
SB-14	0	7/22/2005	--	4.8	--	--	--	--	--	--	--	100	--	--	--	--	--	--	--
	3	7/22/2005	--	2.7	--	--	--	--	--	--	--	70	--	--	--	--	--	--	--
SB-16	0	2/27/2006	3.8	9.2	130	0.2	0.7	81	--	12	75	170	0.25	3.7	120	0.3	0.44	38	230
	5	2/27/2006	<3.2	0.77	14	<0.11	<0.27	1300	--	79	32	0.88	0.031	<1.1	1700	1.2	<0.27	42	32
	10	2/27/2006	35	24	290	0.65	1.8	58	--	11	200	1400	0.7	4.2	46	1.4	0.51	47	1600
SB-17	0	2/22/2006	<3	2.9	68	<0.1	0.34	430	--	64	40	20	0.033	<1	1300	<0.25	<0.25	44	49
	5	2/22/2006	<2.8	3.7	180	0.14	0.48	390	--	36	47	67	0.51	1.1	650	<0.23	<0.23	65	91
	10	2/22/2006	8.3	14	250	0.2	0.58	41	--	9.1	160	340	0.71	0.96	37	0.6	<0.24	53	300
SB-18	0	2/22/2006	<3.5	6.4	160	0.22	0.4	71	--	10	36	85	0.31	1.6	93	0.34	0.32	48	120
	5	2/22/2006	<3.5	4.3	160	0.3	<0.29	61	--	10	29	180	0.31	<1.2	39	0.75	<0.29	80	85
	10	2/22/2006	<4	6.4	140	0.36	<0.33	55	--	7.3	41	93	0.58	<1.3	31	<0.33	0.93	59	100
SB-19	0	2/27/2006	<3.6	8.4	130	0.27	0.47	120	--	17	42	96	0.4	<1.2	220	<0.3	0.97	51	110
	5	2/27/2006	<3.4	1.2	29	<0.11	<0.28	97	--	26	110	33	0.21	<1.1	52	0.94	0.85	78	99
	10	2/27/2006	<2.6	9.6	100	0.25	0.46	200	--	34	57	93	0.33	<0.87	580	0.74	0.29	63	100
SB-20	0	2/24/2006	<3.1	4.9	240	0.37	<0.25	220	--	28	37	56	0.22	<1	360	1.9	<0.25	49	80
	5	2/24/2006	<3	4.6	75	0.12	<0.25	30	--	8.3	12	21	0.22	<0.99	43	0.87	0.83	27	91
	10	2/24/2006	<3.3	5.4	130	0.21	<0.27	21	--	2.5	3.6	13	0.034	<1.1	15	<0.27	0.65	26	21
SB-21	0	2/23/2006	<2.6	4.7	92	0.29	0.32	58	--	9.4	20	42	0.078	<0.88	90	0.54	0.5	42	88
	5	2/23/2006	<4	0.57	3.3	<0.13	<0.33	1100	--	100	6.4	<0.2	0.11	<1.3	2300	3.6	<0.33	44	29
	10	2/23/2006	<2.4	8.2	350	0.47	0.95	22	--	4.2	13	80	0.058	<0.79	19	0.68	0.64	29	200

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SB-22	0	2/23/2006	<2.4	4.6	160	0.32	0.36	39	--	8.2	30	27	0.1	<0.8	57	<0.2	<0.2	40	58
	5	2/23/2006	<2.8	4.1	210	0.25	<0.23	57	--	8.4	32	18	0.088	1.1	100	<0.23	0.41	40	54
	10	2/23/2006	<3.2	4.1	210	0.42	<0.27	220	--	20	27	39	1.1	2.2	360	<0.27	<0.27	35	83
SB-23	0	2/22/2006	<2.8	5.1	170	0.21	0.32	44	--	6.9	23	25	0.068	1.1	49	0.3	0.47	52	53
	5	2/22/2006	<3.4	6.2	82	1.4	0.3	4	--	2.7	4	27	<0.024	2.6	11	<0.28	<0.28	7	71
	10	2/22/2006	5.5	18	390	0.21	1.5	50	--	10	180	480	<0.026	1.5	73	<0.31	0.82	41	870
SB-24	0	2/24/2006	<3.1	3.8	220	0.21	0.3	29	--	4.8	12	5.4	<0.022	1.2	26	0.69	0.59	54	39
	10	2/27/2006	<3.1	3.6	49	<0.1	0.39	48	--	17	81	90	0.22	1.4	33	2.4	<0.26	78	240
SB-25	0	2/23/2006	<3	6.3	200	0.27	0.35	26	--	6.1	22	16	0.049	1.3	34	<0.25	0.48	52	44
	5	2/23/2006	<4.5	11	210	0.21	<0.38	51	--	9.6	23	5.9	<0.028	<1.5	74	0.39	0.77	72	44
	10	2/23/2006	4.4	26	230	0.21	1.2	45	--	8.4	100	180	1.2	7.9	48	1	<0.29	41	310
SB-26	0	2/21/2006	<2.9	4	110	0.15	<0.24	40	--	7.7	19	16	0.066	<0.95	46	0.66	0.4	53	88
	5	2/21/2006	<2.8	5.5	1200	0.22	0.29	50	--	5.6	20	8.2	0.093	5.3	34	<0.24	0.61	51	44
	10	2/21/2006	<2.7	1.5	80	0.25	0.64	120	--	36	91	3.7	0.047	<0.91	92	1.4	<0.23	110	220
SB-27	0	2/24/2006	<2.6	3.9	67	0.15	<0.22	37	--	7.7	13	31	0.036	<0.86	49	0.46	0.41	42	46
	5	2/24/2006	<3.2	5.1	160	0.26	0.65	39	--	7.4	25	28	0.42	<1.1	50	0.93	0.28	43	58
	10	2/24/2006	<3.1	0.56	64	0.11	<0.26	78	--	23	70	<0.15	<0.023	<1	38	1.4	0.64	77	50
SB-28	0	2/20/2006	<2.6	6.3	91	0.21	0.3	31	--	5.9	15	8.8	0.024	1.2	25	0.71	<0.22	38	53
	5	2/20/2006	<2.8	6.6	59	0.39	0.42	91	--	33	120	38	0.082	1.2	64	1.5	<0.24	120	130
	10	2/20/2006	<3.2	3.3	34	<0.11	0.55	300	--	77	33	32	0.072	<1.1	2600	2.4	<0.27	17	610
SB-29	0	2/20/2006	<3.5	6.9	390	0.29	0.43	45	--	6.4	15	7.6	0.027	2.5	42	0.96	0.77	68	37
	5	2/20/2006	<2.8	5.5	110	0.22	0.24	45	--	8.4	24	45	0.039	<0.93	64	<0.23	<0.23	30	51
	10	2/20/2006	<2.8	2	8.2	<0.094	<0.24	440	--	84	5.5	1.7	<0.018	<0.94	1900	0.93	<0.24	18	23
SB-30	0	2/21/2006	<2.2	9.8	82	0.2	0.54	32	--	10	21	24	0.04	0.83	38	0.68	<0.18	42	54
	5	2/21/2006	<3.4	5.8	140	0.27	0.56	45	--	7.8	25	20	0.088	2.9	52	0.4	<0.28	55	65
	10	2/21/2006	25	44	150	<0.12	1.1	54	--	22	230	320	0.46	3.4	60	8.1	<0.3	110	270
SB-31	0	2/21/2006	<2.8	7.4	80	0.21	0.25	32	--	5.6	17	9.4	0.04	1.9	26	<0.23	<0.23	34	47
	5	2/21/2006	<2.8	3.7	180	0.25	<0.24	40	--	6	21	2.6	<0.021	1.8	43	<0.24	0.38	40	33
	10	2/21/2006	3.5	38	170	0.62	1.2	55	--	7.7	95	210	1.5	3.5	63	2.2	<0.27	41	310
Supplemental Investigation - Geomatrix³																			
SB-36	2.0	7/5/2006	--	--	--	--	--	99	<0.05	--	--	--	--	--	--	--	--	--	--
	6.0	7/5/2006	--	--	--	--	--	37	<0.05	--	--	--	--	--	--	--	--	--	--
SB-37	4.0	7/5/2006	--	--	--	--	--	33	0.06	--	--	--	--	--	--	--	--	--	--
	7.0	7/5/2006	--	--	--	--	--	25	<0.05	--	--	--	--	--	--	--	--	--	--
SB-39	10.0	7/5/2006	--	--	--	--	--	300	<0.05	--	--	--	--	--	--	--	--	--	--
	1.5	7/6/2006	--	--	--	--	--	28	0.66	--	--	--	--	--	--	--	--	--	--
SB-43	6.5	7/6/2006	--	--	--	--	--	27	<0.05	--	--	--	--	--	--	--	--	--	--
	2.0	7/6/2006	--	--	--	--	--	610	<0.05	--	--	--	--	--	--	--	--	--	--
SB-43	5.0	7/6/2006	--	--	--	--	--	58	0.75	--	--	--	--	--	--	--	--	--	--

TABLE 1

SOIL SAMPLE ANALYTICAL RESULTS - METALS¹

San Francisco Electric Reliability Project Site

25th and Maryland Streets

San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium (total)	Chromium (hexavalent)	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Thallium	Vanadium	Zinc
SB-44	2.0	7/6/2006	--	--	--	--	--	45	<0.05	--	--	--	--	--	--	--	--	--	--
	5.0	7/6/2006	--	--	--	--	--	35	<0.05	--	--	--	--	--	--	--	--	--	--
SB-45	2.0	7/6/2006	--	--	--	--	--	34	0.06	--	--	--	--	--	--	--	--	--	--
	5.0	7/6/2006	--	--	--	--	--	89	<0.05	--	--	--	--	--	--	--	--	--	--

Notes:

1. Only detected compounds are presented.
2. Samples collected by CH2M HILL and analyzed using EPA Method 6010B for metals and EPA Method 7471A for mercury.
3. Samples collected by Geomatrix Consultants, Inc. and analyzed by Curtis and Tompkins, Ltd. using EPA Method 6010B for chromium and EPA Method 7196A for hexavalent chromium.

Abbreviations:

- bgs = below ground surface
- "**Bold**" = compound detected at or above the laboratory reporting limit
- < = compound not detected at or above the laboratory reporting limit
- = Not analyzed

TABLE 2
SOIL SAMPLE ANALYTICAL RESULTS - VOLATILE ORGANIC COMPOUNDS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in micrograms per kilogram ($\mu\text{g}/\text{kg}$)

Boring ID	Sample Depth (feet bgs)	Sample Date	Acetone	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Naphthalene	Methyl Ethyl Ketone (2-Butanone)	Trichloroethene
<i>Previous Investigation - CH2M HILL²</i>								
SB-16	5	2/27/2006	<30	<7.4	<7.4	<7.4	<15	<7.4
	10	2/27/2006	<35	<8.8	<8.8	<8.8	<18	<8.8
SB-17	5	2/22/2006	<570	1400	880	520	<280	450
	10	2/22/2006	25	5.7	<4.9	<4.9	<9.7	<4.9
SB-18	5	2/22/2006	<30	<7.5	<7.5	<7.5	<15	<7.5
	10	2/22/2006	<27	<6.7	<6.7	<6.7	<13	<6.7
SB-19	5	2/27/2006	81	<5.3	<5.3	<5.3	13	<5.3
	10	2/27/2006	<27	<6.8	<6.8	<6.8	<14	<6.8
SB-20	5	2/24/2006	<25	<6.3	<6.3	<6.3	<13	<6.3
	10	2/24/2006	<38	<9.4	<9.4	<9.4	<19	<9.4
SB-21	5	2/23/2006	<30	<7.5	<7.5	<7.5	<15	<7.5
	10	2/23/2006	<38	<9.4	<9.4	<9.4	<19	<9.4
SB-22	5	2/23/2006	<32	<7.9	<7.9	<7.9	<16	<7.9
	10	2/23/2006	27	<6.5	<6.5	<6.5	<13	<6.5
SB-23	5	2/22/2006	<28	<7	<7	<7	<14	<7
	10	2/22/2006	<33	<8.3	<8.3	<8.3	<17	<8.3
SB-24	10	2/27/2006	<35	<8.9	<8.9	75	<18	<8.9
SB-25	5	2/23/2006	<37	<9.1	<9.1	<9.1	<18	<9.1
	10	2/23/2006	<21	<5.2	<5.2	<5.2	<10	<5.2
SB-26	5	2/21/2006	33	<5.7	<5.7	<5.7	<11	<5.7
	10	2/21/2006	<22	<5.5	<5.5	<5.5	<11	<5.5
SB-27	5	2/24/2006	<25	<6.2	<6.2	<6.2	<12	<6.2
	10	2/24/2006	<25	<6.2	<6.2	<6.2	<12	<6.2
SB-28	5	2/20/2006	<40	<10	<10	<10	<20	<10
	10	2/20/2006	<32	<8	<8	<8	<16	<8
SB-29	5	2/20/2006	<21	<5.3	<5.3	<5.3	<11	<5.3
	10	2/20/2006	<79	<20	<20	<20	<40	<20
SB-30	5	2/21/2006	<34	<8.5	<8.5	<8.5	<17	<8.5
	10	2/21/2006	<28	<7	<7	<7	<14	<7
SB-31	5	2/21/2006	<25	<6.3	<6.3	<6.3	<13	<6.3
	10	2/21/2006	54	<6.7	<6.7	<6.7	<13	<6.7

Notes:

1. Only detected compounds are presented.
2. Samples collected by CH2M HILL and analyzed by EPA Method 8260B.

Abbreviations:

bgs = below ground surface

"**Bold**" = compound detected at or above the laboratory reporting limit

< = compound not detected at or above the laboratory reporting limit

TABLE 3

SOIL SAMPLE ANALYTICAL RESULTS - SEMIVOLATILE ORGANIC COMPOUNDS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in micrograms per kilogram (µg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	Acenaph-thene	Acenaph-thylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo (g,h,i) perylene	Benzo(k) fluoranthene	Butylbenzyl-phthalate	4-Chloro-aniline	Chrysene	Dibenz (a,h) anthracene	Fluoran-thene	Fluorene	Indeno (1,2,3-cd) pyrene	2-Methyl-naphthalene	Naphthalene ²	Phenan-threne	Pyrene	BaP TEF ³
<i>Previous Investigation - CH2M HILL⁴</i>																						
SB-16	0	2/27/2006	<41	<82	37	160	170	140	170	88	<4100	<4100	260	150	320	18	130	<810	<41	160	250	275.4
	5	2/27/2006	<40	<80	87	330	420	260	550	170	<400	<400	390	410	630	32	320	<80	<7.4	340	630	671.3
	10	2/27/2006	<200	<410	50	340	390	340	820	180	<4100	<4100	420	400	640	<41	270	<820	<8.8	230	560	643.2
SB-17	0	2/22/2006	<38	<76	14	65	95	64	110	99	<380	<380	72	130	200	<7.7	83	<76	<38	120	200	171.02
	5	2/22/2006	<38	<75	17	110	160	130	280	120	<370	<370	140	200	280	<7.5	78	<75	520	110	220	273.2
	10	2/22/2006	<37	<74	<3.7	23	21	33	27	13	<370	<370	74	24	130	<7.5	24	<74	<4.9	27	28	39.2
SB-18	0	2/22/2006	<37	<75	11	33	29	27	77	16	<1900	<1900	64	32	93	<7.5	24	<370	<37	71	63	50.52
	5	2/22/2006	<41	<81	85	77	66	62	550	220	<790	<790	89	160	520	<8.1	270	<160	<7.5	380	260	184.19
	10	2/22/2006	<46	140	100	550	550	680	960	590	<2300	<2300	600	580	1500	<9.1	450	<460	<6.7	1100	1400	980.2
SB-19	0	2/27/2006	<39	<78	21	140	140	110	170	69	<3900	<3900	180	150	250	8.2	70	<780	<39	140	230	231.7
	5	2/27/2006	500	<71	150	300	110	790	470	92	<1700	<1700	850	170	900	1000	100	<350	<5.3	1400	1100	304.5
	10	2/27/2006	<38	<76	6.6	36	36	26	140	16	<380	<380	51	31	76	<7.6	99	<76	<6.8	51	75	64.75
SB-20	0	2/24/2006	<37	<74	12	72	81	62	130	35	<720	<720	81	88	140	<7.4	53	<140	<37	78	180	133.93
	5	2/24/2006	<38	<76	<3.8	6.4	8.7	<7.6	18	<3.8	<380	<380	7.8	14	11	<7.6	7.4	<76	<6.3	4.4	10	15.49
	10	2/24/2006	<39	<78	<3.9	<3.9	<3.9	11	<7.8	<3.9	<38000	<38000	5.8	<7.8	<7.8	<7.8	<3.9	<7600	<9.4	4.2	4.1	5.02
SB-21	0	2/23/2006	<180	<360	<18	35	25	<36	57	<18	<3700	<3700	110	<36	73	<36	43	<730	<180	43	58	42.72
	5	2/23/2006	<40	<80	5.5	38	65	44	100	23	<400	<400	40	110	84	<8	70	<80	<7.5	40	97	120.3
	10	2/23/2006	<35	<70	<3.5	6.9	89	120	16	3.6	<350	<350	93	98	20	<7	6.6	<70	<9.4	18	80	136.96
SB-22	0	2/23/2006	<37	<73	80	62	28	36	55	20	<7400	<7400	160	13	180	<7.3	43	<1500	<37	90	120	50.12
	5	2/23/2006	<190	<370	22	120	120	120	380	67	<3700	<3700	190	140	300	<37	150	<730	<7.9	120	210	215.2
	10	2/23/2006	<38	<77	14	96	170	120	400	71	<1900	<1900	170	160	190	<7.7	150	<390	45	110	160	269.8
SB-23	0	2/22/2006	<190	<370	39	66	38	41	81	28	<7400	<7400	210	<37	210	<37	37	<1500	<190	110	120	63.59
	5	2/22/2006	<190	<380	47	300	290	300	320	160	<3900	<3900	360	310	570	<38	160	<780	<7	280	480	491
	10	2/22/2006	<39	<78	<3.9	<3.9	<3.9	<7.8	<7.8	<3.9	<390	<390	<3.9	<7.8	<7.8	<7.8	<3.9	<79	<8.3	<3.9	<3.9	4.27
SB-24	0	2/24/2006	<380	<750	<38	54	44	<75	100	<38	<3800	<3800	250	<75	230	<75	49	<760	<380	120	140	75.2
	10	2/27/2006	<18000	380,000	500,000	420,000	490,000	430,000	210,000	170,000	<320000	450,000	480,000	<64000	1,200,000	470,000	170,000	310,000	1,200,000	2,600,000	1,400,000	624,680
SB-25	0	2/23/2006	<38	<76	13	24	21	28	51	14	<1900	<1900	73	8.7	86	<7.6	23	<380	<38	56	59	33.59
	5	2/23/2006	<47	<94	<4.7	7.3	5.6	9.4	<9.4	<4.7	3,900	<2300	26	<9.4	29	<9.4	<4.7	<460	<9.1	20	16	9.60
	10	2/23/2006	<37	<75	16	60	77	63	83	36	<1900	<1900	91	66	160	<7.5	56	<370	55	110	120	121.85
SB-26	0	2/21/2006	<180	<360	71	130	86	100	230	64	<3600	<3600	400	150	470	41	160	<730	<180	260	310	186.4
	5	2/21/2006	<37	<75	44	66	54	42	46	35	<3700	<3700	180	59	260	25	50	<750	<5.7	230	160	95.16
	10	2/21/2006	<38	<76	<3.8	8.8	10	8	22	4.7	<380	<380	14	10	18	<7.7	10	<76	<5.5	9.1	13	16.69
SB-27	0	2/24/2006	<350	<710	<35	100	69	98	220	45	<3600	<3600	280	<71	420	<71	170	<710	<350	240	270	125.17
	5	2/24/2006	<37	<74	26	53	43	61	91	26	<3700	<3700	120	13	170	11	38	<750	<6.2	110	100	66.42
	10	2/24/2006	<38	<76	<3.8	27	<3.8	33	60	10	<1900	<1900	61	9.6	48	<7.6	44	<380	<6.2	13	37	17.17
SB-28	0	2/20/2006	<38	<73	<3.8	7.6	5.4	12	<7.5	<3.8	<360	<360	13	<7.5	22	<7.5	6	<73	<38	16	18	9.56
	5	2/20/2006	<75	<75	1300	4200	5100	5200	4500	2600	<380	<380	3800	3500	7900	<380	4400	<75	<10	3100	2900	7968
	10	2/20/2006	<42	<84	62	160	160	100	210	53	<430	<430	180	140	410	19	130	<86	<8	290	380	253.7
SB-29	0	2/20/2006	<37	<73	41	56	43	26	73	18	<14000	<14000	75	34	140	7.7	27	<2900	<37	100	120	68.01
	5	2/20/2006	<35	<71	<3.5	<3.5	5.7	12	39	8.2	<360	<360	15	43	<7.1	<7.1	52	<72	<5.3	12	8.5	27.87
	10	2/20/2006	<42	<84	<4.2	<4.2	<4.2	<8.5	<8.5	<4.2	<420	<420	<4.2	<8.5	<8.5	<8.5	<4.2	<84	<20	<4.2	<4.2	ND
SB-30	0	2/21/2006	<180	<360	<18	<18	<18	<36	38	<18	<35000	<35000	100	<36	38	<36	50	<7100	<180	<18	<18	24.72
	5	2/21/2006	<35	<69	<3.5	24	6.7	17	28	11	<7000	<7000	22	12	110	<6.9	31	<1400	<8.5	15	7.5	19.3
	10	2/21/2006	<42	<84	6.4	35	49	46	100	22	<2100	<2100	66	38	84	<8.4	40	<420	<7	49	65	76.88
SB-31	0	2/21/2006	<36	<72	5.6	30	30	48	66	16	<720	<720	110	<7.2	260	<7.2	<3.6	<140	<36	33	50	41.90
	5	2/21/2006	<38	<77	<3.8	<3.8	<3.8	<7.7	<7.7	<3.8	<15000	<15000	<3.8	<7.7	<7.7	<7.7	<3.8	<3000	<6.3	<3.8	<3.8	ND
	10	2/21/2006	<40	<79	14	81	100	90	210	50	<3900	<3900	150	150	190	<7.9	95	<790	<6.7	92	130	184.1

TABLE 3
SOIL SAMPLE ANALYTICAL RESULTS - SEMIVOLATILE ORGANIC COMPOUNDS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in micrograms per kilogram (µg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	Acenaph-thene	Acenaph-thylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo (g,h,i) perylene	Benzo(k)fluoranthene	Butylbenzyl-phthalate	4-Chloro-aniline	Chrysene	Dibenz (a,h)anthracene	Fluoran-thene	Fluorene	Indeno (1,2,3-cd)pyrene	2-Methyl-naphthalene	Naphthalene ²	Phenan-threne	Pyrene	BaP TEF ³
<i>Supplemental Investigation - Geomatrix⁵</i>																						
SB-38	1.0	7/6/2006	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	--	--	<5.1	<5.1	<5.1	<5.1	<5.1	--	<5.1	<5.1	<5.1	ND
	6.0	7/6/2006	<51	54	77	300	290	330	160	180	--	--	270	82	390	<51	170	--	<51	230	410	418.6
	10.5	7/6/2006	<120	<120	290	570	490	540	170	230	--	--	550	<120	940	<120	180	--	<120	900	1,400	667.9
	14.0	7/6/2006	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	<5.0	<5.0	<5.0	<5.0	--	<5.0	<5.0	<5.0	ND
SB-39	1.5	7/6/2006	<5.0	<5.0	<5.0	<5.0	<5.0	6.2	<5.0	<5.0	--	--	8.3	6.3	8.8	<5.0	<5.0	--	<5.0	9.2	8.4	6.10
	6.5	7/6/2006	<150	<150	<150	<150	<150	<150	<150	<150	--	--	<150	<50	<150	<150	<150	--	<150	<150	<150	ND
	10.0	7/6/2006	<5.0	7.1	8.9	13	12	11	6.6	7.2	--	--	11	7.2	25	13	6.2	--	<5.0	27	25	18.30
	14.0	7/6/2006	<100	<100	150	370	240	340	<100	150	--	--	320	<100	710	<100	<100	--	<100	340	760	351.2
SB-40	2.0	7/6/2006	<99	<99	<99	<99	<99	110	<99	<99	--	--	120	<99	110	<99	<99	--	<99	140	120	93.38
	6.5	7/6/2006	<5.0	<5.0	6.0	24	32	29	20	29	--	--	41	8.4	29	<5.0	18	--	<5.0	11	33	45.27
	11.0	7/6/2006	<5.0	11	11	54	56	45	37	38	--	--	51	20	59	<5.0	37	--	<5.0	39	64	80.71
	15.0	7/6/2006	<51	<51	93	<51	<51	<51	<51	<51	--	--	<51	<51	290	82	<51	--	77	380	220	ND
SB-41	1.5	7/6/2006	<4.9	<4.9	<4.9	9.3	13	14	7.2	12	--	--	21	<4.9	25	<4.9	5.6	--	<4.9	21	26	18.13
	6.5	7/6/2006	<100	<100	<100	<100	<100	<100	<100	<100	--	--	<100	<100	<100	<100	<100	--	<100	<100	<100	ND
	11.5	7/6/2006	<25	26	54	52	53	65	<25	30	--	--	58	<25	110	57	<25	--	<25	190	180	74
	14.0	7/6/2006	6,900	4,800	11,000	8,500	8,300	4,500	3,600	6,300	--	--	8,200	<2,500	16,000	12,000	3,600	--	<2,500	26,000	19,000	11,097
SB-42	1.5	7/6/2006	<25	<25	<25	<25	<25	<25	<25	<25	--	--	33	<25	58	<25	<25	--	<25	40	52	22.08
	6.5	7/6/2006	<25	<25	41	41	52	66	42	51	--	--	73	<25	77	<25	34	--	<25	45	80	76.18
	10.0	7/6/2006	<15	<15	38	36	43	51	41	30	--	--	74	<15	96	47	28	--	30	190	110	60.79
	14.0	7/6/2006	<25 R	<25 R	45 R	130 R	47 R	41 R	<25 R	45 R	--	--	210 R	<25 R	210 R	<25 R	<25 R	--	<25 R	250 R	270 R	76.2 R
	14.0 ⁶	7/6/2006	130 J	180 J	480 J	950 J	270 J	210 J	<99 UJ	200 J	--	--	1300 J	<99 UJ	1600 J	180 J	<99 UJ	--	<99 UJ	2400 J	1700 J	430
SB-56	6	7/7/2006	<50	<50	<50	<50	<50	<50	<50	<50	--	--	<50	<50	<50	<50	<50	--	<50	<50	<50	ND
	9.5	7/7/2006	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	--	--	<5.1	<5.1	<5.1	<5.1	<5.1	--	<5.1	<5.1	<5.1	ND
	14	7/7/2006	<49	<49	<49	85	91	49	<49	65	--	--	120	<49	120	<49	<49	--	<49	<49	190	122.88
SB-57	6	7/6/2006	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	--	--	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	--	<5.1 UJ	<5.1 UJ	<5.1 UJ	ND
	10.5	7/6/2006	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	--	--	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ	--	<5 UJ	<5 UJ	<5 UJ	ND
	13.5	7/6/2006	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	--	--	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	<5.1 UJ	--	<5.1 UJ	<5.1 UJ	<5.1 UJ	ND
SB-58	6	7/7/2006	<50	<50	51	120	110	160	54	81	--	--	130	<50	260	<50	<50	--	<50	130	370	158.4
	9.5	7/7/2006	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	--	--	<5.1	<5.1	<5.1	<5.1	<5.1	--	<5.1	<5.1	<5.1	ND
	14	7/7/2006	<5.1	<5.1	<5.1	9.7	15	17	7.7	9.3	--	--	11	<5.1	12	<5.1	7	--	<5.1	6.7	32	20.277

Notes:

- Only chemicals reported above the laboratory reporting limits in at least one sample are shown. Refer to the laboratory analytical report for a full list of constituents analyzed in soil.
- CH2MHILL samples were analyzed for naphthalene using EPA Method 8270C, EPA Method 8310, and EPA Method 8260B. The highest concentration or lowest reporting limit for each sample is presented.
- B(a)P TEFs = Benzo(a)pyrene Toxic Equivalency Factors are used to assess the relative toxicity of PAHs and PAH derivatives as a group. (OEHA, 1993)
If a PAH was not detected, one-half the detection limit was multiplied by the corresponding potency equivalency factor (PEF).
B(a)P TEFs were only calculated if one or more of the carcinogenic PAHs were detected. The PEFs used to calculate B(a)P TEFs were 1.0 for benzo(a)pyrene; 0.1 for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene; 0.01 for chrysene; and 0.34 for dibenz(a,h)anthracene.
- CH2MHILL samples were analyzed for naphthalene using EPA Method 8270C, EPA Method 8310, and EPA Method 8260B. The highest concentration or lowest reporting limit for each sample is presented.
- Samples collected by Geomatrix Consultants, Inc. and analyzed by Curtis and Tompkins, Ltd. using EPA Method 8270C-SIM.
- Sample SB-42-14.0 RE was reextracted because surrogate recoveries were below the lower acceptance limit.

