Final

Technical Memorandum
Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398

Alameda Point
Alameda, California

December 20, 2006

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

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Prepared under:
Naval Facilities Engineering Command
Contract Number N68711-03-D-5104
Contract Task Order 127

DS.B127.20515

Final Technical Memorandum Subslab Soil Gas Investigation of Buildings 14, 113, 162, and 398 Alameda Point Alameda, California

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PREPARED FOR:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

Project Manager: [signature] Tom Shoff, SulTech   Date: December 20, 2006

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ACRONYMS AND ABBREVIATIONS

µg/L	Microgram per liter
µg/m^3	Microgram per cubic meter
95 UCL	95th percentile upper confidence limit on the arithmetic mean
AST	Aboveground storage tank
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHHSL	California human health screening level
COC	Chain of custody
COPC	Chemical of potential concern
DCA	Dichloroethane
DCE	Dichloroethene
dP	Pressure difference
DQO	Data quality objective
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ESL	Environment screening level
g/cm-s^2	Gram per centimeter per second squared
HI	Hazard index
HQ	Hazard quotient
IPA	Isopropyl alcohol
L/m	Liter per minute
m^3/day	Cubic meter per day
mg/kg-day	Milligram per kilogram per day
mL/min	Milliliter per minute
NAS	Naval Air Station
NCEA	National Center of Environmental Assessment
NPL	National Priority List
OEHHA	Office of Environmental Healt Hazard Assessment
OU	Operable Unit

PAH	Polynuclear aromatic hydrocarbons
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PCE	Tetrachloroethene
PID	Photoionization detector
PRC	PRC Environmental Management, Inc.
QA	Quality assurance
QC	Quality control
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial investigation
RWQCB	San Francisco Bay Regional Water Quality Control Board
SAP	Sampling and analysis plan
SF	Slope factor
TCA	Trichloroethane
TCE	Trichloroethene
Tetra Tech	Tetra Tech EM Inc.
TO	Toxic Organics
UST	Underground storage tank
VOC	Volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board

1.0 INTRODUCTION

This technical memorandum presents the results of the subslab investigation for volatile organic compounds (VOC) in soil gas beneath the concrete slab-on-grade floors of Buildings 14, 113, 162, 163A, and 398, which are located in Operable Unit (OU) 2B at Alameda Point in Alameda, California (see Figures 1 and 2). Only the buildings that are leased and occupied by tenants (Buildings 14, 113, 162, 163A, and 398) and that overlie the VOC plume (Figure 2) are being investigated. Buildings that are not occupied by tenants, such as Buildings 430, 627, 414, 373, and 360, and that overlie the contaminant plume are of potential concern for vapor intrusion for future scenarios; however, these buildings are not included in this investigation. The investigation involved installing soil gas probes beneath the slab-on-grade floors of Buildings 14, 113, 162, 163A, and 398 and collecting soil gas samples from each of the probes for chemical analysis during two sampling events. The data from this ongoing investigation will be used to evaluate the potential risk from vapor intrusion to building occupants. The results of the first sampling event are presented in this technical memorandum. The results of the second sampling event will be presented in a subsequent technical memorandum. The first round of soil gas sampling began on January 26, 2006 and was completed on January 28, 2006. The second round of soil gas sampling began on September 26, 2006 and was completed on September 29, 2006.

1.1 DOCUMENT PURPOSE AND ORGANIZATION

The following sections describe the purpose and organization of the report.

1.1.1 Purpose

This ongoing subslab soil gas investigation evaluates the potential risk from vapor intrusion to building occupants. Any chemical concentration that exceeds selected screening criteria was evaluated further using (1) vapor intrusion modeling to model soil gas concentrations into indoor air, and (2) risk assessment equations to estimate cancer risk and noncancer hazards from inhalation of vapors in indoor air. The risk assessment results, interpretations, and conclusions for the first soil gas sampling event are present in this technical memorandum.

1.1.2 Report Organization

The remainder of this section provides further background information on Alameda Point and the specific areas that were the subject of this investigation. Section 2.0 presents the investigation approach, Section 3.0 presents the sampling results, Section 4.0 discusses the human health risk assessment, and Section 5.0 provides the summary and conclusions for subslab soil gas investigation. Section 6.0 is a list of references. Figures, tables, and appendices follow Section 6.0.

1.2 FACILITY BACKGROUND

Originally a peninsula, Alameda Island was detached from the mainland in 1876 when a channel was cut to link San Leandro Bay with San Francisco Bay. The area encompassed by Alameda Point was historically a combination of submerged lands, tideland, and dry land. The site is relatively flat, with elevations ranging from sea level to 30 feet above sea level. The property occupies the flattest portion of Alameda, reflecting its origins as diked bay lands and mud flats. Much of the land now occupied by Alameda Point was once covered by the waters of San Francisco Bay or tidal flats. Large portions of the base were gradually filled using hydraulically placed dredge spoils from the surrounding San Francisco Bay, Seaplane Lagoon, and Oakland Channel. The first documented filling of tidal and submerged land began sometime during the 1890s. By 1927, the northern part of what later became Alameda Point had been filled, chiefly with dredge materials from U.S. Army Corps of Engineers projects associated with the Oakland Harbor and other harbors throughout the East Bay.

Before 1930, at least two large industrial sites—a borax processing plant and an oil refinery—were located near what is now the eastern end of Alameda Point. The borax plant operated in the late 1800s to 1903. The refinery was constructed in 1879 and also ceased operations in 1903. The filled land was partially occupied by the Alameda Airport, a city-owned facility, and Benton Field, a minor U.S. Army Air Corps installation. The U.S. Department of the Army acquired the Alameda Point site from the City of Alameda in 1930 and began construction in 1931. The Navy acquired title to the land from the Army in 1936 and began building the air station called Naval Air Station (NAS) Alameda in response to the military buildup in Europe before World War II. NAS Alameda was commissioned on November 1, 1940. After the United States entered the war in 1941, more land was acquired adjacent to the air station. When the war ended, NAS Alameda returned to its original primary mission of providing facilities and support for fleet aviation. Also after World War II, NAS Alameda served as a critical component to support Navy activities during the Korean War, the Vietnam War, and Operation Desert Storm (Kuwait). During its history, NAS Alameda housed 60 military tenant commands for a combined military and civilian work force of more than 18,000 personnel.

The Navy began investigations of contaminated sites in 1982 under the auspices of the Navy Assessment and Control of Installation Pollutants (NACIP) program. The Navy's procedures and priorities for conducting environmental investigations and cleanups have evolved, partly in response to events such as the closure of NAS Alameda in April 1997, under the Base Closure and Realignment Act, and the designation of Alameda Point as a National Priority List (NPL) site in July 1999 (U.S. Environmental Protection Agency [EPA] 1999). When NAS Alameda was listed for closure, responsibility for the environmental cleanup program at Alameda Point passed to the Base Realignment and Closure (BRAC) Cleanup Team (BCT). At Alameda Point, the BCT comprises representatives from Navy, EPA, and the California Environmental Protection Agency's (Cal/EPA) Department of Toxic Substances Control Board (DTSC) and San Francisco Bay Regional Water Quality Control Board (Water Board). The listing of Alameda Point on the National Contingency Plan invokes the applicable requirements of the NCP and requires EPA concurrence prior to the final classification of any property as uncontaminated. The Navy and EPA negotiated and signed a Federal Facility Agreement in 2001, and DTSC and Water Board signed the agreement in 2005.

NAS Alameda was identified for closure in 1993. In April 1994, the City and County of Alameda signed a Joint Powers Agreement and established the Alameda Reuse and Redevelopment Authority. The U.S. Department of Defense recognized the Alameda Reuse and Redevelopment Authority as the responsible entity for submitting and completing the community reuse plan for NAS Alameda. In 1997, the base closed, and the Navy began the process of property transfer to the City of Alameda.

1.3 SITE DESCRIPTION

A comprehensive OU strategy was developed as a management tool to accelerate site investigation, cleanup, and reuse, which separates 35 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites into 10 OUs (OU-1, OU-2A, OU-2B, OU-2C, OU-3, OU-4A, OU-4B, OU-4C, OU-5, and OU-6). A remedial investigation (RI) (SulTech 2005a) was conducted at OU-2B at Alameda Point (see Figure 2). The CERCLA sites that make up OU-2B are Site 3 – the Abandoned Fuel Storage Area; Site 4 – Building 360 (Aircraft Engine Facility); Site 11 – Building 14 (Engine Test Cell); and Site 21 – Building 162 (Ship Fitting and Engine Repair). The buildings that are being investigated for the subslab soil gas investigation include Buildings 14, 113 (located within Site 21), 162, 163A (located within Site 4), and 398 (located within Site 21).

1.4 PHYSICAL SETTING

Alameda Point is located at the western end of Alameda Island, which lies at the base of a gently westward-sloping plain that extends from the Oakland-Berkeley hills on the east to the shore of San Francisco Bay on the west (see Figure 1). San Francisco Bay also borders the island to the south, and the Oakland Inner Harbor borders the island to the north (SulTech 2005a).

The San Francisco Bay area experiences a maritime climate, with mild summer and winter temperatures. Prevailing winds in the San Francisco Bay area are from the west. Because of the varied topography of the San Francisco Bay Area, climatic conditions vary considerably throughout the region. Heavy fogs occur on an average of 21 days per year. Rainfall occurs primarily from October through April. Alameda Point averages 18 inches of rainfall a year. There are no naturally occurring surface streams or ponds at Alameda Point, so precipitation either returns to the atmosphere by evapotranspiration, runs off in the storm drain system that discharges to San Francisco Bay, or infiltrates to groundwater (SulTech 2005a).

Physical features at Alameda Point include runways, streets, buildings, fuel lines, underground storage tanks (UST), aboveground storage tanks (AST), and utility lines (sanitary sewer, storm sewer, water, and power lines). Some fuel lines, USTs, and ASTs have been removed, and others have been closed in place.

1.5 SUMMARY OF PREVIOUS INVESTIGATIONS

Results of soil, groundwater, and soil gas samples collected during previous investigations for analysis of VOCs are summarized in the RI report for OU-2B (SulTech 2005a). Previous investigations of VOCs at the site have involved collection of soil and groundwater samples as well as soil gas samples for studies at OU-2B. These investigations are described in the paragraphs that follow.

1.5.1 Soil and Groundwater Investigations

General information on previous soil and groundwater investigations at OU-2B is presented in the Phases 1, 2A, 2B, and 3 investigations performed under the Installation Restoration Program. Results for Sites 3 and 4 from investigations during Phases 1 and 2A were summarized in the Phases 1 and 2A report (PRC Environmental Management, Inc. [PRC] and Montgomery Watson 1993). Results for Sites 4, 11, and 21 from investigations conducted during Phases 2B and 3 were summarized in the Phases 2B and 3 report (PRC and James M. Montgomery Consulting Engineers, Inc. 1992).

Two follow-on investigations were conducted during 1994 and 1995 to collect data to fill the gaps from the Phases 1 and 2A and Phases 2B and 3 investigations. Results for Site 4 were summarized in the data transmittal memorandum for Sites 4, 5, 8, 10A, 12, and 14 (PRC and James M. Montgomery Consulting Engineers, Inc. 1996), and results for Sites 3, 11, and 21 were summarized in the data transmittal memorandum for Sites 1, 2, 3, 6, 7A, 7B, 7C, 9, 10B, 11, 13, 15, 16, 19, and the Runway Area (PRC and Montgomery Watson 1995).

Between 1995 and 1997, the storm sewer lines (formerly Site 18) were sampled and cleaned out, and sediment was removed from manholes and catch basins. The Navy Public Works Center conducted Phase 1 of this removal action in 1995 as a CERCLA time-critical removal action (International Technology Corporation 1997). It entailed vacuum-cleaning sediment and debris from storm sewer catch basins and manholes for Outfalls H, I, and J, which are associated with storms drains in OU-2B. Phase 2 of the removal action was completed by 1997 and involved additional cleaning of all manholes and subsystems throughout the base, including Outfalls G, H, I, and J, which are located in OU-2B. The storm sewer bedding was also investigated as a preferential pathway in the "Draft Final Storm Sewer Study Report, Alameda Point" (Tetra Tech EM Inc. [Tetra Tech] 2000).

In 2001, supplemental RI data gaps samples were collected at Sites 3, 4, 11, and 21. Results were summarized in the "Data Summary Report, Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2" (Tetra Tech 2002).

Beginning in 2002, a quarterly basewide groundwater monitoring program has been implemented and continued through summer 2005. Groundwater monitoring is conducted in the fall, winter, spring, and summer. Results are summarized in the groundwater monitoring report for each Installation Restoration site (Innovative Technical Solutions, Inc. 2006).

In 2002, a background investigation of polynuclear aromatic hydrocarbons (PAH) was conducted. Results are summarized in the "Draft Technical Memorandum for the PAH Background Study for Alameda Point" (Bechtel Environmental, Inc. 2002). A basewide PAH investigation was conducted at the CERCLA sites in 2003.

Findings

- **Site 3**: Chemicals detected in soil across Site 3 are consistent with historical activities at the site. Two VOCs, benzene and ethylbenzene, were detected in soil at concentrations that exceed screening criteria and appear to be localized near fuel lines in the western portion of Site 3. VOCs with detection limits that exceeded 2002 U.S. EPA Region 9 residential preliminary remediation goals or California-modified preliminary remediation goals (EPA 2002a, 2004a) included 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2-butanone, 4-methyl-2-pentanone, isopropylbenzene, m,p-xylene, methylene chloride, methyl tertiary butyl ether, o-xylene, toluene, and total xylene. The presence of these compounds in soil most likely resulted from releases of petroleum products, which were used extensively at Site 3. These VOCs detected in soil were not detected in groundwater samples collected using direct-push techniques in the northern area of the site.

- **Site 4:** Chemicals detected in soil across Site 4 are consistent with historical activities at Building 360, including painting, blasting, degreasing, solvent cleaning, and plating aircraft parts, with activities at Building 372, including use of petroleum-related compounds, and with landscaping in the field area east of Building 360. The chlorinated compounds detected in soil included 1,1,1-trichloroethane (TCA), 1,1,2,2-tetrachloroethane, 1,1-dichloroethane (DCA), 1,1-dichloroethene (DCE) 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-DCE, chlorobenzene, styrene, tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. The presence of these compounds in soil is related to the use of solvents. Benzene, toluene, ethylbenzene, and xylene were detected in samples collected across Site 4. Most of the detections were in samples collected near Building 372 and the engine testing facility. The presence of these compounds in soil is related to use of petroleum products at the site.

- **Site 11:** Chemicals detected in soil across Site 11 are consistent with historical activities at Building 14, including jet engine testing, equipment cleaning and repair, and use of petroleum products. Most of the maximum detected concentrations of those chemicals related to solvents and fuel (benzene, toluene, ethylbenzene, and xylenes; lead; chlorobenzene; and methylene chloride) were detected in soil near fuel lines, an UST, and ASTs located in the southern portion of Site 11. The highest concentrations of chlorobenzene and methylene chloride occur at sample locations just south of the site boundary and far from Building 14, where they may have been used. Methylene chloride may be associated with solvents used during paint stripping operations at Alameda Point or possibly is the result of laboratory contamination during analysis of samples. Chlorobenzene is likely associated with the petroleum USTs or fuel lines located southwest of Building 14.

- **Site 21:** Most of the chemicals detected in soil across Site 21 are consistent with historical activities at Buildings 162, 398, and 113, including painting, paint stripping, sandblasting, jet engine maintenance and testing, equipment cleaning, and use of petroleum products. The maximum concentrations of benzene and xylene at Site 21 are located in soil near an industrial waste treatment line south of USTs 398-1 and 398-2. Benzene and xylene are likely the result of total petroleum hydrocarbons contamination at the site. The maximum concentrations of TCE and acetone were detected in soil near the industrial waste treatment line in the southern part of Building 162. This line is the only location where TCE was detected in soil, and acetone was detected at only one other location in soil. TCE and acetone were likely used in Buildings 162, 398, and 113 as degreasers and cleaners. The maximum concentration of toluene was detected below Building 113. Toluene detected in soil near Buildings 113 is likely the result of contamination by total petroleum hydrocarbons in soil.

- **OU-2B Groundwater:** Most of the chemicals detected in groundwater across OU-2B are consistent with historical activities at Sites 3, 4, 11, and 21, which included painting, paint stripping, and equipment cleaning and repair. In several areas, chemicals were apparently released to soil and migrated to groundwater, were released directly to groundwater, or were released to storm sewer lines that drained into the Seaplane Lagoon. Chlorinated solvents and their breakdown products (TCE, 1,2-DCE, PCE, vinyl chloride, dichlorobenzene, TCA, and DCA) were detected in groundwater samples across OU-2B, with the highest concentrations located near Building 360. The chlorinated solvents in groundwater probably originated at Building 360 and have migrated west of Buildings 14, 113, and 162 (Figure 2). Concentrations of TCE, DCE, TCA, and vinyl chloride generally decrease in samples collected closer to the Seaplane Lagoon. In addition, a secondary source of TCE and TCA may be dense nonaqueous-phase liquid located north of and beneath Building 360.

1.5.2 Previous Soil Gas Investigations

Soil gas samples were collected during the Phase 2A (International Technology Corporation 2001) and supplemental remedial investigation data gaps sampling event (Tetra Tech 2001, 2002) to support vapor intrusion modeling in the baseline human health risk assessment. These samples were collected because vapors can emanate from the subsurface, where there is the potential for migration upward into indoor air.

At Site 3, 12 soil gas samples were collected at depths ranging from 0.5 to 7.0 feet below ground surface (bgs). At Site 4, 18 soil gas samples were collected at depths ranging from 0.5 to 5.5 feet bgs. At Site 11, no soil gas samples were collected. At Site 21, four soil gas samples were collected at depths ranging from 0.5 to 4.0 feet bgs. Soil gas samples were collected near areas where the maximum concentrations of VOCs were detected in groundwater. The soil gas results are presented as total VOC concentrations on Figure 3.

2.0 INVESTIGATION APPROACH

This section presents the investigation approach, including the purpose of the investigation, the data quality objectives (DQO), the sampling program, and the criteria used to evaluate the data and assess potential risk.

2.1 INVESTIGATION OBJECTIVES

A baseline human health risk assessment was conducted as part of the RI at OU-2B to estimate human health risks associated with possible exposure to site-related chemicals (SulTech 2005a). An exposure assessment was conducted to identify potential human receptors in current contact with or that could contact environmental media (both soil and groundwater) in the future. The principal objective of the RI exposure evaluation was to identify the reasonable maximum exposure.

The baseline human health risk assessment for OU-2B used two models to evaluate potential exposure to chemicals present in soil or groundwater. The Johnson-Ettinger (1991) and ASTM International (1995) models were used to estimate concentrations in indoor and outdoor air for an inhalation exposure pathway as a result of vapor intrusion from VOCs in groundwater (EPA 2002b). These models are considered screening tools; they typically overestimate exposure and, consequently, risk. Based on the RI modeling results, VOC concentrations in groundwater may be high enough and may be of concern for potential vapor intrusion into some buildings at OU-2B.

The principal objective of the subslab soil gas investigation is to obtain data to evaluate whether VOCs, if present in soil gas, are at concentrations that can lead to vapor intrusion into structures and cause an unacceptable exposure to building occupants. To meet these objectives, soil gas samples were collected from the first permeable layer below the concrete slab-on-grade floors of Buildings 14, 113, 162, 163A, and 398. Additionally, soil gas samples were collected from the fill near utility lines beneath these buildings. The soil gas probes installed to assess the utilities lines are summarized below:

Probe Identification No.	Utility Line Investigated	Distance from Probe to Utility Line
14SG09	Fuel line	Within 2 feet
14SG11	Sewer and fuel lines	Within 1 foot of sewer line and within 10 feet of fuel line
162SG02	Sewer line	Within 3 feet
162SG18	Electrical line	Within 3 feet

A conceptual model of the soil gas investigation is shown on Figure 4. In accordance with the sampling and analysis plan (SAP) (SulTech 2005b), soil gas probes were installed at the locations presented on Figures 5, 6, and 7.