Abbreviations:

- < = compound not detected at or above the laboratory reporting limit
- all ND = All carcinogenic PAHs were not detected above the laboratory reporting limits.
- bgs = below ground surface
- "**Bold**" = compound detected at or above the laboratory reporting limit
- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 4
**SOIL SAMPLE ANALYTICAL RESULTS -
TOTAL PETROLEUM HYDROCARBONS**

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	TPHb	TPHd	TPHg	TPHmo
<i>Previous Investigation - CH2M HILL¹</i>						
SB-1	0	7/23/2005	180	19	--	63
	5	7/23/2005	120	8	--	45
	10	7/23/2005	190	11	--	67
SB-2	0	7/30/2005	1,600	96	--	750
	5	7/30/2005	260	29	--	110
	10	7/30/2005	110	9	--	50
SB-3	0	7/23/2005	2,100	160	--	750
	5	7/23/2005	1,700	210	--	550
	10	7/23/2005	950	96	--	330
SB-4	0	7/23/2005	3,200	160	--	1,200
	5	7/23/2005	1,300	94	--	500
	10	7/23/2005	1,300	75	--	500
SB-6	0	7/27/2005	2,900	220	--	1,200
	5	7/27/2005	2,700	210	--	1,100
SB-7	0	8/2/2005	9,300	680	--	4,300
	3	8/2/2005	960	98	--	380
SB-13	0	7/25/2005	2,200	220	--	850
	3	7/25/2005	20,000	340	--	9,300
SB-14	0	7/22/2005	470	45	--	160
	3	7/22/2005	240	19	--	86
SB-16	0	2/27/2006	570	40	<1.1	300
	5	2/27/2006	<5.9	<1.2	<0.42	<5.9
	10	2/27/2006	500	110	<0.25	170
SB-17	0	2/22/2006	160	16	<1.2	82
	5	2/22/2006	700	92	<0.36	330
	10	2/22/2006	130	12	<0.23	61
SB-18	0	2/22/2006	460	38	<1.2	230
	5	2/22/2006	1,800	170	<0.79	950
	10	2/22/2006	830	100	<0.46	380
SB-19	0	2/27/2006	260	20	<1.2	140
	5	2/27/2006	15,000	2,500	0.37	6,500
	10	2/27/2006	47	7	<0.18	21
SB-20	0	2/24/2006	140	15	<1	68
	5	2/24/2006	59	14	<0.2	18
	10	2/24/2006	10,000	2,500	3.2	3,100
SB-21	0	2/23/2006	38	6	<1	16
	5	2/23/2006	440	54	<0.29	200
	10	2/23/2006	110	15	<0.32	47
SB-22	0	2/23/2006	2,200	180	<1.1	1,100
	5	2/23/2006	550	46	<0.34	290
	10	2/23/2006	140	24	<0.27	51
SB-23	0	2/22/2006	1,600	130	<1.1	800
	5	2/22/2006	340	23	<0.28	170
	10	2/22/2006	40	6	<0.29	18
SB-24	0	2/24/2006	1,100	94	<1.2	570
	10	2/27/2006	57,000	20,000	<0.37	9,500

TABLE 4
**SOIL SAMPLE ANALYTICAL RESULTS -
TOTAL PETROLEUM HYDROCARBONS**

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Boring ID	Sample Depth (feet bgs)	Sample Date	TPHb	TPHd	TPHg	TPHmo
SB-25	0	2/23/2006	610	38	<1.1	330
	5	2/23/2006	320	37	<0.6	150
	10	2/23/2006	750	130	<0.35	280
SB-26	0	2/21/2006	2,200	270	<1.2	1,300
	5	2/21/2006	380	73	<0.34	210
	10	2/21/2006	12	2	<0.2	6
SB-27	0	2/24/2006	3,600	230	<1.1	1,900
	5	2/24/2006	5,600	670	<0.28	2,700
	10	2/24/2006	6	1	<0.31	<5.7
SB-28	0	2/20/2006	2,200	250	<1.2	1,100
	5	2/20/2006	270	39	<0.29	120
	10	2/20/2006	75	13	<0.22	29
SB-29	0	2/20/2006	430	82	<1	200
	5	2/20/2006	48	6	<0.29	22
	10	2/20/2006	21	3	<0.78	9
SB-30	0	2/21/2006	3,800	190	<0.97	2,100
	5	2/21/2006	3,500	200	<0.43	1,800
	10	2/21/2006	400	38	<0.29	200
SB-31	0	2/21/2006	390	29	<1.2	200
	5	2/21/2006	270	35	<0.31	130
	10	2/21/2006	920	53	<0.27	500
Supplemental Investigation - Geomatrix²						
SB-39	1.5	7/6/2006	430 J	30 J	--	190 J
	6.5	7/6/2006	620 J	62 J	--	310 J
	10.0	7/6/2006	140 J	21 J	--	52 J
	14.0	7/6/2006	8100 J	770 J	--	3300 J
SB-40	2.0	7/6/2006	2100 J	200 J	--	970 J
	6.5	7/6/2006	1800 J	130 J	--	970 J
	11.0	7/6/2006	1100 J	85 J	--	570 J
	15.0	7/6/2006	1700 J	200 J	--	660 J
SB-41	1.5	7/6/2006	480J	34 J	--	210 J
	6.5	7/6/2006	4100 J	250 J	--	1800 J
	11.5	7/6/2006	190 J	54 J	--	40 J
	14.0	7/6/2006	1800 J	400 J	--	490
SB-42	1.5	7/6/2006	310 J	170 J	--	120 J
	6.5	7/6/2006	1000 J	110 J	--	480 J
	10.0	7/6/2006	220 J	60 J	--	57 J
	14.0	7/6/2006	16000 J	2200 J	--	5800 J

Notes:

1. Samples collected by CH2M HILL and analyzed by EPA Method 8015E and 8015B.
2. Samples collected by Geomatrix Consultants, Inc. and analyzed by Curtis and Tompkins, Ltd.

Abbreviations:

bgs = below ground surface

"**Bold**" = compound detected at or above the laboratory reporting limit

TPHb = total petroleum hydrocarbons quantified as bunker oil (carbon range C12 to C40)

TPHd = total petroleum hydrocarbons quantified as diesel (carbon range C12 to C24)

TPHg = total petroleum hydrocarbons quantified as gasoline (carbon range C7 to C12)

TPHmo = total petroleum hydrocarbons quantified as diesel (carbon range C24 to C36)

< = compound not detected at or above the laboratory reporting limit

-- = Not analyzed

J = The analyte was positively identified; the associated numerical value is the approximate

TABLE 5
SOIL SAMPLE ANALYTICAL RESULTS -
POLYCHLORINATED BIPHENYLS, ASBESTOS and pH

San Francisco Electric Reliability Project Site
 25th and Maryland Streets
 San Francisco, California

Boring ID	Sample Depth (feet bgs)	Sample Date	Aroclor-1242 (µg/kg)	Aroclor-1248 (µg/kg)	Aroclor-1254 (µg/kg)	Aroclor-1260 (µg/kg)	Asbestos (%)	pH
<i>Previous Investigation - CH2M HILL¹</i>								
SB-1	0	7/23/2005	--	--	--	--	ND	12
	5	7/23/2005	--	--	--	--	Trace	9.7
	10	7/23/2005	--	--	--	--	Trace	8.8
SB-2	0	7/30/2005	--	--	--	--	ND	11.5
	5	7/30/2005	--	--	--	--	Trace	8.3
	10	7/30/2005	--	--	--	--	Trace	8.5
SB-3	0	7/23/2005	--	--	--	--	ND	11.6
	5	7/23/2005	--	--	--	--	ND	8.7
	10	7/23/2005	--	--	--	--	Trace	11
SB-4	0	7/23/2005	--	--	--	--	ND	11.3
	5	7/23/2005	--	--	--	--	ND	11.4
	10	7/23/2005	--	--	--	--	ND	10
SB-6	0	7/27/2005	--	--	--	--	ND	11.6
	5	7/27/2005	--	--	--	--	ND	11.8
SB-7	0	8/2/2005	--	--	--	--	Trace	8.8
	3	8/2/2005	--	--	--	--	ND	11.4
SB-13	0	7/25/2005	--	--	--	--	ND	8.9
	3	7/25/2005	--	--	--	--	ND	9
SB-14	0	7/22/2005	--	--	--	--	ND	11.8
	3	7/22/2005	--	--	--	--	ND	9
SB-16	0	2/27/2006	<12	99	64	66	--	10.3
	5	2/27/2006	<11	<11	<11	15	--	8.2
	10	2/27/2006	<12	<12	<12	<12	--	8.5
SB-17	0	2/22/2006	<11	<11	<11	<11	--	10.4
	5	2/22/2006	<11	<11	<11	<11	--	8.6
	10	2/22/2006	<11	<11	<11	<11	--	9.7
SB-18	0	2/22/2006	<11	<11	<11	17	--	11
	5	2/22/2006	<12	<12	<12	<12	--	8.1
	10	2/22/2006	<13	<13	<13	<13	--	9
SB-19	0	2/27/2006	<11	<11	<11	120	--	9.7
	5	2/27/2006	<10	<10	<10	<10	--	9.1
	10	2/27/2006	<11	<11	<11	<11	--	8.4
SB-20	0	2/24/2006	<11	<11	<11	<11	--	7
	5	2/24/2006	<11	<11	<11	15	--	7.7
	10	2/24/2006	<11	<11	<11	<11	--	9
SB-21	0	2/23/2006	<10	<10	50	<10	--	9.4
	5	2/23/2006	<11	<11	<11	<11	--	8.6
	10	2/23/2006	<10	<10	<10	<10	--	11.7
SB-22	0	2/23/2006	<10	<10	<10	30	--	11
	5	2/23/2006	<11	<11	<11	<11	--	12.3
	10	2/23/2006	<11	<11	<11	<11	--	9
SB-23	0	2/22/2006	<11	<11	140	<11	--	12
	5	2/22/2006	<11	<11	<11	14	--	9.2
	10	2/22/2006	<11	<11	<11	<11	--	8.1
SB-24	0	2/24/2006	<11	<11	540	<11	--	12.3
	10	2/27/2006	<11	<11	<11	<11	--	9.1

TABLE 5
SOIL SAMPLE ANALYTICAL RESULTS -
POLYCHLORINATED BIPHENYLS, ASBESTOS and pH
 San Francisco Electric Reliability Project Site
 25th and Maryland Streets
 San Francisco, California

Boring ID	Sample Depth (feet bgs)	Sample Date	Aroclor-1242 (µg/kg)	Aroclor-1248 (µg/kg)	Aroclor-1254 (µg/kg)	Aroclor-1260 (µg/kg)	Asbestos (%)	pH
SB-25	0	2/23/2006	<11	<11	18	<11	--	11.8
	5	2/23/2006	<14	<14	<14	<14	--	12.6
	10	2/23/2006	<54	<54	1000	1100	--	12.1
SB-26	0	2/21/2006	<51	<51	3000	<51	--	10.5
	5	2/21/2006	22	<11	30	<11	--	11.6
	10	2/21/2006	<11	<11	<11	<11	--	8.7
SB-27	0	2/24/2006	<10	<10	130	<10	--	8.6
	5	2/24/2006	<11	<11	310	<11	--	11.6
	10	2/24/2006	<11	<11	<11	<11	--	8.6
SB-28	0	2/20/2006	<11	<11	<11	<11	--	12.1
	5	2/20/2006	<11	<11	<11	15	--	9.7
	10	2/20/2006	<12	<12	<12	<12	--	8.3
SB-29	0	2/20/2006	<11	<11	<11	<11	--	12.3
	5	2/20/2006	<10	<10	<10	<10	--	8.3
	10	2/20/2006	<12	<12	<12	<12	--	9.3
SB-30	0	2/21/2006	<10	<10	<10	<10	--	8.4
	5	2/21/2006	<10	<10	<10	<10	--	11.9
	10	2/21/2006	<12	<12	<12	<12	--	7.8
SB-31	0	2/21/2006	<11	<11	<11	<11	--	11.7
	5	2/21/2006	<11	<11	<11	<11	--	12.4
	10	2/21/2006	<11	<11	<11	<11	--	11.8
Supplemental Investigation - Geomatrix²								
SB-36	2	7/5/2006	--	--	--	--	--	10.8
	6	7/5/2006	--	--	--	--	--	9.5
SB-37	4	7/5/2006	--	--	--	--	--	11.4
	7	7/5/2006	--	--	--	--	--	11.9
	10	7/5/2006	--	--	--	--	--	10
SB-39	1.5	7/6/2006	--	--	--	--	--	11.9
	6.5	7/6/2006	--	--	--	--	--	9.6
SB-43	2.0	7/6/2006	--	--	--	--	--	8.6
	5.0	7/6/2006	--	--	--	--	--	11.4
SB-44	2.0	7/6/2006	--	--	--	--	--	8.5
	5.0	7/6/2006	--	--	--	--	--	8.7
SB-45	2.0	7/6/2006	--	--	--	--	--	9.4
	5.0	7/6/2006	--	--	--	--	--	9.8

Notes:

1. Samples collected by CH2M HILL and analyzed by EPA Method 8082 for polychlorinated biphenyls, EPA Method PLM for asbestos, and EPA Method 9045C for pH.
2. Samples collected by Geomatrix Consultants, Inc. and analyzed by Curtis and Tompkins, Ltd. using EPA Method 9045C.

Abbreviations:

bgs = below ground surface
"Bold" = compound detected at or above the laboratory reporting limit
 mg/kg = micrograms per kilogram
 % = percent
 < = compound not detected at or above the laboratory reporting limit
 -- = Not analyzed

TABLE 6
SOIL SAMPLE PHYSICAL PROPERTIES RESULTS¹
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Boring	Sample Depth (feet bgs)	Visual Description	Dry Density (g/cm ³)	Moisture Content	Specific Gravity	Total Porosity	Air-filled Porosity	Water Filled Porosity	Total Organic Carbon	% Gravel	% Sand	% Silt and Clay
SB-32	14.0	Gravel with silt and sand	1.51	26.3%	2.7	0.439	0.041	0.398	0.02	34.2%	42.0%	23.8%
SB-34	14.0	Black sand with silt and gravel	1.86	15.8%	2.69	0.309	0.015	0.293	0.01	--	--	--
SB-45	4.5	Olive, brown, and black clayey sand with gravel and pieces of steel	1.82	11.7%	2.84	0.361	0.149	0.212	0.007	--	--	--

Notes:

1. Soil samples collected by Geomatrix Consultants, Inc., and analyzed by Cooper Testing Laboratory, Inc., for total and effective porosity by ASTM

Abbreviations:

- bgs = below ground surface
 g/cm³ = grams per cubic centimeter
 lbs/ft³ = pounds per cubic foot
 % = percent
 -- = not analyzed

TABLE 7
GROUNDWATER SAMPLE ANALYTICAL RESULTS -- METALS

San Francisco Electric Reliability Project Site
 25th and Maryland Streets
 San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
<i>Previous Investigation - CH2M HILL¹</i>																			
SB-16	SB16-W10	2/27/2006	<60	<5	86	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	9.3	<5	<5	<10	55
SB-17	SB17-W10	2/22/2006	<60	<5	310	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
SB-18	SB18-W10	2/22/2006	<60	9.5	66	<2	<5	<10	<20	<10	5.1	<0.2	20	<20	<5	<5	<5	150	<20
SB-19	SB19-W10	2/27/2006	<60	25	310	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	8.7	<5	<5	<10	<20
SB-20	SB20-W10	2/24/2006	<60	<5	220	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
SB-21	SB21-W10	2/24/2006	<60	<5	310	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
SB-22	SB22-W10	2/23/2006	<60	7.5	240	<2	<5	<10	<20	<10	6.9	<0.2	<20	<20	6.7	<5	<5	<10	<20
SB-23	SB23-W10	2/23/2006	<60	13	370	<2	<5	<10	<20	<10	<3	<0.2	23	<20	<5	<5	<5	<10	<20
SB-24	SB24-W10	2/27/2006	<60	8.9	13	<2	<5	22	<20	17	<3	<0.2	<20	<20	<5	<5	<5	18	<20
SB-25	SB25-W10	2/23/2006	<60	190	250	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
SB-26	SB26-W10	2/22/2006	<60	7.2	72	<2	<5	<10	<20	<10	<3	<0.2	30	<20	5.1	<5	<5	81	<20
SB-27	SB27-W10	2/24/2006	<60	18	16	<2	<5	<10	<20	<10	<3	<0.2	78	<20	<5	<5	<5	30	<20
SB-28	SB28-W10	2/20/2006	<60	5.4	230	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	130
SB-29	SB29-W10	2/21/2006	<60	17	22	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	12	<5	<5	<10	<20
SB-30	SB30-W10	2/21/2006	<60	13	140	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	12	<5	<5	<10	53
SB-31	SB31-W10	2/21/2006	<60	16	77	<2	<5	<10	<20	130	9	0.87	33	36	<5	<5	<5	<10	31
<i>Supplemental Investigation - Geomatrix²</i>																			
SB-32	SB-32-GW	7/5/2006	--	2.2	--	--	--	--	--	1.3	<1	<0.2	--	1.7	<1	--	--	5.5	<5 UJ
SB-32 ³	SB-320-GW	7/5/2006	--	2.1	--	--	--	--	--	1.2	1.2	<0.2	--	1.8	<1	--	--	4.9	10 J
SB-33	SB-33-GW	7/5/2006	--	<1	--	--	--	--	--	<1	<1	<0.2	--	1.2	<1	--	--	2	6.4 J
SB-34	SB-34-GW	7/5/2006	--	6.2	--	--	--	--	--	4.9	28	<0.2	--	2.1	<1	--	--	1.6	12 J
SB-35	SB-35-GW	7/5/2006	--	19	--	--	--	--	--	1.2	<1	<0.2	--	7.2	<1	--	--	1.6	12 J
SB-36	SB-36-GW	7/5/2006	--	4.4	--	--	--	--	--	<1	<1	<0.2	--	2.8	<1	--	--	1.2	6.3 J
SB-37	SB-37-GW	7/5/2006	--	3.1	--	--	--	--	--	<1	<1	<0.2	--	15	<1	--	--	1.5	<5 UJ
SB-54	SB-54-GW	7/7/2006	--	46	--	--	--	--	--	1.2	<1	<0.2	--	22	<1	--	--	2.3	6 J
SB-54 ³	SB-540-GW	7/7/2006	--	40	--	--	--	--	--	<1	<1	<0.2	--	26	<1	--	--	1.7	14 J
SB-55	SB-55-GW	7/7/2006	--	17	--	--	--	--	--	5.4	2.5	<0.2	--	28	11	--	--	7	7.6 J

Notes:

1. Samples collected and field filtered by CH2M HILL and analyzed by EPA Method 6010B for metals and EPA Method 7470A for mercury.
2. Samples collected and field filtered by Geomatrix Consultants, Inc. using a 0.45 micron in-line barrel filters and analyzed by Curtis and Tompkins, Ltd. using EPA Method 6020 for selected metals and EPA Method 7470A for mercury.
3. Duplicate sample.

Abbreviations:

"**Bold**" = compound detected at or above the laboratory reporting limit
 <= compound not detected at or above the laboratory reporting limit
 -- = not analyzed
 J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
 UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure

TABLE 8
HISTORICAL ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES - VOLATILE ORGANIC COMPOUNDS

San Francisco Electric Reliability Project Site
 25th and Maryland Streets
 San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	Acetone	Benzene	sec-Butyl- benzene	Carbon Disulfide	Chloro- benzene	Chloroform	Cumene (Isopropyl- benzene)	Cymene (para-Isopropyl Toluene)	1,2- Dichloro- ethane	cis-1,2- Dichloro- ethene	trans-1,2- Dichloro- ethene	Ethyl- benzene	MTBE	Propyl- benzene	Trichloro- ethene	1,2,4- Trimethyl- benzene	1,3,5- Trimethyl- benzene	Vinyl Chloride	Xylenes
<i>Previous Investigation - CH2M HILL¹</i>																					
SB-16	SB16-W10	2/27/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-17	SB17-W10	2/22/2006	<10	2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5
SB-18	SB18-W10	2/22/2006	<10	4.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	1.4	24	2.9	<0.5	1.2	<0.5	0.6	<0.5	<0.5	6.1	<0.5
SB-19	SB19-W10	2/27/2006	<10	1.1	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-20	SB20-W10	2/24/2006	<10	4.8	0.9	<0.5	<0.5	<0.5	1.2	1.1	<0.5	6.8	2.1	1.3	<0.5	1.5	<0.5	7.5	3	3.4	4.7
SB-21	SB21-W10	2/24/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-22	SB22-W10	2/23/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-23	SB23-W10	2/23/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-24	SB24-W10	2/27/2006	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-25	SB25-W10	2/23/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-26	SB26-W10	2/22/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-27	SB27-W10	2/24/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-28	SB28-W10	2/20/2006	<10	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	<0.5	<0.5	<0.5	<0.5
SB-29	SB29-W10	2/21/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	1	<0.5	<0.5	<0.5	<0.5
SB-30	SB30-W10	2/21/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SB-31	SB31-W10	2/21/2006	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:

1. Samples collected by CH2M HILL and analyzed by EPA Method 8260B.

Abbreviations:

"**Bold**" = compound detected at or above the laboratory reporting limit
 < = compound not detected at or above the laboratory reporting limit

TABLE 9
GROUNDWATER SAMPLE ANALYTICAL RESULTS - SEMIVOLATILE ORGANIC COMPOUNDS

San Francisco Electric Reliability Project Site

25th and Maryland Streets

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	BaP TEQ ¹	
<i>Previous Investigation - CH2M HILL²</i>																				
SB-16	SB16-W10	2/27/2006	<0.96	<1.9	0.11	0.36	0.48	0.35	1.2	0.19	0.43	0.6	0.92	<0.19	0.36	<0.96	0.42	0.9	0.81	
SB-17	SB17-W10	2/22/2006	<0.94	<1.9	<0.09	<0.09	<0.09	<0.19	<0.19	<0.09	<0.09	<0.19	0.21	<0.19	<0.09	<0.94	0.28	0.11	all ND	
SB-18	SB18-W10	2/22/2006	<0.94	<1.9	<0.09	0.11	0.12	<0.19	0.34	<0.09	0.19	0.28	0.29	0.44	0.15	<0.94	0.69	0.3	0.26	
SB-19	SB19-W10	2/27/2006	<0.96	<1.9	0.39	1.3	1.6	1.3	3.2	0.67	1.4	1.8	3	0.56	1.1	<0.96	2.1	2.9	2.66	
SB-20	SB20-W10	2/24/2006	5.4	<1.9	0.7	0.15	<0.09	<0.19	<0.19	<0.09	0.16	<0.19	1.4	1.2	<0.09	3.4	2.8	1.2	0.11	
SB-21	SB21-W10	2/24/2006	<0.96	<1.9	<0.1	<0.1	<0.1	<0.19	<0.19	<0.1	<0.1	<0.19	<0.19	<0.19	<0.1	<0.96	0.14	0.13	all ND	
SB-22	SB22-W10	2/23/2006	<0.94	<1.9	<0.09	<0.09	<0.09	<0.19	<0.19	<0.09	<0.09	<0.19	<0.19	<0.19	<0.09	<0.94	<0.09	<0.09	all ND	
SB-23	SB23-W10	2/23/2006	<0.96	<1.9	<0.1	0.14	0.15	<0.19	0.31	<0.1	0.18	0.25	0.41	<0.19	0.14	<0.96	0.18	0.27	0.28	
SB-24	SB24-W10	2/27/2006	<0.96	<1.9	2.1	1.8	2	1.1	2	0.67	1.7	2.1	6.8	3.2	1.6	6.4	12	6.7	3.25	
SB-25	SB25-W10	2/23/2006	<0.97	<1.9	<0.1	0.29	0.52	0.41	0.81	0.19	0.29	0.55	0.63	<0.19	0.46	<0.97	<0.1	0.83	0.84	
SB-26	SB26-W10	2/22/2006	<0.94	<1.9	<0.09	<0.09	0.11	<0.19	0.21	<0.09	<0.09	<0.19	<0.19	<0.19	<0.09	<0.94	<0.09	0.13	0.17	
SB-27	SB27-W10	2/24/2006	<0.95	<1.9	<0.1	<0.1	<0.1	<0.19	<0.19	<0.1	<0.1	<0.19	<0.19	<0.19	<0.1	<0.95	0.11	<0.1	all ND	
SB-28	SB28-W10	2/20/2006	<0.94	<1.9	<0.09	<0.09	<0.09	<0.19	<0.19	<0.09	<0.09	<0.19	<0.19	<0.19	<0.09	<0.94	<0.09	<0.09	all ND	
SB-29	SB29-W10	2/21/2006	<0.94	<1.9	<0.09	<0.09	<0.09	<0.19	<0.19	<0.09	<0.09	<0.19	<0.19	<0.19	<0.09	<0.94	<0.09	<0.09	all ND	
SB-30	SB30-W10	2/21/2006	<0.94	<1.9	<0.09	<0.09	<0.09	<0.19	<0.19	<0.09	<0.09	<0.19	0.19	<0.19	<0.09	<0.94	<0.09	0.17	all ND	
SB-31	SB31-W10	2/21/2006	<0.95	<1.9	<0.1	0.16	0.17	<0.19	0.24	<0.1	0.34	0.23	0.93	<0.19	0.23	<0.95	0.13	0.29	0.31	
<i>Supplemental Investigation - Geomatrix³</i>																				
SB-32	SB-32-GW	7/5/2006	<4.9 UJ	<4.9	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	<4.9 UJ	all ND
SB-32 ⁴	SB-320-GW	7/5/2006	<0.95 UJ	<0.95	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	all ND
SB-33	SB-33-GW	7/5/2006	<0.96 UJ	<0.96	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	all ND
SB-34	SB-34-GW	7/5/2006	<2.9 UJ	<2.9	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	<2.9 UJ	all ND
SB-35	SB-35-GW	7/5/2006	<4.8 UJ	<4.8	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	<4.8 UJ	all ND
SB-36	SB-36-GW	7/5/2006	<2 UJ	<2	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ	all ND
SB-37	SB-37-GW	7/5/2006	<0.96 UJ	<0.96	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	<0.96 UJ	all ND
SB-54	SB-54-GW	7/7/2006	<0.95 UJ	<0.95	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	<0.95 UJ	all ND
SB-54 ⁴	SB-540-GW	7/7/2006	<0.94 UJ	<0.94	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	<0.94 UJ	all ND
SB-55	SB-55-GW	7/7/2006	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	<0.95	all ND