All soil gas samples collected for the subslab soil gas investigation were analyzed for VOCs by EPA Method Toxic Organics (TO)-15 (EPA 1999). Two rounds of soil gas samples will be collected to evaluate seasonal or temporal variations. As stated in Section 1.0, this technical memorandum presents the results of the first round of sampling. The results of the second round of sampling will be presented in a subsequent technical memorandum.

2.2 DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000a, 2000b). The DQOs clarify the study objective, define the most appropriate data to collect and the conditions under which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making. The DQOs are used to develop a scientific and resource-effective design for data collection. The seven steps of the DQO process for this project are presented in Table 1.

2.3 SOIL GAS SAMPLING PROGRAM

This section presents the method used to install the subslab soil gas probes, soil gas sampling procedures, analytical methods, and technical and regulatory standards.

2.3.1 Probe Installation

Subslab soil gas probes were installed in the fill directly beneath the building foundations using a concrete corer and rotary-hammer drill to drill through the slab foundation at the locations shown on Figures 5, 6, and 7. Figure 8 shows a schematic diagram of a subslab sample probe that was installed for this investigation. The soil gas probes are semipermanent installations consisting of a 0.25-inch diameter polyethylene tubing with a permeable probe tip (see Figure 8). Soil gas probes were installed within the subslab fill immediately beneath the concrete slab (5 inches or less beneath the slab) of each building to be sampled. Soil gas probes were also installed in the subslab fill near utility lines beneath the buildings to be sampled. Table 2 provides a summary of the soil gas probe installations.

A sand pack (#2/12 sand) was placed in the annular space around the tip of the vapor probe. Teflon sheeting was placed between the probe tip and blank tubing. Bentonite powder was used to fill the borehole annular space around the probe tubing to the base of the concrete foundation. Deionized water was used to hydrate the bentonite powder. The probe tubing was tightly secured to the foundation slab with quick-setting, non-shrinking grout. Surface completion for each probe consisted of a recessed threaded fitting and a brass plug so that the probe completion is flush with the foundation slab. A minimum of 48 hours was required after sample probes were installed and before soil gas samples were collected to allow subsurface conditions to equilibrate. Soil gas samples were collected in accordance with the SAP (SulTech 2005b) and analyzed by modified EPA Compendium Method TO-15 (EPA 1999).

Sampling locations were surveyed after soil gas probes were installed and samples collected. All locations were surveyed to the nearest 0.1 foot vertically and horizontally by a licensed California surveyor.

2.3.2 Soil Gas Sampling

Soil gas samples were collected in 1-liter Summa canisters that were certified clean and evacuated to -30 millimeter of mercury by the laboratory that supplied the canisters. All soil gas samples were analyzed by EPA Method TO-15. The procedures for sample collection are summarized below.

- **Purge Volume** – At least three purge volumes were extracted using a syringe before sampling to ensure that stagnant or ambient air was removed from the sampling system and that samples collected are representative of subsurface conditions. The purge volume was estimated based on a summation of the volume of tubing used and the annular space around the probe tip. For example, 9.6 milliliters per foot was used to estimate the volume of stagnant air in the 1/4-inch (outside diameter) tubing, and 12.8 milliliters per inch was used for the annular space around the probe tip.

- **Purging and Sampling Flow Rates** – The flow rates for both purging and sampling was between 100 and 200 milliliters per minute (mL/min). A flow restricting valve was attached to the Summa canister to regulate the flow rate.

- **Leak Testing** – Leak testing was conducted at each soil gas probe location to determine if leaks have occurred. A pure tracer compound of 91 percent isopropyl alcohol (IPA) was used as the leak check compound. Immediately before samples were collected, IPA was added to a cotton ball and placed within 6 inches of the probe being sampled to assess whether ambient air can enter the sampling system from leaks along the sample train or if cross contamination was occurring during sampling.

- **Soil Gas Sampling** – After the subslab soil gas probe was adequately purged to remove stagnant or ambient air, a soil gas sample was collected using a 1-liter Summa canister with a negative pressure of -30 millimeters of mercury. The Summa canister was attached to a sampling apparatus consisting of a flow regulator (preset at a flow rate of 100 to 200 mL/min), which is attached directly to the Summa canister, an inline valve with a syringe attachment for removing the stagnant air before sampling, and ¼-inch (inside diameter) Tygon tubing to attach the sampling apparatus to the probe. After the sampling apparatus was connected to the probe, the stagnant air was purged from the system using the syringe. Generally, 250 milliliters of stagnant air was removed from each sampling probe before a sample was collected. After the stagnant air was purged from the system, the valve on the Summa canister was opened, which allows the evacuated canister to draw in soil gas until the canister reaches ambient pressure. When approximately 5 millimeters of mercury remained on the vacuum gauge, the sampling valve was closed and the canister was removed from the sampling line. The final vacuum was recorded on the field form and the chain-of-custody (COC) form. Closing the valve with 5 millimeters of mercury remaining allows the laboratory to monitor for leaks. After the soil gas sample was collected, the Summa canister was labeled with a sample tag attached to the handle of the canister. The label information was then recorded in the field logbook and on the COC form.

2.4 ANALYTICAL METHODS

The analytical method used to analyze the soil gas samples was EPA Method TO-15. In total, 46 samples (including 4 duplicates) were collected for the first round of soil gas sampling and submitted for chemical analysis to N&P Mobile Geochemistry in Solana Beach, California. All samples submitted to the laboratory were screened using a photoionization detector to determine if sample dilutions were required before the samples were analyzed by EPA Method TO-15. Sample dilutions and data quality are discussed below in Section 3.2.

2.5 DEVIATIONS FROM SAMPLING AND ANALYSIS PLAN

Deviations from the SAP (SulTech 2005b) for the subslab soil gas investigation are summarized below:

- Some of the probe locations in Building 14 were moved to assess if the utility corridors are a preferential pathway for transport of VOCs (see Table 1, Step 2, Item 2). As stated in Section 1.2.1 of the SAP (SulTech 2005): "Additionally, soil gas samples will be collected from the fill near utility lines beneath these buildings, if utilities are present beneath the foundation." As a result, probe 14SG01 was moved to target both the sanitary sewer and fuel lines, and probe 14SG09 was moved to target the fuel lines.

- The proposed soil gas probe 14SG07 located inside Building 14 was not installed. The proposed location for probe 14SG07 is in an unoccupied area of the building and was not accessible at the time of probe installation; therefore, it was not installed.

- Section 2.1.1 of the SAP (SulTech 2005b) indicated that the soil gas probes would consist of a 0.25-inch diameter brass or stainless steel pipe with a permeable probe tip. All 42 probes installed for this investigation were constructed with polyethylene tubing with a permeable probe tip. Polyethylene tubing is inert and commonly used for soil gas studies and an acceptable material to use when analyzing for VOCs. Section 2.1.1 also indicated that bentonite chips would be used to fill the borehole annular-space around the probe pipe to the base of the concrete foundation. Powder bentonite was used instead of bentonite chips.

- Soil gas samples with high concentrations of VOCs required dilution, as discussed below in Section 3.2. Samples that required dilutions (see Table 5) resulted in reporting limits above the reporting limits presented in Appendix B of the SAP (SulTech 2005b).

- Section 2.2.1 of the SAP indicated three purge volumes would be extracted using a vacuum pump before sampling to ensure stagnant or ambient air is removed before the sampling system (SulTech 2005b). However, a syringe was used instead of a vacuum pump to extract the three purge volumes.

2.6 TECHNICAL OR REGULATORY STANDARDS

Comparison criteria were used for the preliminary evaluation of potential risks to human health and the environment. Environment screening levels (ESL) for soil gas from the Cal/EPA Water Board (2005) and California human health screening level (CHHSL) for soil gas from the Cal/EPA DTSC (2005a) were used as the comparison criteria (see Table 3) to assess the soil gas results.

3.0 SOIL GAS SAMPLING RESULTS

The section presents the results of the leak testing conducted during the soil gas sampling, the data quality, and the soil gas results screened against the comparison criteria. The soil gas analytical results are provided in Appendix B, and the laboratory report is provided on the enclosed CD.

3.1 LEAK TESTING RESULTS

Results of leak testing during soil gas sampling are summarized in Table 4. Pure IPA at a concentration of 91 percent (910,000,000 micrograms per liter [µg/L]) was used as the tracer for leak testing. IPA was detected in 80 percent of the soil gas samples collected during the first sampling event (January 2006) at concentrations ranging from 7.1 to 100 µg/L. The average IPA concentration detected per building is as follows: 26.4 µg/L (Building 14), 60 µg/L (Building 113), 28.6 µg/L (Building 162), 14 µg/L (Building 163A), and 27.3 µg/L (Building 398). An article on evaluating leaks in a soil gas sampling train (Benton and Shafer 2006) indicates the following leak rate relationship for IPA:

Leak Rate (mL/min)	Leak Volume Introduced* (Percent)	Calculated Concentration (µg/L)
0.5	0.5	12,000
0.05	0.05	1,200
0.005	0.005	12

Notes:
* Sample flow rate assumed to be 100 mL/min.
µg/L Microgram per liter
mL/min Milliliter per minute

Based on the average IPA concentration detected per building and the leak rate relationship presented, the leak volume introduced ranges from 0.0025 to 0.006 percent. Based on the information provided in the article by Benton and Shafer for evaluating leaks in soil gas, the IPA tracer was not detected at concentrations high enough in any samples to affect the results used in the human health risk assessment.

For example, TCE was detected at 4,500 micrograms per cubic meter (µg/m$^{3)}$ in sample 162SG16, and the IPA tracer used for leak testing was not detected. A duplicate sample (162SG16 DUP) was also collected at this location. The TCE concentration in the duplicate sample was 4,800 µg/m^3, and the IPA tracer was detected at a concentration of 7.1 µg/L. The relative percent difference for the duplicate was very low at 4.5 percent, further indicating leaking had a negligible effect on the reported concentrations.

3.2 Data Quality

Although some qualifiers were assigned to the data, a final review of the data set with respect to the EPA data quality parameters indicated that the data are of high overall quality. The data meet all the requirements of the precision, accuracy, representativeness, completeness, and comparability (PARCC) data quality indicators described in EPA guidance for quality assurance project plans (EPA 1997) and are usable for risk assessment. The overall assessment of the sampling program, quality assurance and quality control (QA/QC) data, data review, and data validation results presented in Appendix A indicate that the data for the subslab soil gas investigation are of acceptable PARCC. All supporting documentation is available on request. The database containing all sample results is provided on the enclosed CD.

The EPA "Risk Assessment Guidance for Superfund" (RAGS) was used to evaluate the usability of the validated data (EPA 1989). Exhibit 5-5 in RAGS states that data qualified as estimated (J) based on data validation reports should be used in quantitative risk assessments. Although this guidance is specifically for human health risk assessments, the same usability criteria were applied for all the subslab soil gas investigation data. None of the soil gas data were rejected during the data validation. Only data qualified as rejected (R) were considered unusable for the risk assessment. Accordingly, all J-qualified data, but no R-qualified data (which was none), were used for the subslab soil gas human health risk assessment.

The laboratory prescreened all soil gas samples with a photoionization detector (PID) before analysis by EPA Method TO-15. Based on the total VOC concentration measured by the PID, 78 percent (36 of 46 samples) of the samples required dilutions, resulting in reporting limits above the reporting limits specified in Table B-1 of the SAP (SulTech 2005b). Soil gas samples that required a dilution factor of 10 or more resulted in reporting limits that exceeded the CHHSL but not the ESL for vinyl chloride. Three samples (113SG03, 162SG15, and 398SG06) required a dilution factor of 20 or more resulting in reporting limits that exceeded both the CHHSL and ELS for carbon tetrachloride (see Table 5). Vinyl chloride and carbon tetrachloride were not detected in any of the 46 soil gas samples analyzed. The reporting limits for vinyl chloride did not exceed the screening criteria for 63 percent (29 of 46 samples) of the samples analyzed. Thirty percent of the samples that had reporting limits for vinyl chloride above the screening criteria exceeded the more stringent criteria (CHHSL) by only 5.2 micrograms per cubic meter ($\mu g/m^3$), but were well below the ESL. The reporting limits for carbon tetrachloride exceeded the CHHSL for 6 percent (3 of 46 samples) of the samples analyzed but were well below the ESL.

3.3 Soil Gas Results Screened against Comparison Criteria

Analytical results for soil gas were compared with the comparison criteria. The results of the comparison for each building are presented below.

3.3.1 Building 14

PCE was detected in three of 11 soil gas samples collected in Building 14, and one sample exceeded the CHHSL screening criterion of 603 μg/m^3 (Table 6). The sample that exceeded the screening criterion was collected from probe 014SG08, and the concentration of PCE detected in this sample was 760 μg/m^3 (Figure 5). None of the detected results exceeded the ESL. Vinyl chloride was not detected in the samples collected from probes 014SG02, 014SG08, and 014SG11 (for both original and duplicate samples); however, because of the required dilutions (see Section 3.2) the reporting limit for these samples exceeded the CHHSL.

3.3.2 Building 113

Benzene was detected in one of three soil gas samples collected in Building 113, and one sample exceeded the CHHSL screening criterion of 122 μg/m^3 (Table 7). The sample that exceeded the screening criterion was collected from probe 013SG03, and the concentration of benzene detected in this sample was 140 μg/m^3; however, this result did not exceed the ESL criterion of 290 μg/m^3 (Figure 6). Carbon tetrachloride, 1,1,2,2-trichloroethane (1,1,2,2-TCA) and vinyl chloride were not detected in the sample collected from probe 113SG03; however, the reporting limit exceeded the screening criteria. The reporting limit for carbon tetrachloride exceeded the CHHSL but did not exceed the ESL. The reporting limit for 1,1,2,2-TCA exceeded the ESL and no CHHSL is available for this chemical. The reporting limit for Vinyl chloride exceed both the ESL and CHHSL value.

3.3.3 Building 162

TCE was detected in 21 of 23 soil gas samples collected in Building 162, and 13 samples (12 samples and one duplicate) exceeded the CHHSL screening criterion of 1,770 μg/m^3 and four samples (3 samples and one duplicate) exceeded the ESL screening criterion of 4,100 μg/m^3 (Table 8). Benzene was also detected in one of 23 soil gas samples collected in Building 113, and the detected concentration exceeded the CHHSL screening criterion of 122 μg/m^3. The samples that exceeded the comparison criteria are shown on Figure 6 and are summarized in the table below:

Building 162 Chemicals in Soil Gas that Exceed Screening Criteria

Analyte	Probe Location	Detected Concentration (μg/m^3)	CHHSL[a] Criteria (μg/m^3)	Detected Concentrations Exceed CHHSL Criterion?	ESL Criterion (μg/m^3)	Detected Concentrations Exceed ESL Criterion?
Trichloroethene	162SG01	3,000	1,770	Yes	4,100	No
Trichloroethene	162SG03	3,600	1,770	Yes	4,100	No
Trichloroethene	162SG06	2,700	1,770	Yes	4,100	No
Trichloroethene	162SG07	3,700	1,770	Yes	4,100	No
Trichloroethene	162SG08	4,200	1,770	Yes	4,100	Yes
Trichloroethene	162SG09	1,900	1,770	Yes	4,100	No
Trichloroethene	162SG12	2,200	1,770	Yes	4,100	No

Building 162 Chemicals in Soil Gas that Exceed Screening Criteria						
Analyte	Probe Location	Detected Concentration (µg/m³)	CHHSL[a] Criteria (µg/m³)	Detected Concentrations Exceed CHHSL Criterion?	ESL Criterion (µg/m³)	Detected Concentrations Exceed ESL Criterion?
Trichloroethene	162SG13	12,000	1,770	Yes	4,100	Yes
Trichloroethene	162SG14	11,000	1,770	Yes	4,100	Yes
Trichloroethene	162SG15	8,300	1,770	Yes	4,100	Yes
Trichloroethene	162SG16	4,500	1,770	Yes	4,100	Yes
Trichloroethene	162SG16	4,300 (DUP)	1,770	Yes	4,100	Yes
Trichloroethene	162SG21	3,000	1,770	Yes	4,100	No
Benzene	162SG15	140	122	Yes	290	No

Notes:

µg/m³ Microgram per cubic meter
CHHSL California Human Health Screening Level (DTSC 2005a)
ESL Environmental Screening Level (Water Board 2005)
DUP Duplicate sample collected for quality control

3.3.4 Building 163A

TCE was detected in three of three soil gas samples (two samples and one duplicate) collected in Building 163A, and two samples exceeded the CHHSL screening criterion of 1,770 µg/m³ (Table 9). TCE was detected at 2,500 µg/m³ (940 µg/m³ in the duplicate sample) and 9,600 µg/m³ in the samples collected from probes 163SG01 and 163SG02, respectively (Figure 7). The sample collected from probe 163SG-02 also exceeded the ESL criterion of 4,100 µg/m³.

3.3.5 Building 398

Six soil gas samples were collected in Building 398. None of the VOCs detected in samples collected from Building 398 exceeded the ESL or CHHSL criteria (Table 10). Vinyl chloride was not detected in the samples collected from probes 398SG01 and 398SG06; however, the reporting limit for these samples exceeded the CHHSL. Similarly, carbon tetrachloride was not detected in the sample collected from probe 398SG06, but the reporting limits exceeded the CHHSL criteria.

3.4 UTILITIIES LINE ASSESSMENT

The objective of Step 2 in Table 1 (Are utility corridors a preferential pathway for transport of VOCs vapors into these buildings?) was achieved by installing soil gas probes at the following locations:

- Probe 14SG11 was installed to assess the sanitary sewer line and fuel lines.
- Probe 14SG09 was installed to assess the fuel line.

- Probe 162SG02 was installed to assess the sewer line (6-inch diameter) coming up through the slab foundation (not shown on Figure 6); this probe was installed within 3 feet of the sewer line.

- Probe 162SG18 was installed to assess electrical lines identified by the utility locating subcontractor.

Utilities lines are not present beneath Buildings 113 and 163A, and the fuel lines shown beneath Building 398 could not be located by the utility locating subcontractor. As a result, soil gas probes were not needed to address Step 2 for Buildings 113, 163A, and 398.

As shown on Figures 5 and 6, VOCs detected in soil gas are not clustered near the utility lines nor are they detected at higher concentrations compared with other probe locations. As a result, the utility lines do not appear to be a preferential pathway of VOCs.

4.0 HUMAN HEALTH RISK ASSESSMENT

This section details the methodology for estimating concentrations and associated cancer risks and noncancer health hazards of chemicals of potential concern (COPC) in indoor air from soil gas by vapor intrusion into occupied buildings at OU-2B. The indoor air pathway was originally evaluated in the RI report using data for groundwater. Based on the RI report, the cancer risk estimate for commercial/industrial workers at OU-2B is 1×10^{-4}, and the noncancer hazard index (HI) is 0.2. This evaluation reevaluates the vapor intrusion pathway using building-specific soil gas data, which is the preferred medium for evaluating the indoor air pathway (DTSC 2005b).

The DTSC 2003 Advanced Vapor Intrusion Model (DTSC 2003) was used to estimate indoor air concentrations from concentrations of volatile COPCs in soil gas. The one-dimensional vapor intrusion model estimates convective and diffusive transport of chemical vapors emanating from subsurface media into indoor spaces located directly above or near the source of contamination. A detailed description of the vapor intrusion model is provided in DTSC's "Guidance for the Evaluation and Migration of Subsurface Vapor Intrusion to Indoor Air" (DTSC 2005b) and EPA's Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (subsurface vapor intrusion guidance) (EPA 2002b).

To evaluate the indoor air migration pathway, DTSC's 2003 Advanced Vapor Intrusion Model was used to estimate the indoor air concentrations from concentrations of volatile COPCs in groundwater and soil (DTSC 2003). The model assumes (1) the chemical concentration in the source (groundwater or soil) is not decreased by transport of the constituent to the surface and (2) the depth to the pollutant source remains constant. The model also ignores attenuating factors, such as biological degradation. For this reason, it is a conservative screening tool to identify maximum indoor air concentrations and risks.