TABLE 9
GROUNDWATER SAMPLE ANALYTICAL RESULTS - SEMIVOLATILE ORGANIC COMPOUNDS

San Francisco Electric Reliability Project Site

25th and Maryland Streets

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo (g,h,i) perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	BaP TEQ ¹
<i>Supplemental Investigation - Geomatrix⁵ (samples reported to the method detection limits)</i>																			
SB-32	SB-32-GW	7/5/2006	0.1 J	<0.046 UJ	0.11 J	<0.066 UJ	<0.13 UJ	<0.05 UJ	<0.12 UJ	<0.061 UJ	<0.08 UJ	<0.072 UJ	0.093 J	0.14 J	<0.017 UJ	0.54 J	0.17 J	0.08 J	all ND
SB-32 ⁴	SB-320-GW	7/5/2006	0.088 J	0.023 J	0.12 J	0.11 J	<0.025 UJ	<0.0097 UJ	<0.023 UJ	<0.012 UJ	0.018 J	<0.014 UJ	0.045 J	0.097 J	<0.014 UJ	0.42 J	0.11 J	0.052 J	0.04
SB-33	SB-33-GW	7/5/2006	<0.0090 UJ	<0.0092 UJ	<0.019 UJ	<0.013 UJ	<0.025 UJ	<0.0098 UJ	<0.024 UJ	<0.012 UJ	<0.016 UJ	<0.014 UJ	<0.011 UJ	<0.013 UJ	<0.014 UJ	<0.022 UJ	<0.0092 UJ	<0.0084 UJ	all ND
SB-34	SB-34-GW	7/5/2006	<0.10 J	<0.14 UJ	0.05 J	0.053 J	<0.19 UJ	<0.15 UJ	<0.054 UJ	<0.044 UJ	<0.057 UJ	0.032 J	<0.042 UJ	<0.087 UJ	0.039 J	<0.071 UJ	0.049 J	<0.057 UJ	0.23
SB-35	SB-35-GW	7/5/2006	<0.17 UJ	<0.23 UJ	<0.074 UJ	0.076 J	<0.30 UJ	<0.25 UJ	<0.089 UJ	0.072 J	<0.093 UJ	0.065 J	<0.069 UJ	<0.14 UJ	0.078 J	<0.12 UJ	<0.071 UJ	<0.093 UJ	0.37
SB-36	SB-36-GW	7/5/2006	<0.069 UJ	<0.094 UJ	0.035 J	0.029 J	<0.12 UJ	<0.10 UJ	<0.037 UJ	<0.029 UJ	<0.038 UJ	<0.02 UJ	<0.029 UJ	<0.058 UJ	<0.023 UJ	<0.048 UJ	<0.029 UJ	<0.038 UJ	0.15
SB-37	SB-37-GW	7/5/2006	<0.0090 UJ	<0.0092 UJ	<0.019 UJ	<0.013 UJ	<0.025 UJ	<0.0098 UJ	<0.024 UJ	<0.012 UJ	<0.016 UJ	<0.014 UJ	<0.011 UJ	<0.013 UJ	<0.014 UJ	<0.022 UJ	<0.0092 UJ	<0.0084 UJ	all ND
SB-54	SB-54-GW	7/7/2006	<0.0054 UJ	<0.0052 UJ	0.022 J	0.0085 J	<0.012 UJ	<0.011 UJ	<0.0090 UJ	<0.012 UJ	<0.0077 UJ	<0.010 UJ	0.0090 J	<0.0054 UJ	<0.010 UJ	0.014 J	0.018 J	0.014 J	0.02
SB-54 ⁴	SB-540-GW	7/7/2006	<0.0054 UJ	<0.0051 UJ	0.018 J	<0.0078 UJ	<0.012 UJ	<0.011 UJ	<0.0089 UJ	<0.012 UJ	<0.0076 UJ	<0.0099 UJ	0.0078 J	<0.0054 UJ	<0.010 UJ	0.012 J	0.012 J	0.011 J	0.02
SB-55	SB-55-GW	7/7/2006	0.016 J	0.13 J	0.10 J	0.017 J	<0.012 UJ	<0.011 UJ	<0.0090 UJ	<0.012 UJ	0.0087 J	<0.010 UJ	0.019 J	0.015 J	<0.010 UJ	0.019 J	0.020 J	0.023 J	0.02

Notes:

- B(a)P TEFs = Benz(a)pyrene Toxic Equivalency Factors are used to assess the relative toxicity of PAHs and PAH derivatives as a group. (OEHHA, 1993)
 If a PAH was not detected, one-half the laboratory sample quantitation limit was multiplied by the corresponding potency equivalency factor (PEF). For TEQs based on the results reported to the method detection limits, the MDL was used.
 B(a)P TEFs were only calculated if one or more of the carcinogenic PAHs were detected. The PEFs used to calculate B(a)P TEFs were 1.0 for benzo(a)pyrene; 0.1 for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene; 0.01 for chrysene; and 0.34 for dibenz(a,h)anthracene.
- Samples collected by CH2M HILL and analyzed by EPA Method 8310.
- Samples collected by Geomatrix Consultants, Inc., laboratory filtered using a 0.7 micron glass fiber filter, and analyzed by Curtis and Tompkins, Ltd. using EPA Method 8270C-SIM.
- Duplicate sample.
- Samples collected by Geomatrix and reported to the method detection limit for all compounds.

Abbreviations:

all ND = All carcinogenic PAHs were not detected above the laboratory sample quantitation limits or method detection limits.
"Bold" = compound detected at or above the laboratory reporting limit
 < = compound not detected at or above the laboratory reporting limit
 UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 10
GROUNDWATER SAMPLE ANALYTICAL RESULTS -
TOTAL PETROLEUM HYDROCARBONS

San Francisco Electric Reliability Project Site
 25th and Maryland Streets
 San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	TPHb	TPHd	TPHg	TPHmo
<i>Previous Investigation - CH2M HILL¹</i>						
SB-16	SB16-W10	2/27/2006	1200	300	<50	420
SB-17	SB17-W10	2/22/2006	5000	1800	<50	980
SB-18	SB18-W10	2/22/2006	8800	3500	<50	1000
SB-19	SB19-W10	2/27/2006	4700	1700	<50	710
SB-20	SB20-W10	2/24/2006	11000	2900	200	2500
SB-21	SB21-W10	2/24/2006	3400	870	<50	830
SB-22	SB22-W10	2/23/2006	4300	1200	<50	940
SB-23	SB23-W10	2/23/2006	3300	880	<50	780
SB-24	SB24-W10	2/27/2006	5700	1700	<50	1300
SB-25	SB25-W10	2/23/2006	4200	1100	<50	1000
SB-26	SB26-W10	2/22/2006	3500	1300	<50	570
SB-27	SB27-W10	2/24/2006	12000	3300	<50	2500
SB-28	SB28-W10	2/20/2006	1300	340	<50	340
SB-29	SB29-W10	2/21/2006	590	140	<50	<300
SB-30	SB30-W10	2/21/2006	2000	560	<50	530
SB-31	SB31-W10	2/21/2006	5300	790	<50	2200
<i>Supplemental Investigation - Geomatrix²</i>						
SB-32	SB-32-GW	7/5/2006	410 J	130 J	--	<300 UJ
SB-32 ³	SB-320-GW	7/5/2006	<300 UJ	<50 UJ	--	<300 UJ
SB-33	SB-33-GW	7/5/2006	<300 UJ	100 J	--	<300 UJ
SB-34	SB-34-GW	7/5/2006	350 J	100 J	--	<300 UJ
SB-35	SB-35-GW	7/5/2006	<300 UJ	71 J	--	<300 UJ
SB-36	SB-36-GW	7/5/2006	<300 UJ	77 J	--	<300 UJ
SB-37	SB-37-GW	7/5/2006	<300 UJ	66 J	--	<300 UJ
SB-54	SB-54-GW	7/7/2006	<300 UJ	<50 UJ	--	<300 UJ
SB-54 ³	SB-540-GW	7/7/2006	<300 UJ	<56 UJ	--	<300 UJ
SB-55	SB-55-GW	7/7/2006	<300	<55 UJ	--	<300

Notes:

1. Samples collected by CH2M HILL and analyzed by EPA Method 8015E and 8015B.
2. Samples collected by Geomatrix Consultants, Inc., laboratory filtered using a 0.7 micron glass fiber filter and silica gel preparation, and analyzed by Curtis and Tompkins, Ltd. using EPA Method 8015B.
3. Duplicate sample.

Abbreviations:

"**Bold**" = compound detected at or above the laboratory reporting limit

TPHb = total petroleum hydrocarbons quantified as bunker oil (carbon range C12 to C40)

TPHd = total petroleum hydrocarbons quantified as diesel (carbon range C12 to C24)

TPHg = total petroleum hydrocarbons quantified as gasoline (carbon range C7 to C12)

TPHmo = total petroleum hydrocarbons quantified as diesel (carbon range C24 to C36)

< = compound not detected at or above the laboratory reporting limit

-- = not analyzed

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure

the analyte in the sample.

TABLE 11
**HISTORICAL ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES -
POLYCHLORINATED BIPHENYLS AND pH**

San Francisco Electric Reliability Project Site

25th and Maryland Streets

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Boring ID	Sample ID	Sample Date	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	pH
<i>Previous Investigation - CH2M HILL¹</i>										
SB-16	SB16-W10	2/27/2006	<0.48	<0.95	<0.48	<0.48	<0.48	<0.48	<0.48	7.3
SB-17	SB17-W10	2/22/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	8.1
SB-18	SB18-W10	2/22/2006	<0.48	<0.95	<0.48	<0.48	<0.48	<0.48	<0.48	9.7
SB-19	SB19-W10	2/27/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	8.3
SB-20	SB20-W10	2/24/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	9.2
SB-21	SB21-W10	2/24/2006	<0.49	<0.97	<0.49	<0.49	<0.49	<0.49	<0.49	7.8
SB-22	SB22-W10	2/23/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	8.2
SB-23	SB23-W10	2/23/2006	<0.48	<0.96	<0.48	<0.48	<0.48	<0.48	<0.48	8.1
SB-24	SB24-W10	2/27/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	10.7
SB-25	SB25-W10	2/23/2006	<0.48	<0.96	<0.48	<0.48	<0.48	<0.48	<0.48	8.1
SB-26	SB26-W10	2/22/2006	<0.48	<0.95	<0.48	<0.48	<0.48	<0.48	<0.48	8
SB-27	SB27-W10	2/24/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	10.7
SB-28	SB28-W10	2/20/2006	<0.47	<0.94	<0.47	<0.47	<0.47	<0.47	<0.47	7.4
SB-29	SB29-W10	2/21/2006	<0.48	<0.95	<0.48	<0.48	<0.48	<0.48	<0.48	8.1
SB-30	SB30-W10	2/21/2006	<0.48	<0.95	<0.48	<0.48	<0.48	<0.48	<0.48	7.2
SB-31	SB31-W10	2/21/2006	<0.48	<0.96	<0.48	<0.48	<0.48	<0.48	<0.48	7.8

Notes:

1. Samples collected by CH2M HILL and analyzed by EPA Method 8082 for polychlorinated biphenyls and EPA Method 9040B for pH.

Abbreviations:

"**Bold**" = compound detected at or above the laboratory reporting limit

< = compound not detected at or above the laboratory reporting limit

-- = Not analyzed

TABLE 12

SOIL VAPOR SAMPLE ANALYTICAL RESULTS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

Boring ID	Sample Depth (feet bgs)	Sample Date	Acetone	Benzene	2-Butanone (Methyl Ethyl Ketone)	Carbon Disulfide	Chloroform	Cumene (Isopropyl-benzene)	Cyclohexane	Dichloro-difluoro-methane (Freon 12)	1,2-Dichloro-ethane	1,1-Dichloro-ethene	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethanol	Ethyl Benzene	4-Ethyl-toluene	Heptane	Hexane	Methylene Chloride
<i>Previous Investigation - CH2M HILL²</i>																				
SB-17	5	2/22/2006	39	400	96	<13	<20	<20	170	<21	<17	41	6200	3,800	<32	<18	<20	86	260	<14
SB-18	5	2/22/2006	<11	69	<3.6	<3.8	<5.9	<5.9	140	<6	5.3	<4.8	83	31	<9.1	<5.2	<5.9	<5	140	<4.2
SB-20	5	2/24/2006	92	75	18	5.9	<5.9	20	160	<6	<4.9	11	220	290	<9.1	5.6	<5.9	17	230	<4.2
SB-21	5	2/23/2006	37	10	8.3	3.9	<5	<5	9.4	<5.1	<4.1	<4.1	<4.1	<4.1	8.2	<4.4	<5	5.9	29	36
SB-22	5	2/23/2006	120	<3.5	13	5.3	<5.4	<5.4	8.3	<5.4	<4.4	<4.4	<4.4	<4.4	24	<4.8	<5.4	<4.5	5.9	<3.8
SB-23	5	2/22/2006	<530	1,100	<160	<170	<270	<280	2,500	<280	<230	<220	<220	<220	<420	<240	<280	1,300	12,000	<190
SB-24	5	2/24/2006	43	9.1	5.4	16	<5.6	<5.6	24	5.8	<4.6	<4.5	<4.5	<4.5	<8.6	<5	<5.6	6.5	22	<4
SB-25	5	2/23/2006	140	16	20	23	13	<5.4	310	<5.4	<4.4	<4.4	<4.4	<4.4	10	<4.8	<5.4	33	79	<3.8
SB-27	5	2/24/2006	21	11	6.1	<3.4	100	<5.4	17	<5.4	<4.4	<4.4	<4.4	<4.4	<8.3	<4.8	<5.4	10	18	5.4
SB-28	5	2/20/2006	64	29	15	9.8	59	<5.7	73	<5.8	<4.7	<4.6	<4.6	<4.6	<8.8	5.7	44	140	64	<4
SB-29	5	2/20/2006	18	5.7	<3.4	<3.6	72	<5.6	5.4	<5.7	<4.6	<4.5	<4.5	<4.5	<8.6	<5	<5.6	<4.7	5	<4
SB-30	5	2/21/2006	240	33	53	32	<5.8	<5.8	29	<5.9	<4.8	<4.7	<4.7	<4.7	12	<5.2	6	41	66	<4.1
SB-31	5	2/21/2006	52	23	4.8	14	<5.1	<5.1	37	22	<4.2	<4.1	<4.1	<4.1	<7.9	<4.5	<5.1	22	44	<3.6
<i>Supplemental Investigation - Geomatrix³</i>																				
SB-46	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	38	19	--	--	--	--	--	--
SB-47	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	<4.4	<4.4	--	--	--	--	--	--
SB-48	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	12	<5.6	--	--	--	--	--	--
SB-49	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	<4.1	<4.1	--	--	--	--	--	--
SB-50	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	7.6	<5.6	--	--	--	--	--	--
SB-51	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	1,300	370	--	--	--	--	--	--
SB-52	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	<5.0	<5.0	--	--	--	--	--	--
SB-53 ⁵	5	7/6/2006	--	--	--	--	--	--	--	--	--	--	8.2	<4.2	--	--	--	--	--	--

TABLE 12

SOIL VAPOR SAMPLE ANALYTICAL RESULTS¹

San Francisco Electric Reliability Project Site
25th and Maryland Streets
San Francisco, California

Concentrations reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

Boring ID	Sample Depth (feet bgs)	Sample Date	Naphthalene	2-Propanol	Propylbenzene	Tetrachloroethene	Tetrahydrofuran	Toluene	1,1,1-Trichloroethane	Trichloroethene	Trichlorofluoromethane (Freon 11)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2,2,4-Trimethylpentane	Vinyl Chloride	Xylenes	Leak Check Compounds		
																	2-Methylpropane	1,1-Difluoroethane	1,1,1,2-Tetrafluoroethane (Norflurane)
<i>Previous Investigation - CH2M HILL²</i>																			
SB17	5.0	2/22/2006	--	<41	<20	<28	<12	31	<23	250	<23	<20	<20	<20	2,800	<18	1,600	--	--
SB18	5.0	2/22/2006	--	<12	<5.9	<8.2	<3.6	<4.6	<6.6	15	<6.8	<5.9	<5.9	55	470	<5.2	2,100	--	--
SB20	5.0	2/24/2006	--	<12	<5.9	<8.2	<3.6	9	<6.6	62	<6.8	<5.9	<5.9	<5.6	<3.1	6.6	1,900	--	--
SB21	5.0	2/23/2006	--	<10	<5	<7	4.4	8.9	<5.6	42	<5.8	<5	<5	<4.8	<2.6	5.2	NF	--	--
SB22	5.0	2/23/2006	--	<11	<5.4	<7.5	<3.2	<4.1	<6	<5.9	36	<5.4	<5.4	<5.1	<2.8	<4.8	210	--	--
SB23	5.0	2/22/2006	--	<550	<280	<380	<160	340	<300	<300	<310	<280	<280	1,300	<140	250	13,000	--	--
SB24	5.0	2/24/2006	--	<11	<5.6	12	<3.4	9.4	17	<6.2	47	<5.6	<5.6	<5.3	<2.9	6.3	260	--	--
SB25	5.0	2/23/2006	--	<11	<5.4	25	<3.2	18	<6	<5.9	31	<5.4	<5.4	<5.1	<2.8	8.3	1,300	--	--
SB27	5.0	2/24/2006	--	<11	<5.4	<7.5	13	6.2	<6	<5.9	<6.2	<5.4	<5.4	16	<2.8	<4.8	300	--	--
SB28	5.0	2/20/2006	--	<11	16	<7.9	3.6	44	<6.4	11	<6.5	58	24	590	<3	35	840	--	--
SB29	5.0	2/20/2006	--	<11	<5.6	120	<3.4	5.4	<6.2	350	8.6	<5.6	<5.6	<5.3	<2.9	<5	1,300	--	--
SB30	5.0	2/21/2006	--	27	<5.8	8.3	6.8	28	<6.5	9.7	<6.7	9.2	<5.8	7.6	<3	20.4	1,500	--	--
SB31	5.0	2/21/2006	--	<10	<5.1	<7.1	<3.1	16	<5.7	<5.6	<5.9	<5.1	<5.1	<4.9	<2.7	9.3	900	--	--
<i>Supplemental Investigation - Geomatrix³</i>																			
SB-46	5.0	7/6/2006	<4.6	--	--	<4.6	--	--	--	280	--	--	--	--	470	--	--	NF	NF
SB-47	5.0	7/6/2006	<4.4	--	--	<4.4	--	--	--	<4.4	--	--	--	--	27	--	--	NF	10⁴
SB-48	5.0	7/6/2006	<5.6	--	--	<5.6	--	--	--	<5.6	--	--	--	--	160	--	--	70	200
SB-49	5.0	7/6/2006	<4.1	--	--	<4.1	--	--	--	<4.1	--	--	--	--	<4.1	--	--	NF	NF
SB-50	5.0	7/6/2006	<5.6	--	--	<5.6	--	--	--	40	--	--	--	--	13	--	--	NF	NF
SB-51	5.0	7/6/2006	<4.8	--	--	<4.8	--	--	--	66	--	--	--	--	1,200	--	--	NF	20⁴
SB-52	5.0	7/6/2006	<5.0	--	--	95	--	--	--	12	--	--	--	--	<5.0	--	--	NF	NF
SB-53 ⁵	5.0	7/6/2006	5.7	--	--	17	--	--	--	380	--	--	--	--	<4.2	--	--	20	300

Notes:

1. Only detected compounds are presented.
2. Samples collected by CH2M HILL and analyzed by EPA Method TO-14A.
3. Samples collected by Geomatrix Consultants Inc., and analyzed by Columbia Analytical Services Inc. of Simi Valley, California using EPA Method TO-15 for selected compounds.
4. Leak check compound was reported as 1,1,1,2-tetrafluoroethane (norflurane) plus n-pentane.
5. Duplicate sample collected. The highest concentration of each compound is presented.

Abbreviations:

bgs = below ground surface
"Bold" = compound detected at or above the laboratory reporting limit
 NF = Compound was searched for, but not found.
 < = compound not detected at or above the laboratory reporting limit
 -- = not analyzed

TABLE 13
STATISTICAL SUMMARY FOR CHEMICALS DETECTED IN SOIL

San Francisco Electric Reliability Project Site

25th and Maryland Street

San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Compound	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
Acenaphthene	67	1	1%	0.5	6.9	0.0049	18
Acenaphthylene	67	3	4%	0.0071	380	0.0049	0.75
Acetone	31	5	16%	0.025	0.081	0.021	0.57
Anthracene	67	32	48%	0.0055	500	0.0035	0.15
Antimony	47	7	15%	3.5	35	2.2	4.5
Aroclor 1242	47	1	2%	0.022	0.022	0.01	0.054
Aroclor 1248	47	1	2%	0.099	0.033	0.01	0.054
Aroclor 1254	47	10	21%	0.018	3	0.01	0.014
Aroclor 1260	47	9	19%	0.014	1.1	0.01	0.051
Arsenic	67	67	100%	0.56	460	--	--
Barium	47	47	100%	3.3	1200	--	--
Benzo(a)anthracene	67	43	64%	0.0064	420	0.0035	0.15
Benzo(a)pyrene	67	43	64%	0.0054	490	0.0038	0.15
Benzo(b)fluoranthene	67	42	63%	0.0062	430	0.005	0.15
Benzo (g,h,i) perylene	67	43	64%	0.0066	210	0.005	0.15
Benzo(k) fluoranthene	67	39	58%	0.0036	170	0.0038	0.15
Beryllium	47	39	83%	0.11	1.4	0.094	0.13
Butylbenzylphthalate	47	1	2%	3.9	3.9	0.35	320
Cadmium	47	31	66%	0.24	1.8	0.22	0.38
4-Chloroaniline	47	1	2%	450	450	0.35	38
Chromium (total)	60	60	100%	4	1300	--	--
Chromium (hexavalent)	13	4	31%	0.06	0.75	0.05	0.05
Chrysene	67	46	69%	0.0058	480	0.0038	0.15
Cobalt	47	47	100%	2.5	100	--	--
Copper	47	47	100%	3.6	230	--	--
Dibenz(a,h) anthracene	67	35	52%	0.0063	3.5	0.0049	64
cis-1,2-Dichloroethene	31	2	6%	0.0057	1.4	0.0052	0.02
trans-1,2-Dichloroethene	31	1	3%	0.88	0.88	0.0049	0.02
Fluoranthene	67	44	66%	0.0088	1200	0.005	0.15
Fluorene	67	10	15%	0.0077	470	0.0049	0.38
Indeno (1,2,3-cd) pyrene	67	43	64%	0.0056	170	0.0036	0.15
Lead	67	65	97%	0.2	2100	0.15	0.2
Mercury	47	40	85%	0.024	1.5	0.018	0.028
Methyl Ethyl Ketone (2-Butanone)	31	1	3%	0.013	0.013	0.0097	0.28
2-Methylnaphthalene	47	1	2%	310	310	0.07	7.6
Molybdenum	47	24	51%	0.83	7.9	0.79	1.5
Naphthalene	67	4	6%	0.03	1200	0.0049	2.5
Nickel	47	47	100%	11	2600	--	--
Phenanthrene	67	45	67%	0.0042	2600	0.0038	0.15

TABLE 13
STATISTICAL SUMMARY FOR CHEMICALS DETECTED IN SOIL

San Francisco Electric Reliability Project Site

25th and Maryland Street

San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

Compound	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
Pyrene	67	45	67%	0.0041	1400	0.0038	0.15
Selenium	47	32	68%	0.3	8.1	0.2	0.33
Thallium	47	24	51%	0.28	0.97	0.18	0.33
TPH bunker	83	82	99%	6	57000	5.9	5.9
TPHd	83	82	99%	1.3	20000	1.2	1.2
TPHg	47	2	4%	0.37	3.2	0.18	1.2
TPHmo	83	81	98%	6.3	9500	5.7	5.9
Trichloroethene	31	1	3%	0.45	0.45	0.0049	0.02
Vanadium	47	47	100%	7	120	--	--
Zinc	47	47	100%	21	1600	--	--

Abbreviations:

COPC = chemical of potential concern

TPH bunker = total petroleum hydrocarbons quantified as bunker oil

TPHd = total petroleum hydrocarbons quantified as diesel

TPHg = total petroleum hydrocarbons quantified as gasoline

TPHmo = total petroleum hydrocarbons quantified as motor oil

-- = not applicable

TABLE 14
STATISTICAL SUMMARY FOR CHEMICALS DETECTED IN GROUNDWATER

San Francisco Electric Reliability Project Site

 25th and Maryland Street

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Compound	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
Acenaphthene	24	1	4%	5.4	5.4	0.94	4.8
Acetone	16	1	6%	10	10	10	10
Anthracene	24	4	17%	0.11	2.1	0.09	4.8
Arsenic	24	19	79%	2.2	190	1	5
Barium	16	16	100%	13	370	--	--
Benzene	16	4	25%	1.1	4.8	0.5	0.5
Benzo(a)anthracene	24	8	33%	0.11	1.8	0.09	4.8
Benzo(a)pyrene	24	8	33%	0.11	2	0.09	4.8
Benzo(b)fluoranthene	24	4	17%	0.35	1.3	0.19	4.8
Benzo(g,h,i)perylene	24	8	33%	0.21	3.2	0.19	4.8
Benzo(k)fluoranthene	24	4	17%	0.19	0.67	0.09	4.8
sec-Butylbenzene	16	1	6%	0.9	0.9	0.5	0.5
Carbon Disulfide	16	1	6%	1.1	1.1	0.5	0.5
Chlorobenzene	16	1	6%	0.7	0.7	0.5	0.5
Chloroform	16	1	6%	0.5	0.5	0.5	0.5
Chromium (total)	16	1	6%	22	22	10	10
Chrysene	24	8	33%	0.16	1.7	0.09	4.8
Copper	24	7	29%	1.2	130	1	10
Cumene (Isopropylbenzene)	16	1	6%	1.2	1.2	0.5	0.5
Cymene (para-Isopropyl Toluene)	16	1	6%	1.1	1.1	0.5	0.5
Dibenz(a,h)anthracene	24	7	29%	0.23	2.1	0.19	4.8
1,2-Dichloroethane	16	1	6%	1.4	1.4	0.5	0.5
cis-1,2-Dichloroethene	16	4	25%	0.8	24	0.5	0.5
trans-1,2-Dichloroethene	16	3	19%	1.5	2.9	0.5	0.5
Ethylbenzene	16	1	6%	1.3	1.3	0.5	0.5
Fluoranthene	24	10	42%	0.19	6.8	0.19	4.8
Fluorene	24	4	17%	0.44	3.2	0.19	4.8
Indeno(1,2,3-cd)pyrene	24	7	29%	0.14	1.6	0.09	4.8
Lead	24	6	25%	1.2	28	1	3
Mercury	24	1	4%	0.87	0.87	0.2	0.2
Molybdenum	16	5	31%	20	78	20	20
MTBE	16	4	25%	1.1	3.1	0.5	0.5
Naphthalene	24	2	8%	3.4	6.4	0.94	4.8
Nickel	24	9	38%	1.2	36	20	20
Phenanthrene	24	10	42%	0.11	12	0.09	4.8
Propylbenzene	16	1	6%	1.5	1.5	0.5	0.5
Pyrene	24	12	50%	0.11	6.7	0.09	4.8
Selenium	24	7	29%	5.1	12	1	5
TPH bunker	24	18	75%	350	12000	300	300

TABLE 14

STATISTICAL SUMMARY FOR CHEMICALS DETECTED IN GROUNDWATER

San Francisco Electric Reliability Project Site

25th and Maryland Street

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Compound	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
TPHd	24	24	100%	55	3500	--	--
TPHg	16	1	6%	200	200	50	50
TPHmo	24	15	63%	340	2500	300	300
Trichloroethene	16	3	19%	0.6	1.6	0.5	0.5
1,2,4-Trimethylbenzene	16	1	6%	7.5	7.5	0.5	0.5
1,3,5-Trimethylbenzene	16	1	6%	3	3	0.5	0.5
Vanadium	24	12	50%	1.2	150	10	10
Vinyl Chloride	16	3	19%	0.8	6.1	0.5	0.5
Xylenes	16	1	6%	4.7	4.7	0.5	0.5
Zinc	24	11	46%	6.3	130	5	20

Abbreviations:

COPC = chemical of potential concern

TPH bunker = total petroleum hydrocarbons quantified as bunker oil

TPHd = total petroleum hydrocarbons quantified as diesel

TPHg total petroleum hydrocarbons quantified as gasoline

TPHmo = total petroleum hydrocarbons quantified as motor oil

-- = not applicable

TABLE 15
STATISTICAL SUMMARY FOR CHEMICALS DETECTED IN SOIL VAPOR

San Francisco Electric Reliability Project Site

 25th and Maryland Street

San Francisco, California

 Concentrations reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

Compound	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
Acetone	13	11	85%	18	240	11	530
Benzene	13	12	92%	5.7	1100	3.5	3.5
Carbon Disulfide	13	8	62%	3.9	32	3.4	170
Chloroform	13	4	31%	13	100	5	270
Cumene (Isopropylbenzene)	13	1	8%	20	20	5	280
Cyclohexane	13	13	100%	5.4	2500	--	--
Dichlorodifluoromethane (Freon 12)	13	2	15%	5.8	22	5.1	280
1,2-Dichloroethane	13	1	8%	5.3	5.3	4.1	230
1,1-Dichloroethene	13	2	15%	11	41	4.1	220
cis-1,2-Dichloroethene	21	8	38%	7.6	6200	4.1	220
trans-1,2-Dichloroethene	21	5	24%	19	3800	4.1	220
Ethanol	13	4	31%	8.2	24	7.9	420
Ethylbenzene	13	2	15%	5.6	5.7	4.4	240
4-Ethyltoluene	13	2	15%	6	44	5	280
Heptane	13	10	77%	5.9	1300	4.5	5
Hexane	13	13	100%	5	12000	0	0
Methylene Chloride	13	2	15%	5.4	36	3.6	190
Methyl Ethyl Ketone (2-Butanone)	13	10	77%	4.8	96	3.4	160
Naphthalene	8	1	13%	5.7	5.7	4.1	5.6
2-methyl-Propane	13	12	92%	210	13000	--	--
2-Propanol	13	1	8%	27	27	10	550
Propylbenzene	13	1	8%	16	16	5	280
Tetrachloroethene	21	6	29%	8.3	120	4.1	380
Tetrahydrofuran	13	4	31%	3.6	13	3.1	160
Toluene	13	11	85%	5.4	340	4.1	4.6
1,1,1-Trichloroethane	13	1	8%	17	17	5.6	300
Trichloroethene	21	12	57%	9.7	380	4.1	300
Trichlorofluoromethane (Freon 11)	13	4	31%	8.6	47	5.8	310
1,2,4-Trimethylbenzene	13	2	15%	9.2	58	5	280
1,3,5-Trimethylbenzene	13	1	8%	24	24	5	280
2,2,4-Trimethylpentane	13	5	38%	7.6	1300	4.8	20
Vinyl Chloride	21	7	33%	13	2800	2.6	140
Xylenes	13	8	62%	5.2	250	4.8	18

Abbreviations:

COPC = chemical of potential concern

-- = not applicable

TABLE 16
STATISTICAL SUMMARY FOR CHEMICALS OF
POTENTIAL CONCERN IN SOIL SAMPLES USED FOR RISK ASSESSMENT¹

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

COPC	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	95% UCL	Rationale
Acenaphthene	56	1	2%	0.5	0.5	0.0049	1.8	1.20E+00	97.5% Chebyshev (Mean, Sd) UCL
Acenaphthylene	56	3	5%	0.0071	380	0.0049	0.75	4.92E+01	97.5% Chebyshev (Mean, Sd) UCL
Acetone	31	5	16%	0.025	0.081	0.021	0.57	7.02E-02	95% Chebyshev (Mean, Sd) UCL
Anthracene	56	29	52%	0.0055	500	0.0035	0.15	9.78E+01	99% Chebyshev (Mean, Sd) UCL
Antimony	44	6	14%	3.8	35	2.2	4.5	7.23E+00	95% Chebyshev (Mean, Sd) UCL
Aroclor 1242	44	1	2%	0.022	0.022	0.01	0.054	8.11E-03	Student's-t UCL
Aroclor 1248	44	1	2%	0.099	0.099	0.01	0.054	1.82E-02	95% Chebyshev (Mean, Sd) UCL
Aroclor 1254	44	10	23%	0.018	3	0.01	0.014	8.39E-01	99% Chebyshev (Mean, Sd) UCL
Aroclor 1260	44	9	20%	0.014	1.1	0.01	0.051	2.84E-01	99% Chebyshev (Mean, Sd) UCL
Arsenic	64	64	100%	0.56	460	--	--	6.65E+01	97.5% Chebyshev (Mean, Sd) UCL
Barium	44	44	100%	3.3	1200	--	--	2.13E+02	Approximate Gamma UCL
Benzo(a)anthracene	56	40	71%	0.0064	420	0.0035	0.15	8.23E+01	99% Chebyshev (Mean, Sd) UCL
Benzo(a)pyrene	56	40	71%	0.0054	490	0.0038	0.15	9.60E+01	99% Chebyshev (Mean, Sd) UCL
Benzo(b)fluoranthene	56	40	71%	0.0062	430	0.0051	0.15	5.58E+01	97.5% Chebyshev (Mean, Sd) UCL
Benzo(g,h,i)perylene	56	40	71%	0.0066	210	0.005	0.15	1.20E+00	95% H-UCL
Benzo(k)fluoranthene	56	36	64%	0.0036	170	0.0038	0.15	4.66E-01	95% H-UCL
Beryllium	44	36	82%	0.11	1.4	0.094	0.13	3.90E-01	95% Chebyshev (Mean, Sd) UCL
Butylbenzylphthalate	44	1	2%	3.9	3.9	0.35	320	4.19E+01	99% Chebyshev (Mean, Sd) UCL
Cadmium	44	29	66%	0.24	1.8	0.22	0.38	5.27E-01	Approximate Gamma UCL
Chromium (total)	57	57	100%	4	1300	--	--	3.35E+02	97.5% Chebyshev (Mean, Sd) UCL
Chromium (hexavalent)	57	48	84%	0.06	31	0.05	0.05	7.23E+00	97.5% Chebyshev (Mean, Sd) UCL
Chrysene	56	44	79%	0.0058	480	0.0039	0.15	6.23E+01	97.5% Chebyshev (Mean, Sd) UCL
Cobalt	44	44	100%	2.5	100	--	--	3.64E+01	95% Chebyshev (Mean, Sd) UCL
Copper	44	44	100%	3.6	230	--	--	7.38E+01	95% H-UCL
Dibenz(a,h)anthracene	56	35	63%	0.0063	3.5	0.0049	64	4.40E-01	95% H-UCL
cis-1,2-Dichloroethene	31	2	6%	0.0057	1.4	0.0052	0.02	5.31E-01	99% Chebyshev (Mean, Sd) UCL
trans-1,2-Dichloroethene	31	1	3%	0.88	0.88	0.0049	0.02	3.35E-01	99% Chebyshev (Mean, Sd) UCL
Fluoranthene	56	42	75%	0.0088	12000	0.0051	0.15	2.35E+02	99% Chebyshev (Mean, Sd) UCL
Fluorene	56	10	18%	0.0077	470	0.0049	0.38	6.08E+01	97.5% Chebyshev (Mean, Sd) UCL
Indeno(1,2,3-cd)pyrene	56	41	73%	0.0056	170	0.0039	0.15	2.21E+01	97.5% Chebyshev (Mean, Sd) UCL

TABLE 16
STATISTICAL SUMMARY FOR CHEMICALS OF
POTENTIAL CONCERN IN SOIL SAMPLES USED FOR RISK ASSESSMENT¹

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Concentrations reported in milligrams per kilogram (mg/kg)

COPC	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	95% UCL	Rationale
Lead	64	62	97%	0.2	2100	0.15	0.2	5.41E+02	95% H-UCL
Mercury	44	38	86%	0.024	1.2	0.018	0.028	4.26E-01	95% H-UCL
Methyl Ethyl Ketone (2-Butanone)	31	1	3%	0.013	0.013	0.0097	0.28	3.25E-02	95% Chebyshev (Mean, Sd) UCL
Molybdenum	44	21	48%	0.83	7.9	0.79	1.5	2.39E+00	95% Chebyshev (Mean, Sd) UCL
Naphthalene	55	3	5%	0.03	120000	0.0049	0.38	2.35E+02	99% Chebyshev (Mean, Sd) UCL
Nickel	44	44	100%	11	2600	--	--	1.26E+03	99% Chebyshev (Mean, Sd) UCL
Phenanthrene	56	43	77%	0.0042	2600	0.0039	0.15	5.09E+02	95% Chebyshev (Mean, Sd) UCL
Pyrene	56	43	77%	0.0041	1400	0.0039	0.15	1.94E+00	95% Chebyshev (MVUE) UCL
Selenium	44	31	70%	0.3	8.1	0.2	0.33	1.23E-03	Approximate Gamma UCL
Thallium	44	23	52%	0.28	0.97	0.18	0.33	5.51E-01	95% Chebyshev (Mean, Sd) UCL
Trichloroethene	31	1	3%	0.45	0.45	0.0049	0.02	8.63E-02	95% Chebyshev (Mean, Sd) UCL
Vanadium	44	44	100%	7	120	--	--	5.83E+01	Approximate Gamma UCL
Zinc	44	44	100%	21	1600	--	--	3.40E+02	95% Chebyshev (Mean, Sd) UCL

Notes:

1. Shallow soil data used in the risk assessment (0-10 feet below ground surface). The analytical results are presented in Appendix F.

Abbreviations:

- COPC = chemical of potential concern
- TPH bunker = total petroleum hydrocarbons quantified as bunker oil
- TPHd = total petroleum hydrocarbons quantified as diesel
- TPHg total petroleum hydrocarbons quantified as gasoline
- TPHmo = total petroleum hydrocarbons quantified as motor oil
- = not applicable

TABLE 17

**STATISTICAL SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER SAMPLES
USED IN HUMAN HEALTH RISK ASSESSMENT^{1,2}**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations in micrograms per liter (µg/L)

COPC	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	95% UCL	Rationale
Acenaphthene	21	1	5%	5.4	5.4	0.94	4.8	1.95E+00	95% Chebyshev (Mean, Sd) UCL
Acetone	15	1	7%	10	10	10	10	5.92E+00	Student's-t UCL
Anthracene	21	4	19%	0.11	2.1	0.09	4.8	2.00E+00	99% Chebyshev (Mean, Sd) UCL
Arsenic	21	16	76%	2.2	190	1	5	5.53E+01	95% Chebyshev (MVUE) UCL
Barium	15	15	100%	13	370	--	--	2.33E+02	Student's-t UCL
Benzene	15	4	27%	1.1	4.8	0.5	0.5	5.19E+00	99% Chebyshev (Mean, Sd) UCL
Benzo(a)anthracene	21	7	33%	0.11	1.8	0.09	4.8	1.99E+00	99% Chebyshev (Mean, Sd) UCL
Benzo(a)pyrene	21	7	33%	0.11	2	0.09	4.8	2.11E+00	99% Chebyshev (Mean, Sd) UCL
Benzo(b)fluoranthene	21	4	19%	0.35	1.3	0.19	4.8	1.84E+00	99% Chebyshev (Mean, Sd) UCL
Benzo(g,h,i)perylene	21	7	33%	0.21	3.2	0.19	4.8	2.62E+00	99% Chebyshev (Mean, Sd) UCL
Benzo(k)fluoranthene	21	4	19%	0.19	0.67	0.09	4.8	1.70E+00	99% Chebyshev (Mean, Sd) UCL
sec-Butylbenzene	15	1	7%	0.9	0.9	0.5	0.5	3.70E-01	Student's-t UCL
Carbon Disulfide	15	1	7%	1.1	1.1	0.5	0.5	4.06E-01	Student's-t UCL
Chlorobenzene	15	1	7%	0.7	0.7	0.5	0.5	3.33E-01	Student's-t UCL
Chloroform	15	1	7%	0.5	0.5	0.5	0.5	2.96E-01	Student's-t UCL
Chromium	15	1	7%	22	22	10	10	8.13E+00	Student's-t UCL
Chrysene	21	7	33%	0.16	1.7	0.09	4.8	1.98E+00	99% Chebyshev (Mean, Sd) UCL
Copper	21	4	19%	1.2	17	1	10	7.78E+00	95% Chebyshev (Mean, Sd) UCL
Cumene (Isopropylbenzene)	15	1	7%	1.2	1.2	0.5	0.5	4.25E-01	Student's-t UCL
Cymene (para-Isopropyl Toluene)	15	1	7%	1.1	1.1	0.5	0.5	4.06E-01	Student's-t UCL
Dibenz(a,h)anthracene	21	6	29%	0.25	2.1	0.19	4.8	2.17E+00	95% Chebyshev (Mean, Sd) UCL
1,2-Dichloroethane	15	1	7%	1.4	1.4	0.5	0.5	4.62E-01	Student's-t UCL
cis-1,2-Dichloroethene	15	4	27%	0.8	24	0.5	0.5	1.83E+01	99% Chebyshev (Mean, Sd) UCL
trans-1,2-Dichloroethene	15	3	20%	1.5	2.9	0.5	0.5	1.58E+00	95% Chebyshev (Mean, Sd) UCL
Ethylbenzene	15	1	7%	1.3	1.3	0.5	0.5	4.43E-01	Student's-t UCL

TABLE 17

**STATISTICAL SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER SAMPLES
USED IN HUMAN HEALTH RISK ASSESSMENT^{1,2}**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations in micrograms per liter (µg/L)

COPC	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	95% UCL	Rationale
Fluoranthene	21	9	43%	0.19	6.8	0.19	4.8	1.64E+00	Approximate Gamma UCL
Fluorene	21	4	19%	0.44	3.2	0.19	4.8	2.43E+00	99% Chebyshev (Mean, Sd) UCL
Indeno(1,2,3-cd)pyrene	21	6	29%	0.14	1.6	0.09	4.8	1.91E+00	99% Chebyshev (Mean, Sd) UCL
Lead	21	4	19%	1.2	28	1	3	8.62E+00	95% Chebyshev (Mean, Sd) UCL
Molybdenum	15	4	27%	20	78	20	20	3.75E+01	95% Chebyshev (Mean, Sd) UCL
MTBE	15	3	20%	1.1	3.1	0.5	0.5	1.43E+00	95% Chebyshev (Mean, Sd) UCL
Naphthalene	21	2	10%	3.4	6.4	0.94	4.8	2.43E+00	95% Chebyshev (Mean, Sd) UCL
Nickel	21	6	29%	1.2	15	20	20	1.19E+01	95% Chebyshev (Mean, Sd) UCL
Phenanthrene	21	9	43%	0.11	12	0.09	4.8	2.38E+00	Adjusted Gamma UCL
Propylbenzene	15	1	7%	1.5	1.5	0.5	0.5	4.80E-01	Student's-t UCL
Pyrene	21	11	52%	0.11	6.7	0.09	4.8	1.65E+00	Approximate Gamma UCL
Selenium	21	6	29%	5.1	12	1	5	1.19E+01	99% Chebyshev (Mean, Sd) UCL
Trichloroethene	15	3	20%	0.6	1.6	0.5	0.5	8.50E-01	95% Chebyshev (Mean, Sd) UCL
1,2,4-Trimethylbenzene	15	1	7%	7.5	7.5	0.5	0.5	2.84E+00	95% Chebyshev (Mean, Sd) UCL
1,3,5-Trimethylbenzene	15	1	7%	3	3	0.5	0.5	1.23E+00	95% Chebyshev (Mean, Sd) UCL
Vanadium	21	10	48%	1.2	150	10	10	9.31E+01	99% Chebyshev (Mean, Sd) UCL
Vinyl Chloride	15	3	20%	0.8	6.1	0.5	0.5	5.14E+00	99% Chebyshev (Mean, Sd) UCL
Xylenes	15	1	7%	4.7	4.7	0.5	0.5	1.84E+00	95% Chebyshev (Mean, Sd) UCL
Zinc	21	8	38%	6.3	130	5	20	4.67E+01	95% Chebyshev (Mean, Sd) UCL

Notes:

- Groundwater samples collected from on-site monitoring wells.
- Total petroleum hydrocarbons are not quantitatively evaluated in the human health risk assessment.

Abbreviations:

COPC = chemical of potential concern
 MTBE = methyl tert-butyl ether
 TPH bunker = total petroleum hydrocarbons quantified as bunker oil
 TPHd = total petroleum hydrocarbons quantified as diesel
 TPHg total petroleum hydrocarbons quantified as gasoline
 TPHmo = total petroleum hydrocarbons quantified as motor oil
 -- = not applicable

TABLE 18
**STATISTICAL SUMMARY FOR CHEMICALS OF POTENTIAL CONCERN IN SOIL
VAPOR SAMPLES USED IN RISK ASSESSMENT¹**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

COPC	Count	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit
Acetone	12	10	83%	18	240	11	530
Benzene	12	11	92%	5.7	1100	3.5	3.5
Carbon Disulfide	12	7	58%	3.9	32	3.4	170
Chloroform	12	4	33%	13	100	5	270
Cumene (Isopropylbenzene)	12	1	8%	20	20	5	280
Cyclohexane	12	12	100%	5.4	2500	--	--
Dichlorodifluoromethane (Freon 12)	12	1	8%	5.8	5.8	5.1	280
1,2-Dichloroethane	12	1	8%	5.3	5.3	4.1	230
1,1-Dichloroethene	12	2	17%	11	41	4.1	220
cis-1,2-Dichloroethene	20	8	40%	7.6	6200	4.1	220
trans-1,2-Dichloroethene	20	5	25%	19	3800	4.1	220
Ethanol	12	4	33%	8.2	24	8.3	420
Ethylbenzene	12	2	17%	5.6	5.7	4.4	240
4-Ethyltoluene	12	2	17%	6	44	5	280
Heptane	12	9	75%	5.9	1300	4.5	5
Hexane	12	12	100%	5	12000	--	--
Methylene Chloride	12	2	17%	5.4	36	3.8	190
Methyl Ethyl Ketone (2-Butanone)	12	9	75%	5.4	96	3.4	160
Naphthalene	8	1	13%	5.7	5.7	4.1	5.6
2-methyl-Propane	12	12	100%	210	13000	--	--
2-Propanol	12	1	8%	27	27	10	550
Propylbenzene	12	1	8%	16	16	5	280
Tetrachloroethene	20	6	30%	8.3	120	4.1	380
Tetrahydrofuran	12	4	33%	3.6	13	3.1	160
Toluene	12	10	83%	5.4	340	4.1	4.6
1,1,1-Trichloroethane	12	1	8%	17	17	5.6	300
Trichloroethene	20	12	60%	9.7	380	4.1	300
Trichlorofluoromethane (Freon 11)	12	4	33%	8.6	47	5.8	310
1,2,4-Trimethylbenzene	12	2	17%	9.2	58	5	280
1,3,5-Trimethylbenzene	12	1	8%	24	24	5	280
2,2,4-Trimethylpentane	12	5	42%	7.6	1300	4.8	20
Vinyl Chloride	20	7	35%	13	2800	2.6	140
Xylenes	12	7	58%	5.2	250	4.8	18

Notes:

1. Soil vapor samples analytical results used in risk assessment are presented in Appendix F.

Abbreviations:

- COPC = chemical of potential concern
-- = not applicable

TABLE 19
SUMMARY OF EXPOSURE POINT CONCENTRATIONS
FOR CHEMICALS OF POTENTIAL CONCERN

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

COPC	Soil		Soil Vapor		Indoor Air		Groundwater	
	Soil EPC (mg/kg)	Rationale ¹	EPC (mg/m ³)	Rationale ¹	EPC from Soil Vapor ² (mg/m ³)	EPC from Soil ³ (mg/m ³)	Groundwater EPC (mg/L)	Rationale ¹
Acenaphthene	5.00E-01	Maximum Detection	NA	--	--	9.14E-07	1.95E-03	95% Chebyshev (Mean, Sd)
Acenaphthylene	4.92E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	--	1.04E-04	ND	--
Acetone	7.02E-02	95% Chebyshev (Mean, Sd) UCL	2.40E-01	Maximum	2.33E-05	--	5.92E-03	Student's-t UCL
Anthracene	9.78E+01	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	2.00E-03	99% Chebyshev (Mean, Sd)
Antimony	7.23E+00	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Aroclor 1242	8.11E-03	Student's-t UCL	NA	--	NV	--	ND	--
Aroclor 1248	1.82E-02	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Aroclor 1254	8.39E-01	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Aroclor 1260	2.84E-01	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Arsenic	6.65E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	5.53E-02	95% Chebyshev (MVUE) UCL
Barium	2.13E+02	Approximate Gamma UCL	NA	--	NV	--	2.33E-01	Student's-t UCL
Benzene	ND	--	1.10E+00	Maximum	6.40E-05	--	4.80E-03	Maximum Detection
Benzo(a)anthracene	8.23E+01	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	1.80E-03	Maximum Detection
Benzo(a)pyrene	9.60E+01	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	2.00E-03	Maximum Detection
Benzo(b)fluoranthene	5.58E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	--	4.36E-08	1.30E-03	Maximum Detection
Benzo(g,h,i)perylene	1.20E+00	95% H-UCL	NA	--	NV	--	2.62E-03	99% Chebyshev (Mean, Sd)
Benzo(k)fluoranthene	4.66E-01	95% H-UCL	NA	--	NV	--	6.70E-04	Maximum Detection
Beryllium	3.90E-01	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
sec-Butylbenzene	ND	--	NA	--	--	--	3.70E-04	Student's-t UCL
Butylbenzylphthalate	3.90E+00	Maximum Detection	NA	--	NV	--	ND	--
Cadmium	5.27E-01	Approximate Gamma UCL	NA	--	NV	--	ND	--
Carbon disulfide	ND	--	3.20E-02	Maximum	2.16E-06	--	4.06E-04	Student's-t UCL
Chlorobenzene	ND	--	ND	Maximum	NV	--	3.33E-04	Student's-t UCL
Chloroform	ND	--	1.00E-01	Maximum	6.76E-06	--	2.96E-04	Student's-t UCL
Chromium (total)	3.35E+02	97.5% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Chromium (hexavalent)	7.23E+00	97.5% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Chrysene	6.23E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	--	1.91E-07	1.70E-03	Maximum Detection
Cobalt	3.64E+01	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Copper	7.38E+01	95% H-UCL	NA	--	NV	--	7.78E-03	95% Chebyshev (Mean, Sd)
Cumene	ND	--	2.00E-02	Maximum	8.79E-07	--	4.25E-04	Student's-t UCL
Cymene	ND	--	NA	--	--	--	4.06E-04	Student's-t UCL
Cyclohexane	NA	--	2.50E+00	Maximum	1.61E-04	--	NA	--
Dibenz(a,h)anthracene	4.40E-01	95% H-UCL	NA	--	NV	--	2.10E-03	Maximum Detection
Dichlorodifluoromethane	ND	--	5.80E-03	Maximum	2.60E-07	--	ND	--
1,2-Dichloroethane	ND	--	5.30E-03	Maximum	3.61E-07	--	4.62E-04	Student's-t UCL
1,1-Dichloroethene	ND	--	4.10E-02	Maximum	2.43E-06	--	ND	--
cis-1,2-Dichloroethene	5.31E-01	99% Chebyshev (Mean, Sd) UCL	6.20E+00	Maximum	3.07E-04	--	1.83E-02	99% Chebyshev (Mean, Sd)
trans-1,2-Dichloroethene	3.35E-01	99% Chebyshev (Mean, Sd) UCL	3.80E+00	Maximum	1.81E-04	--	1.58E-03	95% Chebyshev (Mean, Sd)
Ethanol	NA	--	2.40E-02	Maximum	1.88E-06	--	NA	--
Ethylbenzene	ND	--	5.70E-03	Maximum	2.86E-07	--	4.43E-04	Student's-t UCL
4-Ethyltoluene	NA	--	4.40E-02	Maximum	2.30E-06	--	NA	--
Fluoranthene	2.35E+02	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	1.64E-03	Approximate Gamma UCL
Fluorene	6.08E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	--	2.70E-05	2.43E-03	99% Chebyshev (Mean, Sd)
Heptane	NA	--	1.30E+00	Maximum	7.54E-05	--	NA	--
Hexane	NA	--	1.20E+01	Maximum	1.41E-03	--	NA	--
Indeno(1,2,3-cd)pyrene	2.21E+01	97.5% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	1.60E-03	Maximum Detection
Lead	5.41E+02	95% H-UCL	NA	--	NV	--	8.62E-03	95% Chebyshev (Mean, Sd)
Mercury	4.26E-01	95% H-UCL	NA	--	NV	--	ND	--
Methylene chloride	ND	--	3.60E-02	Maximum	2.38E-06	--	ND	--
Methyl Ethyl Ketone	1.30E-02	Maximum Detection	9.60E-02	Maximum	6.37E-06	--	ND	--
Molybdenum	2.39E+00	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	3.75E-02	95% Chebyshev (Mean, Sd)
MTBE	ND	--	ND	Maximum	--	--	1.43E-03	95% Chebyshev (Mean, Sd)
Naphthalene	2.35E+02	99% Chebyshev (Mean, Sd) UCL	5.70E-03	Maximum	2.38E-07	--	2.43E-03	95% Chebyshev (Mean, Sd)
Nickel	1.26E+03	99% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	1.19E-02	95% Chebyshev (Mean, Sd)
Phenanthrene	5.09E+02	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	2.38E-03	Adjusted Gamma UCL
2-Propanol	NA	--	2.70E-02	Maximum	4.70E-06	--	NA	--
Propylbenzene	ND	--	1.60E-02	Maximum	6.55E-07	--	4.80E-04	Student's-t UCL
Pyrene	1.94E+00	95% Chebyshev (MVUE) UCL	NA	--	--	4.24E-08	1.65E-03	Approximate Gamma UCL