For the purpose of this investigation, volatile chemicals were identified using the definition of volatility (a molecular weight of less than 200 grams per mole and a Henry's Law Constant greater than 1 x 10^{-5} atmosphere-cubic meter per mole) adopted from EPA (1991 and 2004b). Modeling equations and further details pertaining to the vapor intrusion model can be found in the DTSC (2005b) and EPA (1992, 2000c, 2002b) vapor intrusion guidance.

4.1 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

All VOCs detected in soil gas at each occupied building at OU-2B were evaluated for the indoor air vapor intrusion pathway. COPCs included in the human health risk evaluation for each building at OU-2B are presented in Tables 12 through 16.

4.2 VAPOR INTRUSION MODEL

Volatilization of contaminants located in groundwater and soil, and the subsequent mass transport of these vapors into indoor spaces constitutes a potential inhalation exposure pathway evaluated through risk assessment. Johnson and Ettinger (1991) introduced a screening-level model that incorporates both convective and diffusive mechanisms for estimating the transport of contaminant vapors emanating from groundwater or soil into indoor spaces located directly above or in close proximity to the source of contamination. In their article, Johnson and Ettinger reported that the results of the model were in qualitative agreement with published experimental case histories and in good qualitative and quantitative agreement with detailed three-dimensional numerical modeling of radon transport into houses (Loureiro and others 1990).

The vapor intrusion model provides an estimated attenuation coefficient that relates the vapor concentration in the indoor space to the vapor concentration at the source of contamination. The model is constructed as both a steady-state solution to vapor transport (infinite or nondiminishing source) and as a quasi-steady-state solution (finite or diminishing source). Inputs to the model include chemical properties of the contaminant, saturated and unsaturated zone soil properties, structural properties of the building, and appropriate exposure assumptions for those receptors that are being evaluated (EPA 2000c, 2002b).

4.3 INPUT PARAMETERS USED IN SOIL GAS MODELING

Air emissions and transport of volatile COPCs from groundwater or soil to indoor air are based on properties of the contaminant, the saturated and vadose zone soil, and dimensions of buildings or residential structures (EPA 2000c, 2002b). Input parameters used in the human health risk evaluation are discussed in the following subsections and presented in Table 17.

4.3.1 Soil Properties and Soil Characteristics

Site-specific soil and data were used for the vapor intrusion evaluation. Soil overlying groundwater at OU-2B consists primarily of sand. This evaluation assumed that the soil stratigraphy is homogeneous from soil surface to groundwater, which is reasonable given the shallow depth (approximately 5 feet) to groundwater.

Migration of constituents through soil depends on their ability to diffuse from the source into the vapor space and through the soil thereafter. Vapor space is a function of the total porosity of the soil and the volume of water displacing the air within the pore volume. Research has shown that the vapor space immediately above free product and dissolved-phase hydrocarbon contamination is typically low because of the capillary fringe effect. For this analysis, the total soil porosity, water-filled soil porosity, and air-filled soil porosity were based on default parameters for "sand" (DTSC 2003). The average soil temperature (16.7 degrees Celsius) is based on the site location and information provided in Figure A-1 of DTSC 2005b. The soil gas sampling depth below grade is based on the average gas sampling probe depth for each building. Input parameters for modeling the vapor intrusion pathway are presented in Table 17.

4.3.2 Building Parameters

The current dimensions of the five buildings at OU-2B were used to estimate exposure point concentrations (EPC) in indoor air. The foundation thickness was based on the average slab thickness for each building.

The vapor intrusion model assumes that the contaminant source is infinite (with respect to modeling time of interest) for groundwater and finite for soil and that vapor infiltration is through cracks in the foundation and below-grade walls, if any (EPA 2000c, 2002b). The area of cracks through which vapors can pass was assumed to be equal to a 0.1 centimeter-wide crack.

The building ventilation rate (also known as exchange rate) is another characteristic used in the vapor intrusion model. The building ventilation rate used in the modeling (1.0 $hour^{-1}$) was adopted from DTSC (DTSC 2005b).

Buildings can develop negative pressures relative to ambient pressure as a result of temperature gradients and wind effects. These pressure differences (dP) affect contaminant flux into buildings and are taken into account in the vapor intrusion model. Typical dP values are 10 to 100 grams per centimeter per second squared ($g/cm\text{-}s^2$). However, the recommended value from DTSC (DTSC 2005b) and EPA (EPA 2002b) of 40 $g/cm\text{-}s^2$ was used for dP in this evaluation because flux is directly proportional to dP.

A soil gas advection rate (referred as Q_{soil} in the model) of 5 liters per minute (L/m) is recommended by EPA (EPA 2002b) for small buildings (10 meters by 10 meters). A building-specific soil gas advection rate for the existing buildings was estimated by adjusting the model default of 5 L/m proportionally based on dimension, as recommended by DTSC (DTSC 2005b).

Building parameters used in the indoor air modeling are presented in Table 17.

4.3.3 Soil Gas Concentrations

The 95th percentile upper confidence limit on the arithmetic mean (95 UCL) was calculated and used as the EPC in the risk evaluation to estimate chemical intakes. The 95 UCL is defined as a value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95 percent of the time (EPA 2002c). The 95 UCL is a better predictor of actual chronic exposure conditions than the maximum concentration because it is based on the probability of long-term random contact with contaminated areas. However, the maximum concentration was used as the EPC in areas where the 95 UCL exceeded the maximum chemical concentration. The use of the 95 UCL is warranted for the human health risk evaluation based on the proximity of the samples collected beneath the individual buildings. All statistics were estimated using ProUCL software, Version 3.0 (EPA 2004b).

4.3.4 Vapor Intrusion Modeling Results

The EPCs calculated from the soil gas results (as described in Section 4.3.3) were used to estimate the indoor air concentrations of volatile COPCs in each building using DTSC's version of the Johnson and Ettinger model (DTSC 2003). The vapor intrusion modeling results are summarized in Table 18.

4.4 CALCULATION OF RISK ESTIMATES

The method used to evaluate the risk from inhalation of indoor air is based on the risk assessment framework developed by EPA and DTSC, as documented in "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)" (EPA 1989) and "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities" (DTSC 1992). The EPA-derived exposure algorithm was used to estimate the chemical intakes for the inhalation pathway. The equation used for calculating chemical intake is as follows:

$$I = \frac{C \times IR \times EF \times ED}{BW \times AT} \qquad (1)$$

where:

I	=	Intake (in milligrams per kilogram per day [mg/kg-day])
C	=	Indoor air concentration (mg/m^3)
IR	=	Inhalation rate (m^3/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kilograms)
AT	=	Averaging time (days)

The exposure parameter values used in the intake equation above are based on factors for the commercial/industrial worker:

- **Inhalation Rate:** The inhalation rate used to estimate an inhaled dose or intake for a given chemical depends on the activity level of the potential receptor. An inhalation rate of 14 cubic meters per 8-hour commercial work day (m^3/day) was used (DTSC 2005c).

- **Exposure Frequency:** The exposure frequency of 250 days per year (EPA 1991; DTSC 1992) was assumed to correspond to the number of work days in a year.

- **Exposure Duration:** The exposure duration of 25 years was used for the commercial/industrial worker (EPA 1991; DTSC 1992).

- **Body Weight:** Consistent with EPA and DTSC guidance (EPA 1991; DTSC 1992), a default body weight of 70 kilograms was used for an adult.

- **Averaging Time:** The averaging time for addressing adverse noncancer health effects is equal to the exposure duration (in years) times 365 days per year, as recommended by EPA (EPA 1989). The averaging time for cancer risk estimation is the number of days in a 70-year lifetime or 25,550 days, as recommended by EPA (EPA 1989). This cancer risk averaging time is used to remain consistent with the basis for slope factors (SF).

For carcinogens, the intakes were multiplied by chemical-specific inhalation SFs to estimate a chemical-specific cancer risk. For noncarcinogens, the intakes were divided by chemical-specific inhalation reference doses to estimate a noncancer hazard quotient (HQ). The cumulative cancer risk and noncancer HI were then calculated by summing the individual cancer risks or noncancer HQs.

4.5 RISK EVALUATION RESULTS

Potential risks associated with exposure to chemicals detected at OU-2B were evaluated for commercial/industrial receptors for all Buildings 14, 113, 162, 163A, and 398. The risk estimates for the five buildings are discussed below, and are presented in Table 18.

4.5.1 Building 14

The potential cancer risk estimate for the commercial/industrial worker at Building 14 is 1×10^{-6}, at the lower end of the EPA risk management range of 10^{-6} to 10^{-4}, and the noncancer HI is 0.02. TCE is the primary contributor to the cancer risk, contributing 87 percent to the cumulative cancer risk and is the only cancer risk driver (that is, COPCs that exceed an individual cancer risk of 1×10^{-6}) identified at Building 14. No noncancer risk drivers (that is, COPCs that exceed a noncancer quotient of 1) were identified at Building 14.

4.5.2 Building 113

The potential cancer risk estimate for the commercial/industrial worker at Building 113 is 6×10^{-6}, within the EPA risk management range of 10^{-6} to 10^{-4}, and the noncancer HI is 0.03. TCE is the primary contributor to the cancer risk, contributing 99 percent to the cumulative cancer risk and is the only cancer risk driver identified at Building 113. No noncancer risk drivers were identified at Building 113.

4.5.3 Building 162

The potential cancer risk estimate for the commercial/industrial worker at Building 162 is 5×10^{-5}, within the EPA risk management range of 10^{-6} to 10^{-4}, and the noncancer HI is 0.05. TCE is the primary contributor to the cancer risk, contributing more than 99 percent to the cumulative cancer risk and is the only cancer risk driver identified at Building 162. No noncancer risk drivers were identified at Building 162.

4.5.4 Building 163A

The potential cancer risk estimate for the commercial/industrial worker at Building 163A is 7×10^{-5}, within the EPA risk management range of 10^{-6} to 10^{-4}, and the noncancer HI is 0.08. TCE is the primary contributor to the cancer risk, contributing more than 99 percent to the cumulative cancer risk and is the only cancer risk driver identified at Building 163A. No noncancer risk drivers were identified at Building 163A.

4.5.5 Building 398

The potential cancer risk estimate for the commercial/industrial worker at Building 398 is 2×10^{-5}, within the EPA risk management range of 10^{-6} to 10^{-4}, and the noncancer HI is 0.08. TCE is the primary contributor to the cancer risk, contributing 96 percent to the cumulative cancer risk and is the only cancer risk driver identified at Building 398. No noncancer risk drivers were identified at Building 398.

4.6 UNCERTAINTY ANALYSIS

This section presents the uncertainties associated with calculating infinite indoor air concentrations with the vapor intrusion model and uncertainty associated with the toxicity values used for TCE are discussed below. The cumulative effect of the uncertainties described below results in an overestimate of risk to human health from vapor intrusion into indoor air.

The assumption of steady-state exposure concentrations over long-term exposure durations (e.g., 25 years for workers) results in uncertainty in risk assessment. To be conservative, the soil gas concentrations are assumed to be constant for the duration of exposure and thereby do not consider the natural physical, chemical, or biological processes which reduce chemical concentrations over time.

Over time, concentrations can decrease, as chemicals move from one medium to another and from location to location within a particular medium. In addition, the overall available mass of a chemical may decrease as the chemical is lost through transformation or degradation processes, such as hydrolysis, photolysis, and biodegradation. Thus, the concentrations to which the receptors would be exposed also decrease over time. Using only the measured concentration of the chemical in a particular medium to calculate potential risks is highly conservative. Evans and Bedient (1995) determined that the use of steady-state methods may over-predict risk by as much as two orders of magnitude.

The assumption that buildings are continuously under-pressurized neglects significant periods where neutral or positive pressurized conditions exist, thereby overestimating advective transport of contaminated vapors to indoor air, and yields higher indoor air concentrations.

The assumption of vapor transport under a single (vertical) dimension ignores the potential for vapor migration in multiple directions away from the source area, resulting in an overestimation of vapor emissions and higher indoor concentrations.

Toxicity values are not currently available for TCE in EPA's Integrated Risk Information System (EPA 2006). EPA withdrew its previously published toxicity values for TCE in 1988 because of uncertainties relating to the science of TCE toxicity. Thus, cancer risk for TCE was estimated using an inhalation slope factor of 0.4 milligrams per kilogram per day $(mg/kg\text{-}day)^{-1}$ from the EPA National Center of Environmental Assessment (NCEA) (EPA 2001), which is a Tier 3 source of toxicity criteria in EPA guidance on selecting toxicity factor for Superfund risk assessments (EPA 2003). A more current inhalation factor of 0.007 $(mg/kg\text{-}day)^{-1}$ is available from another Tier 3 source of toxicity criteria, the Office of Environmental Health Hazard Assessment (OEHHA 2006). Because this slope factor is nearly three orders of magnitude lower than the NCEA slope factor, cancer risk of TCE would be correspondingly lower if the OEHHA slope factor were used. As a conservative estimate, the NCEA slope factor of 0.4 $(mg/kg\text{-}day)^{-1}$ was used and therefore, the risk estimate for TCE in this evaluation may be overestimated for this subslab soil gas investigation.

5.0 SUMMARY

Subslab soil gas samples were collected from probes installed directly beneath the concrete slab-on-grade floors of Buildings 14, 113, 162, 163A, and 398. Soil gas samples were collected from probes in January 2006 and analyzed for VOCs by EPA Method TO-15. A human health risk assessment was conducted using vapor intrusion modeling to model soil gas concentrations into indoor air and to assess cancer risk and noncancer hazard from inhalation of vapors in indoor air for the commercial/industrial worker. The results of the human health risk assessment are summarized below:

Building Identification	Cancer Risk	Noncancer Hazard Index
Building 14	1×10^{-6}	0.02
Building 113	6×10^{-6}	0.03
Building 162	5×10^{-5}	0.05
Building 163A	7×10^{-5}	0.08
Building 398	2×10^{-5}	0.08

Note:

NA Not applicable - Soil gas concentration did not exceed the screening criteria; therefore, cancer and noncancer risk estimates were not calculated.

The cancer risks estimated for the commercial/industrial work for all five buildings were within the EPA risk management range of 10^{-6} to 10^{-4}. Noncancer health hazards for the commercial/industrial worker were below the EPA HI benchmark of 1. TCE was identified as the only cancer risk driver for all five buildings and no noncancer risk drivers were identified for any of the five buildings.

The cancer risk and noncancer HI for the commercial/industrial worker using soil gas data for all five buildings were less than the cancer risk (1×10^{-4}) and noncancer HI (0.2) estimated in the RI using groundwater data.

6.0 REFERENCES

ASTM International. 1995. *Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM Designation: ES 38 – 94.*

Bechtel Environmental, Inc. 2002. "Draft Technical Memorandum for the PAH Background Study for Alameda Point, Alameda, California." August.

Benton, D.J. and Shafer, N.S. 2006. "Evaluating Leaks in a Soil Gas Sample Train" Accessed May 2006. Available on line at: http://www.airtoxic.com/literature/AirToxicsLeakCheckStudy.pdf

Department of Toxic Substances Control (DTSC). 1992. "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities." Office of the Science Advisor. July.

DTSC. 2003. "Johnson and Ettinger (1991) Model for Vapor Intrusion into Buildings." Version 3.0-Modification 1. July.

DTSC. 2005a. "Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties." January.

DTSC. 2005b. "Guidance for the Evaluation and Migration of Subsurface Vapor Intrusion to Indoor Air." Interim Final. California Environmental Protection Agency. February 7. On-line address: http://www.dtsc.ca.gov/ScienceTechnology/HERD_POL_Eval_Subsurface_Vapor_Intrusion_interim_final.pdf

DTSC. 2005c. "Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Military Facilities." Human and Ecological Division. October 29.

Evans, K.L. and Bedient, P.B. 1995. "A Transient Methodology for Assessing Risk: Development and Comparison with the Conventional Approach, IN: The Proceedings of the 1995 Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection, and Remediation, Conference and Exposition." Houston, Texas. Pages 111 through 125.

Helsel, D. 2005. Nondetects and Data Analysis: Statistics for Censored Environmental Data. John Wiley & Sons, Inc., New York, NY. 250 p.

International Technology Corporation (IT). 1997. "Naval Air Station Alameda Site 18 Storm Sewer Removal Action, Remaining Systems Review."

IT. 2001. "Final Environmental Baseline Survey Data Evaluation Summaries, Alameda Point, Alameda, California." January.

Innovative Technical Solutions, Inc. 2006. "Summer 2005 Quarterly Groundwater Monitoring Data Report." March.

Johnson, P.C. and R.A. Ettinger. 1991. "Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings." *Environmental Science and Technology.* Volume 25, Number 8. Pages 1,445-1,452.

Johnson, Paul C. 2002. "Identification of Critical Parameters for the Johnson and Ettinger (1991) Vapor Intrusion Model." American Petroleum Institute.

Loureiro, C.O., L.M. Abriola, J.E. Martin, and R.G. Sextro. 1990. Environmental Science Technology. Volume 24. Pages 1338 through 1348.

Office of Environmental Health Hazard Assessment (OEHHA). 2006. "Toxicity Criteria Database." Available Online at: http://www.oehha.ca.gov/risk/chemicalDB/index.asp

PRC Environmental Management, Inc. (PRC) and James M. Montgomery Consulting Engineers, Inc. 1992. "Data Summary Report RI/FS Phases 2B and 3, Volume 1 of 2, NAS Alameda, Alameda, California (Final)." Prepared for Naval Facilities Engineering Command, Engineering Field Activity West. October 27.

PRC and James M. Montgomery Consulting Engineers, Inc. 1996. "Remedial Investigation/Feasibility Study Data Transmittal Memorandum Sites 4, 5, 8, 10A, 12, and 14. Final, Volume 1 of 2." Prepared for Naval Facilities Engineering Command, Engineering Field Activity West. April.

PRC and Montgomery Watson. 1993. "Data Summary Report, RI/FS Phases 1 and 2A, Naval Air Station Alameda, Alameda, California." Final. Prepared for Naval Facilities Engineering Command, Engineering Field Activity West. August.

PRC and Montgomery Watson. 1995. "RI/FS Data Transmittal Memorandum, Sites 1, 2, 3, Runway Area, 6, 7A, 7B, 7C, 9, 10B, 11, 13, 15, 16, and 19 NAS Alameda, Alameda, California." Final. Prepared for Naval Facilities Engineering Command, Engineering Field Activity West. May.

San Francisco Regional Water Quality Control Board. 2005. "Interim Final Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater." February. Available on line at: http://www.swrcb.ca.gov/rwqcb2/Download.htm

Sullivan Consulting Group and Tetra Tech EM, Inc. (SulTech). 2005a. "Final Operable Unit 2B Remedial Investigation Report, Sites 3, 4, 11, and 21, Alameda Point, Alameda, California." Prepared for Base Realignment and Closure Program Management Office West. August 5.

SulTech 2005b. "Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan), Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California." November 18.

Tetra Tech EM Inc. (Tetra Tech). 2000. "Draft Final Storm Sewer Study Report, Alameda Point." Prepared for Naval Facilities Engineering Command, Southwest Division. December 4.

Tetra Tech. 2001. "Final Field Sampling Plan, Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2." Prepared for Naval Facilities Engineering Command, Southwest Division. June 14.

Tetra Tech. 2002. "Data Summary Report, Supplemental Remedial Investigation Data Gap Sampling for Operable Units 1 and 2, Alameda Point, Alameda, California." Prepared for Naval Facilities Engineering Command, Southwest Division. July 25.

U.S. Environmental Protection Agency (EPA). 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A." Office of Solid Waste and Environmental Response. December.

EPA. 1991. "Interoffice Memorandum Regarding the Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors." From T. Fields, Jr., and B. Diamond. To Directors, Waste Management Division, Regions I, IV, V, and VII; Director, Emergency and Remedial Response Division, Region III; Directors, Hazardous Waste Management Division, Regions III, VI, VIII, and IX; Director, Hazardous Waste Division, Region X. March 25.