TABLE 19
SUMMARY OF EXPOSURE POINT CONCENTRATIONS
FOR CHEMICALS OF POTENTIAL CONCERN

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

COPC	Soil		Soil Vapor		Indoor Air		Groundwater	
	Soil EPC (mg/kg)	Rationale ¹	EPC (mg/m ³)	Rationale ¹	EPC from Soil Vapor ² (mg/m ³)	EPC from Soil ³ (mg/m ³)	Groundwater EPC (mg/L)	Rationale ¹
Selenium	1.23E-03	Approximate Gamma UCL	NA	--	NV	--	1.19E-02	99% Chebyshev (Mean, Sd)
Tetrachloroethene	ND	--	1.20E-01	Maximum	5.80E-06	--	ND	--
Tetrahydrofuran	NA	--	1.30E-02	Maximum	9.56E-07	--	NA	--
Thallium	5.51E-01	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	ND	--
Toluene	ND	--	3.40E-01	Maximum	1.96E-05	--	ND	--
1,1,1-Trichloroethane	ND	--	1.70E-02	Maximum	8.85E-07	--	ND	--
Trichloroethene	8.63E-02	95% Chebyshev (Mean, Sd) UCL	3.80E-01	Maximum	2.00E-05	--	8.50E-04	95% Chebyshev (Mean, Sd)
Trichlorofluoromethane	NA	--	4.70E-02	Maximum	2.70E-06	--	NA	--
1,2,4-Trimethylbenzene	ND	--	5.80E-02	Maximum	2.40E-06	--	2.84E-03	95% Chebyshev (Mean, Sd)
1,3,5-Trimethylbenzene	ND	--	2.40E-02	Maximum	9.85E-07	--	1.23E-03	95% Chebyshev (Mean, Sd)
2,2,4-Trimethylpentane	NA	--	1.30E+00	Maximum	7.00E-05	--	NA	--
Vanadium	5.83E+01	Approximate Gamma UCL	NA	--	NV	--	9.31E-02	99% Chebyshev (Mean, Sd)
Vinyl chloride	ND	--	2.80E+00	Maximum	1.92E-04	--	5.14E-03	99% Chebyshev (Mean, Sd)
Xylenes	ND	--	2.50E-01	Maximum	2.73E-05	--	1.84E-03	95% Chebyshev (Mean, Sd)
Zinc	3.40E+02	95% Chebyshev (Mean, Sd) UCL	NA	--	NV	--	4.67E-02	95% Chebyshev (Mean, Sd)

Notes:

1. If a chemical is retained as a COPC, the rationale presents the method for calculating the exposure point concentration; calculations in Appendix G.
2. The indoor air concentration is calculated using the soil vapor exposure point concentration and the Johnson & Etinger Model for vapor intrusion.
3. The indoor air concentration is calculated using the soil exposure point concentrations for volatile compounds that were not analyzed in soil vapor, but are considered sufficiently volatile to evaluate.

Abbreviations:

COPC = chemical of potential concern	ND = not detected
EPC = exposure point concentration	NV = non-volatile
mg/kg = milligrams per kilogram	Sd = standard deviation
mg/m ³ = milligrams per cubic meter	UCL = upper confidence limit
NA = not analyzed	-- = not applicable

TABLE 20
PHYSICOCHEMICAL CONSTANTS FOR CHEMICALS OF POTENTIAL CONCERN

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Log Octanol-Water Coefficient (log Kow)		Henry's Law Constant (H)		Water Solubility (S)		Diffusivity in Air (D _i)		Diffusivity in Water (D _w)		Organic Carbon Partition Coefficient (K _{oc})		Molecular Weight (MW)		Dermal-Soil Absorption Factor (ABS _d s)	
	(unitless)	Ref	(atm·m ³ /mole)	Ref	(mg/L)	Ref	(cm ² /sec)	Ref	(cm ² /sec)	Ref	(L/kg)	Ref	(g/mole)	Ref	(--)	Ref
Acenaphthene	3.9	3	1.5E-04	9	3.6E+00	9	4.2E-02	9	7.7E-06	9	7.1E+03	9	154.21	9	0.13	12
Acenaphthylene	4.0	1	1.1E-04	1	1.0E+01	1	4.4E-02	10	6.6E-06	1	4.8E+03	1	152.2	1	0.13	12
Acetone	-0.2	3	3.9E-05	9	1.0E+06	9	1.2E-01	9	1.1E-05	9	5.8E-01	9	58.08	9	0.1	4
Anthracene	4.6	3	6.5E-05	9	4.3E-02	9	3.2E-02	9	7.7E-06	9	3.0E+04	9	178.24	8	0.13	12
Antimony	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	122	6	0.01	4
Aroclor 1242	4.1	1	5.2E-04	9	3.4E-01	9	2.1E-02	9	5.3E-06	9	3.3E+04	9	261	1	0.14	12
Aroclor 1248	6.1	1	2.9E-03	1	7.0E-01	2	4.4E-02	Calc	6.6E-06	1	4.4E+05	1	288	1	0.14	12
Aroclor 1254	6.0	1	2.0E-03	9	5.7E-02	9	1.6E-02	9	5.0E-06	9	2.0E+05	9	327	1	0.14	12
Aroclor 1260	6.5	1	1.9E-04	9	7.0E-01	9	3.7E-02	9	5.3E-06	9	2.9E+05	9	370	1	0.14	12
Arsenic	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	75	6	0.03	12
Barium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	137	6	0.01	4
Benzene	2.1	3	5.5E-03	9	1.8E+03	9	8.8E-02	9	9.8E-06	9	5.9E+01	9	78.11	9	0.1	4
Benzo(a)anthracene	5.7	3	3.4E-06	3	9.4E-03	2	5.1E-02	2	9.0E-06	2	4.0E+05	2	228.3	1	0.13	12
Benzo(a)pyrene	6.1	3	1.1E-06	9	1.6E-03	9	4.3E-02	9	9.0E-06	9	1.0E+06	9	252.32	1	0.13	12
Benzo(b)fluoranthene	6.2	3	1.1E-04	9	1.5E-03	9	2.3E-02	9	5.6E-06	9	1.2E+06	9	252.32	9	0.13	12
Benzo(g,h,i)perylene	7.1	1	2.7E-07	1	2.6E-04	1	4.5E-02	1	4.9E-06	1	7.8E+06	1	276.34	1	0.13	12
Benzo(k)fluoranthene	6.2	3	8.3E-07	9	8.0E-04	9	2.3E-02	9	5.6E-06	9	1.2E+06	9	252.32	1	0.13	12
Beryllium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	9.01	6	0.01	4
sec-Butylbenzene	4.2	1	1.4E-02	9	3.9E+00	9	5.7E-02	9	8.1E-06	9	9.7E+02	9	134.22	9	0.1	4
Butylbenzylphthalate	4.8	3	1.3E-06	3	2.7E+00	3	1.7E-02	3	4.8E-06	3	1.7E+04	3	312.36	6	0.1	12
Cadmium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	112	6	0.001	12
Carbon disulfide	2.0	3	3.0E-02	9	1.2E+03	9	1.0E-01	9	1.0E-05	9	4.6E+01	9	76.13	9	0.1	4
Chlorobenzene	2.9	3	3.7E-03	9	4.7E+02	9	7.3E-02	9	8.7E-06	9	2.2E+02	9	112.56	9	0.1	4
Chloroform	1.9	3	3.7E-03	9	7.9E+03	9	1.0E-01	9	1.0E-05	9	4.0E+01	9	119.38	9	0.1	4
Chromium III	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	52	6	0.01	4
Chromium VI	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	52	6	0	4
Chrysene	5.7	3	9.4E-05	9	6.3E-03	9	2.5E-02	9	6.2E-06	9	4.0E+05	9	228.3	9	0.13	12
Cobalt	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	59	6	0.01	4
Copper	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	64	6	0.01	4
Cumene	3.6	1	1.2E+00	9	6.1E+01	9	6.5E-02	9	7.1E-06	9	4.9E+02	9	120.19	9	0.1	4
Cyclohexane	3.4	7	1.8E-01	1	5.8E+01	1	8.4E-02	10	9.0E-06	1	4.8E+02	10	84.18	1	0.1	4
Cymene	4.1	10	1.1E-02	7	2.3E+01	7	5.6E-02	10	7.3E-06	10	4.1E+03	7	134.22	6	0.1	4
Dibenz(a,h)anthracene	6.7	3	1.5E-08	9	2.5E-03	9	2.0E-02	9	5.2E-06	9	3.8E+06	9	278.36	1	0.13	12
Dichlorodifluoromethane	2.2	7	3.4E-01	9	2.8E+02	9	6.7E-02	9	9.9E-06	9	4.6E+02	9	120.92	9	0.1	4

TABLE 20
PHYSICOCHEMICAL CONSTANTS FOR CHEMICALS OF POTENTIAL CONCERN

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Log Octanol-Water Coefficient (log Kow)		Henry's Law Constant (H)		Water Solubility (S)		Diffusivity in Air (D _i)		Diffusivity in Water (D _w)		Organic Carbon Partition Coefficient (K _{oc})		Molecular Weight (MW)		Dermal-Soil Absorption Factor (ABS _d s)	
	(unitless)	Ref	(atm·m ³ /mole)	Ref	(mg/L)	Ref	(cm ² /sec)	Ref	(cm ² /sec)	Ref	(L/kg)	Ref	(g/mole)	Ref	(--)	Ref
1,2-Dichloroethane	1.5	3	9.8E-04	9	8.5E+03	9	1.0E-01	9	9.9E-06	9	1.7E+01	9	98.96	9	0.1	4
1,1-Dichloroethylene	2.1	3	2.6E-02	9	2.3E+03	9	9.0E-02	9	1.0E-05	9	5.9E+01	9	96.94	9	0.1	4
cis-1,2-Dichloroethylene	1.9	3	4.1E-03	9	3.5E+03	9	7.4E-02	9	1.1E-05	9	3.6E+01	9	96.94	9	0.1	4
trans-1,2-Dichloroethylene	2.1	3	9.4E-03	9	6.3E+03	9	7.1E-02	9	1.2E-05	9	5.3E+01	9	96.94	9	0.1	4
Ethanol	-0.3	10	5.00E-06	7	1.00E+06	11	1.2E-01	10	1.3E-05	10	3.09E-01	11	46.07	6	0.1	4
Ethylbenzene	3.1	3	7.9E-03	9	1.7E+02	9	7.5E-02	9	7.8E-06	9	3.6E+02	9	106.17	9	0.1	4
4-Ethyltoluene	3.63	10	0.0049	10	95	10	6.5E-02	10	7.8E-06	10	1380	10	120.19	10	0.1	4
Fluoranthene	5.1	3	1.6E-05	9	2.1E-01	9	3.0E-02	9	6.4E-06	9	1.1E+05	9	202.26	1	0.13	12
Fluorene	4.2	3	6.3E-05	9	2.0E+00	9	3.6E-02	9	7.9E-06	9	1.4E+04	9	166.22	9	0.13	12
Heptane	4.66	1	2.035	1	2.9	1	9.3E-02	1	7.1E-06	1	8.20E+03	7	100.2	1	0.1	4
Hexane	3.9	7	1.7E+00	9	1.2E+01	9	2.0E-01	9	7.8E-06	9	4.3E+01	9	86.18	9	0.1	4
Indeno(1,2,3-cd)pyrene	6.7	3	1.6E-06	9	2.2E-05	9	1.9E-02	9	5.7E-06	9	3.5E+06	9	276.34	1	0.13	12
Lead	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	207.2	--	0.01	4
Mercury (elemental)	NA		1.1E-02	9	2.0E+01	9	3.1E-02	9	6.3E-06	9	5.2E+01	9	200.59	9	0.01	4
Methylene chloride	1.3	3	2.2E-03	9	1.3E+04	9	1.0E-01	9	1.2E-05	9	1.2E+01	9	84.93	9	0.1	4
Methylethylketone (2-butanone)	0.4	1	5.6E-05	9	2.2E+05	9	8.1E-02	9	9.8E-06	9	2.3E+00	9	72.11	9	0.1	4
2-Methylnaphthalene	3.9	3	5.2E-04	9	2.5E+01	9	5.2E-02	9	7.8E-06	9	2.8E+03	9	142.21	9	0.13	12
Molybdenum	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	95.94	6	0.01	4
MTBE	1.2		6.2E-04	9	5.1E+04	9	1.0E-01	9	1.1E-05	9	7.3E+00	9	88.15	9	0.1	4
Naphthalene	3.4	3	4.8E-04	9	3.1E+01	9	5.9E-02	9	7.5E-06	9	2.0E+03	9	128.18	9	0.13	12
Nickel	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	59	6	0.01	4
Phenanthrene	4.5	1	3.9E-05	9	1.2E+00	9	5.8E-02	9	5.9E-06	9	2.7E+04	9	178.24	1	0.13	12
2-Propanol	0.3	1	5.1E-06	1	2.5E+05	1	9.8E-02	10	1.1E-05	1	3.0E+00	1	60.1	1	0.1	4
n-Propylbenzene	3.6	1	1.1E-02	9	6.0E+01	9	6.0E-02	9	7.8E-06	9	5.6E+02	9	120.19	9	0.1	4
Pyrene	5.1	3	1.1E-05	9	1.4E+00	9	2.7E-02	9	7.2E-06	9	1.1E+05	9	202.26	9	0.13	12
Selenium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	79	6	0.01	4
Tetrachloroethylene	2.7	3	1.8E-02	9	2.0E+02	9	7.2E-02	9	8.2E-06	9	1.6E+02	9	165.83	9	0.1	4
Tetrahydrofuran	0.46	1	7.06E-05	1	3.03E+05	1	9.8E-02	10	1.0E-05	1	23.4	1	72.11	1	0.1	4
Thallium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	204	6	0.01	4
Toluene	2.8	3	6.6E-03	9	5.3E+02	9	8.7E-02	9	8.6E-06	9	1.8E+02	9	92.14	9	0.1	4
1,1,1-Trichloroethane	2.5	3	1.7E-02	9	1.3E+03	9	7.8E-02	9	8.8E-06	9	1.1E+02	9	133.4	9	0.1	4
Trichloroethylene	2.7	3	1.0E-02	9	1.5E+03	9	7.9E-02	9	9.1E-06	9	1.7E+02	9	131.39	9	0.1	4
1,2,4-Trimethylbenzene	3.7	1	6.1E-03	9	5.7E+01	9	6.1E-02	9	7.9E-06	9	1.4E+03	9	120.2	9	0.1	4
1,3,5-Trimethylbenzene	3.5	1	5.9E-03	9	2.0E+00	9	6.0E-02	9	8.7E-06	9	1.4E+03	9	120.2	9	0.1	4
2,2,4-Trimethylpentane	5.8	1	3.0E+00	1	1.1E+00	1	7.0E-02	10	6.6E-06	1	8.0E+03	10	114.22	7	0.1	4
Vanadium	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	51	6	0.01	4

TABLE 20
PHYSICOCHEMICAL CONSTANTS FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Log Octanol-Water Coefficient (log Kow)		Henry's Law Constant (H)		Water Solubility (S)		Diffusivity in Air (D _i)		Diffusivity in Water (D _w)		Organic Carbon Partition Coefficient (K _{oc})		Molecular Weight (MW)		Dermal-Soil Absorption Factor (ABS _d s)	
	(unitless)	Ref	(atm·m ³ /mole)	Ref	(mg/L)	Ref	(cm ² /sec)	Ref	(cm ² /sec)	Ref	(L/kg)	Ref	(g/mole)	Ref	(--)	Ref
Vinyl chloride (chloroethene)	1.5	3	2.7E-02	9	8.8E+03	9	1.1E-01	9	1.2E-05	9	1.9E+01	9	62.5	9	0.1	4
Xylenes	3.2	3	7.3E-03	8	1.6E+02	8	7.0E-02	8	7.9E-06	8	2.0E+02	8	106.17	8	0.1	4
Zinc	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	65	6	0.01	4

Notes:

- The diffusivity constants for 2-methylpropane (isobutane) in air and water were substituted with surrogate chemical, isobutyl alcohol, because there was no chemical-specific information available.

Abbreviations:

atm·m ³ /mole = atmospheres-cubic meters per mole	NA = Not available
cm ² /sec = square centimeters per second	calc = calculated; see Appendix I
g/mole = grams per mole	Ref = Reference
L/kg = liters per kilogram	-- = not applicable
mg/L = milligrams per liter	

References:

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- Hazardous Substances Database (HSDB): <<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>>
- U.S. EPA Region 9, 2004b
- User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion Into Buildings (Revised), December, 2003
- Pennsylvania Department of Environmental Protection, Chemical and Physical Property Database, 2006. <http://www.dep.state.pa.us/physicalproperties/CASNUM_Search.htm>
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- U.S. EPA, 2004d, Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E, Supplemental guidance for Dermal Risk Assessment), Final.

TABLE 21

**EXPOSURE PARAMETERS FOR
 CONSTRUCTION/MAINTENANCE WORKER SCENARIO**
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: Professional Judgment
Exposure Duration (ED)	years	Value: 1 Rationale: Professional Judgment
Body Weight (BW)	kg	Value: 70 Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 365 (noncarcinogens) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Incidental Soil Ingestion		
Soil Ingestion Rate (IR _s)	mg/day	Value: 480 Rationale: RWQCB, 2005
Dermal Contact with Soil		
Exposed Skin Surface Area (SA _s)	cm ² /day	Value: 5,800 Rationale: RWQCB, 2005
Soil-to-Skin Adherence Factor (SAF)	mg/cm ²	Value: 0.51 Rationale: RWQCB, 2005
Absorption Fraction (ABS)	unitless	Value: Chemical-specific Rationale: See Appendix I
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR _a)	m ³ /hr	Value: 2.5 Rationale: U.S. EPA, 2002b; U.S. EPA 1997a
Exposure Time (ET)	hours	Value: 8 Rationale: Cal-EPA, 1996; U.S. EPA, 1991; Standard work day

TABLE 21

**EXPOSURE PARAMETERS FOR
CONSTRUCTION/MAINTENANCE WORKER SCENARIO**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Exposure Parameter	Units	Reasonable Maximum Exposure
Inhalation of Suspended Soil Particulates		
Particulate Emission Factor (PEF)	m ³ /kg	Value: 2.0 x 10 ⁷ Rationale: Cal-EPA, 1999a
Inhalation Rate (IHR _a)	m ³ /hr	Value: 2.5 Rationale: U.S. EPA, 2002b, U.S. EPA, 1997a
Exposure Time (ET)	hours	Value: 8 Rationale: Cal-EPA, 1996; U.S. EPA, 1991; Standard work day
Inhalation of Volatiles in Trench Ambient Air		
Exposure Time (ET)	hours/day	Value: 4 Rationale: Professional judgment
Event Frequency (EV)	event/day	Value: 1 Rationale: Professional judgment
Exposure Frequency (EF)	days/year	Value: 20 Rationale: Professional judgment
Inhalation Rate (IHR _a)	m ³ /hr	Value: 2.5 Rationale: Cal-EPA, 1996; U.S. EPA, 1991; Standard work day
Dermal Contact with Groundwater		
Event Time (ET)	hours/day	Value: 4 Rationale: Professional judgment; based on incidental contact
Event Frequency (EV)	event/day	Value: 1 Rationale: Professional judgment
Exposure Frequency (EF)	days/year	Value: 20 Rationale: Professional judgment
Exposed Skin Surface Area (SA _s)	cm ²	Rationale: 7,000 Rationale: U.S. EPA, 1997b. Assuming that workers stand in ~2 feet of water; thus, forearms, hands, lower legs, and feet (30.6% of total body area, 23,000 cm ³) are exposed.

TABLE 21**EXPOSURE PARAMETERS FOR
CONSTRUCTION/MAINTENANCE WORKER SCENARIO**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Abbreviations:

cm² = squared centimeters

kg = kilogram

mg/cm² = milligrams per squared centimeters

mg/day = milligrams per day

m³/hr = cubic meters per hour

m³/kg = cubic meters per kilogram

TABLE 22
EXPOSURE PARAMETERS FOR
OFF-SITE RESIDENTIAL SCENARIO
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Duration (ED)	years	Value: 6 (child) 24 (adult) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Exposure Frequency (EF)	days	Value: 350 (adult and child) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 15 (child) 70 (adult) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 2,190 (child-noncarcinogens) 9,125 (adult-noncarcinogens) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Inhalation of Vapors in Ambient Air		
Inhalation Rate (IHR _a)	m ³ /hr	Value: 0.42 (child) 0.83 (adult) Rationale: U.S. EPA, 1997a (child); Cal-EPA, 1996 (adult)
Exposure Time (ET)	hours	Value: 24 Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Inhalation of Suspended Soil Particulates		
Inhalation Rate (IHR _a)	m ³ /hour	Value: 0.42 (child) 0.83 (adult) Rationale: U.S. EPA, 1997a (child); Cal-EPA, 1996 (adult)
Particulate Emission Factor (PEF)	m ³ /kg	Value: 4.4 x 10 ⁸ Rationale: U.S. EPA, 2002b
Exposure Time (ET)	hours	Value: 24 Rationale: Cal-EPA, 1996; U.S. EPA, 1991

TABLE 23
EXPOSURE PARAMETERS FOR FUTURE
COMMERCIAL WORKER SCENARIO
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Exposure Parameter	Units	Reasonable Maximum Exposure
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 250 Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 25 Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 70 Rationale: Cal-EPA, 1996; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 25,550 (carcinogens) 9,125 (noncarcinogens) Rationale: Cal-EPA, 1996; U.S. EPA, 1991
PATHWAY-SPECIFIC PARAMETERS		
Inhalation of Vapors in Indoor Air		
Inhalation Rate (IHRa)	m ³ /hr	Value: 2.5 Rationale: U.S. EPA, 1997a; Average worker
Exposure Time (ET)	hours	Value: 8 Rationale: Cal-EPA, 1996; U.S. EPA, 1991

Abbreviations:

kg = kilogram

m³/hr = cubic meters per hour

TABLE 24
CHRONIC NONCARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral						Dermal		Inhalation					
	Reference Dose (RfDo) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference	Dermal Adjustment Factor (ABS _{GI})	Reference Dose (RfDi) (mg/kg-day)	Reference Dose (RfDi) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference
Acenaphthene	0.06	3000 x 1	Mouse	Liver	Weight Change	IRIS	1	0.06	0.06	--	--	--	--	Route
Acenaphthylene	0.06	--	--	--	--	Acenaphthene	1	0.06	0.06	--	--	--	--	Acenaphthene
Acetone	0.9	1000 x 1	Rat	Kidney	Nephropathy	IRIS	1	0.9	0.9	--	--	--	--	Route
Anthracene	0.3	3000 x 1	Mouse	--	None Observed	IRIS	1	0.3	0.3	--	--	--	--	Route
Antimony	0.0004	1000 x 1	Rat	Blood	Glucose, Cholesterol and Shorter Lifespan	IRIS	0.15	0.00006	0.0004	--	--	--	--	Route
Aroclor 1242	0.00002	--	--	--	--	--	1	0.00002	0.00002	--	--	--	--	--
Aroclor 1248	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Aroclor 1254	0.00002	300 x 1	Monkey	Immune sytem, Eyes	various	IRIS	1	0.00002	0.00002	--	--	--	--	Route
Aroclor 1260	0.00002	--	--	--	--	--	1	0.00002	0.00002	--	--	--	--	--
Arsenic	0.0003	3 x 1	Human	Skin	Hyperpigmentation, Keratosis	IRIS	1	0.0003	0.0003	--	--	--	--	Route
Barium	0.07	3 x 1	Human	--	None Observed	IRIS	0.07	0.0049	0.00014	1000 x 1	Rat	Fetus	Fetotoxicity	HEAST
Benzene	0.004	300 x 1	Human	Blood	Decreased Lymphocytes	IRIS	1	0.004	0.0086	300 x 1	Human	Blood	Decreased Lymphocytes	IRIS
Benzo(a)anthracene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Benzo(a)pyrene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Benzo(b)fluoranthene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Benzo(g,h,i)perylene	0.06	--	--	--	--	Acenaphthene	1	0.06	0.06	--	--	--	--	Acenaphthene
Benzo(k)fluoranthene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Beryllium	0.002	300 x 1	Dog	Small Intestine	Lesions	IRIS	0.007	0.000014	0.0000057	10 x 1	Human	Immune System	Sensitization	IRIS
sec-Butylbenzene	0.04	--	--	--	--	USEPA, 2004b	1	0.04	0.04	--	--	--	--	Route
Cadmium	0.0005	10 x 1	Human	Kidney	Proteinuria	IRIS	0.025	0.0000125	0.0005	--	--	--	--	Route
Carbon disulfide	0.1	100 x 1	Rabbit	Fetal	Toxicity	IRIS	1	0.1	0.2	30 x 1	Human	Periperal Nervous System	Dysfunction	IRIS
Chloroform	0.01	1000 x 1	Dog	Liver	Fatty Cyst	IRIS	1	0.01	0.014	NA	NA	NA	NA	USEPA, 2004b
Chromium III	1.5	100 x 10	Rat	--	None Observed	IRIS	0.013	0.0195	1.5	--	--	--	--	Route
Chromium VI	0.003	300 x 3	Rat	--	None Reported	IRIS	0.025	0.000075	2.2E-06	300 x 1	Rat	Lung	Various effects	IRIS
Chrysene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Cobalt	0.02	NA	NA	NA	NA	USEPA, 2004b	1	0.02	5.70E-06	--	--	--	--	USEPA, 2004b
Copper	0.037	Human	--	Gastrointestinal System	Irritation	HEAST	1	0.037	0.037	--	--	--	--	Route
Cumene	0.1	1000 x 1	Rat	Kidney/Adrenal	Increased weight	IRIS	1	0.1	0.11	1000 x 1	Rat	Kidney	Increased weight	IRIS
Cyclohexane	1.7	--	--	--	--	Route	1	1.7	1.7	300 x 1	Rat	Developmental	Decreased pup weights	IRIS
Cymene	0.08	3000 x 1	Rat	Kidney	Increased Weight	Toluene	1	0.08	1.4	10 x 1	Human	Nervous system	Neurological effects	Toluene
Dibenz(a,h)anthracene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Dichlorodifluoromethane	0.2	100 x 1	Rat	--	Reduced body weight	IRIS	1	0.2	0.057	10,000 x 1	Guinea Pig	Liver	lesions	HEAST
1,2-Dichloroethane	0.02	--	--	--	--	USEPA, 2004b	1	0.02	0.0014	--	--	--	--	USEPA, 2004b
1,1-Dichloroethylene	0.05	1000 x 1	Rat	Liver	Fatty change	IRIS	1	0.05	0.057	30 x 1	Rat	Liver	Fatty change	IRIS
cis-1,2-Dichloroethylene	0.01	3000 x 1	Rat	Blood	Decreased Hematocrit and Hemoglobin	HEAST	1	0.01	0.01	--	--	--	--	Route
trans-1,2-Dichloroethylene	0.02	1000 x 1	Mouse	Blood	Enzyme Changes	IRIS	1	0.02	0.02	--	--	--	--	Route

TABLE 24
CHRONIC NONCARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral						Dermal		Inhalation					
	Reference Dose (RfDo) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference	Dermal Adjustment Factor (ABS _{GI})	Reference Dose (RfDi) (mg/kg-day)	Reference Dose (RfDi) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference
Ethanol	0.5	1000 x 1	Rat	Central Nervous system	Increased SAP and SGPT, and decreased brain weight	Methanol	1	0.5	0.5	--	--	--	--	Route
Ethylbenzene	0.1	1000 x 1	Rat	Liver/Kidney	Histopathologic Changes	IRIS	1	0.1	0.29	300 x 1	Rat/Rabbit	--	Developmental Toxicity	IRIS
4-Ethyltoluene	NA	--	--	--	--	Xylenes	1	NA	0.029	300 x 1	Rat	CNS	CNS symptoms	Xylenes
Fluoranthene	0.04	3000 x 1	Mouse	Kidney, Liver, Blood	Nephropathy, Weight Changes, Histopathological Changes	IRIS	1	0.04	0.04	--	--	--	--	Route
Fluorene	0.04	3000 x 1	Mouse	Blood	Decreased RBC	IRIS	1	0.04	0.04	--	--	--	--	Route
Heptane	2	--	--	--	--	TPHCWG	1	NA	5.3	--	--	--	--	TPHCWG
Hexane	11	--	--	--	--	PPRTV	1	11	0.057	--	--	--	--	IRIS
Indeno(1,2,3-cd)pyrene	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Lead	NA	--	--	--	--	--	1	NA	NA	--	--	--	--	--
Mercury (elemental)	0.000086	--	--	--	--	Route	1	0.000086	0.000086	30 x 1	Human	CNS	Hand Tremor, Memory Effects	IRIS
Methylene chloride	0.06	100 x 1	Rat	Liver	Toxicity	IRIS	1	0.06	0.86	100 x 1	Rat	Liver	Toxicity	HEAST
Methylethylketone (2-butanone)	0.6	3000 x 1	Rat	Fetal	Decreased birth weight	IRIS	1	0.6	0.29	1000 x 3	Mouse	Fetal	Decreased birth weight	IRIS
2-Methylnaphthalene	0.004	--	--	--	--	Naphthalene	1	0.004	0.004	--	--	--	--	Naphthalene
Molybdenum	0.005	30 x 1	Human	Kidney	Increase in Uric Acid	IRIS	1	0.005	0.005	--	--	--	--	Route
MTBE	0.86	--	--	--	--	Route	1	0.86	0.86	100 x 1	Rat	Liver, Kidney	Lesions, Altered Weight	IRIS
Naphthalene	0.02	3000 x 1	Rat	--	Decreased Body Weight	IRIS	1	0.02	0.00086	3000 x 1	Mouse	Nasal, Respiratory	Hyperplasia, Metaplasia	IRIS
Nickel	0.02	300 x 1	Rat	Various	Decreased Weight	IRIS	0.04	0.0008	0.02	--	--	--	--	Route
Phenanthrene	0.04	--	--	--	--	Fluoranthene	1	0.04	0.04	--	--	--	--	Fluoranthene
2-Propanol	0.9	1000 x 1	Rat	Kidney	Nephropathy	Acetone	1	0.9	0.9	--	--	--	--	Route
n-Propylbenzene	0.04	--	--	--	--	USEPA, 2004b	1	0.04	0.04	--	--	--	--	Route
Pyrene	0.03	3000 x 1	Mouse	Kidney	Nephropathy, Decreased Weight	IRIS	1	0.03	0.03	--	--	--	--	Route
Selenium	0.005	3 x 1	Human	Various	Clinical Selenosis	IRIS	1	0.005	0.005	--	--	--	--	Route
Tetrachloroethylene	0.01	1000 x 1	Mouse/Rat	Liver	Toxicity	IRIS	1	0.01	0.01	--	--	--	--	USEPA, 2004b
Tetrahydrofuran	0.21	--	--	--	--	USEPA, 2004b	1	0.021	0.086	--	--	--	--	USEPA, 2004b
Thallium	0.000066	--	--	--	--	IRIS	1	0.000066	0.000066	--	--	--	--	Route
Toluene	0.08	3000 x 1	Rat	Kidney	Increased Weight	IRIS	1	0.08	1.4	10 x 1	Human	Nervous system	Neurological effects	IRIS
1,1,1-Trichloroethane	0.28	--	--	--	--	USEPA, 2004b	1	0.28	0.63	300 x 1	Gerbil	Brain	Increased GFA protein	USEPA, 2004b
Trichloroethylene	0.0003	NA	NA	NA	NA	USEPA, 2004b	1	0.0003	0.01	--	--	--	--	USEPA, 2004b
Trichlorofluoromethane	0.3	1000 x 1	Rats, mice	--	Survival, histopathology	IRIS	1	0.3	0.2	1000 x 1	Rat	--	Increased mortality	HEAST
1,2,4-Trimethylbenzene	0.05	--	--	--	--	1,3,5-Trimethylbenzene	1	0.05	0.0017	3000 x 1	Human	CNS	CNS symptoms	USEPA, 2004b

TABLE 24

CHRONIC NONCARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral						Dermal		Inhalation					
	Reference Dose (RfDo) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference	Dermal Adjustment Factor (ABS _{GI})	Reference Dose (RfDi) (mg/kg-day)	Reference Dose (RfDi) (mg/kg-day)	UF x MF	Target Species	Target Organ	Critical Effect	Reference
1,3,5-Trimethylbenzene	0.05	3000 x 1	Rat	various	various	USEPA, 2004b	1	0.05	0.0017	3000 x 1	Human	CNS	CNS symptoms	USEPA, 2004b
2,2,4-Trimethylpentane	NA	--	--	--	--	NA	1	NA	NA	--	--	--	--	NA
Vanadium	0.007	100 x 1	Rat	NA	NA	HEAST	0.026	0.000182	0.007	--	--	--	--	Route
Vinyl chloride (chloroethene)	0.003	30 x 1	Rat	Liver	Cell polymorphism	IRIS	1	0.003	0.029	--	--	--	--	U.S. EPA, 2004b
Xylenes	0.2	1000 x 1	Rat	--	Increased Mortality, Decreased Body Weight	IRIS	1	0.2	0.029	300 x 1	Rat	CNS	CNS symptoms	IRIS
Zinc	0.3	3 x 1	Human	Blood	Enzyme Changes	IRIS	1	0.3	0.3	--	--	--	--	Route

Notes:

¹ U.S. EPA, 2004d; Dermal Slope Factor (SFd) = SFo/ABS_{GI}
 UF = Uncertainty Factor
 MF = Modifying Factor
 mg/kg-day = milligram per kilogram-day
 NA = Not available
 -- = Not applicable

References:

HEAST = U.S. EPA, 1997, Health Effects Assessment Summary Tables (HEAST)
 IRIS = U.S. EPA, 2006, Integrated Risk Information System (IRIS) Data Base
 USEPA, 2004d = Risk Assessment Guidance for Superfund (RAGS): Volume 1 – Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final.
 USEPA, 2004b = U.S. EPA Region 9 Preliminary Remediation Goals, October 2004.
 TPHCWG = Total Petroleum Hydrocarbon Criteria Working Group Series: Development of Fraction Specific Reference doses (RfDs) and Reference concentrations (RfCs) for Total Petroleum Hydrocarbons (TPH).

TABLE 25
CARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral							Dermal		Inhalation						
	Slope Factor (SFo) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference	Dermal Adjustment Factor (ABS _{GI})	Slope Factor (SFd) (mg/kg-day) ⁻¹	Slope Factor (SFi) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference
Acenaphthene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
Acenaphthylene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Acetone	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Anthracene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Antimony	NC	--	--	--	--	--	--	0.15	NA	NC	--	--	--	--	--	--
Aroclor 1242	5	--	--	--	--	--	--	1	5	2	--	--	--	--	--	--
Aroclor 1248	5	NA	NA	NA	Cal-EPA	B2	IRIS	1	5	2	NA	NA	NA	Cal-EPA	B2	IRIS
Aroclor 1254	5	NA	NA	NA	Cal-EPA	B2	IRIS	1	5	2	NA	NA	NA	Cal-EPA	B2	IRIS
Aroclor 1260	5	NA	NA	NA	Cal-EPA	B2	IRIS	1	5	2	NA	NA	NA	Cal-EPA	B2	IRIS
Arsenic	9.45	Human	Skin	Cancer	Cal-EPA	A	IRIS	1	9.45	12	Human	Lung	Tumors	Cal-EPA	A	IRIS
Barium	NA	--	--	--	--	NA	NA	0.07	NA	NA	--	--	--	--	NA	NA
Benzene	0.1	--	Route Extrapolat	--	Cal-EPA	A	IRIS	1	0.1	0.1	Human	Blood	Leukemias, Lymphomas	Cal-EPA	A	IRIS
Benzo(a)anthracene	1.2	NA	NA	--	Cal-EPA	B2	IRIS	1	1.2	0.39	NA	NA	--	Cal-EPA	--	--
Benzo(a)pyrene	12	NA	NA	NA	Cal-EPA	B2	IRIS	1	12	3.9	hamster	Respiratory system, GI tract	Tumors	Cal-EPA	--	--
Benzo(b)fluoranthene	1.2	NA	NA	--	Cal-EPA	B2	IRIS	1	1.2	0.39	NA	NA	--	Cal-EPA	B2	IRIS
Benzo(g,h,i)perylene	NA	--	--	--	--	D	IRIS	1	NA	NA	--	--	--	--	D	IRIS
Benzo(k)fluoranthene	1.2	NA	NA	--	Cal-EPA	B2	IRIS	1	1.2	0.39	NA	NA	--	Cal-EPA	B2	IRIS
Beryllium	NA	--	--	--	--	--	--	0.007	NA	8.4	--	--	--	Cal-EPA	--	--
sec-Butylbenzene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
Cadmium	0.38	NA	NA	NA	Cal-EPA	B1	IRIS	0.025	15.2	15	Human	Lung	Cancer	Cal-EPA	B1	IRIS
Carbon disulfide	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Chloroform	0.031	Mouse, Rat	Liver, Kidney	Carcinoma, adenoma	Cal-EPA	B2	IRIS	1	0.031	0.019	Rat	Kidney	Tumors	Cal-EPA	B2	IRIS
Chromium III	NA	--	--	--	--	--	--	0.013	NA	NA	--	--	--	--	--	--
Chromium VI	NA	NA	NA	NA	Cal-EPA	D	IRIS	0.025	NA	510	Human	Lung	Cancer	Cal-EPA	D	IRIS
Chrysene	0.12	NA	NA	--	Cal-EPA	B2	IRIS	1	0.12	0.039	NA	NA	--	Cal-EPA	B2	IRIS
Cobalt	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Copper	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Cumene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Cyclohexane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Cymene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
Dibenz(a,h)anthracene	4.1	Mouse	Lung	Carcinoma	Cal-EPA	B2	IRIS	1	4.1	4.1	--	Route Extrapolat	--	Cal-EPA	B2	IRIS
Dichlorodifluoromethane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
1,2-Dichloroethane	0.047	Route Extrapolation	--	--	Cal-EPA	B2	IRIS	1	0.047	0.072	Rat, Mouse	Multiple	Carcinoma	Cal-EPA	B2	IRIS
1,1-Dichloroethylene	NA	--	--	--	--	C	IRIS	1	NA	NA	--	--	--	--	C	IRIS
cis-1,2-Dichloroethylene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
trans-1,2-Dichloroethylene	NA	--	--	--	--	NA	--	1	NA	NA	--	--	--	--	NA	--
Ethanol	NA	--	--	--	surrogate chemical: methanol	--	--	1	NA	NA	--	--	--	--	--	--

TABLE 25
CARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral							Dermal		Inhalation						
	Slope Factor (SFo) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference	Dermal Adjustment Factor (ABS _{GI})	Slope Factor (SFd) (mg/kg-day) ⁻¹	Slope Factor (SFi) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference
Ethylbenzene	NA	--	--	--	--	NA	NA	1	NA	NA	--	--	--	--	NA	NA
4-Ethyltoluene	NA	--	--	--	Surrogate chemical: o-xylene	--	--	1	NA	NA	--	--	--	--	--	--
Fluoranthene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Fluorene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Heptane	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	--	IRIS
Hexane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	1.2	NA	NA	--	Cal-EPA	B2	IRIS	1	1.2	0.39	NA	NA	--	Cal-EPA	B2	IRIS
Lead	0.0085	--	--	--	Cal-EPA	B2	IRIS	1	0.0085	0.042	--	--	--	Cal-EPA	B2	IRIS
Mercury (elemental)	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Methylene chloride	0.014	NA	NA	NA	Cal-EPA	B2	IRIS	1	0.014	0.0035	Mouse, Rat	Mammary Gland, Lung, Liver	Adenomas, Carcinomas	Cal-EPA	B2	IRIS
Methylethylketone (2-butanone)	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
2-Methylnaphthalene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
Molybdenum	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
MTBE	0.00091	--	--	--	--	--	--	1	0.00091	0.0018	--	--	--	--	--	--
Naphthalene	0.12	--	--	--	--	C	IRIS	1	0.12	0.12	--	--	--	--	C	IRIS
Nickel	NC	--	--	--	--	--	--	0.04	NA	0.91	Human	Lung	Cancer	Cal-EPA	A	IRIS
Phenanthrene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
2-Propanol	NC	--	--	--	Surrogate chemical: acetone (IRIS)	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
n-Propylbenzene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
Pyrene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
Selenium	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Tetrachloroethylene	0.54	NA	NA	NA	Cal-EPA	NA	NA	1	0.54	0.021	Mouse	Liver	Carcinomas, Adenomas	Cal-EPA	NA	NA
Tetrahydrofuran	7.60E-03	--	--	--	NCEA	--	--	1	7.60E-03	6.80E-03	--	--	--	--	--	NCEA
Thallium	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Toluene	NC	--	--	--	--	D	IRIS	1	NA	NC	--	--	--	--	D	IRIS
1,1,1-Trichloroethane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Trichloroethylene	0.013	NA	NA	NA	Cal-EPA	NA	NA	1	0.013	0.007	Mouse	Liver, Blood, Lung	Adenomas, Lymphomas, Carcinomas	Cal-EPA	NA	NA
Trichlorofluoromethane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--
1,3,5-Trimethylbenzene	NC	--	--	--	--	NA	--	1	NA	NC	--	--	--	--	NA	--

TABLE 25
CARCINOGENIC TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN
 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Oral							Dermal		Inhalation						
	Slope Factor (SFo) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference	Dermal Adjustment Factor (ABS _{GI})	Slope Factor (SFd) (mg/kg-day) ⁻¹	Slope Factor (SFi) (mg/kg-day) ⁻¹	Target Species	Target Organ	Critical Effect	Reference	Weight-of-evidence	Reference
2,2,4-Trimethylpentane	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--
Vanadium	NA	--	--	--	--	--	--	0.026	NA	NA	--	--	--	--	--	--
Vinyl chloride (chloroethene)	0.27	--	Route Extrapolat	--	Cal-EPA	A	IRIS	1	0.27	0.27	Rat, Mouse	Liver, Lung, Mammary	Carcinomas, Angiosarcomas	Cal-EPA	A	IRIS
Xylenes	NC	--	--	--	--	D	IRIS	1	NA	NA	--	--	--	--	D	IRIS
Zinc	NA	--	--	--	--	--	--	1	NA	NA	--	--	--	--	--	--

Notes:

¹ U.S. EPA, 2004d; Dermal Slope Factor (SFd) = SFo/ABS_{GI}

(mg/kg-day)⁻¹ = 1/(milligram per kilogram-day)

NA = Not available

NC = Not believed to be carcinogenic

-- = Not applicable

References:

IRIS = U.S. EPA, 2006, Integrated Risk Information System (IRIS) Data Base

Cal-EPA = OEHHA, 2006, Toxicity Criteria Database

Weight of Evidence:

A = Known human carcinogen

B1 = Probable human carcinogen - based on limited evidence of carcinogenicity in humans

B2 = Likely to be carcinogenic to humans based on strong evidence of carcinogenicity in animals and inconclusive evidence of carcinogenicity in an exposed human population.

C = Possible human carcinogen

D = Inadequate evidence to assess carcinogenic potential

TABLE 26A
**SUMMARY OF NONCARCINOGENIC HAZARD INDEXES FOR
CONSTRUCTION WORKER**

 San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Soil				Soil Vapor		Groundwater in Trench		Hazard Index	Percent Contribution
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Groundwater	Dermal Contact with Groundwater		
Acenaphthene	3.9E-05	3.1E-05	NA	2.0E-05	NA	NA	8.5E-07	4.3E-05	1.E-04	0.0%
Acenaphthylene	3.9E-03	3.1E-03	NA	2.1E-03	NA	NA	NA	NA	9.E-03	0.3%
Acetone	3.7E-07	2.3E-07	NA	NA	5.8E-05	1.1E-07	2.8E-07	1.4E-07	6.E-05	0.0%
Anthracene	1.5E-03	1.2E-03	NA	2.4E-04	NA	NA	1.6E-07	1.3E-05	3.E-03	0.1%
Antimony	8.5E-02	3.5E-02	1.8E-04	NA	NA	NA	NA	NA	1.E-01	3.6%
Aroclor 1242	1.9E-03	1.6E-03	4.0E-06	NA	NA	NA	NA	NA	4.E-03	0.1%
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	2.0E-01	1.7E-01	4.1E-04	NA	NA	NA	NA	NA	4.E-01	11.0%
Aroclor 1260	6.7E-02	5.8E-02	1.4E-04	NA	NA	NA	NA	NA	1.E-01	3.7%
Arsenic	1.0E+00	1.9E-01	2.2E-03	NA	NA	NA	NA	4.0E-03	1.E+00	37.0%
Barium	1.4E-02	1.3E-02	1.5E-02	NA	NA	NA	NA	1.0E-03	4.E-02	1.3%
Benzene	NA	NA	NA	NA	3.8E-03	3.9E-05	2.0E-05	3.8E-04	4.E-03	0.1%
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	9.4E-05	7.5E-05	2.0E-07	NA	NA	NA	8.5E-07	1.5E-04	3.E-04	0.0%
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	9.2E-04	8.1E-03	6.7E-04	NA	NA	NA	NA	NA	1.E-02	0.3%
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	2.6E-07	2.0E-05	2.E-05	0.0%
Butylbenzylphthalate	9.2E-05	5.6E-05	1.9E-07	NA	NA	NA	NA	NA	1.E-04	0.0%
Cadmium	4.9E-03	1.2E-02	1.0E-05	NA	NA	NA	NA	NA	2.E-02	0.5%
Carbon disulfide	NA	NA	NA	NA	2.2E-06	5.8E-08	7.5E-08	1.4E-06	4.E-06	0.0%
Chlorobenzene	NA	NA	NA	NA	NA	NA	6.0E-07	9.2E-06	1.E-05	0.0%
Chloroform	NA	NA	NA	NA	2.5E-04	2.6E-06	6.2E-07	4.3E-06	3.E-04	0.0%
Chromium III	1.0E-03	5.0E-03	2.2E-06	NA	NA	NA	NA	NA	6.E-03	0.2%
Chromium VI	1.1E-02	0.0E+00	3.2E-02	NA	NA	NA	NA	NA	4.E-02	1.3%
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	8.6E-03	5.3E-04	6.3E-02	NA	NA	NA	NA	NA	7.E-02	2.1%
Copper	9.4E-03	5.8E-04	2.0E-05	NA	NA	NA	NA	4.6E-06	1.E-02	0.3%
Cumene	NA	NA	NA	NA	1.2E-06	4.1E-08	1.1E-07	5.6E-06	7.E-06	0.0%
Cymene	NA	NA	NA	NA	NA	NA	8.1E-09	9.7E-06	1.E-05	0.0%
Cyclohexane	NA	NA	NA	NA	2.1E-05	4.3E-07	NA	NA	2.E-05	0.0%
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	NA	NA	9.6E-07	2.3E-08	NA	NA	1.E-06	0.0%
1,2-Dichloroethane	NA	NA	NA	NA	2.0E-04	1.4E-06	1.1E-05	2.1E-06	2.E-04	0.0%
1,1-Dichloroethylene	NA	NA	NA	NA	1.1E-05	2.2E-07	NA	NA	1.E-05	0.0%
cis-1,2-Dichloroethylene	2.5E-04	1.5E-04	NA	NA	1.6E-02	1.6E-04	6.0E-05	3.0E-04	2.E-02	0.5%
trans-1,2-Dichloroethylene	7.9E-05	4.8E-05	NA	NA	3.8E-03	4.6E-05	2.6E-06	1.3E-05	4.E-03	0.1%
Ethanol	NA	NA	NA	NA	4.3E-05	2.0E-08	NA	NA	4.E-05	0.0%
Ethylbenzene	NA	NA	NA	NA	1.0E-06	5.1E-09	4.8E-08	4.7E-07	2.E-06	0.0%
4-Ethyltoluene	NA	NA	NA	NA	1.8E-04	3.4E-07	NA	NA	2.E-04	0.0%
Fluoranthene	2.8E-02	2.2E-02	5.7E-05	NA	NA	NA	9.3E-07	1.3E-05	5.E-02	1.5%
Fluorene	7.1E-03	5.7E-03	NA	1.7E-03	NA	NA	1.5E-06	9.6E-05	1.E-02	0.4%
Heptane	NA	NA	NA	NA	4.3E-06	7.9E-05	NA	NA	8.E-05	0.0%
Hexane	NA	NA	NA	NA	1.8E-03	1.5E-04	NA	NA	2.E-03	0.1%
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (elemental)	2.3E-02	1.4E-03	4.8E-05	NA	NA	NA	NA	NA	2.E-02	0.7%
Methylene chloride	NA	NA	NA	NA	1.3E-06	1.5E-08	NA	NA	1.E-06	0.0%
Methylethylketone (2-butanone)	1.0E-07	6.3E-08	NA	NA	5.1E-05	9.4E-08	NA	NA	5.E-05	0.0%
2-Methylpropane (Isobutane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	2.2E-03	1.4E-04	4.7E-06	NA	NA	NA	NA	1.6E-04	3.E-03	0.1%
MTBE	NA	NA	NA	NA	NA	NA	5.7E-08	1.1E-07	2.E-07	0.0%
Naphthalene	5.5E-02	4.4E-02	NA	NA	2.8E-03	1.4E-06	8.1E-05	1.0E-04	1.E-01	3.1%
Nickel	3.0E-01	4.6E-01	6.2E-04	NA	NA	NA	NA	6.5E-05	8.E-01	22.4%
Phenanthrene	6.0E-02	3.7E-02	NA	9.6E-03	NA	NA	1.4E-06	8.4E-06	1.E-01	3.2%
2-Propanol	NA	NA	NA	NA	2.6E-05	8.3E-08	NA	NA	3.E-05	0.0%
n-Propylbenzene	NA	NA	NA	NA	1.9E-05	8.3E-08	3.5E-07	1.6E-05	4.E-05	0.0%
Pyrene	3.0E-04	2.4E-04	NA	1.4E-05	NA	NA	1.2E-06	1.3E-04	7.E-04	0.0%
Selenium	1.2E-06	7.1E-08	2.4E-09	NA	NA	NA	NA	5.2E-05	5.E-05	0.0%

TABLE 26A
**SUMMARY OF NONCARCINOGENIC HAZARD INDEXES FOR
CONSTRUCTION WORKER**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil				Soil Vapor		Groundwater in Trench		Hazard Index	Percent Contribution
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Groundwater	Dermal Contact with Groundwater		
Tetrachloroethene	NA	NA	NA	NA	2.7E-04	3.0E-06	NA	NA	3.E-04	0.0%
Tetrahydrofuran	NA	NA	NA	NA	3.2E-05	5.1E-08	NA	NA	3.E-05	0.0%
Thallium	3.9E-02	2.4E-03	8.2E-05	NA	NA	NA	NA	NA	4.E-02	1.2%
Toluene	NA	NA	NA	NA	1.1E-05	7.3E-08	NA	NA	1.E-05	0.0%
1,1,1-Trichloroethane	NA	NA	NA	NA	5.7E-07	7.3E-09	NA	NA	6.E-07	0.0%
Trichloroethene	1.4E-03	8.3E-04	NA	NA	1.2E-03	1.0E-05	2.4E-06	7.1E-04	4.E-03	0.1%
Trichlorofluoromethane	NA	NA	NA	NA	4.5E-06	7.1E-08	NA	NA	5.E-06	0.0%
1,2,4-Trimethylbenzene	NA	NA	NA	NA	3.4E-03	7.1E-06	4.9E-05	8.5E-05	4.E-03	0.1%
1,3,5-Trimethylbenzene	NA	NA	NA	NA	1.4E-03	2.9E-06	2.1E-05	3.0E-05	1.E-03	0.0%
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	3.9E-02	9.3E-02	8.1E-05	NA	NA	NA	NA	1.1E-02	1.E-01	4.3%
Vinyl chloride	NA	NA	NA	NA	1.1E-03	3.5E-05	7.2E-06	2.1E-04	1.E-03	0.0%
Xylenes	NA	NA	NA	NA	3.4E-04	2.1E-06	2.0E-06	8.8E-06	3.E-04	0.0%
Zinc	5.3E-03	3.3E-04	1.1E-05	NA	NA	NA	NA	2.0E-06	6.E-03	0.2%
Total	2.0E+00	1.2E+00	1.1E-01	1.4E-02	3.7E-02	5.3E-04	2.7E-04	1.9E-02	3.E+00	100.0%
Percent Contribution	59.8%	34.7%	3.4%	0.4%	1.1%	0.0%	0.0%	0.6%	100.0%	