EPA. 1992. "Assessing Potential Indoor Air Impacts for Superfund Sites." EPA-451/R-92-002. September.

EPA. 1997. "USEPA Guidance for Quality Assurance Project Plans." EPA QA/G-5. Final.

EPA. 1999. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)." Cincinnati, Ohio. EPA/625/R-96/010b. January.

EPA. 2001. "Trichloroethylene Health Risk Assessment: Synthesis and Characterization." Office of Research and Development. National Center for Environmental Assessment (NCEA). Washington, DC. August.EPA. 2000a. "Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA00 Update." EPA/600/R-96-084. Office of Environmental Information. Washington, DC. July.

EPA. 2000b. "Guidance for the Data Quality Objectives Process, EPA QA/G-4." Office of Environmental Information. Washington, D.C. EPA/600/R-96/055. August.

EPA. 2000c. "User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings." Washington D.C., Office of Emergency and Remedial Response, Toxics Integration Branch (5202G). December.

EPA. 2002a. "Region IX Preliminary Remediation Goals." Accessed July 2003. Available on line at: http://www.epa.gov/region09/waste/sfund/prg/index.htm

EPA. 2002b. Office of Solid Waste and Emergency Response Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November. Available on line at: http://www.epa.gov/correctiveaction/eis/vapor.htm

EPA. 2002c. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2003. "Human Health Toxicity Values in Superfund Risk Assessments." OSWER 9285.7-53. December 5.

EPA. 2004a. "Region IX Preliminary Remediation Goals." October. Available on line at: http://www.epa.gov/region09/waste/sfund/prg/index.htm

EPA. 2004b. "Pro UCL software, Version 3.0." On-line Address: http://www.epa.gov/nerlesd1/tsc/software.htm.

EPA. 2006. "Integrated Risk Infonnation System." On-line Address: http://www.epa.gov/iris.htm

FIGURES

Alameda Point
U.S. Navy, BRAC PMO West, San Diego, CA

FIGURE 1
ALAMEDA POINT LOCATION MAP

Operable Unit 2B
Soil Gas Investigation

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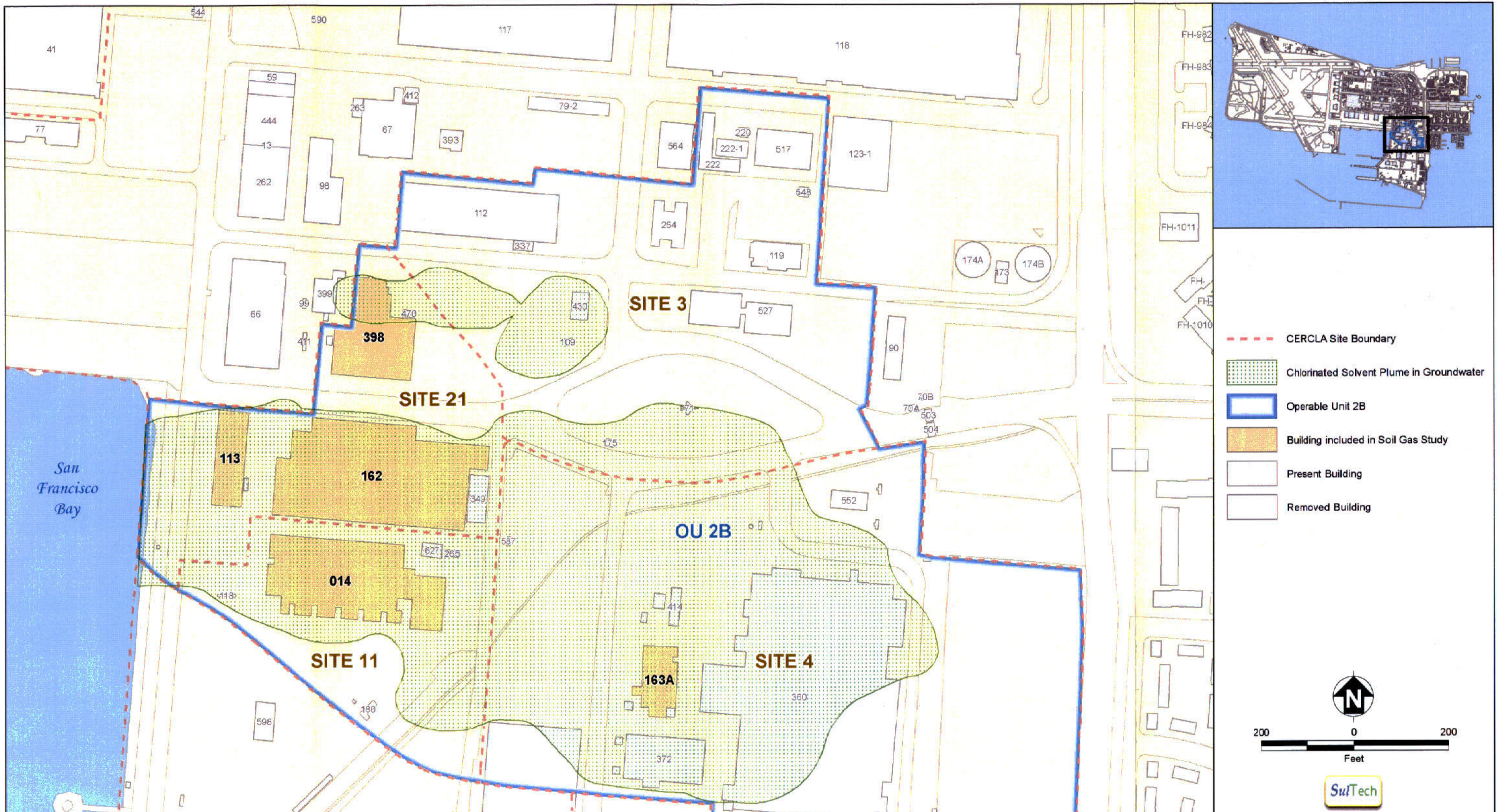

Alameda Point
U.S Navy, BRAC PMO West, San Diego, CA

FIGURE 2
CHLORINATED SOLVENT PLUME IN GROUNDWATER
Operable Unit 2B
Subslab Soil Gas Investigation

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Alameda Point
U.S Navy, BRAC PMO West, San Diego, CA

FIGURE 3
TOTAL VOC CONCENTRATIONS IN SOIL GAS
Operable Unit 2B
Subslab Soil Gas Investigation

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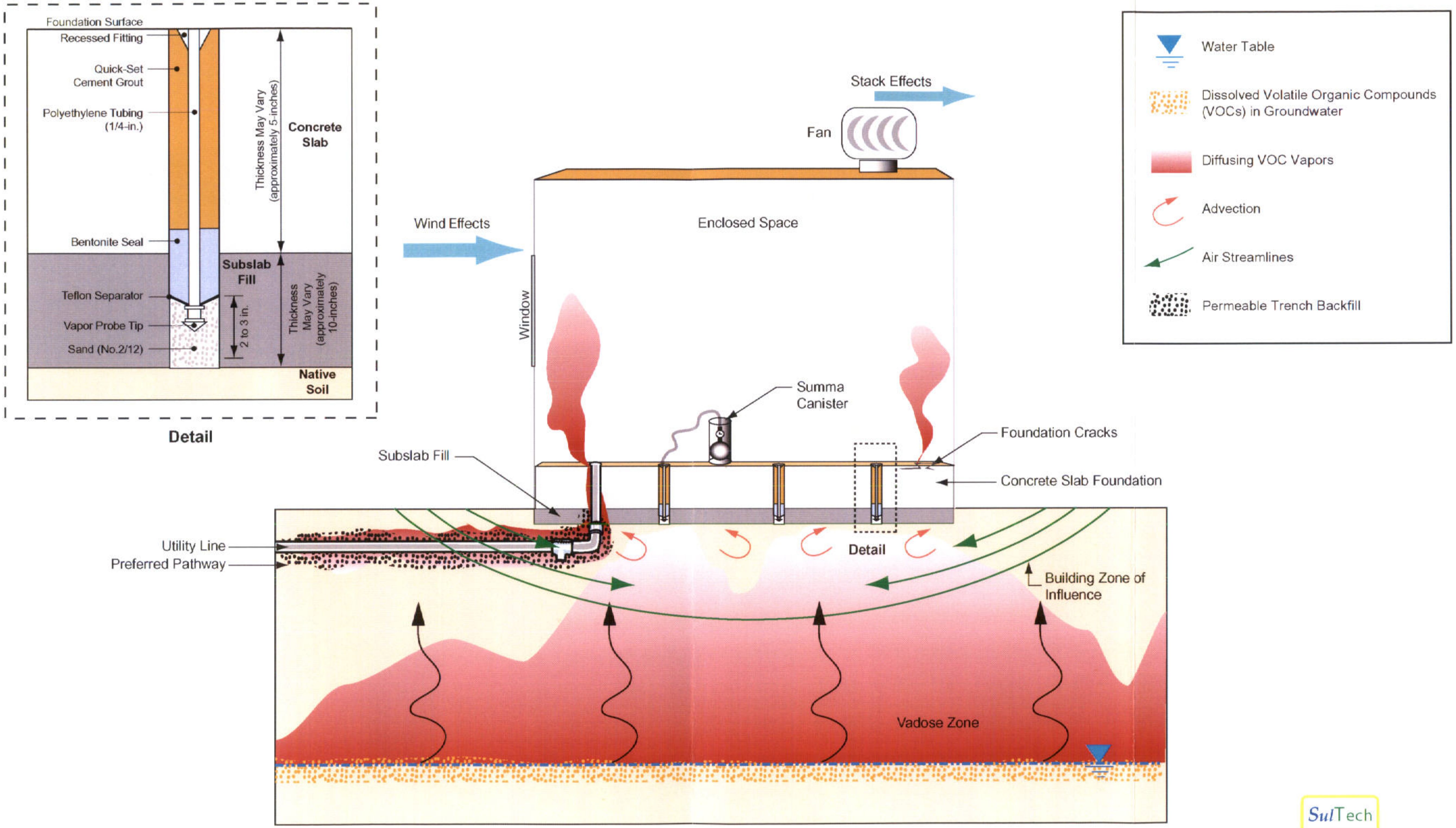

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U.S. Navy, BRAC PMO West, San Diego, CA

FIGURE 4
CONCEPTUAL DIAGRAM

Operable Unit 2B Subslab Soil Gas Investigation

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POINT ID	ANALYTE	RESULT
113SG03	BENZENE	140
162SG01	TRICHLOROETHENE	3,000
162SG03	TRICHLOROETHENE	3,600
162SG06	TRICHLOROETHENE	2,700
162SG07	TRICHLOROETHENE	3,700
162SG08	TRICHLOROETHENE	4,200
162SG09	TRICHLOROETHENE	1,900
162SG12	TRICHLOROETHENE	2,200
162SG13	TRICHLOROETHENE	12,000
162SG14	TRICHLOROETHENE	11,000
162SG15	BENZENE	140
162SG15	TRICHLOROETHENE	8,300
162SG16	TRICHLOROETHENE	4,500
162SG16	TRICHLOROETHENE	4,300 (DUP)
162SG21	TRICHLOROETHENE	3,000

Alameda Point
U.S Navy, BRAC PMO West, San Diego, CA

FIGURE 6
SOIL GAS RESULTS
BUILDINGS 113, 162, AND 398
Operable Unit 2B
Subslab Soil Gas Investigation

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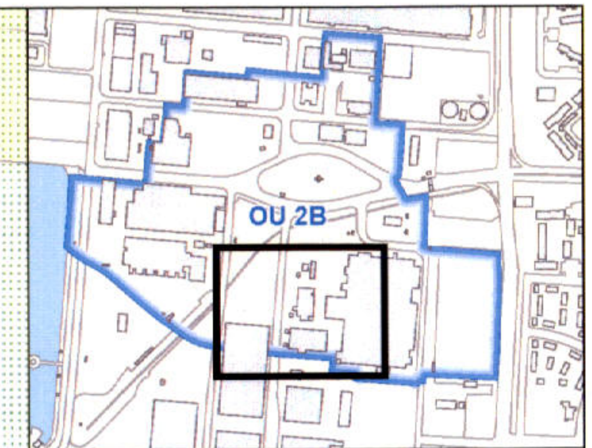
POINT ID	ANALYTE	RESULT
163SG01	TRICHLOROETHENE	2,500
163SG02	TRICHLOROETHENE	9,600



- VOC Result Exceeds CHHSL or ESL
- Sanitary Sewer Line
- Storm Sewer Line
- Gas Line
- Fuel Line
- Operable Unit 2B
- Present Building
- Removed Building
- Chlorinated Solvent Plume in Groundwater
- Building included in Soil Gas Study

Notes:

Screening Criteria:
CHHSL - California Human Health Screening Level (DTSC 2005a)
ESL - Environmental Screening Level (RWQCB 2005)

Results in Micrograms per Cubic Meter (ug/m^3)

Trichloroethene ESL = 4,100 ug/m^3
Trichloroethene CHHSL = 1,770 ug/m^3

N

60 0 60
Feet

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FIGURE 7
SOIL GAS RESULTS
BUILDING163A
Operable Unit 2B
Subslab Soil Gas Investigation

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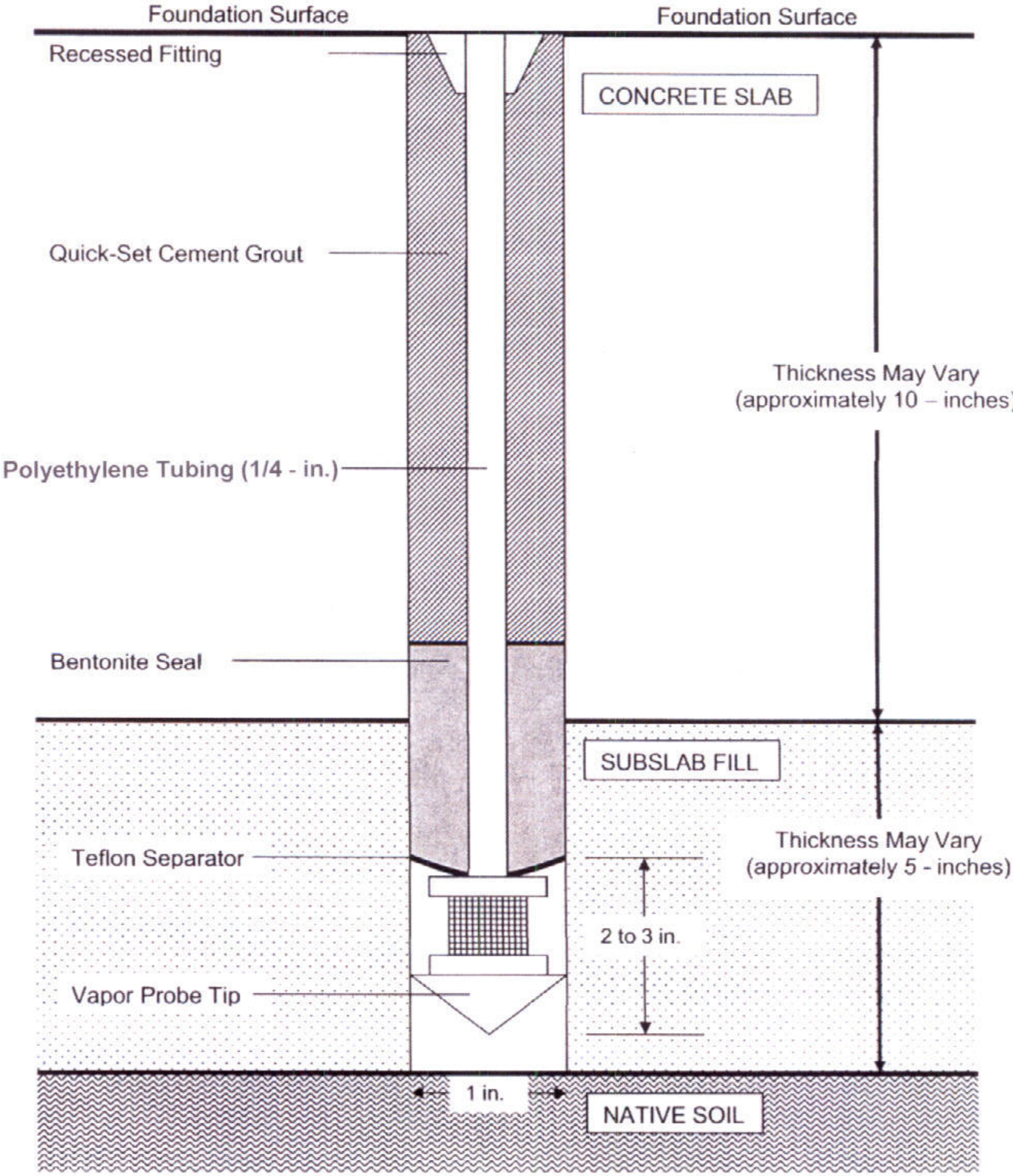

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Alameda Point
U.S. Navy, BRAC PMO West, San Diego, CA

FIGURE 8
SCHEMATIC DIAGRAM OF A SUBSLAB SAMPLING PROBE

Operable Unit 2B
Subslab Soil Gas Investigation

TABLES

TABLE 1: DATA QUALITY OBJECTIVES
Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Step1: State the Problem

VOCs are present in soil and groundwater beneath Buildings 14, 113, 162,163A, and 398. Additional data are desired to evaluate whether VOCs in the subsurface are migrating upward through the soil, entering into buildings, and causing an unacceptable chemical exposure for building occupants.

Step 2: Identify the Decisions

1. Are VOCs in soil gas below Buildings 14, 113,162, 163A, and 398 present at concentrations above the comparison criteria (Table 3)?
2. Are utility corridors a preferential pathway for transport of VOCs vapors into these buildings?

Step 3: Identify Inputs to the Decisions

- Risk-based screening criteria that have been accepted by all stakeholders
- Results from previous investigations
- Analytical results for VOCs in soil gas collected at the site
- Risk assessment results of the Operable Unit 2B remedial investigation
- Regional Water Quality Control Board's soil gas environmental screening levels for commercial/industrial land use (Water Board 2005)
- Cal/EPA's soil gas California human health screening levels (CHHSL) for shallow soil for commercial/industrial land use (DTSC 2005a)
- Validated, defensible analytical data for VOCs in soil gas from this investigation

Step 4: Define Study Boundaries

The specific samples to be collected define the analytical study boundary and are set forth in the sampling and analysis plan (SulTech 2005b). If concentrations of VOCs are detected above the screening levels established for this investigation, then further evaluation may be necessary to make site decisions.

The temporal boundary is defined by the time to complete the soil gas.

Step 5: Develop Decision Rules

1a. If VOCs are detected at concentrations above the comparison criteria (Table 3) in soil gas samples collected from below Buildings 14, 113, 162, 163A, and 398, then further study will be required to evaluate risk to building occupants.

1b. If VOCs are nondetect or are detected below the comparison criteria (Table 3) in soil gas samples collected from below Buildings 14, 113, 162, 163A, and 398, then further study may not be required.

2a. If VOCs are detected above the comparison criteria (Table 3) in soil gas samples collected at utility line corridors, then soil vapor along utility lines will be considered a possible preferential pathway for VOCs and may require further study.

2b. If VOCs are nondetected or are detected below the comparison criteria (Table 3) in soil gas samples collected at utility line corridors, then soil vapor along utility lines will not be considered a possible preferential pathway for VOCs into the building, and no further action on the utility lines will be required.

Step 6: Specify Tolerable limits on Decision Errors
Site-specific sampling objectives and media investigated limit the use of statistical methods in selecting sampling locations for this investigation. Sampling locations will be judgmentally based to obtain representative coverage of areas and buildings of particular concern. Tolerable limits on decision errors cannot be precisely defined.
Step 7: Optimize the Sampling Design
Step 7 of the data quality objective process involves optimization of the sampling or experimental design based on current information. As this investigation entails a biased sampling approach, the number of samples, the locations, and the media to be sampled are based on the site history, previous investigations, the overall objectives associated with the data to be collected, and the resource and schedule constraints for this investigation.