Abbreviations:

NA = not applicable

TABLE 26B
**COMPARISON OF PREDICTED AIR CONCENTRATIONS
TO ACUTE/SUBCHRONIC REFERENCE EXPOSURE LEVELS**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations reported in milligrams per cubic meter (mg/m³)

Compound	Ambient Air		Trench Air		Exposure Levels		
	Inhalation of VOCs in Ambient Air from Soil Vapor and Soil	Inhalation of Particulates in Ambient Air from Soil	Inhalation of VOCs in trench ambient air from groundwater	Inhalation of VOCs in trench ambient air from soil vapor	Acute REL ²	Chronic REL ²	PEL ³
Acenaphthene	6.1E-06	na	na	6.5E-06	na	na	na
Acenaphthylene	6.4E-04	na	na	na	na	na	na
Acetone	2.7E-04	na	1.3E-05	3.2E-05	na	na	1.78E+03
Anthracene	3.6E-04	na	na	6.2E-06	na	na	na
Antimony	na	3.6E-07	na	na	na	2.00E-04	5.00E-01
Aroclor 1242	na	4.1E-10	na	na	na	4.00E-04	1.00E+00
Aroclor 1248	na	9.1E-10	na	na	na	4.00E-04	na
Aroclor 1254	na	4.2E-08	na	na	na	4.00E-04	5.00E-01
Aroclor 1260	na	1.4E-08	na	na	na	4.00E-04	na
Arsenic	na	3.3E-06	na	na	1.90E-04	3.00E-05	2.00E-01
Barium	na	1.1E-05	na	na	na	na	5.00E-01
Benzene	1.7E-04	na	4.3E-05	2.2E-05	1.30E+00	6.00E-02	3.19E+00
Benzo(a)anthracene	na	4.1E-06	na	4.9E-06	na	na	na
Benzo(a)pyrene	na	4.8E-06	na	5.2E-06	na	na	na
Benzo(b)fluoranthene	na	2.8E-06	na	3.4E-06	na	na	na
Benzo(g,h,i)perylene	na	6.0E-08	na	6.5E-06	na	na	na
Benzo(k)fluoranthene	na	2.3E-08	na	1.7E-06	na	na	na
Beryllium	na	2.0E-08	na	na	na	7.00E-06	2.00E-03
sec-Butylbenzene	na	na	na	1.3E-06	na	na	na
Butylbenzylphthalate	na	2.0E-07	na	na	na	na	na
Cadmium	na	2.6E-08	na	na	na	2.00E-02	5.00E-03
Carbon disulfide	2.3E-06	na	1.5E-06	1.9E-06	6.20E+00	8.00E-01	1.20E+01
Chlorobenzene	na	na	na	1.3E-06	na	1.00E+00	4.60E+01
Chloroform	1.8E-05	na	4.6E-06	1.1E-06	1.50E-01	3.00E-01	9.78E+00
Chromium (total)	na	1.7E-05	na	na	na	na	5.00E-01
Chromium (hexavalent)	na	3.6E-07	na	na	na	2.00E-04	0.01/0.05 ⁴
Chrysene	na	3.1E-06	na	4.6E-06	na	na	na
Cobalt	na	1.8E-06	na	na	na	na	2.00E-02
Copper	na	3.7E-06	na	na	1.00E-01	2.40E-03	1.00E+00
Cumene (Isopropylbenzene)	6.7E-07	na	5.7E-07	1.6E-06	na	na	na
Cymene (para-Isopropyl Toluene)	na	na	na	1.4E-06	na	na	na
Cyclohexane	1.8E-04	na	9.3E-05	na	na	na	1.05E+03
Dibenz(a,h)anthracene	na	2.2E-08	na	na	na	na	na
Dichlorodifluoromethane (Freon 12)	2.8E-07	na	1.7E-07	na	na	7.00E-01	4.95E+03
1,2-Dichloroethane	1.4E-06	na	2.4E-07	1.9E-06	na	na	4.00E+00
1,1-Dichloroethene	3.1E-06	na	1.6E-06	na	na	7.00E-02	4.00E+00
cis-1,2-Dichloroethene	8.4E-04	na	2.0E-04	7.7E-05	na	na	na
trans-1,2-Dichloroethene	3.9E-04	na	1.2E-04	6.6E-06	na	na	na
Ethanol	1.1E-04	na	1.3E-06	na	na	na	1.90E+03
Ethylbenzene	1.5E-06	na	1.9E-07	1.8E-06	na	2.00E+00	4.35E+02
4-Ethyltoluene	2.6E-05	na	1.3E-06	na	na	na	na
Fluoranthene	na	1.2E-05	na	4.8E-06	na	na	na
Fluorene	3.4E-04	na	na	7.8E-06	na	na	na
Heptane	1.2E-04	na	5.3E-05	na	na	na	1.60E+03
Hexane	5.3E-04	na	1.1E-03	na	na	7.00E+00	1.80E+02
Indeno(1,2,3-cd)pyrene	na	1.1E-06	na	4.0E-06	na	na	na
Mercury	na	2.1E-08	na	na	1.80E-03	9.00E-05	2.50E-02
Methylene chloride	5.8E-06	na	1.6E-06	na	1.40E+01	4.00E-01	8.70E+01
Methyl Ethyl Ketone (2-Butanone)	7.5E-05	na	na	na	1.30E+01	1.00E+00	5.90E+02

TABLE 26B
**COMPARISON OF PREDICTED AIR CONCENTRATIONS
TO ACUTE/SUBCHRONIC REFERENCE EXPOSURE LEVELS**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Concentrations reported in milligrams per cubic meter (mg/m³)

Compound	Ambient Air		Trench Air		Exposure Levels		
	Inhalation of VOCs in Ambient Air from Soil Vapor and Soil	Inhalation of Particulates in Ambient Air from Soil	Inhalation of VOCs in trench ambient air from groundwater	Inhalation of VOCs in trench ambient air from soil vapor	Acute REL ²	Chronic REL ²	PEL ³
Molybdenum	na	1.2E-07	na	na	na	na	10/5 ⁴
MTBE	na	na	na	6.3E-06	na	8.00E+00	1.44E+02
Naphthalene	1.2E-05	na	1.5E-07	8.8E-06	na	9.00E-03	5.00E+01
Nickel	na	6.3E-05	na	na	6.00E-03	5.00E-05	1/0.1 ⁴
Phenanthrene	2.0E-03	na	na	7.4E-06	na	na	na
2-Propanol	1.2E-04	na	1.2E-06	na	na	na	na
Propylbenzene	4.0E-06	na	4.2E-07	1.8E-06	na	na	na
Pyrene	2.2E-06	na	na	4.8E-06	na	na	na
Selenium	na	6.1E-11	na	na	na	na	2.00E-01
Tetrachloroethene	1.4E-05	na	3.8E-06	na	na	3.50E-02	1.70E+02
Tetrahydrofuran	1.4E-05	na	5.6E-07	na	na	na	5.90E+02
Thallium	na	2.8E-08	na	na	na	na	1.00E-01
Toluene	7.6E-05	na	1.3E-05	na	3.70E+01	3.00E-01	1.88E+02
1,1,1-Trichloroethane	1.8E-06	na	5.9E-07	na	na	na	1.90E+03
Trichloroethene	6.3E-05	na	1.3E-05	3.1E-06	na	6.00E-01	1.35E+02
Trichlorofluoromethane (Freon 11)	4.6E-06	na	1.8E-06	na	na	7.00E-01	5.60E+03
1,2,4-Trimethylbenzene	2.9E-05	na	1.6E-06	1.1E-05	na	na	na
1,3,5-Trimethylbenzene	1.2E-05	na	6.4E-07	4.6E-06	na	na	na
2,2,4-Trimethylpentane	9.0E-05	na	3.5E-05	na	na	na	na
Vanadium	na	2.9E-06	na	na	3.00E-02	na	5.00E-02
Vinyl chloride	1.7E-04	na	1.3E-04	2.7E-05	1.80E+02	2.60E-02	2.56E+00
Xylenes	5.0E-05	1.7E-05	7.7E-06	7.4E-06	2.20E+01	7.00E-01	4.35E+02
Zinc	na	1.70E-05	na	na	na	3.50E-02	10/5 ⁵

Notes:

1. Ambient air concentrations for construction workers.
2. RELs from the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values.
<<http://www.arb.ca.gov/toxics/healthval/healthval.htm>>
3. Permissible Exposure Limits from Occupational Safety and Health Administration.
4. Permissible exposure limits for water insoluble/soluble compounds respectively.
5. Recommended permissible exposure limit for zinc oxide dust regulated as particulates. Total dust/respirable dust PEL presented.

Abbreviations:

mg/m³ = milligrams per cubic meter
na = not applicable
PEL = Permissible Exposure Level
REL = Reference Exposure Level

TABLE 27
**SUMMARY OF NONCARCINOGENIC HAZARD INDEXES:
OFF-SITE RESIDENT¹**

San Francisco Electric Reliability Project Site
San Francisco, California

Chemical	Soil		Soil Vapor	Hazard Index	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor		
Acenaphthene	NA	2.2E-05	NA	2.2E-05	0.1%
Acenaphthylene	NA	2.3E-03	NA	2.3E-03	9.8%
Acetone	NA	NA	1.2E-07	1.2E-07	0.0%
Anthracene	NA	2.6E-04	NA	2.6E-04	1.1%
Antimony	1.3E-05	NA	NA	1.3E-05	0.1%
Aroclor 1242	3.0E-07	NA	NA	3.0E-07	0.0%
Aroclor 1248	NA	NA	NA	NA	NA
Aroclor 1254	3.1E-05	NA	NA	3.1E-05	0.1%
Aroclor 1260	1.0E-05	NA	NA	1.0E-05	0.0%
Arsenic	1.6E-04	NA	NA	1.6E-04	0.7%
Barium	1.1E-03	NA	NA	1.1E-03	4.7%
Benzene	NA	NA	7.7E-06	7.7E-06	0.0%
Benzo(a)anthracene	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	1.5E-08	NA	NA	1.5E-08	0.0%
Benzo(k)fluoranthene	NA	NA	NA	NA	NA
Beryllium	5.0E-05	NA	NA	5.0E-05	0.2%
sec-Butylbenzene	NA	NA	NA	NA	NA
Butylbenzylphthalate	1.4E-08	NA	NA	1.4E-08	0.0%
Cadmium	7.7E-07	NA	NA	7.7E-07	0.0%
Carbon disulfide	NA	NA	4.4E-09	4.4E-09	0.0%
Chlorobenzene	NA	NA	NA	NA	NA
Chloroform	NA	NA	5.0E-07	5.0E-07	0.0%
Chromium III	1.6E-07	NA	NA	1.6E-07	0.0%
Chromium VI	2.4E-03	NA	NA	2.4E-03	10.1%
Chrysene	NA	NA	NA	NA	NA
Cobalt	4.7E-03	NA	NA	4.7E-03	19.7%
Copper	1.5E-06	NA	NA	1.5E-06	0.0%
Cumene	NA	NA	2.4E-09	2.4E-09	0.0%
Cymene	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	4.2E-08	4.2E-08	0.0%
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	1.9E-09	1.9E-09	0.0%
1,2-Dichloroethane	NA	NA	3.9E-07	3.9E-07	0.0%
1,1-Dichloroethylene	NA	NA	2.1E-08	2.1E-08	0.0%
cis-1,2-Dichloroethylene	NA	NA	3.3E-05	3.3E-05	0.1%
trans-1,2-Dichloroethylene	NA	NA	7.6E-06	7.6E-06	0.0%
Ethanol	NA	NA	8.6E-08	8.6E-08	0.0%
4-Ethyltoluene	NA	NA	3.5E-07	3.5E-07	0.0%
Fluoranthene	4.3E-06	NA	NA	4.3E-06	0.0%
Fluorene	NA	1.9E-03	NA	1.9E-03	7.8%
Heptane	NA	NA	8.6E-09	8.6E-09	0.0%
Hexane	NA	NA	3.6E-06	3.6E-06	0.0%

TABLE 27
**SUMMARY OF NONCARCINOGENIC HAZARD INDEXES:
OFF-SITE RESIDENT¹**

San Francisco Electric Reliability Project Site
San Francisco, California

Chemical	Soil		Soil Vapor	Hazard Index	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor		
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA
Mercury (elemental)	3.6E-06	NA	NA	3.6E-06	0.0%
Methylene chloride	NA	NA	2.6E-09	2.6E-09	0.0%
Methylethylketone (2-butanone)	NA	NA	1.0E-07	1.0E-07	0.0%
2-Methylpropane (Isobutane)	NA	NA	NA	NA	NA
Molybdenum	3.5E-07	NA	NA	3.5E-07	0.0%
MTBE	NA	NA	NA	NA	NA
Naphthalene	NA	NA	5.7E-06	5.7E-06	0.0%
Nickel	4.6E-05	NA	NA	4.6E-05	0.2%
Phenanthrene	NA	1.1E-02	NA	1.1E-02	45.0%
2-Propanol	NA	NA	5.2E-08	5.2E-08	0.0%
n-Propylbenzene	NA	NA	3.9E-08	3.9E-08	0.0%
Pyrene	NA	1.6E-05	NA	1.6E-05	0.1%
Selenium	1.8E-10	NA	NA	1.8E-10	0.0%
Tetrachloroethene	NA	NA	5.4E-07	5.4E-07	0.0%
Tetrahydrofuran	NA	NA	6.4E-08	6.4E-08	0.0%
Thallium	6.1E-06	NA	NA	6.1E-06	0.0%
Toluene	NA	NA	2.1E-08	2.1E-08	0.0%
1,1,1-Trichloroethane	NA	NA	1.1E-09	1.1E-09	0.0%
Trichloroethene	NA	NA	2.5E-06	2.5E-06	0.0%
Trichlorofluoromethane	NA	NA	9.0E-09	9.0E-09	0.0%
1,2,4-Trimethylbenzene	NA	NA	6.8E-06	6.8E-06	0.0%
1,3,5-Trimethylbenzene	NA	NA	2.9E-06	2.9E-06	0.0%
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA
Vanadium	6.1E-06	NA	NA	6.1E-06	0.0%
Vinyl chloride	NA	NA	2.3E-06	2.3E-06	0.0%
Xylenes	NA	NA	6.8E-07	6.8E-07	0.0%
Zinc	8.3E-07	NA	NA	8.3E-07	0.0%
Total	8.5E-03	1.5E-02	7.5E-05	2.4E-02	100.0%
Percent Contribution	36%	64%	0%	100%	

Notes:

¹ Noncarcinogenic health effects for residents are based on exposures to children.

Abbreviations:

NA = not applicable

TABLE 28
**SUMMARY OF NONCARCINOGENIC HAZARD INDICES:
FUTURE INDUSTRIAL WORKER**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil	Soil Vapor	Hazard Index	Percent Contribution
	Inhalation of Volatiles in Indoor Air from Soil	Inhalation of Volatiles in Indoor Air from Soil Vapor		
Acenaphthene	3.0E-06	NA	3E-06	0.0%
Acenaphthylene	3.4E-04	NA	3E-04	2.0%
Acetone	NA	5.1E-06	5E-06	0.0%
Anthracene	NA	NA	NA	NA
Antimony	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Benzene	NA	1.5E-03	1E-03	8.5%
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Carbon disulfide	NA	2.1E-06	2E-06	0.0%
Chlorobenzene	NA	NA	NA	NA
Chloroform	NA	9.5E-05	9E-05	0.5%
Chromium III	NA	NA	NA	NA
Chromium VI	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Cumene	NA	1.6E-06	2E-06	0.0%
Cymene	NA	NA	NA	NA
Cyclohexane	NA	1.9E-05	2E-05	0.1%
Dibenz(a,h)anthracene	NA	NA	NA	NA
Dichlorodifluoromethane	NA	8.9E-07	9E-07	0.0%
1,2-Dichloroethane	NA	5.0E-05	5E-05	0.3%
1,1-Dichloroethylene	NA	8.3E-06	8E-06	0.0%
cis-1,2-Dichloroethylene	NA	6.0E-03	6E-03	34.9%
trans-1,2-Dichloroethylene	NA	1.8E-03	2E-03	10.3%
Ethanol	NA	7.3E-07	7E-07	0.0%
Ethylbenzene	NA	1.9E-07	2E-07	0.0%
4-Ethyltoluene	NA	1.5E-05	2E-05	0.1%
Fluoranthene	NA	NA	NA	NA
Fluorene	1.3E-04	NA	1E-04	0.8%

TABLE 28
**SUMMARY OF NONCARCINOGENIC HAZARD INDICES:
FUTURE INDUSTRIAL WORKER**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil	Soil Vapor	Hazard Index	Percent Contribution
	Inhalation of Volatiles in Indoor Air from Soil	Inhalation of Volatiles in Indoor Air from Soil Vapor		
Heptane	NA	2.8E-06	3E-06	0.0%
Hexane	NA	4.8E-03	5E-03	28.2%
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA
Mercury (elemental)	NA	NA	NA	NA
Methylene chloride	NA	5.4E-07	5E-07	0.0%
Methylethylketone (2-butanone)	NA	4.4E-06	4E-06	0.0%
2-Methylpropane (Isobutane)	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA
MTBE	NA	NA	NA	NA
Naphthalene	NA	5.4E-05	5E-05	0.3%
Nickel	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
2-Propanol	NA	1.0E-06	1E-06	0.0%
n-Propylbenzene	NA	3.2E-06	3E-06	0.0%
Pyrene	2.8E-07	NA	3E-07	0.0%
Selenium	NA	NA	NA	NA
Tetrachloroethene	NA	1.1E-04	1E-04	0.7%
Tetrahydrofuran	NA	2.2E-06	2E-06	0.0%
Thallium	NA	NA	NA	NA
Toluene	NA	2.7E-06	3E-06	0.0%
1,1,1-Trichloroethane	NA	2.7E-07	3E-07	0.0%
Trichloroethene	NA	3.9E-04	4E-04	2.3%
Trichlorofluoromethane	NA	2.6E-06	3E-06	0.0%
1,2,4-Trimethylbenzene	NA	2.8E-04	3E-04	1.6%
1,3,5-Trimethylbenzene	NA	1.1E-04	1E-04	0.7%
2,2,4-Trimethylpentane	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA
Vinyl chloride	NA	1.3E-03	1E-03	7.5%
Xylenes	NA	1.8E-04	2E-04	1.1%
Zinc	NA	NA	NA	NA
Total	4.7E-04	1.7E-02	2E-02	100.0%
Percent Contribution	2.8%	97.2%		

Abbreviations:

NA = not applicable

TABLE 29
SUMMARY OF EXCESS LIFETIME CANCER RISKS FOR
CONSTRUCTION WORKER

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Soil				Soil Vapor		Groundwater in Trench		Excess Cancer Risk	Percent Contribution
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Groundwater	Dermal Contact with Groundwater		
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	2.7E-09	2.3E-09	2.3E-12	NA	NA	NA	NA	NA	5.E-09	0.0%
Aroclor 1248	6.1E-09	5.3E-09	5.1E-12	NA	NA	NA	NA	NA	1.E-08	0.0%
Aroclor 1254	2.8E-07	2.4E-07	2.3E-10	NA	NA	NA	NA	NA	5.E-07	0.2%
Aroclor 1260	9.5E-08	8.2E-08	7.9E-11	NA	NA	NA	NA	NA	2.E-07	0.1%
Arsenic	4.2E-05	7.8E-06	1.1E-07	NA	NA	NA	NA	1.6E-07	5.E-05	22.9%
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	4.7E-08	4.8E-10	2.5E-10	2.1E-09	5.E-08	0.0%
Benzo(a)anthracene	6.6E-06	5.3E-06	4.5E-09	NA	NA	NA	2.1E-10	2.0E-08	1.E-05	5.4%
Benzo(a)pyrene	7.7E-05	6.2E-05	5.2E-08	NA	NA	NA	2.3E-09	3.6E-07	1.E-04	63.5%
Benzo(b)fluoranthene	4.5E-06	3.6E-06	3.0E-09	NA	NA	NA	1.5E-10	2.7E-08	8.E-06	3.7%
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	3.7E-08	3.0E-08	2.5E-11	NA	NA	NA	7.6E-11	3.5E-08	1.E-07	0.0%
Beryllium	NA	NA	4.6E-10	NA	NA	NA	NA	NA	5.E-10	0.0%
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.3E-08	3.3E-08	1.1E-09	NA	NA	NA	NA	NA	5.E-08	0.0%
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	9.4E-10	9.8E-12	2.4E-12	1.9E-11	1.E-09	0.0%
Chromium III	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium VI	NA	NA	5.2E-07	NA	NA	NA	NA	NA	5.E-07	0.2%
Chrysene	5.0E-07	4.0E-07	3.4E-10	NA	NA	NA	2.0E-11	1.9E-09	9.E-07	0.4%
Cobalt	NA	NA	5.0E-08	NA	NA	NA	NA	NA	5.E-08	0.0%
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.2E-07	9.7E-08	2.5E-10	NA	NA	NA	2.3E-09	2.6E-07	5.E-07	0.2%
Dichlorodifluoromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	2.8E-10	2.0E-12	1.5E-11	2.8E-11	3.E-10	0.0%
1,1-Dichloroethylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.8E-06	1.4E-06	1.2E-09	NA	NA	NA	1.7E-10	5.6E-08	3.E-06	1.5%
Lead	NA	NA	NA	NA	NA	NA	NA	2.3E-11	2.E-11	0.0%
Mercury (elemental)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	5.6E-11	6.3E-13	NA	NA	6.E-11	0.0%
Methylethylketone (2-butanone)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MTBE	NA	NA	NA	NA	NA	NA	1.3E-12	1.2E-12	2.E-12	0.0%
Naphthalene	1.9E-06	1.5E-06	NA	NA	4.2E-09	2.0E-12	1.2E-10	3.6E-09	3.E-06	1.6%
Nickel	NA	NA	1.6E-07	NA	NA	NA	NA	NA	2.E-07	0.1%
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Propanol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	8.1E-10	9.0E-12	NA	NA	8.E-10	0.0%
Tetrahydrofuran	NA	NA	NA	NA	2.7E-10	4.3E-13	NA	NA	3.E-10	0.0%
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	7.5E-11	4.6E-11	NA	NA	1.2E-09	1.0E-11	2.4E-12	3.9E-11	1.E-09	0.0%

TABLE 29
SUMMARY OF EXCESS LIFETIME CANCER RISKS FOR
CONSTRUCTION WORKER

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Soil				Soil Vapor		Groundwater in Trench		Excess Cancer Risk	Percent Contribution
	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Soil Vapor	Inhalation of Volatiles in Trench Ambient Air from Groundwater	Dermal Contact with Groundwater		
Trichlorofluoromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	1.3E-07	4.0E-09	8.1E-10	2.4E-09	1.E-07	0.1%
Xylenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	1.4E-04	8.2E-05	9.0E-07	NA	1.8E-07	4.5E-09	6.4E-09	9.3E-07	2.E-04	100.0%
Percent Contribution	61.6%	37.5%	0.4%	NA	0.1%	0.0%	0.0%	0.4%	100.0%	

Abbreviations:
 NA = not applicable

TABLE 30–PART I
SUMMARY OF EXCESS LIFETIME CANCER RISKS:
OFF-SITE RESIDENT

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil		Soil Vapor	Excess Cancer Risk - Child	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor		
Acenaphthene	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA
Aroclor 1242	1.0E-12	NA	NA	1.0E-12	0%
Aroclor 1248	2.3E-12	NA	NA	2.3E-12	0%
Aroclor 1254	1.0E-10	NA	NA	1.0E-10	0%
Aroclor 1260	3.6E-11	NA	NA	3.6E-11	0%
Arsenic	5.0E-08	NA	NA	5.0E-08	12%
Barium	NA	NA	NA	NA	NA
Benzene	NA	NA	5.7E-10	5.7E-10	0%
Benzo(a)anthracene	2.0E-09	NA	NA	2.0E-09	0%
Benzo(a)pyrene	2.3E-08	NA	NA	2.3E-08	6%
Benzo(b)fluoranthene	1.4E-09	NA	NA	1.4E-09	0%
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	1.1E-11	NA	NA	1.1E-11	0%
Beryllium	2.0E-10	NA	NA	2.0E-10	0%
sec-Butylbenzene	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA
Cadmium	4.9E-10	NA	NA	4.9E-10	0%
Carbon disulfide	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA
Chloroform	NA	NA	1.1E-11	1.1E-11	0%
Chromium III	NA	NA	NA	NA	NA
Chromium VI	2.3E-07	NA	NA	2.3E-07	57%
Chrysene	1.5E-10	NA	NA	1.5E-10	0%
Cobalt	2.2E-08	NA	NA	2.2E-08	6%
Copper	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	NA	NA
Cymene	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.1E-10	NA	NA	1.1E-10	0%
Dichlorodifluoromethane	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	3.4E-12	3.4E-12	0%
1,1-Dichloroethylene	NA	NA	NA	NA	NA
cis-1,2-Dichloroethylene	NA	NA	NA	NA	NA
trans-1,2-Dichloroethylene	NA	NA	NA	NA	NA
Ethanol	NA	NA	NA	NA	NA
4-Ethyltoluene	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA
Heptane	NA	NA	NA	NA	NA

TABLE 30–PART I
SUMMARY OF EXCESS LIFETIME CANCER RISKS:
OFF-SITE RESIDENT

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Soil		Soil Vapor	Excess Cancer Risk - Child	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor		
Hexane	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.4E-10	NA	NA	5.4E-10	0%
Mercury (elemental)	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	6.8E-13	6.8E-13	0%
Methylethylketone (2-butanone)	NA	NA	NA	NA	NA
2-Methylpropane (Isobutane)	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA
MTBE	NA	NA	NA	NA	NA
Naphthalene	NA	NA	5.0E-11	5.0E-11	0%
Nickel	7.2E-08	NA	NA	7.2E-08	18%
Phenanthrene	NA	NA	NA	NA	NA
2-Propanol	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	9.8E-12	9.8E-12	0%
Tetrahydrofuran	NA	NA	3.2E-12	3.2E-12	0%
Thallium	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	1.5E-11	1.5E-11	0%
Trichlorofluoromethane	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	1.5E-09	1.5E-09	0%
Xylenes	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA
Total	4.0E-07	NA	2.2E-09	4.0E-07	100%
Percent Contribution	99%	NA	1%		