Notes:

DTSC	Department of Toxic Substances Control
Water Board	San Francisco Bay Regional Water Quality Control Board
VOC	Volatile organic compound

TABLE 2: SUMMARY OF SOIL GAS PROBE INSTALLATIONS
Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Slab Thickness (Inches)	Probe Total Depth (Inches)	Date Installed
Building 14			
14SG01	14	18	18 Jan 2006
14SG02	9	13	18 Jan 2006
14SG03	10	15	18 Jan 2006
14SG04	12	16	18 Jan 2006
14SG05	8	13	18 Jan 2006
14SG06	11	15	18 Jan 2006
14SG08	12	17	18 Jan 2006
14SG09	4	9	18 Jan 2006
14SG010	6	11	18 Jan 2006
14SG011	6	11	18 Jan 2006
Building 113			
113SG01	7	12	19 Jan 2006
113SG02	8	12	19 Jan 2006
113SG03	8	13	19 Jan 2006
Building 162			
162SG01	6	12	19 Jan 2006
162SG02	8	14	19 Jan 2006
162SG03	9	14	19 Jan 2006
162SG04	7	12	19 Jan 2006
162SG05	7	12	19 Jan 2006
162SG06	7	12	19 Jan 2006
162SG07	7	12	19 Jan 2006
162SG08	7	12	19 Jan 2006
162SG09	7	12	19 Jan 2006
162SG10	9	15	19 Jan 2006
162SG11	8	12	19 Jan 2006
162SG12	8	12	19 Jan 2006
162SG13	23	28	19 Jan 2006
162SG14	8	13	19 Jan 2006
162SG15	7	11	19 Jan 2006
162SG16	6	12	19 Jan 2006
162SG17	7	12	20 Jan 2006
162SG18	7	12	20 Jan 2006
162SG19	7	12	20 Jan 2006
162SG20	9	15	20 Jan 2006
162SG21	8	13	20 Jan 2006

TABLE 2: SUMMARY OF SOIL GAS PROBE INSTALLATIONS (CONTINUED)
Technical Memorandum, Subslab Soil Gas Investigation at Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Slab Thickness (Inches)	Probe Total Depth (Inches)	Date Installed
Building 163A			
163SG01	6	11	19 Jan 2006
163SG02	6	11	19 Jan 2006
Building 398			
398SG01	10	14	20 Jan 2006
398SG02	10	15	20 Jan 2006
398SG03	5	10	20 Jan 2006
398SG04	6	11	20 Jan 2006
398SG05	4	9	20 Jan 2006
398SG06	6	10	20 Jan 2006

TABLE 3: COMPARISON CRITERIA FOR VOC IN SOIL GAS

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Comparison Criteria[a]	
	ESL ($\mu g/m^3$)	CHHSL ($\mu g/m^3$)
1,1,2,2-Tetrachloroethane	140	NA
1,1,1,2-Tetrachloroethane	1,100	NA
1,1,2-Trichloroethane	510	NA
1,1-Dichloroethane	5,100	NA
1,1-Dichloroethene	120,000	NA
1,2,4-Trichlorobenzene	2,000	NA
1,2,4-Trimethylbenzene	NA	NA
1,2-Dichlorobenzene	120,000	NA
1,2-Dichloroethane	390	167
1,2-Dichloropropane	790	NA
1,3,5-Trimethylbenzene	NA	NA
1,3-Butadiene	NA	NA
1,3-Dichlorobenzene	61,000	NA
1,4-Dichlorobenzene	720	NA
1,4-Dioxane	NA	NA
2-Butanone (Methyl Ethyl Ketone)	590,000	NA
2-Hexanone	NA	NA
4-Ethyltoluene	NA	NA
4-Methyl-2-Pentanone (MIBK)	NA	NA
Acetone	1,800,000	NA
Benzene	290	122
Bromodichloromethane	220	NA
Bromoform	NA	NA
Bromomethane	2,900	NA
Carbon Disulfide	NA	NA
Carbon Tetrachloride	190	84.6
Chlorobenzene	35,000	NA
Chloroethane	9,900	NA
Chloroform	1,500	NA
Chloromethane	1,100	NA
Chlorotoluene	NA	NA
cis-1,2-Dichloroethene	20,000	44,400
trans-1,2-Dichloroethene	41,000	88,700

TABLE 3: COMPARISON CRITERIA FOR VOC IN SOIL GAS (CONTINUED)

Technical Memorandum, Subslab Soil Gas Investigation at Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Analyte	Comparison Criteria[a]	
	ESL (µg/m^3)	CHHSL (µg/m^3)
1,3-Dichloropropene	520	NA
trans-1,3-Dichloropropene	NA	NA
Cyclohexane	NA	NA
Dibromochloromethane	300	NA
Ethanol	38,000,000	NA
Ethylbenzene	1,200,000	NA
Ethylene Dibromide	NA	NA
Freon 11	NA	NA
Freon 113	NA	NA
Freon 114	NA	NA
Freon 12	NA	NA
Heptane	NA	NA
Hexachlorobutadiene	NA	NA
m,p-Xylene	410,000	887,000
Methylene Chloride	8,200	NA
Methyl-Tertiary-Butyl Ether (MTBE)	31,000	13,400
o-Xylene	410,000	877,000
Styrene	590,000	NA
Tetrachloroethene	1,400	603
Tetrahydrofuran	NA	NA
Toluene	180,000	378,000
Trichloroethene	4,100	1,770
Vinyl Acetate	NA	NA
Vinyl Chloride	110	44.8

Notes:

a Screening criteria are from (1) California Regional Water Quality Control Board's Table E, Shallow Soil Gas Screening Levels for Evaluation of Potential Indoor-Air Impacts, in "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final," dated February 2005; and (2) California Environment Protection Agency, Table 2, California Human Health Screening Levels for Indoor Air and Soil Gas, in "Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties," dated January 2005.

µg/m^3 Microgram per cubic meter
ESL Environmental screening level
NA Not available
VOC Volatile organic compound

TABLE 4: SUMMARY OF LEAK TESTING RESULTS

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Tracer[a] Detected in Sample?	Detected Tracer Concentration (µg/L)	Tracer Reporting Limit (µg/L)
Building 14			
14SG01	No	ND	10
14SG02	Yes	55	10
14SG03	Yes	16	10
14SG04	Yes	14	10
14SG05	No	ND	10
14SG06	Yes	20	5
14SG08	Yes	37	10
14SG09	Yes	11	10
14SG010	Yes	12	10
14SG011	Yes	46	10
14SG011 (Dup)	Yes	57	10
Building 113			
113SG01	No	ND	10
113SG02	Yes	21	5
113SG03	Yes	100	25
Building 162			
162SG01	Yes	36	10
162SG02	Yes	37	10
162SG03	Yes	23	5
162SG04	Yes	22	5
162SG05	Yes	17	5
162SG05 (Dup)	Yes	19	5
162SG06	Yes	21	5
162SG07	Yes	42	10
162SG08	Yes	26	5
162SG09	Yes	46	10
162SG10	Yes	24	5
162SG11	Yes	10	10
162SG12	Yes	37	5
162SG13	No	ND	10
162SG14	Yes	30	5
162SG15	No	ND	20
162SG16	No	ND	5
162SG16 (Dup)	Yes	7.1	2
162SG17	Yes	39	10
162SG18	Yes	42	10
162SG19	Yes	43	10
162SG20	Yes	22	5
162SG21	No	ND	10

TABLE 4: SUMMARY OF LEAK TESTING RESULTS (CONTINUED)

Technical Memorandum, Subslab Soil Gas Investigation at Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Tracer[a] Detected in Sample?	Detected Tracer Concentration (µg/L)	Tracer Reporting Limit (µg/L)
Building 163A			
163SG01	No	ND	10
163SG01 (Dup)	No	ND	10
163SG02	Yes	14	2
Building 398			
398SG01	Yes	36	10
398SG02	Yes	29	5
398SG03	Yes	13	2
398SG04	Yes	21	5
398SG05	Yes	23	5
398SG06	Yes	42	20

Notes:

a Isopropyl alcohol at a concentration of 91 percent (910,000,000 µg/L) was the tracer used for leak testing.

µg/L Microgram per liter

Dup Duplicate sample collected for quality control.

ND Not detected

TABLE 5: SUMMARY OF SAMPLE DILUTIONS
Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Sample Required Dilution?	Dilution Factor
14SG01	No	1
14SG02	Yes	10
14SG03	No	1
14SG04	No	1
14SG05	No	1
14SG06	Yes	5
14SG08	Yes	10
14SG09	No	1
14SG010	No	1
14SG011	Yes	10
14SG011 (Dup)	Yes	10
113SG01	No	1
113SG02	Yes	5
113SG03	Yes	25
162SG01	Yes	10
162SG02	Yes	10
162SG03	Yes	5
162SG04	Yes	5
162SG05	Yes	5
162SG05 (Dup)	Yes	5
162SG06	Yes	5
162SG07	Yes	10
162SG08	Yes	5
162SG09	Yes	10
162SG10	Yes	5
162SG11	No	1
162SG12	Yes	5
162SG13	No	10
162SG14	Yes	5
162SG15	Yes	20
162SG16	Yes	5
162SG16 (Dup)	Yes	2
162SG17	Yes	10
162SG18	Yes	10
162SG19	Yes	10
162SG20	Yes	5
162SG21	Yes	10

TABLE 5: SUMMARY OF SAMPLE DILUTIONS (CONTINUED)
Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

Probe Identification	Sample Required Dilution?	Dilution Factor
163SG01	No	1
163SG01 (Dup)	No	1
163SG02	Yes	2
398SG01	Yes	10
398SG02	Yes	5
398SG03	Yes	2
398SG04	Yes	5
398SG05	Yes	5
398SG06	Yes	20

Notes:

Dup Duplicate sample collected for quality control.

TABLE 6: BUILDING 14 STATISTICAL SUMMARY OF SOIL GAS ANALYSES

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
1,1,1-TRICHLOROETHANE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
1,1,2,2-TETRACHLOROETHANE	11	0	0	--	--	--	6	60	0	0	140	--	--	NA
1,1,2-TRICHLOROETHANE	11	0	0	--	--	--	5	50	0	0	510	--	--	NA
1,1-DICHLOROETHANE	11	0	0	--	--	--	5	50	0	0	5,100	--	--	NA
1,1-DICHLOROETHENE	11	0	0	--	--	--	5	50	0	0	120,000	--	--	NA
1,2,4-TRICHLOROBENZENE	11	0	0	--	--	--	20	200	0	0	2,000	--	--	NA
1,2,4-TRIMETHYLBENZENE	11	5	45	170	6.7	790 J	5	50	--	--	NA	--	--	NA
1,2-DICHLOROBENZENE	11	0	0	--	--	--	10	100	0	0	120,000	--	--	NA
1,2-DICHLOROETHANE	11	0	0	--	--	--	5	50	0	0	390	0	0	167
1,2-DICHLOROPROPANE	11	0	0	--	--	--	5	50	0	0	790	--	--	NA
1,3,5-TRIMETHYLBENZENE	11	2	18	69	18	120	5	50	--	--	NA	--	--	NA
1,3-BUTADIENE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
1,3-DICHLOROBENZENE	11	0	0	--	--	--	10	100	0	0	61,000	--	--	NA
1,4-DICHLOROBENZENE	11	0	0	--	--	--	10	100	0	0	720	--	--	NA
1,4-DIOXANE	11	0	0	--	--	--	5.5	55	--	--	NA	--	--	NA
2,2,4-TRIMETHYLPENTANE	11	8	73	89	11	270	5	50	--	--	NA	--	--	NA
2-BUTANONE	11	11	100	110	7.1	290	0	0	0	0	590,000	--	--	NA
2-HEXANONE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
3-CHLOROPROPENE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
4-ETHYL TOLUENE	11	3	27	290	7.8	810 J	5	50	--	--	NA	--	--	NA
4-METHYL-2-PENTANONE	11	10	91	150	55	240	5	5	--	--	NA	--	--	NA
ACETONE	11	9	82	330	66	1,100	200	200	0	0	1,800,000	--	--	NA
BENZENE	11	1	9	19	19	19	5	50	0	0	290	0	0	122
BENZYL CHLORIDE	11	0	0	--	--	--	10	100	--	--	NA	--	--	NA
BROMODICHLOROMETHANE	11	0	0	--	--	--	5	50	0	0	220	--	--	NA
BROMOFORM	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
BROMOMETHANE	11	0	0	--	--	--	5	50	0	0	2,900	--	--	NA
CARBON DISULFIDE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
CARBON TETRACHLORIDE	11	0	0	--	--	--	5.5	55	0	0	190	0	0	84.6
CHLOROBENZENE	11	0	0	--	--	--	5	50	0	0	35,000	--	--	NA
CHLOROETHANE	11	0	0	--	--	--	5	50	0	0	9,900	--	--	NA
CHLOROFORM	11	3	27	11	7.9	14	5	50	0	0	1,500	--	--	NA
CHLOROMETHANE	11	0	0	--	--	--	5	50	0	0	1,100	--	--	NA
CIS-1,2-DICHLOROETHENE	11	0	0	--	--	--	5	50	0	0	20,000	0	0	44,400
CIS-1,3-DICHLOROPROPENE	11	0	0	--	--	--	5	50	0	0	520	--	--	NA
CYCLOHEXANE	11	2	18	130	76	180	5	50	--	--	NA	--	--	NA
DIBROMOCHLOROMETHANE	11	0	0	--	--	--	6.5	65	0	0	300	--	--	NA
DICHLORODIFLUOROMETHANE	11	0	0	--	--	--	5.5	55	--	--	NA	--	--	NA
DICHLOROTETRAFLUOROETHANE	11	0	0	--	--	--	5.5	55	--	--	NA	--	--	NA
ETHYL ACETATE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
ETHYLBENZENE	11	5	45	52	8	120	5	50	0	0	1,200,000	--	--	NA
ETHYLENE DIBROMIDE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
HEPTANE	11	4	36	70	6.6	120	5	50	--	--	NA	--	--	NA
HEXACHLOROBUTADIENE	11	0	0	--	--	--	11	110	--	--	NA	--	--	NA
HEXANE	11	2	18	25	6.2	44	5	50	--	--	NA	--	--	NA
M,P-XYLENE	11	5	45	100	5.7	270	5	50	0	0	410,000	0	0	887,000
METHYL-T-BUTYL ETHER	11	0	0	--	--	--	5	50	0	0	31,000	0	0	13,400
METHYLENE CHLORIDE	11	3	27	33	5	87	5	50	0	0	8,200	--	--	NA

TABLE 6: BUILDING 14 STATISTICAL SUMMARY OF SOIL GAS ANALYSES (Continued)

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
O-XYLENE	11	5	45	110	5.1	360	5	50	0	0	410,000	0	0	877,000
PROPYLENE	11	1	9	53	53	53	10	100	--	--	NA	--	--	NA
STYRENE	11	0	0	--	--	--	5	50	0	0	590,000	--	--	NA
TETRACHLOROETHENE	11	3	27	310	58	**760**	5	50	0	0	1,400	1	0	603
TETRAHYDROFURAN	11	10	91	220	20	670	5	5	--	--	NA	--	--	NA
TOLUENE	11	8	73	44	6.1	110	25	50	0	0	180,000	0	0	378,000
TRANS-1,2-DICHLOROETHENE	11	0	0	--	--	--	5	50	0	0	41,000	0	0	88,700
TRANS-1,3-DICHLOROPROPENE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
TRICHLOROETHENE	11	4	36	130	44	300	5	50	0	0	4,100	0	0	1,770
TRICHLOROFLUOROMETHANE	11	1	9	8	8.4	8.4	5	50	--	--	NA	--	--	NA
TRICHLOROTRIFLUOROETHANE	11	6	55	51	9.1	140	6	60	--	--	NA	--	--	NA
VINYL ACETATE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
VINYL BROMIDE	11	0	0	--	--	--	5	50	--	--	NA	--	--	NA
VINYL CHLORIDE	11	0	0	--	--	--	5	**50**	0	0	110	0	4	44.8

Notes:

Bold denotes values exceeding the screening level (CHHSL or ESL) or reported as non-detect but the reporting limit exceeded the screening criteria.

-- Not detected
CHHSL California Human Health Screening Level (DTSC 2005a)
DTSC Department of Toxic Substances Control
ESL Environmental Screening Level (RWQCB 2005)
J Estimated value
µg/m3 Micrograms per cubic meter

TABLE 7: BUILDING 113 STATISTICAL SUMMARY OF SOIL GAS ANALYSES

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
1,1,1-TRICHLOROETHANE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
1,1,2,2-TETRACHLOROETHANE	3	0	0	--	--	--	6	**150**	0	1	140	--	--	NA
1,1,2-TRICHLOROETHANE	3	0	0	--	--	--	5	120	0	0	510	--	--	NA
1,1-DICHLOROETHANE	3	0	0	--	--	--	5	120	0	0	5,100	--	--	NA
1,1-DICHLOROETHENE	3	0	0	--	--	--	5	120	0	0	120,000	--	--	NA
1,2,4-TRICHLOROBENZENE	3	0	0	--	--	--	20	500	0	0	2,000	--	--	NA
1,2,4-TRIMETHYLBENZENE	3	1	33	12	12 J	12 J	25	120	--	--	NA	--	--	NA
1,2-DICHLOROBENZENE	3	0	0	--	--	--	10	250	0	0	120,000	--	--	NA
1,2-DICHLOROETHANE	3	0	0	--	--	--	5	120	0	0	390	0	0	167
1,2-DICHLOROPROPANE	3	0	0	--	--	--	5	120	0	0	790	--	--	NA
1,3,5-TRIMETHYLBENZENE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
1,3-BUTADIENE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
1,3-DICHLOROBENZENE	3	0	0	--	--	--	10	250	0	0	61,000	--	--	NA
1,4-DICHLOROBENZENE	3	0	0	--	--	--	10	250	0	0	720	--	--	NA
1,4-DIOXANE	3	0	0	--	--	--	5.5	140	--	--	NA	--	--	NA
2,2,4-TRIMETHYLPENTANE	3	1	33	380	380	380	5	25	--	--	NA	--	--	NA
2-BUTANONE	3	2	67	100	85	120	120	120	0	0	590,000	--	--	NA
2-HEXANONE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
3-CHLOROPROPENE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
4-ETHYL TOLUENE	3	1	33	8	7.9	7.9	25	120	--	--	NA	--	--	NA
4-METHYL-2-PENTANONE	3	2	67	68	55	81	120	120	--	--	NA	--	--	NA
ACETONE	3	1	33	35	35	35	100	500	0	0	1,800,000	--	--	NA
BENZENE	3	1	33	**140**	**140**	**140**	5	25	0	0	290	1	0	122
BENZYL CHLORIDE	3	0	0	--	--	--	10	250	--	--	NA	--	--	NA
BROMODICHLOROMETHANE	3	0	0	--	--	--	5	120	0	0	220	--	--	NA
BROMOFORM	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
BROMOMETHANE	3	0	0	--	--	--	5	120	0	0	2,900	--	--	NA
CARBON DISULFIDE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
CARBON TETRACHLORIDE	3	0	0	--	--	--	5.5	**140**	0	0	190	0	1	84.6
CHLOROBENZENE	3	0	0	--	--	--	5	120	0	0	35,000	--	--	NA
CHLOROETHANE	3	0	0	--	--	--	5	120	0	0	9,900	--	--	NA
CHLOROFORM	3	0	0	--	--	--	5	120	0	0	1,500	--	--	NA
CHLOROMETHANE	3	0	0	--	--	--	5	120	0	0	1,100	--	--	NA
CIS-1,2-DICHLOROETHENE	3	0	0	--	--	--	5	120	0	0	20,000	0	0	44,400
CIS-1,3-DICHLOROPROPENE	3	0	0	--	--	--	5	120	0	0	520	--	--	NA
CYCLOHEXANE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
DIBROMOCHLOROMETHANE	3	0	0	--	--	--	6.5	160	0	0	300	--	--	NA
DICHLORODIFLUOROMETHANE	3	0	0	--	--	--	5.5	140	--	--	NA	--	--	NA
DICHLOROTETRAFLUOROETHANE	3	0	0	--	--	--	5.5	140	--	--	NA	--	--	NA
ETHYL ACETATE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
ETHYLBENZENE	3	1	33	9	8.8	8.8	25	120	0	0	1,200,000	--	--	NA
ETHYLENE DIBROMIDE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
HEPTANE	3	1	33	170	170	170	5	25	--	--	NA	--	--	NA
HEXACHLOROBUTADIENE	3	0	0	--	--	--	11	280	--	--	NA	--	--	NA
HEXANE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
M,P-XYLENE	3	1	33	5	5.4	5.4	25	120	0	0	410,000	0	0	887,000
METHYL-T-BUTYL ETHER	3	0	0	--	--	--	5	120	0	0	31,000	0	0	13,400
METHYLENE CHLORIDE	3	0	0	--	--	--	5	120	0	0	8,200	--	--	NA

TABLE 7: BUILDING 113 STATISTICAL SUMMARY OF SOIL GAS ANALYSES (Continued)

Technical Memorandum, Subslab Soil Gas Investigation

Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
O-XYLENE	3	1	33	5	5.2	5.2	25	120	0	0	410,000	0	0	877,000
PROPYLENE	3	0	0	--	--	--	10	250	--	--	NA	--	--	NA
STYRENE	3	0	0	--	--	--	5	120	0	0	590,000	--	--	NA
TETRACHLOROETHENE	3	0	0	--	--	--	5	120	0	0	1,400	0	0	603
TETRAHYDROFURAN	3	2	67	240	190	280	120	120	--	--	NA	--	--	NA
TOLUENE	3	1	33	9	9.1	9.1	25	120	0	0	180,000	0	0	378,000
TRANS-1,2-DICHLOROETHENE	3	0	0	--	--	--	5	120	0	0	41,000	0	0	88,700
TRANS-1,3-DICHLOROPROPENE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
TRICHLOROETHENE	3	3	100	380	15	1,100	0	0	0	0	4,100	0	0	1,770
TRICHLOROFLUOROMETHANE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
TRICHLOROTRIFLUOROETHANE	3	0	0	--	--	--	6	150	--	--	NA	--	--	NA
VINYL ACETATE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
VINYL BROMIDE	3	0	0	--	--	--	5	120	--	--	NA	--	--	NA
VINYL CHLORIDE	3	0	0	--	--	--	5	**120**	0	1	110	0	1	44.8

Notes:

Bold denotes values exceeding the screening level (CHHSL or ESL) or reported as non-detect but the reporting limit exceeded the screening criteria.

-- Not detected

CHHSL California Human Health Screening Level (DTSC 2005a)

DTSC Department of Toxic Substances Control

ESL Environmental Screening Level (RWQCB 2005)

J Estimated value

µg/m3 Micrograms per cubic meter

TABLE 8: BUILDING 162 STATISTICAL SUMMARY OF SOIL GAS ANALYSES

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
1,1,1-TRICHLOROETHANE	23	7	30	34	10	58	25	100	--	--	NA	--	--	NA
1,1,2,2-TETRACHLOROETHANE	23	0	0	--	--	--	6	120	0	0	140	--	--	NA
1,1,2-TRICHLOROETHANE	23	0	0	--	--	--	5	100	0	0	510	--	--	NA
1,1-DICHLOROETHANE	23	0	0	--	--	--	5	100	0	0	5,100	--	--	NA
1,1-DICHLOROETHENE	23	0	0	--	--	--	5	100	0	0	120,000	--	--	NA
1,2,4-TRICHLOROBENZENE	23	0	0	--	--	--	20	400	0	0	2,000	--	--	NA
1,2,4-TRIMETHYLBENZENE	23	2	9	28	5.6J	50 J	10	100	--	--	NA	--	--	NA
1,2-DICHLOROBENZENE	23	0	0	--	--	--	10	200	0	0	120,000	--	--	NA
1,2-DICHLOROETHANE	23	0	0	--	--	--	5	100	0	0	390	0	0	167
1,2-DICHLOROPROPANE	23	0	0	--	--	--	5	100	0	0	790	--	--	NA
1,3,5-TRIMETHYLBENZENE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
1,3-BUTADIENE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
1,3-DICHLOROBENZENE	23	0	0	--	--	--	10	200	0	0	61,000	--	--	NA
1,4-DICHLOROBENZENE	23	0	0	--	--	--	10	200	0	0	720	--	--	NA
1,4-DIOXANE	23	0	0	--	--	--	5.5	110	--	--	NA	--	--	NA
2,2,4-TRIMETHYLPENTANE	23	5	22	130	33	400	5	50	--	--	NA	--	--	NA
2-BUTANONE	23	15	65	63	17	130	25	100	0	0	590,000	--	--	NA
2-HEXANONE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
3-CHLOROPROPENE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
4-ETHYL TOLUENE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
4-METHYL-2-PENTANONE	23	21	91	110	34	190	25	100	--	--	NA	--	--	NA
ACETONE	23	6	26	1,500	41	8,500	100	400	0	0	1,800,000	--	--	NA
BENZENE	23	1	4	**140**	**140**	**140**	5	50	0	0	290	1	0	122
BENZYL CHLORIDE	23	0	0	--	--	--	10	200	--	--	NA	--	--	NA
BROMODICHLOROMETHANE	23	0	0	--	--	--	5	100	0	0	220	--	--	NA
BROMOFORM	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
BROMOMETHANE	23	0	0	--	--	--	5	100	0	0	2,900	--	--	NA
CARBON DISULFIDE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
CARBON TETRACHLORIDE	23	0	0	--	--	--	5.5	110	0	0	190	0	1	84.6
CHLOROBENZENE	23	0	0	--	--	--	5	100	0	0	35,000	--	--	NA
CHLOROETHANE	23	0	0	--	--	--	5	100	0	0	9,900	--	--	NA
CHLOROFORM	23	4	17	47	11	99	10	100	0	0	1,500	--	--	NA
CHLOROMETHANE	23	0	0	--	--	--	5	100	0	0	1,100	--	--	NA
CIS-1,2-DICHLOROETHENE	23	2	9	30	25	34	5	100	0	0	20,000	0	0	44,400
CIS-1,3-DICHLOROPROPENE	23	0	0	--	--	--	5	100	0	0	520	--	--	NA
CYCLOHEXANE	23	1	4	1,300	1,300	1,300	5	100	--	--	NA	--	--	NA
DIBROMOCHLOROMETHANE	23	0	0	--	--	--	6.5	130	0	0	300	--	--	NA
DICHLORODIFLUOROMETHANE	23	0	0	--	--	--	5.5	110	--	--	NA	--	--	NA
DICHLOROTETRAFLUOROETHANE	23	0	0	--	--	--	5.5	110	--	--	NA	--	--	NA
ETHYL ACETATE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
ETHYLBENZENE	23	1	4	98	98	98	5	100	0	0	1,200,000	--	--	NA
ETHYLENE DIBROMIDE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
HEPTANE	23	2	9	3,300	170	6,400	5	50	--	--	NA	--	--	NA
HEXACHLOROBUTADIENE	23	0	0	--	--	--	11	220	--	--	NA	--	--	NA
HEXANE	23	1	4	73	73	73	5	100	--	--	NA	--	--	NA
M,P-XYLENE	23	1	4	140	140	140	5	100	0	0	410,000	0	0	887,000
METHYL-T-BUTYL ETHER	23	0	0	--	--	--	5	100	0	0	31,000	0	0	13,400
METHYLENE CHLORIDE	23	0	0	--	--	--	5	100	0	0	8,200	--	--	NA

TABLE 8: BUILDING 162 STATISTICAL SUMMARY OF SOIL GAS ANALYSES (Continued)

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
O-XYLENE	23	1	4	82	82	82	5	100	0	0	410,000	0	0	877,000
PROPYLENE	23	0	0	--	--	--	10	200	--	--	NA	--	--	NA
STYRENE	23	0	0	--	--	--	5	100	0	0	590,000	--	--	NA
TETRACHLOROETHENE	23	7	30	64	13	150	5	100	0	0	1,400	0	0	603
TETRAHYDROFURAN	23	18	78	120	24	280	25	100	--	--	NA	--	--	NA
TOLUENE	23	3	13	160	6.2	450	10	100	0	0	180,000	0	0	378,000
TRANS-1,2-DICHLOROETHENE	23	1	4	13	13	13	5	100	0	0	41,000	0	0	88,700
TRANS-1,3-DICHLOROPROPENE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
TRICHLOROETHENE	23	21	91	3,300	7.5	**12,000**	25	50	6	0	4,100	13	0	1,770
TRICHLOROFLUOROMETHANE	23	4	17	66	26	110	5	100	--	--	NA	--	--	NA
TRICHLOROTRIFLUOROETHANE	23	12	52	210	36	790	6	60	--	--	NA	--	--	NA
VINYL ACETATE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
VINYL BROMIDE	23	0	0	--	--	--	5	100	--	--	NA	--	--	NA
VINYL CHLORIDE	23	0	0	--	--	--	5	**100**	0	0	110	0	10	44.8

Notes:

Bold denotes values exceeding the screening level (CHHSL or ESL) or reported as non-detect but the reporting limit exceeded the screening criteria.

--	Not detected
CHHSL	California Human Health Screening Level (DTSC 2005a)
DTSC	Department of Toxic Substances Control
ESL	Environmental Screening Level (RWQCB 2005)
J	Estimated value
µg/m3	Micrograms per cubic meter

TABLE 9: BUILDING 163A STATISTICAL SUMMARY OF SOIL GAS ANALYSES

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
1,1,1-TRICHLOROETHANE	3	3	100	19	12	32	0	0	--	--	NA	--	--	NA
1,1,2,2-TETRACHLOROETHANE	3	0	0	--	--	--	6	12	0	0	140	--	--	NA
1,1,2-TRICHLOROETHANE	3	0	0	--	--	--	5	10	0	0	510	--	--	NA
1,1-DICHLOROETHANE	3	3	100	28	9.5	52	0	0	0	0	5,100	--	--	NA
1,1-DICHLOROETHENE	3	0	0	--	--	--	5	10	0	0	120,000	--	--	NA
1,2,4-TRICHLOROBENZENE	3	0	0	--	--	--	20	40	0	0	2,000	--	--	NA
1,2,4-TRIMETHYLBENZENE	3	2	67	7	6.9 J	7.1 J	10	10	--	--	NA	--	--	NA
1,2-DICHLOROBENZENE	3	0	0	--	--	--	10	20	0	0	120,000	--	--	NA
1,2-DICHLOROETHANE	3	0	0	--	--	--	5	10	0	0	390	0	0	167
1,2-DICHLOROPROPANE	3	0	0	--	--	--	5	10	0	0	790	--	--	NA
1,3,5-TRIMETHYLBENZENE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
1,3-BUTADIENE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
1,3-DICHLOROBENZENE	3	0	0	--	--	--	10	20	0	0	61,000	--	--	NA
1,4-DICHLOROBENZENE	3	0	0	--	--	--	10	20	0	0	720	--	--	NA
1,4-DIOXANE	3	0	0	--	--	--	5.5	11	--	--	NA	--	--	NA
2,2,4-TRIMETHYLPENTANE	3	2	67	19	17	21	5	5	--	--	NA	--	--	NA
2-BUTANONE	3	3	100	40	17	84	0	0	0	0	590,000	--	--	NA
2-HEXANONE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
3-CHLOROPROPENE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
4-ETHYL TOLUENE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
4-METHYL-2-PENTANONE	3	3	100	52	18	110	0	0	--	--	NA	--	--	NA
ACETONE	3	3	100	82	51	130	0	0	0	0	1,800,000	--	--	NA
BENZENE	3	0	0	--	--	--	5	10	0	0	290	0	0	122
BENZYL CHLORIDE	3	0	0	--	--	--	10	20	--	--	NA	--	--	NA
BROMODICHLOROMETHANE	3	0	0	--	--	--	5	10	0	0	220	--	--	NA
BROMOFORM	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
BROMOMETHANE	3	0	0	--	--	--	5	10	0	0	2,900	--	--	NA
CARBON DISULFIDE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
CARBON TETRACHLORIDE	3	0	0	--	--	--	5.5	11	0	0	190	0	0	84.6
CHLOROBENZENE	3	0	0	--	--	--	5	10	0	0	35,000	--	--	NA
CHLOROETHANE	3	0	0	--	--	--	5	10	0	0	9,900	--	--	NA
CHLOROFORM	3	2	67	10	6.8	14	5	5	0	0	1,500	--	--	NA
CHLOROMETHANE	3	0	0	--	--	--	5	10	0	0	1,100	--	--	NA
CIS-1,2-DICHLOROETHENE	3	3	100	2,100	110	5,800	0	0	0	0	20,000	0	0	44,400
CIS-1,3-DICHLOROPROPENE	3	0	0	--	--	--	5	10	0	0	520	--	--	NA
CYCLOHEXANE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
DIBROMOCHLOROMETHANE	3	0	0	--	--	--	6.5	13	0	0	300	--	--	NA
DICHLORODIFLUOROMETHANE	3	0	0	--	--	--	5.5	11	--	--	NA	--	--	NA
DICHLOROTETRAFLUOROETHANE	3	0	0	--	--	--	5.5	11	--	--	NA	--	--	NA
ETHYL ACETATE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
ETHYLBENZENE	3	0	0	--	--	--	5	10	0	0	1,200,000	--	--	NA
ETHYLENE DIBROMIDE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
HEPTANE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
HEXACHLOROBUTADIENE	3	0	0	--	--	--	11	22	--	--	NA	--	--	NA
HEXANE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
M,P-XYLENE	3	2	67	7	7.2	7.6	10	10	0	0	410,000	0	0	887,000
METHYL-T-BUTYL ETHER	3	0	0	--	--	--	5	10	0	0	31,000	0	0	13,400
METHYLENE CHLORIDE	3	0	0	--	--	--	5	10	0	0	8,200	--	--	NA

TABLE 9: BUILDING 163A STATISTICAL SUMMARY OF SOIL GAS ANALYSES (Continued)

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
O-XYLENE	3	2	67	6	5.4	5.6	10	10	0	0	410,000	0	0	877,000
PROPYLENE	3	0	0	--	--	--	10	20	--	--	NA	--	--	NA
STYRENE	3	0	0	--	--	--	5	10	0	0	590,000	--	--	NA
TETRACHLOROETHENE	3	0	0	--	--	--	5	10	0	0	1,400	0	0	603
TETRAHYDROFURAN	3	3	100	65	16	160	0	0	--	--	NA	--	--	NA
TOLUENE	3	3	100	16	9.1	21	0	0	0	0	180,000	0	0	378,000
TRANS-1,2-DICHLOROETHENE	3	3	100	110	18	260	0	0	0	0	41,000	0	0	88,700
TRANS-1,3-DICHLOROPROPENE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
TRICHLOROETHENE	3	3	100	4,300	940	9,600	0	0	1	0	4,100	2	0	1,770
TRICHLOROFLUOROMETHANE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
TRICHLOROTRIFLUOROETHANE	3	2	67	20	14	26	12	12	--	--	NA	--	--	NA
VINYL ACETATE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
VINYL BROMIDE	3	0	0	--	--	--	5	10	--	--	NA	--	--	NA
VINYL CHLORIDE	3	0	0	--	--	--	5	10	0	0	110	0	0	44.8

Notes:

Bold denotes values exceeding the screening level (CHHSL or ESL) or reported as non-detect but the reporting limit exceeded the screening criteria.

--	Not detected
CHHSL	California Human Health Screening Level (DTSC 2005a)
DTSC	Department of Toxic Substances Control
ESL	Environmental Screening Level (RWQCB 2005)
J	Estimated value
µg/m3	Micrograms per cubic meter

TABLE 10: BUILDING 398 STATISTICAL SUMMARY OF SOIL GAS ANALYSES

Technical Memorandum, Subslab Soil Gas Investigation
Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
1,1,1-TRICHLOROETHANE	6	4	67	47	32	71	25	100	--	--	NA	--	--	NA
1,1,2,2-TETRACHLOROETHANE	6	0	0	--	--	--	12	120	0	0	140	--	--	NA
1,1,2-TRICHLOROETHANE	6	0	0	--	--	--	10	100	0	0	510	--	--	NA
1,1-DICHLOROETHANE	6	0	0	--	--	--	10	100	0	0	5,100	--	--	NA
1,1-DICHLOROETHENE	6	0	0	--	--	--	10	100	0	0	120,000	--	--	NA
1,2,4-TRICHLOROBENZENE	6	0	0	--	--	--	40	400	0	0	2,000	--	--	NA
1,2,4-TRIMETHYLBENZENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
1,2-DICHLOROBENZENE	6	0	0	--	--	--	20	200	0	0	120,000	--	--	NA
1,2-DICHLOROETHANE	6	0	0	--	--	--	10	100	0	0	390	0	0	167
1,2-DICHLOROPROPANE	6	1	17	190	190	190	10	50	0	0	790	--	--	NA
1,3,5-TRIMETHYLBENZENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
1,3-BUTADIENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
1,3-DICHLOROBENZENE	6	0	0	--	--	--	20	200	0	0	61,000	--	--	NA
1,4-DICHLOROBENZENE	6	0	0	--	--	--	20	200	0	0	720	--	--	NA
1,4-DIOXANE	6	0	0	--	--	--	11	110	--	--	NA	--	--	NA
2,2,4-TRIMETHYLPENTANE	6	1	17	630	630	630	10	50	--	--	NA	--	--	NA
2-BUTANONE	6	5	83	110	66	140	100	100	0	0	590,000	--	--	NA
2-HEXANONE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
3-CHLOROPROPENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
4-ETHYL TOLUENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
4-METHYL-2-PENTANONE	6	5	83	71	42	97	100	100	--	--	NA	--	--	NA
ACETONE	6	2	33	110	89	130	100	400	0	0	1,800,000	--	--	NA
BENZENE	6	1	17	100	100	100	10	50	0	0	290	0	0	122
BENZYL CHLORIDE	6	0	0	--	--	--	20	200	--	--	NA	--	--	NA
BROMODICHLOROMETHANE	6	0	0	--	--	--	10	100	0	0	220	--	--	NA
BROMOFORM	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
BROMOMETHANE	6	0	0	--	--	--	10	100	0	0	2,900	--	--	NA
CARBON DISULFIDE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
CARBON TETRACHLORIDE	6	0	0	--	--	--	11	110	0	0	190	0	1	84.6
CHLOROBENZENE	6	0	0	--	--	--	10	100	0	0	35,000	--	--	NA
CHLOROETHANE	6	0	0	--	--	--	10	100	0	0	9,900	--	--	NA
CHLOROFORM	6	1	17	27	27	27	10	100	0	0	1,500	--	--	NA
CHLOROMETHANE	6	0	0	--	--	--	10	100	0	0	1,100	--	--	NA
CIS-1,2-DICHLOROETHENE	6	0	0	--	--	--	10	100	0	0	20,000	0	0	44,400
CIS-1,3-DICHLOROPROPENE	6	0	0	--	--	--	10	100	0	0	520	--	--	NA
CYCLOHEXANE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
DIBROMOCHLOROMETHANE	6	0	0	--	--	--	13	130	0	0	300	--	--	NA
DICHLORODIFLUOROMETHANE	6	0	0	--	--	--	11	110	--	--	NA	--	--	NA
DICHLOROTETRAFLUOROETHANE	6	0	0	--	--	--	11	110	--	--	NA	--	--	NA
ETHYL ACETATE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
ETHYLBENZENE	6	1	17	14	14	14	25	100	0	0	1,200,000	--	--	NA
ETHYLENE DIBROMIDE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
HEPTANE	6	1	17	130	130	130	10	50	--	--	NA	--	--	NA
HEXACHLOROBUTADIENE	6	0	0	--	--	--	22	220	--	--	NA	--	--	NA
HEXANE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
M,P-XYLENE	6	1	17	13	13	13	25	100	0	0	410,000	0	0	887,000
METHYL-T-BUTYL ETHER	6	0	0	--	--	--	10	100	0	0	31,000	0	0	13,400
METHYLENE CHLORIDE	6	0	0	--	--	--	10	100	0	0	8,200	--	--	NA

TABLE 10: BUILDING 398 STATISTICAL SUMMARY OF SOIL GAS ANALYSES (Continued)

Technical Memorandum, Subslab Soil Gas Investigation

Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over ESL	Number of Non-detects Over ESL	ESL	Number of Detections Over CHHSL	Number of Non-detects Over CHHSL	CHHSL
EPA TO-15 (UG/M3)														
O-XYLENE	6	0	0	--	--	--	10	100	0	0	410,000	0	0	877,000
PROPYLENE	6	0	0	--	--	--	20	200	--	--	NA	--	--	NA
STYRENE	6	1	17	16	16	16	25	100	0	0	590,000	--	--	NA
TETRACHLOROETHENE	6	2	33	57	38	76	25	100	0	0	1,400	0	0	603
TETRAHYDROFURAN	6	5	83	240	150	310	100	100	--	--	NA	--	--	NA
TOLUENE	6	1	17	13	13	13	25	100	0	0	180,000	0	0	378,000
TRANS-1,2-DICHLOROETHENE	6	0	0	--	--	--	10	100	0	0	41,000	0	0	88,700
TRANS-1,3-DICHLOROPROPENE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
TRICHLOROETHENE	6	2	33	770	230	1,300	25	100	0	0	4,100	0	0	1,770
TRICHLOROFLUOROMETHANE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
TRICHLOROTRIFLUOROETHANE	6	1	17	16	16	16	30	120	--	--	NA	--	--	NA
VINYL ACETATE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
VINYL BROMIDE	6	0	0	--	--	--	10	100	--	--	NA	--	--	NA
VINYL CHLORIDE	6	0	0	--	--	--	10	**100**	0	0	110	0	2	44.8

Notes:

Bold denotes values exceeding the screening level (CHHSL or ESL) or reported as non-detect but the reporting limit exceeded the screening criteria.