Abbreviations:

NA = not applicable

TABLE 30–PART II
SUMMARY OF EXCESS LIFETIME CANCER RISKS:
OFF-SITE RESIDENT

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil		Soil Vapor	Excess Cancer Risk - Adult	Excess Cancer Risk - Total	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor			
Acenaphthene	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA
Aroclor 1242	1.7E-12	NA	NA	1.7E-12	2.7E-12	0%
Aroclor 1248	3.9E-12	NA	NA	3.9E-12	6.1E-12	0%
Aroclor 1254	1.8E-10	NA	NA	1.8E-10	2.8E-10	0%
Aroclor 1260	6.0E-11	NA	NA	6.0E-11	9.6E-11	0%
Arsenic	8.5E-08	NA	NA	8.5E-08	1.3E-07	12%
Barium	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	4.3E-10	4.3E-10	1.0E-09	0%
Benzo(a)anthracene	3.4E-09	NA	NA	3.4E-09	5.4E-09	0%
Benzo(a)pyrene	4.0E-08	NA	NA	4.0E-08	6.3E-08	6%
Benzo(b)fluoranthene	2.3E-09	NA	NA	2.3E-09	3.7E-09	0%
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	1.9E-11	NA	NA	1.9E-11	3.1E-11	0%
Beryllium	3.5E-10	NA	NA	3.5E-10	5.5E-10	0%
sec-Butylbenzene	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA
Cadmium	8.4E-10	NA	NA	8.4E-10	1.3E-09	0%
Carbon disulfide	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	8.6E-12	8.6E-12	2.0E-11	0%
Chromium III	NA	NA	NA	NA	NA	NA
Chromium VI	3.9E-07	NA	NA	3.9E-07	6.2E-07	57%
Chrysene	2.6E-10	NA	NA	2.6E-10	4.1E-10	0%
Cobalt	3.8E-08	NA	NA	3.8E-08	6.0E-08	6%
Copper	NA	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	NA	NA	NA
Cymene	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.9E-10	NA	NA	1.9E-10	3.0E-10	0%
Dichlorodifluoromethane	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	2.6E-12	2.6E-12	6.0E-12	0%
1,1-Dichloroethylene	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethylene	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethylene	NA	NA	NA	NA	NA	NA
Ethanol	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA
Heptane	NA	NA	NA	NA	NA	NA
Hexane	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	9.1E-10	NA	NA	9.1E-10	1.5E-09	0%

TABLE 30–PART II
SUMMARY OF EXCESS LIFETIME CANCER RISKS:
OFF-SITE RESIDENT

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Chemical	Soil		Soil Vapor	Excess Cancer Risk - Adult	Excess Cancer Risk - Total	Percent Contribution
	Inhalation of Particulates	Inhalation of Volatiles in Ambient Air from Soil	Inhalation of Volatiles in Ambient Air from Soil Vapor			
Mercury (elemental)	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	5.2E-13	5.2E-13	1.2E-12	0%
Methylethylketone (2-butanone)	NA	NA	NA	NA	NA	NA
2-Methylpropane (Isobutane)	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA
MTBE	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	3.8E-11	3.8E-11	8.8E-11	0%
Nickel	1.2E-07	NA	NA	1.2E-07	1.9E-07	18%
Phenanthrene	NA	NA	NA	NA	NA	NA
2-Propanol	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	7.4E-12	7.4E-12	1.7E-11	0%
Tetrahydrofuran	NA	NA	2.4E-12	2.4E-12	5.7E-12	0%
Thallium	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	1.1E-11	1.1E-11	2.6E-11	0%
Trichlorofluoromethane	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA
2,2,4-Trimethylpentane	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	1.2E-09	1.2E-09	2.7E-09	0%
Xylenes	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA
Total	6.8E-07	NA	1.7E-09	6.8E-07	1E-06	100%
Percent Contribution	100%	NA	0%	100%		

Abbreviations:

NA = not applicable

TABLE 31
**SUMMARY OF EXCESS LIFETIME CANCER RISKS:
FUTURE INDUSTRIAL WORKER**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil	Soil Vapor	Excess Cancer Risk	Percent Contribution
	Inhalation of Volatiles in Indoor Air from Soil	Inhalation of Volatiles in Indoor Air from Soil Vapor		
Acenaphthene	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA
Acetone	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA
Antimony	NA	NA	NA	NA
Aroclor 1242	NA	NA	NA	NA
Aroclor 1248	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Benzene	NA	4.5E-07	4E-07	10.9%
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(b)fluoranthene	1.2E-09	NA	1E-09	0.0%
Benzo(g,h,i)perylene	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA
Chloroform	NA	9.0E-09	9E-09	0.2%
Chromium III	NA	NA	NA	NA
Chromium VI	NA	NA	NA	NA
Chrysene	5.2E-10	NA	5E-10	0.0%
Cobalt	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Cumene	NA	NA	NA	NA
Cymene	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA
Dichlorodifluoromethane	NA	NA	NA	NA
1,2-Dichloroethane	NA	1.8E-09	2E-09	0.0%
1,1-Dichloroethylene	NA	NA	NA	NA

TABLE 31
**SUMMARY OF EXCESS LIFETIME CANCER RISKS:
FUTURE INDUSTRIAL WORKER**

San Francisco Electric Reliability Project Site
25th and Maryland Street
San Francisco, California

Chemical	Soil	Soil Vapor	Excess Cancer Risk	Percent Contribution
	Inhalation of Volatiles in Indoor Air from Soil	Inhalation of Volatiles in Indoor Air from Soil Vapor		
cis-1,2-Dichloroethylene	NA	NA	NA	NA
trans-1,2-Dichloroethylene	NA	NA	NA	NA
Ethanol	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA
4-Ethyltoluene	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA
Heptane	NA	NA	NA	NA
Hexane	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA
Mercury (elemental)	NA	NA	NA	NA
Methylene chloride	NA	5.8E-10	6E-10	0.0%
Methylethylketone (2-butanone)	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA
MTBE	NA	NA	NA	NA
Naphthalene	NA	2.0E-09	2E-09	0.0%
Nickel	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
2-Propanol	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA
Selenium	NA	NA	NA	NA
Tetrachloroethene	NA	8.5E-09	9E-09	0.2%
Tetrahydrofuran	NA	4.5E-10	5E-10	0.0%
Thallium	NA	NA	NA	NA
Toluene	NA	NA	NA	NA
1,1,1-Trichloroethane	NA	NA	NA	NA
Trichloroethene	NA	9.8E-09	1E-08	0.2%
Trichlorofluoromethane	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NA	NA	NA	NA
1,3,5-Trimethylbenzene	NA	NA	NA	NA
2,2,4-Trimethylpentane	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA
Vinyl chloride	NA	3.6E-06	4E-06	88.3%
Xylenes	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
Total	1.7E-09	4.1E-06	4E-06	100.0%
Percent Contribution	0.0%	100.0%		

Abbreviations:

NA = not applicable

TABLE 32**SUMMARY OF HUMAN HEALTH RISKS**

San Francisco Electric Reliability Project Site

25th and Maryland Street

San Francisco, California

Receptor	Theoretical Excess Lifetime Cancer Risk	Non-cancer Hazard Index
Construction Worker	2E-04	3E+00
Resident (off-site)	1E-06	2E-02
Future Industrial Worker	4E-06	2E-02

TABLE 33

SUMMARY OF SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

San Francisco Electric Reliability Project Site

25th and Maryland Street

San Francisco, California

Concentrations in micrograms per liter (µg/L)

Compound	On-Site Groundwater Statistics ¹							Screening Criteria		Screening Criteria Exceedance ³	Eastern Well Groundwater Statistics ⁴							Screening Criteria Exceedance ⁶	Screening Criteria Exceedance DAF = 10 ⁷	
	Count (n)	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit ¹	Maximum Detection Limit ¹	Marine Aquatic ESL ²	Basis		Count (n)	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit ⁴	Maximum Detection Limit ⁴			95% UCL ⁵
Metals																				
Arsenic	21	16	76%	2.2	190	1	5	36	CTR SW CCC	Yes	5	4	80%	2.2	19	1	1	13.5	No	No
Barium	15	15	100%	13	370	0	0	1000	=Drinking Water (Table F-3)	No	--	--	--	--	na	--	--	na	na	na
Chromium	15	1	7%	22	22	10	10	180	CTR FW CCC	No	--	--	--	--	na	--	--	na	na	na
Copper	21	4	19%	1.2	17	1	10	3.1	CTR SW CCC	Yes	5	3	60%	1.2	4.9	1	1	4.9	Yes	No
Lead	21	4	19%	1.2	28	1	3	8.1	CTR SW CCC	Yes	5	2	40%	1.2	28	1	1	28.0	Yes	No
Molybdenum	15	4	27%	20	78	20	20	240	USEPA Ecotox FW Chronic	No	--	--	--	--	na	--	--	na	na	na
Nickel	21	6	29%	1.2	15	20	20	8.2	CTR SW CCC	Yes	5	5	100%	1.2	7.2	--	--	5.3	No	No
Selenium	21	6	29%	5.1	12	1	5	71	CTR SW CCC	No	5	0	0%	--	na	1	1	na	na	na
Vanadium	21	10	48%	1.2	150	10	10	19	USEPA Ecotox FW Chronic	Yes	5	5	100%	1.2	5.5	--	--	5.0	No	No
Zinc	21	8	38%	6.3	130	5	20	81	CTR SW CCC	Yes	5	5	100%	6.3	12	--	--	12	No	No
Polynuclear Aromatic Hydrocarbons																				
Polynuclear Aromatic Hydrocarbons (based on data quantified to the laboratory method detection limits).																				
Acenaphthene	21	1	5%	5.4	5.4	0.94	4.8	40	USEPA Ecotox SW Chronic	No	5	1	20%	0.1	0.1	0.009	0.17	0.100	No	No
Acenaphthylene	21	0	0%	--	--	0.95	4.8	30		No	5	1	20%	0.023	0.023	0.0092	0.23	0.023	No	No
Anthracene	21	4	19%	0.11	2.1	0.09	4.8	0.73	USDOE FW Chronic PRG	Yes	5	3	60%	0.035	0.12	0.019	0.074	0.097	No	No
Benzo(a)anthracene	21	7	33%	0.11	1.8	0.09	4.8	0.027	USDOE FW Chronic PRG	Yes	5	4	80%	0.029	0.11	0.013	0.013	0.093	Yes	No
Benzo(a)pyrene	21	7	33%	0.11	2	0.09	4.8	0.014	USEPA Ecotox FW Chronic	Yes	5	0	0%	--	na	0.025	0.3	0.243 ⁸	na	na
Benzo(b)fluoranthene	21	4	19%	0.35	1.3	0.19	4.8	0.029	=Drinking Water (Table F-3)	Yes	5	0	0%	--	na	0.0097	0.25	0.201 ⁸	na	na
Benzo(g,h,i)perylene	21	7	33%	0.21	3.2	0.19	4.8	0.1	50% MOEE FW Chronic LOEL	Yes	5	0	0%	--	na	0.023	0.089	0.072 ⁸	na	na
Benzo(k)fluoranthene	21	4	19%	0.19	0.67	0.09	4.8	3.7	50% MOEE FW Chronic LOEL	No	5	1	20%	0.072	0.072	0.012	0.044	0.058	No	No
Chrysene	21	7	33%	0.16	1.7	0.09	4.8	0.35	50% MOEE FW Chronic LOEL	Yes	5	1	20%	0.018	0.018	0.016	0.093	0.018	No	No
Dibenz(a,h)anthracene	21	6	29%	0.25	2.1	0.19	4.8	7.5	50% MOEE FW Chronic LOEL	No	5	2	40%	0.032	0.065	0.014	0.02	0.049	No	No
Fluoranthene	21	9	43%	0.19	6.8	0.19	4.8	8	50% USEPA SW Chronic LOEL	No	5	1	20%	0.093	0.093	0.011	0.069	0.080	No	No
Fluorene	21	4	19%	0.44	3.2	0.19	4.8	3.9	USEPA Ecotox FW Chronic	No	5	1	20%	0.14	0.14	0.013	0.14	0.140	No	No
Indeno(1,2,3-cd)pyrene	21	6	29%	0.14	1.6	0.09	4.8	0.029	=Drinking Water (Table F-3)	Yes	5	2	40%	0.039	0.078	0.014	0.023	0.059	Yes	No
Naphthalene	21	2	10%	3.4	6.4	0.94	4.8	24	USEPA Ecotox FW Chronic	No	5	1	20%	0.54	0.54	0.022	0.12	0.540	No	No
Phenanthrene	21	9	43%	0.11	12	0.09	4.8	4.6	USEPA SW CCC	Yes	5	2	40%	0.049	0.17	0.0092	0.071	0.125	No	No
Pyrene	21	11	52%	0.11	6.7	0.09	4.8	2	50% MOEE FW Chronic LOEL	Yes	5	1	20%	0.08	0.08	0.0084	0.093	0.080	No	No
Total Petroleum Hydrocarbons																				
TPH bunker	21	17	81%	350	12000	300	300	640	RWQCBSF (see notes)	Yes	5	2	40%	350	410	300	300	410	No	No
TPHd	21	21	100%	66	3500	0	0	640	RWQCBSF (see notes)	Yes	5	5	100%	71	130	--	--	118	No	No
TPHg	15	1	7%	200	200	50	50	3700	RWQCBSF (see notes)	No	--	--	--	--	na	--	--	na	na	na
TPHmo	21	14	67%	340	2500	300	300	640	RWQCBSF (see notes)	Yes	5	--	0%	--	na	300	300	na	na	na
Volatile Organic Compounds																				
1,2,4-Trimethylbenzene	15	1	7%	7.5	7.5	0.5	0.5	na	na	na	--	--	--	--	--	--	--	na	na	na
1,2-Dichloroethane	15	1	7%	1.4	1.4	0.5	0.5	10000	50% USEPA FW Chronic LOEL	No	--	--	--	--	--	--	--	na	na	na
1,3,5-Trimethylbenzene	15	1	7%	3	3	0.5	0.5	na	na	na	--	--	--	--	--	--	--	na	na	na
Acetone	15	1	7%	10	10	10	10	1500	USDOE FW Chronic PRG	No	--	--	--	--	--	--	--	na	na	na
Benzene	15	4	27%	1.1	4.8	0.5	0.5	350	50% USEPA SW Chronic LOEL	No	--	--	--	--	--	--	--	na	na	na
Carbon Disulfide	15	1	7%	1.1	1.1	0.5	0.5	na	na	na	--	--	--	--	--	--	--	na	na	na
Chlorobenzene	15	1	7%	0.7	0.7	0.5	0.5	65	50% USEPA SW Chronic LOEL	No	--	--	--	--	--	--	--	na	na	na
Chloroform	15	1	7%	0.5	0.5	0.5	0.5	3200	50% USEPA SW Chronic LOEL	No	--	--	--	--	--	--	--	na	na	na
cis-1,2-Dichloroethene	15	4	27%	0.8	24	0.5	0.5	590	USDOE FW Chronic PRG	No	--	--	--	--	--	--	--	na	na	na
Cumene (Isopropylbenzene)	15	1	7%	1.2	1.2	0.5	0.5	na	na	na	--	--	--	--	--	--	--	na	na	na
Cymene (para-Isopropyl Toluene)	15	1	7%	1.1	1.1	0.5	0.5	na	na	na	--	--	--	--	--	--	--	na	na	na

TABLE 33

SUMMARY OF SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

San Francisco Electric Reliability Project Site
 25th and Maryland Street
 San Francisco, California

Concentrations in micrograms per liter (µg/L)

Compound	On-Site Groundwater Statistics ¹							Screening Criteria		Screening Criteria Exceedance ³	Eastern Well Groundwater Statistics ⁴						Screening Criteria Exceedance ⁶	Screening Criteria Exceedance DAF = 10 ⁷	
	Count (n)	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit ¹	Maximum Detection Limit ¹	Marine Aquatic ESL ²	Basis		Count (n)	Number of Detects	Detection Frequency	Minimum Detection	Maximum Detection	Minimum Detection Limit ⁴			Maximum Detection Limit ⁴
Ethylbenzene	15	1	7%	1.3	1.3	0.5	0.5	290	USEPA Ecotox FW Chronic	No	--	--	--	--	--	--	na	na	na
MTBE	15	3	20%	1.1	3.1	0.5	0.5	8000	CTR SW CCC	No	--	--	--	--	--	--	na	na	na
Propylbenzene	15	1	7%	1.5	1.5	0.5	0.5	na	na	na	--	--	--	--	--	--	na	na	na
sec-Butylbenzene	15	1	7%	0.9	0.9	0.5	0.5	na	na	na	--	--	--	--	--	--	na	na	na
trans-1,2-Dichloroethene	15	3	20%	1.5	2.9	0.5	0.5	590	USDOE FW Chronic PRG	No	--	--	--	--	--	--	na	na	na
Trichloroethene	15	3	20%	0.6	1.6	0.5	0.5	360	USEPA Ecotox FW Chronic	No	--	--	--	--	--	--	na	na	na
Vinyl Chloride	15	3	20%	0.8	6.1	0.5	0.5	780	USDOE FW Chronic PRG	No	--	--	--	--	--	--	na	na	na
Xylenes	15	1	7%	4.7	4.7	0.5	0.5	100	5% acute SW LC 50	No	--	--	--	--	--	--	na	na	na

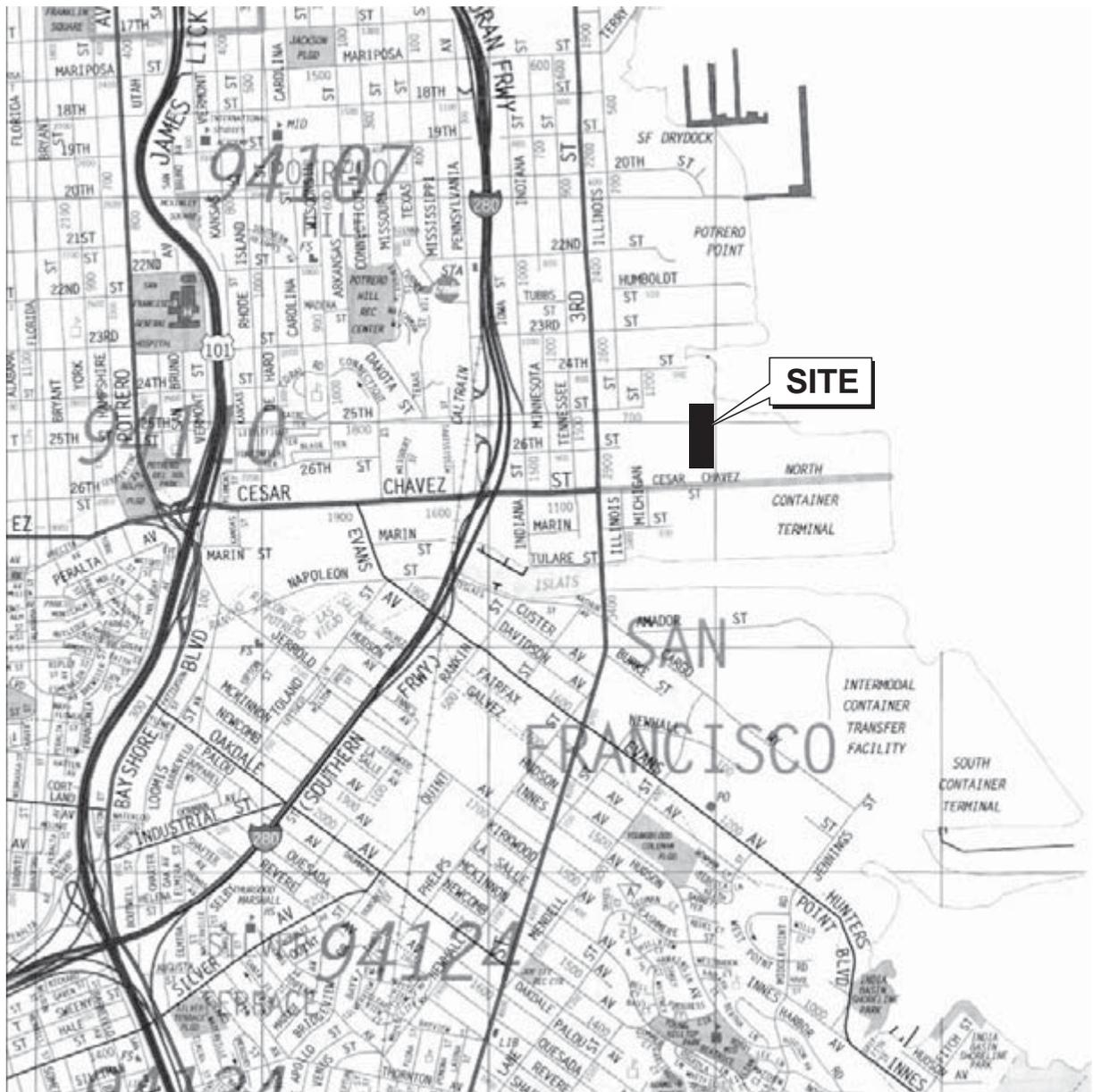
Notes:

- Summary statistics for all groundwater samples collected on-site based on the laboratory sample quantitation limits (SQLs).
- California Regional Water Quality Control Board, San Francisco Bay Region, 2005, Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table F-4a, Summary of Selected Chronic Aquatic Habitat Goals (lowest marine aquat
- Comparison of the maximum detection to the screening criteria
- The eastern wells include samples collected from monitoring wells SB32, SB33, SB34, SB35, and SB36. Data presented are based on results reported to the laboratory method detection limits (MDLs).
- The mean and 95% UCL concentrations were based on the higher value of the duplicate samples. Non-detections were set at the MDL. The 95% UCL or the maximum detected concentration is presented, whichever is low
- Comparison of the maximum detection to the screening criteria
- Comparison of the maximum detection and a dilution attenuation factor (DAF) of 10, used at other Bay sites (e.g., Mission Bay and San Francisco Airport) to the screening criteria.
- These chemicals were not detected above their MDLs. Dissolved chemicals not detected above the laboratory SQLs or MDLs in at least one sample were not considered chemicals of potential ecological conce

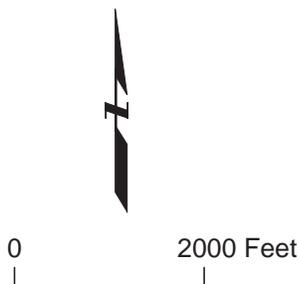
Abbreviations:

- | | |
|--|--|
| CCC = criterion for continuous concentration | RWQCBSF = Regional Water Quality Control Board of San Francisco |
| COPC = chemical of potential concern | SW = saltwater |
| CTR = California (interim) Toxics Rule (in RWQCBCV 2000 and Federal Register 2000) | TPH bunker = total petroleum hydrocarbons quantified as bunker oil |
| ESL = Environmental Screening Level | TPHd = total petroleum hydrocarbons quantified as diesel |
| FW = freshwater | TPHg = total petroleum hydrocarbons quantified as gasoline |
| LOEL = lowest observed effect level | TPHmo = total petroleum hydrocarbons quantified as motor oil |
| MOEE = Ontario Ministry of Environmental and Energy (MOEE 1996) | UCL = upper confidence limit |
| MTBE = methyl tert-butyl ether | USDOE = U.S. Department of Energy |
| na = not available | USEPA = U.S. Environmental Protection Agency |
| PRG = USDOE Preliminary Remediation Goals for ecological concern | -- = not applicable |

FIGURES



Base map from *The Thomas Guide, 2003 Golden Gate Edition*. Reproduced with permission granted by THOMAS BROS. MAPS®. This map is copyrighted by THOMAS BROS. MAPS®. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission. All rights reserved.



SITE LOCATION MAP
 San Francisco Electric Reliability Project
 25th and Louisiana Streets
 San Francisco, California

By: JS	Date: 06/14/06	Project No. 12415
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Figure **1**



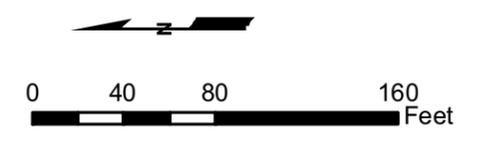
Explanation

- Soil sampling location (Geomatrix, 2006)
- Depth-discrete groundwater sampling location (Geomatrix, 2006)
- Soil and depth-discrete sampling location (Geomatrix, 2006)
- Soil vapor sampling location (Geomatrix, 2006)
- Soil sampling location (Dames & Moore, 1987 and 1989)
- Sampling location (CH2M Hill, 2005)
- Sampling location (CH2M Hill, 2006)

- Approximate Site boundary
- Approximate location of fences within site

Notes:

1. Aerial photo from City and County of San Francisco Department of Telecommunications and Information Services, dated 2001.
2. Geomatrix sampling locations were surveyed by Nolte Associates on 7/10/06; other sampling locations are approximate.
3. CH2M Hill 2005 locations were sampled by Geotechnical Consultants, Inc., 2005.



SAMPLING LOCATIONS
 San Francisco Electric Reliability Project
 25th and Maryland Streets
 San Francisco, California

By:	Date: 7/19/06	Project No. 12415.000
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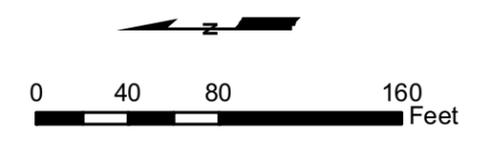
Explanation

- Soil sampling location (Geomatrix, 2006)
- Depth-discrete groundwater sampling location (Geomatrix, 2006)
- Soil and depth-discrete sampling location (Geomatrix, 2006)
- Soil vapor sampling location (Geomatrix, 2006)
- Sampling location (CH2M Hill, 2005)
- Sampling location (CH2M Hill, 2006)

- Approximate Site boundary
- Approximate location of fences within site

Notes:

1. Aerial photo from City and County of San Francisco Department of Telecommunications and Information Services, dated 2001.
2. Geomatrix sampling locations were surveyed by Nolte Associates on 7/10/06; other sampling locations are approximate.
3. CH2M Hill 2005 locations were sampled by Geotechnical Consultants, Inc., 2005.
4. Power Plant Operations Building Plan from PB Power, dated February 2006.



SAMPLING LOCATIONS WITH
 POWER PLANT OPERATIONS BUILDING PLAN
 San Francisco Electric Reliability Project
 25th and Maryland Streets
 San Francisco, California

By: _____ Date: 7/19/06 Project No. 12415.000