-- Not detected

CHHSL California Human Health Screening Level (DTSC 2005a)

DTSC Department of Toxic Substances Control

ESL Environmental Screening Level (RWQCB 2005)

µg/m3 Micrograms per cubic meter

TABLE 11: SUMMARY OF SOIL GAS SCREENING VALUES

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398
Alameda Point, Alameda, California

COPC	Soil Gas Screening Value (µg/m³)			
	CHSSL (1)	ESL (2)	EPA VI (3)	Value Used (4)
1,1,1-Trichloroethane	2.79E+06	1.29E+06	2.20E+04	1.29E+06
1,1-Dichlorethane	--	5.02E+03	5.00E+03	5.02E+03
1,2,4-Trimethylbenzene	--	--	6.00E+01	6.00E+01
1,2-Dichloropropane	--	7.95E+02	4.00E+01	7.95E+02
1,3,5-Trimethylbenzene	--	--	6.00E+01	6.00E+01
2,2,4-Trimethylpentane	--	--	--	--
2-Butanone	--	5.93E+05	1.00E+04	5.93E+05
4-Ethyl Toluene	3.78E+05	1.75E+05	4.00E+03	1.75E+05
4-Methyl-2-pentanone	--	4.70E+04	8.00E+02	4.70E+04
Acetone	--	1.84E+06	3.50E+03	1.84E+06
Benzene	1.22E+02	2.86E+02	3.10E+00	1.22E+02
Chloroform	--	1.51E+03	1.10E+00	1.51E+03
cis-1,2-Dichloroethene	4.44E+04	2.04E+04	3.50E+02	2.04E+04
Cyclohexane	--	--	--	--
Ethylbenzene	--	1.17E+06	2.20E+01	1.17E+06
Heptane	--	--	--	--
Hexane	--	--	2.00E+03	2.00E+03
Isopropyl Alcohol	--	--	--	--
m,p-Xylene	8.87E+05	4.09E+05	7.00E+04	4.09E+05
Methylene chloride	--	8.18E+03	5.20E+01	8.18E+03
o-Xylene	8.79E+05	4.09E+05	7.00E+04	4.09E+05
Propylene	--	4.09E+05	--	4.09E+05
Styrene	--	5.93E+05	1.00E+04	5.93E+05
Tetrachloroethene	6.03E+02	1.36E+03	8.10E+00	6.03E+02
Tetrahydrofuran	--	--	--	--
Toluene	3.78E+05	1.75E+05	4.00E+03	1.75E+05
trans-1,2-Dichloroethene	8.87E+04	4.09E+04	7.00E+02	4.09E+04
Trichloroethene	1.77E+03	4.09E+03	2.20E-01	1.77E+03
Trichlorofluoromethane	--	--	7.00E+03	7.00E+03
Trichlorotrifluoroethane	--	--	3.00E+05	3.00E+05

TABLE 11: SUMMARY OF SOIL GAS SCREENING VALUES (Continued)

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398
Alameda Point, Alameda, California

Notes:

(1) Screening concentrations obtained from Table 2 of DTSC 2005 for commercial/industrial land use.

(2) Screening concentrations obtained from Table E of RWQCB 2005 for commercial/industrial land use.

(3) Screening concentrations obtained from Table 2c of EPA 2002.

(4) The screening concentration used in the indoor air evaluation is the lower of the CHSSL and ESL value. If a value is not available from either of these sources, the EPA VI value was used.

$\mu g/m^3$	Microgram per cubic meter
CHSSL	California Human Health Screening Level
EPA	U.S. Environmental Protection Agency
ESL	Environmental Screening Level
VI	Vapor Intrusion

References:

California Environmental Protection Agency Department of Toxic Substances Control (DTSC). 2005. "Use of California Health Screening Levels (CHSSLs) in Evaluation of Contaminated Properties." January.

California Regional Water Quality Control Board (RWQCB). 2005. "Screening for Environmental Concerns At Sites With Contaminated Soil and Groundwater." San Francisco Bay Region. Interim Final. February.

U.S. Environmental Protection Agency (EPA). 2002. "Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)." Draft Federal Register. November 29. On-Line Address: http://www.epa.gov/correctiveaction/eis/vapor.htm

TAB[illegible]: EXPOSURE POINT CONCENTRATION SUMMARY, BUILDING 14

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398, Alameda Point, Alameda, California

Scenario Timeframe:	Current
Medium:	Soil Gas
Exposure Medium:	Soil Gas

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) [a]		Maximum Concentration (Qualifier)		Exposure Point Concentration	
								Value	Statistic [b]
Soil Gas	1,2,4-Trimethylbenzene	µg/m^3	9.08E+01	2.48E+02	NP	7.90E+02	J	2.48E+02	(2)
	1,3,5-Trimethylbenzene	µg/m^3	1.50E+01	6.64E+01	NP	1.20E+02		6.64E+01	(3)
	2,2,4-Trimethylpentane	µg/m^3	7.37E+01	1.27E+02	NP	2.70E+02		1.27E+02	(2)
	2-Butanone	µg/m^3	9.17E+01	1.40E+02	N	2.60E+02		1.40E+02	(1)
	4-Ethyl Toluene	µg/m^3	8.66E+01	4.37E+02	NP	8.10E+02	J	4.37E+02	(3)
	4-Methyl-2-pentanone	µg/m^3	1.26E+02	1.72E+02	N	2.40E+02		1.72E+02	(1)
	Acetone	µg/m^3	3.08E+02	5.89E+02	G	1.10E+03		5.89E+02	(1)
	Benzene	µg/m^3	1.20E+01	4.01E+01	NP	1.90E+01		1.90E+01	(4)
	Chloroform	µg/m^3	1.28E+01	4.02E+01	NP	1.40E+01		1.40E+01	(4)
	Cyclohexane	µg/m^3	3.10E+01	1.10E+02	NP	1.80E+02		1.10E+02	(3)
	Ethylbenzene	µg/m^3	3.04E+01	6.31E+01	NP	1.20E+02		6.31E+01	(2)
	Heptane	µg/m^3	2.90E+01	9.13E+01	NP	1.20E+02		9.13E+01	(3)
	Hexane	µg/m^3	1.48E+01	4.54E+01	NP	4.40E+01		4.40E+01	(4)
	Isopropyl Alcohol	µg/m^3	2.33E+04	3.23E+04	NP	5.50E+04		3.23E+04	(2)
	Methylene chloride	µg/m^3	1.04E+01	4.76E+01	NP	8.70E+01		4.76E+01	(3)
	Propylene	µg/m^3	2.50E+01	8.27E+01	NP	5.30E+01		5.30E+01	(4)
	Tetrachloroethene	µg/m^3	9.53E+01	4.22E+02	NP	7.60E+02		4.22E+02	(3)
	Tetrahydrofuran	µg/m^3	1.49E+02	2.33E+02	N	4.90E+02		2.33E+02	(1)
	Toluene	µg/m^3	3.74E+01	5.69E+01	NP	1.10E+02		5.69E+01	(2)
	Trichloroethene	µg/m^3	5.61E+01	1.81E+02	NP	3.00E+02		1.81E+02	(3)
	Trichlorofluoromethane	µg/m^3	1.08E+01	4.00E+01	NP	8.40E+00		8.40E+00	(4)
	Trichlorotrifluoroethane	µg/m^3	3.59E+01	6.55E+01	NP	1.40E+02		6.55E+01	(2)
	m,p-Xylene	µg/m^3	5.61E+01	1.20E+02	NP	2.70E+02		1.20E+02	(2)
	o-Xylene	µg/m^3	6.10E+01	1.36E+02	NP	3.60E+02		1.36E+02	(2)

Notes: See the text for a detailed description of the statistical methods used.

a — Tested for all chemicals with at least 5 samples and detection frequencies greater than or equal to 85 percent using the Shapiro-Wilk W test (a 5 percent level of significance was used for all tests). All other chemical distributions were treated as nonparametric in calculations of the mean, UCL, and EPC.
Distribution Codes: G= gamma, L= lognormal, N= normal, NP= nonparametric

b — Methods used to calculate summary statistics were based on the relative sample size and DF.
Statistics Codes are defined as follows:
The EPC is the lesser of the UCL and the maximum detected concentration
(1) DF greater than or equal to 85 percent: methods followed recommendations in EPA's ProUCL software package (EPA 2004)
(2) DF greater than or equal to 50 percent and less than 85 percent: flipped Kaplan-Meier method was used following Helsel (2005)
(3) DF greater than or equal to 20 percent and less than 50 percent: regression on order statistics (ROS) method used following Helsel (2005).
For cases where the maximum concentration was a censored value or fewer than four measurements were detected, method (4) was used.
(4) Detection frequencies less than 20 percent: Monte Carlo methods were used following the "Bounding" approach described in EPA (2002).
(5) For sample sizes less than 4, the maximum detected concentration was used as the EPC. No results are reported for the mean or UCL.

COPC	Chemical of potential concern
DF	Detection frequency
EPC	Exposure point concentration
J	Estimated value
N/A	Not applicable, no result reported because the sample size was less than 4.
UCL	One-sided upper confidence limit of the mean. Following EPA (2004), this can be either a 95, 97.5, or 99 percent UCL.

References

Helsel, D. 2005. *Nondetects and Data Analysis: Statistics for Censored Environmental Data*. John Wiley & Sons, Inc., New York, NY. 250 p.

U.S. Environmental Protection Agency (EPA). 2002. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2004b. "ProUCL Version 3.0 User Guide." Prepared by Singh, A., Singh, A.K. and R.W. Maichle for the U.S. Environmental Protection Agency, Technical Support Center, Las Vegas, NV. April

TABLE 13: EXPOSURE POINT CONCENTRATION SUMMARY, BUILDING 113

Technical Memorandum, *Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398*, Alameda Point, Alameda, California

Scenario Timeframe:	Current
Medium:	Soil Gas
Exposure Medium:	Soil Gas

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) [a]		Maximum Concentration (Qualifier)		Exposure Point Concentration	
								Value	Statistic [b]
Soil Gas	1,2,4-Trimethylbenzene	µg/m³	N/A	N/A	N/A	1.20E+01	J	1.20E+01	(5)
	2,2,4-Trimethylpentane	µg/m³	N/A	N/A	N/A	3.80E+02		3.80E+02	(5)
	2-Butanone	µg/m³	N/A	N/A	N/A	1.20E+02		1.20E+02	(5)
	4-Ethyl Toluene	µg/m³	N/A	N/A	N/A	7.90E+00		7.90E+00	(5)
	4-Methyl-2-pentanone	µg/m³	N/A	N/A	N/A	8.10E+01		8.10E+01	(5)
	Acetone	µg/m³	N/A	N/A	N/A	3.50E+01		3.50E+01	(5)
	Benzene	µg/m³	N/A	N/A	N/A	1.40E+02		1.40E+02	(5)
	Ethylbenzene	µg/m³	N/A	N/A	N/A	8.80E+00		8.80E+00	(5)
	Heptane	µg/m³	N/A	N/A	N/A	1.70E+02		1.70E+02	(5)
	Isopropyl Alcohol	µg/m³	N/A	N/A	N/A	1.00E+05		1.00E+05	(5)
	Tetrahydrofuran	µg/m³	N/A	N/A	N/A	2.80E+02		2.80E+02	(5)
	Toluene	µg/m³	N/A	N/A	N/A	9.10E+00		9.10E+00	(5)
	Trichloroethene	µg/m³	N/A	N/A	N/A	1.10E+03		1.10E+03	(5)
	m,p-Xylene	µg/m³	N/A	N/A	N/A	5.40E+00		5.40E+00	(5)
	o-Xylene	µg/m³	N/A	N/A	N/A	5.20E+00		5.20E+00	(5)

Notes: See the text for a detailed description of the statistical methods used.

a Tested for all chemicals with at least 5 samples and detection frequencies greater than or equal to 85 percent using the Shapiro-Wilk W test (a 5 percent level of significance was used for all tests). All other chemical distributions were treated as nonparametric in calculations of the mean, UCL, and EPC.
Distribution Codes: G= gamma, L= lognormal, N= normal, NP= nonparametric

b Methods used to calculate summary statistics were based on the relative sample size and DF.
Statistics Codes are defined as follows:
The EPC is the lesser of the UCL and the maximum detected concentration
(1) DF greater than or equal to 85 percent: methods followed recommendations in EPA's ProUCL software package (EPA 2004)
(2) DF greater than or equal to 50 percent and less than 85 percent: flipped Kaplan-Meier method was used following Helsel (2005)
(3) DF greater than or equal to 20 percent and less than 50 percent: regression on order statistics (ROS) method used following Helsel (2005). For cases where the maximum concentration was a censored value or fewer than four measurements were detected, method (4) was used.
(4) Detection frequencies less than 20 percent: Monte Carlo methods were used following the "Bounding" approach described in EPA (2002).
(5) For sample sizes less than 4, the maximum detected concentration was used as the EPC. No results are reported for the mean or UCL.

µg/m³	Microgram per cubic meter
COPC	Chemical of potential concern
DF	Detection frequency
EPC	Exposure point concentration
J	Estimated value
N/A	Not applicable, no result reported because the sample size was less than 4.
UCL	One-sided upper confidence limit of the mean. Following EPA (2004), this can be either a 95, 97.5, or 99 percent UCL.

References

Helsel, D. 2005. *Nondetects and Data Analysis: Statistics for Censored Environmental Data*. John Wiley & Sons, Inc., New York, NY. 250 p.

U.S. Environmental Protection Agency (EPA). 2002. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2004b. "ProUCL Version 3.0 User Guide." Prepared by Singh, A., Singh, A.K. and R.W. Maichle for the U.S. Environmental Protection Agency, Technical Support Center, Las Vegas, NV. April

TABLE ,4: EXPOSURE POINT CONCENTRATION SUMMARY, BUILDING 162

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398, Alameda Point, Alameda, California

Scenario Timeframe:	Current
Medium:	Soil Gas
Exposure Medium:	Soil Gas

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution)[a]		Maximum Concentration (Qualifier)		Exposure Point Concentration	
								Value	Statistic[b]
Soil Gas	1,1,1-Trichloroethane	µg/m³	2.57E+01	4.97E+01	NP	5.80E+01		4.97E+01	(4)
	1,2,4-Trimethylbenzene	µg/m³	2.05E+01	4.43E+01	NP	5.00E+01	J	4.43E+01	(4)
	2,2,4-Trimethylpentane	µg/m³	3.45E+01	1.18E+02	NP	4.00E+02		1.18E+02	(3)
	2-Butanone	µg/m³	5.76E+01	6.69E+01	NP	1.30E+02		6.69E+01	(2)
	4-Methyl-2-pentanone	µg/m³	1.11E+02	1.29E+02	N	1.90E+02		1.29E+02	(1)
	Acetone	µg/m³	4.72E+02	2.22E+03	NP	8.50E+03		2.22E+03	(3)
	Benzene	µg/m³	2.34E+01	5.54E+01	NP	1.40E+02		5.54E+01	(4)
	Chloroform	µg/m³	2.55E+01	5.41E+01	NP	9.90E+01		5.41E+01	(4)
	Cyclohexane	µg/m³	7.98E+01	3.50E+02	NP	1.30E+03		3.50E+02	(4)
	Ethylbenzene	µg/m³	2.26E+01	5.12E+01	NP	9.80E+01		5.12E+01	(4)
	Heptane	µg/m³	3.29E+02	1.66E+03	NP	6.40E+03		1.66E+03	(4)
	Hexane	µg/m³	2.14E+01	4.72E+01	NP	7.30E+01		4.72E+01	(4)
	Isopropyl Alcohol	µg/m³	2.66E+04	3.10E+04	NP	4.60E+04		3.10E+04	(2)
	Tetrachloroethene	µg/m³	3.18E+01	6.44E+01	NP	1.50E+02		6.44E+01	(3)
	Tetrahydrofuran	µg/m³	1.16E+02	1.38E+02	NP	2.80E+02		1.38E+02	(2)
	Toluene	µg/m³	4.05E+01	1.35E+02	NP	4.50E+02		1.35E+02	(4)
	Trichloroethene	µg/m³	3.08E+03	5.54E+03	G	1.20E+04		5.54E+03	(1)
	Trichlorofluoromethane	µg/m³	2.87E+01	6.20E+01	NP	1.10E+02		6.20E+01	(4)
	Trichlorotrifluoroethane	µg/m³	1.24E+02	2.01E+02	NP	7.90E+02		2.01E+02	(2)
	cis-1,2-Dichloroethene	µg/m³	2.08E+01	4.35E+01	NP	3.40E+01		3.40E+01	(4)
	m,p-Xylene	µg/m³	2.48E+01	5.97E+01	NP	1.40E+02		5.97E+01	(4)
	o-Xylene	µg/m³	2.19E+01	4.82E+01	NP	8.20E+01		4.82E+01	(4)

Notes: See the text for a detailed description of the statistical methods used.

a — Tested for all chemicals with at least 5 samples and detection frequencies greater than or equal to 85 percent using the Shapiro-Wilk W test (a 5 percent level of significance was used for all tests). All other chemical distributions were treated as nonparametric in calculations of the mean, UCL, and EPC.
Distribution Codes: G= gamma, L= lognormal, N= normal, NP= nonparametric

b — Methods used to calculate summary statistics were based on the relative sample size and DF.
Statistics Codes are defined as follows:
The EPC is the lesser of the UCL and the maximum detected concentration
(1) DF greater than or equal to 85 percent: methods followed recommendations in EPA's ProUCL software package (EPA 2004)
(2) DF greater than or equal to 50 percent and less than 85 percent: flipped Kaplan-Meier method was used following Helsel (2005)
(3) DF greater than or equal to 20 percent and less than 50 percent: regression on order statistics (ROS) method used following Helsel (2005). For cases where the maximum concentration was a censored value or fewer than four measurements were detected, method (4) was used.
(4) Detection frequencies less than 20 percent: Monte Carlo methods were used following the "Bounding" approach described in EPA (2002).
(5) *For sample sizes less than 4, the maximum detected concentration was used as the EPC.* No results are reported for the mean or UCL.

µg/m³	Microgram per cubic meter
COPC	Chemical of potential concern
DF	Detection frequency
EPC	Exposure point concentration
J	Estimated value
N/A	Not applicable, no result reported because the sample size was less than 4.
UCL	One-sided upper confidence limit of the mean. *Following EPA (2004), this can be either a 95, 97.5, or 99 percent UCL.*

References

Helsel, D. 2005. *Nondetects and Data Analysis: Statistics for Censored Environmental Data*. John Wiley & Sons, Inc., New York, NY. 250 p.

U.S. Environmental Protection Agency (EPA). 2002. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2004b. "ProUCL Version 3.0 User Guide." Prepared by Singh, A., Singh, A.K. and R.W. Maichle for the U.S. Environmental Protection Agency, Technical Support Center, Las Vegas, NV. April

TABLE 15: EXPOSURE POINT CONCENTRATION SUMMARY, BUILDING 163A

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398, Alameda Point, Alameda, California

Scenario Timeframe:	Current
Medium:	Soil Gas
Exposure Medium:	Soil Gas

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) [a]		Maximum Concentration (Qualifier)		Exposure Point Concentration	
								Value	Statistic [b]
Soil Gas	1,1,1-Trichloroethane	μg/m³	N/A	N/A	N/A	3.20E+01		3.20E+01	(5)
	1,1-Dichlorethane	μg/m³	N/A	N/A	N/A	5.20E+01		5.20E+01	(5)
	1,2,4-Trimethylbenzene	μg/m³	N/A	N/A	N/A	7.10E+00	J	7.10E+00	(5)
	2,2,4-Trimethylpentane	μg/m³	N/A	N/A	N/A	2.10E+01		2.10E+01	(5)
	2-Butanone	μg/m³	N/A	N/A	N/A	8.40E+01		8.40E+01	(5)
	4-Methyl-2-pentanone	μg/m³	N/A	N/A	N/A	1.10E+02		1.10E+02	(5)
	Acetone	μg/m³	N/A	N/A	N/A	1.30E+02		1.30E+02	(5)
	Chloroform	μg/m³	N/A	N/A	N/A	1.40E+01		1.40E+01	(5)
	Isopropyl Alcohol	μg/m³	N/A	N/A	N/A	1.40E+04		1.40E+04	(5)
	Tetrahydrofuran	μg/m³	N/A	N/A	N/A	1.60E+02		1.60E+02	(5)
	Toluene	μg/m³	N/A	N/A	N/A	2.10E+01		2.10E+01	(5)
	Trichloroethene	μg/m³	N/A	N/A	N/A	9.60E+03		9.60E+03	(5)
	Trichlorotrifluoroethane	μg/m³	N/A	N/A	N/A	2.60E+01		2.60E+01	(5)
	cis-1,2-Dichloroethene	μg/m³	N/A	N/A	N/A	5.80E+03		5.80E+03	(5)
	m,p-Xylene	μg/m³	N/A	N/A	N/A	7.20E+00		7.20E+00	(5)
	o-Xylene	μg/m³	N/A	N/A	N/A	5.60E+00		5.60E+00	(5)
	trans-1,2-Dichloroethene	μg/m³	N/A	N/A	N/A	2.60E+02		2.60E+02	(5)

Notes: See the text for a detailed description of the statistical methods used.

a Tested for all chemicals with at least 5 samples and detection frequencies greater than or equal to 85 percent using the Shapiro-Wilk W test (a 5 percent level of significance was used for all tests). All other chemical distributions were treated as nonparametric in calculations of the mean, UCL, and EPC.
Distribution Codes: G= gamma, L= lognormal, N= normal, NP= nonparametric

b *Methods used to calculate summary statistics were based on the relative sample size and DF.*
Statistics Codes are defined as follows:
The EPC is the lesser of the UCL and the maximum detected concentration
(1) DF greater than or equal to 85 percent: methods followed recommendations in EPA's ProUCL software package (EPA 2004)
(2) DF greater than or equal to 50 percent and less than 85 percent: flipped Kaplan-Meier method was used following Helsel (2005)
(3) DF greater than or equal to 20 percent and less than 50 percent: regression on order statistics (ROS) method used following Helsel (2005).
For cases where the maximum concentration was a censored value or fewer than four measurements were detected, method (4) was used.
(4) Detection frequencies less than 20 percent: Monte Carlo methods were used following the "Bounding" approach described in EPA (2002).
(5) For sample sizes less than 4, the maximum detected concentration was used as the EPC. No results are reported for the mean or UCL.

μg/m³	Microgram per cubic meter
COPC	Chemical of potential concern
DF	Detection frequency
EPC	Exposure point concentration
J	Estimated value
N/A	Not applicable, no result reported because the sample size was less than 4.
UCL	One-sided upper confidence limit of the mean. Following EPA (2004), this can be either a 95, 97.5, or 99 percent UCL.

References

Helsel, D. 2005. *Nondetects and Data Analysis: Statistics for Censored Environmental Data*. John Wiley & Sons, Inc., New York, NY. 250 p.

U.S. Environmental Protection Agency (EPA). 2002. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2004b. "ProUCL Version 3.0 User Guide." Prepared by Singh, A., Singh, A.K. and R.W. Maichle for the U.S. Environmental Protection Agency, Technical Support Center, Las Vegas, NV. April

TABLE 16: EXPOSURE POINT CONCENTRATION SUMMARY, BUILDING 398

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398, Alameda Point, Alameda, California

Scenario Timeframe:	Current
Medium:	Soil Gas
Exposure Medium:	Soil Gas

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) [a]		Maximum Concentration (Qualifier)	Exposure Point Concentration	
							Value	Statistic [b]
Soil Gas	1,1,1-Trichloroethane	µg/m³	4.42E+01	5.50E+01	NP	7.10E+01	5.50E+01	(2)
	1,2-Dichloropropane	µg/m³	4.25E+01	1.75E+02	NP	1.90E+02	1.75E+02	(4)
	2,2,4-Trimethylpentane	µg/m³	1.16E+02	5.66E+02	NP	6.30E+02	5.66E+02	(4)
	2-Butanone	µg/m³	1.01E+02	1.27E+02	NP	1.40E+02	1.27E+02	(2)
	4-Methyl-2-pentanone	µg/m³	7.06E+01	8.37E+01	NP	9.70E+01	8.37E+01	(2)
	Acetone	µg/m³	1.04E+02	3.63E+02	NP	1.30E+02	1.30E+02	(4)
	Benzene	µg/m³	2.83E+01	9.76E+01	NP	1.00E+02	9.76E+01	(4)
	Chloroform	µg/m³	2.22E+01	9.02E+01	NP	2.70E+01	2.70E+01	(4)
	Ethylbenzene	µg/m³	2.09E+01	8.87E+01	NP	1.40E+01	1.40E+01	(4)
	Heptane	µg/m³	3.28E+01	1.23E+02	NP	1.30E+02	1.23E+02	(4)
	Isopropyl Alcohol	µg/m³	2.73E+04	3.60E+04	N	4.20E+04	3.60E+04	(1)
	Styrene	µg/m³	2.13E+01	8.86E+01	NP	1.60E+01	1.60E+01	(4)
	Tetrachloroethene	µg/m³	3.54E+01	1.06E+02	NP	7.60E+01	7.60E+01	(4)
	Tetrahydrofuran	µg/m³	2.27E+02	2.93E+02	NP	3.10E+02	2.93E+02	(2)
	Toluene	µg/m³	2.13E+01	8.77E+01	NP	1.30E+01	1.30E+01	(4)
	Trichloroethene	µg/m³	2.59E+02	1.18E+03	NP	1.30E+03	1.18E+03	(3)
	Trichlorotrifluoroethane	µg/m³	2.51E+01	1.07E+02	NP	1.60E+01	1.60E+01	(4)
	m,p-Xylene	µg/m³	2.10E+01	8.89E+01	NP	1.30E+01	1.30E+01	(4)

Notes: See the text for a detailed description of the statistical methods used.

a Tested for all chemicals with at least 5 samples and detection frequencies greater than or equal to 85 percent using the Shapiro-Wilk W test (a 5 percent level of significance was used for all tests). All other chemical distributions were treated as nonparametric in calculations of the mean, UCL, and EPC.
Distribution Codes: G= gamma, L= lognormal, N= normal, NP= nonparametric

b Methods used to calculate summary statistics were based on the relative sample size and DF.
Statistics Codes are defined as follows:
The EPC is the lesser of the UCL and the maximum detected concentration
(1) DF greater than or equal to 85 percent: methods followed recommendations in EPA's ProUCL software package (EPA 2004)
(2) DF greater than or equal to 50 percent and less than 85 percent: flipped Kaplan-Meier method was used following Helsel (2005)
(3) DF greater than or equal to 20 percent and less than 50 percent: regression on order statistics (ROS) method used following Helsel (2005). For cases where the maximum concentration was a censored value or fewer than four measurements were detected, method (4) was used.
(4) Detection frequencies less than 20 percent: Monte Carlo methods were used following the "Bounding" approach described in EPA (2002).
(5) For sample sizes less than 4, the maximum detected concentration was used as the EPC. No results are reported for the mean or UCL.

µg/m³	Microgram per cubic meter
COPC	Chemical of potential concern
DF	Detection frequency
EPC	Exposure point concentration
J	Estimated value
N/A	Not applicable, no result reported because the sample size was less than 4.
UCL	One-sided upper confidence limit of the mean. Following EPA (2004b), this can be either a 95, 97.5, or 99 percent UCL.

References

Helsel, D. 2005. *Nondetects and Data Analysis: Statistics for Censored Environmental Data*. John Wiley & Sons, Inc., New York, NY. 250 p.

U.S. Environmental Protection Agency (EPA). 2002. "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites." OSWER 9285.6-10. Office of Emergency and Remedial Response. Washington, DC. December.

EPA. 2004b. "ProUCL Version 3.0 User Guide." Prepared by Singh, A., Singh, A.K. and R.W. Maichle for the U.S. Environmental Protection Agency, Technical Support Center, Las Vegas, NV. April

TABLE 17: SUMMARY OF INPUT PARAMETERS

Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 162A and 398, Alameda Point, Alameda, California

Building	Depth Below Grade to Bottom of Enclosed Space Floor (Slab on Grade) (cm)	Water-Filled Porosity (unitless)	Soil Bulk Density (g/cm^3)	Soil Porosity = 1 - Bd/Ps (unitless)	Soil Gas Sampling Depth Below Grade (cm)	Thickness of Soil Stratum (cm)	Average Soil/GW Temperature (°C)	Soil Stratum Directly Above Water Table (A, B, or C)	Soil Stratum A Soil Type	Enclosed Space Floor Thickness (cm)	Soil-Building Pressure Differential (g/cm-s^2)	Enclosed Space Floor Length (cm)	Enclosed Space Floor Width (cm)	Enclosed Space Height (cm)	Floor-Wall Seam Crack Width (cm)	Indoor Air Exchange Rate (hr^{-1})	Soil Gas Advection Rate (L/min)
14	15 (5 & 7)	0.054 (4)	1.66 (4)	0.375 (4)	35	35	16.7 (3)	A	Sand (2)	23 (1)	40 (5 & 7)	8534	4877	914	0.1 (5)	1.0 (6)	208.1 (8)
113	15 (5 & 7)	0.054 (4)	1.66 (4)	0.375 (4)	31	31	16.7 (3)	A	Sand (2)	20 (1)	40 (5 & 7)	5944	1829	914	0.1 (5)	1.0 (6)	54.4 (8)
162	15 (5 & 7)	0.054 (4)	1.66 (4)	0.375 (4)	32	32	16.7 (3)	A	Sand (2)	19 (1)	40 (5 & 7)	10973	5944	610	0.1 (5)	1.0 (6)	326.1 (8)
163A	15 (5 & 7)	0.054 (4)	1.66 (4)	0.375 (4)	28	28	16.7 (3)	A	Sand (2)	15 (1)	40 (5 & 7)	4267	2286	792	0.1 (5)	1.0 (6)	48.8 (8)
398	15 (5 & 7)	0.054 (4)	1.66 (4)	0.375 (4)	29	29	16.7 (3)	A	Sand (2)	17 (1)	40 (5 & 7)	5944	3658	427	0.1 (5)	1.0 (6)	108.7 (8)

Notes:

(1) The building foundation slab thickness is based upon building-specific values.

(2) The most predominant soil type found across the site was Sand (S).

(3) Average soil and groundwater temperature were determined from Figure A-1 of DTSC 2005.

(4) Default values from the DTSC's 2003 Vapor Intrusion Model (DTSC 2003) for Sand.

(5) Default value from EPA 2002.

(6) The default indoor air exchange rate is 1.0 hr^{-1} for industrial structures (DTSC 2005).

(7) Default value from DTSC 2005.

(8) Based on DTSC (2005) default value, adjusted for the area of the building footprint.

Bd	Bulk density
bgs	Below ground surface
cm	Centimeter
°C	Degree Celsius
EPA	U.S. Environmental Protection Agency
g	Gram
g/cm^3	Gram per cubic centimeter
g/cm-s^2	Gram per centimeter per second squared
hr	Hour
hr^{-1}	Reciprocal hour
Ps	Soil porosity

References:

Department of Toxic Substances Control (DTSC). 2003. "Johnson and Ettinger (1991) Model for Vapor Intrusion Into Buildings." Version 3.0-Modification 1. July.

DTSC. 2005. "Guidance for the Evaluation and Migration of Subsurface Vapor Intrusion to Indoor Air." Interim Final. California Environmental Protection Agency. February 7. On-Line Address: http://www.dtsc.ca.gov/ScienceTechnology/HERD_POL_Eval_Subsurface_Vapor_Intrusion_interim_final.pdf

U.S. Environmental Protection Agency (EPA). 2002. "Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)." Draft Federal Register. November 29. On-Line Address: http://www.epa.gov/correctiveaction/eis/vapor.htm

TABLE 18: CANCER RISK AND NONCANCER HAZARD SUMMARY FOR THE COMMERCIAL/INDUSTRIAL RECEPTOR

Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Building	Chemicals of Potential Concern in Soil Gas	Exposure Point Concentration (µg/m3)	Attenuation Factor[a]	Indoor Air Concentration[a] (µg/m³)	Toxicity Values: Inhalation Cancer Slope Factor [(mg/kg-d)⁻¹]	Toxicity Values: Inhalation Reference Dose [mg/kg-d]	Risk Estimates: Cancer Risk	Risk Estimates: Hazard Index
14	1,2,4-Trimethylbenzene	2.48E+02	0.0003	7.0E-02	--	1.7E-03	--	6E-03
	1,3,5-Trimethylbenzene	6.64E+01		1.9E-02	--	1.7E-03	--	1E-03
	2,2,4-Trimethylpentane[b]	1.27E+02		3.6E-02	--	1.7E-03	--	3E-03
	2-Butanone	1.40E+02		4.0E-02	--	1.4E+00	--	4E-06
	4-Ethyl Toluene[c]	4.37E+02		1.3E-01	--	1.4E+00	--	1E-05
	4-Methyl-2-pentanone	1.72E+02		4.9E-02	--	8.6E-01	--	8E-06
	Acetone	5.89E+02		1.8E-01	--	9.0E-01	--	3E-05
	Benzene	1.90E+01		5.6E-03	2.7E-02	8.6E-03	7E-09	9E-05
	Chloroform	1.40E+01		4.2E-03	8.1E-02	1.4E-02	2E-08	4E-05
	Cyclohexane[d]	1.10E+02		3.4E-02	--	5.7E-02	--	8E-05
	Ethylbenzene	6.31E+01		1.8E-02	--	2.9E-01	--	9E-06
	Heptane[d]	9.13E+01		2.8E-02	--	5.7E-02	--	7E-05
	Hexane	4.40E+01		1.4E-02	--	5.7E-02	--	3E-05
	Methylene chloride	4.76E+01		1.4E-02	1.6E-03	8.6E-01	1E-09	2E-06
	Propylene[d]	5.30E+01		1.7E-02	--	5.7E-02	--	4E-05
	Tetrachloroethene	4.22E+02		1.2E-01	2.1E-02	1.0E-02	1E-07	2E-03
	Tetrahydrofuran[e]	2.33E+02		7.0E-02	--	1.0E-03	--	1E-02
	Toluene	5.69E+01		1.7E-02	--	1.4E+00	--	2E-06
	Trichloroethene	1.81E+02		5.3E-02	4.0E-01	1.0E-02	1.0E-06	7E-04
	Trichlorofluoromethane	8.40E+00		2.5E-03	--	2.0E-01	--	2E-06
	Trichlorotrifluoroethane	6.55E+01		1.9E-02	--	8.6E+00	--	3E-07
	m,p-Xylene	1.20E+02		3.5E-02	--	2.9E-02	--	2E-04
	o-Xylene	1.36E+02		4.0E-02	--	2.9E-02	--	2E-04
						Total	**1E-06**	**2E-02**

TABLE 18: CANCER RISK AND NONCANCER HAZARD SUMMARY FOR THE COMMERCIAL/INDUSTRIAL RECEPTOR (Continued)

Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Building	Chemicals of Potential Concern in Soil Gas	Exposure Point Concentration (µg/m3)	Attenuation Factor[a]	Indoor Air Concentration[a] (µg/m^3)	Toxicity Values		Risk Estimates	
					Inhalation Cancer Slope Factor [(mg/kg-d)$^{-1}$]	Inhalation Reference Dose [mg/kg-d]	Cancer Risk	Hazard Index
113	1,2,4-Trimethylbenzene	1.20E+01	0.0003	3.5E-03	--	1.7E-03	--	3E-04
	2,2,4-Trimethylpentane[b]	3.80E+02		1.1E-01	--	1.7E-03	--	9E-03
	2-Butanone	1.20E+02		3.6E-02	--	1.4E+00	--	3E-06
	4-Ethyl Toluene[c]	7.90E+00		2.4E-03	--	1.4E+00	--	2E-07
	4-Methyl-2-pentanone	8.10E+01		2.4E-02	--	8.6E-01	--	4E-06
	Acetone	3.50E+01		1.1E-02	--	9.0E-01	--	2E-06
	Benzene	1.40E+02		4.2E-02	2.7E-02	8.6E-03	6E-08	7E-04
	Ethylbenzene	8.80E+00		2.6E-03	--	2.9E-01	--	1E-06
	Heptane[d]	1.70E+02		5.4E-02	--	5.7E-02	--	1E-04
	Tetrahydrofuran[e]	2.80E+02		8.5E-02	--	1.0E-03	--	1E-02
	Toluene	9.10E+00		2.7E-03	--	1.4E+00	--	3E-07
	Trichloroethene	1.10E+03		3.3E-01	4.0E-01	1.0E-02	6E-06	4E-03
	m,p-Xylene	5.40E+00		1.6E-03	--	2.9E-02	--	8E-06
	o-Xylene	5.20E+00		1.6E-03	--	2.9E-02	--	7E-06
						Total	**6E-06**	**3E-02**

TABLE 18: CANCER RISK AND NONCANCER HAZARD SUMMARY FOR THE COMMERCIAL/INDUSTRIAL RECEPTOR (Continued)

Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Building	Chemicals of Potential Concern in Soil Gas	Exposure Point Concentration (µg/m3)	Attenuation Factor[a]	Indoor Air Concentration[a] (µg/m^3)	Toxicity Values: Inhalation Cancer Slope Factor [(mg/kg-d)$^{-1}$]	Toxicity Values: Inhalation Reference Dose [mg/kg-d]	Risk Estimates: Cancer Risk	Risk Estimates: Hazard Index
162	1,1,1-Trichloroethane	4.97E+01	0.0004	2.2E-02	--	6.3E-01	--	5E-06
	1,2,4-Trimethylbenzene	4.43E+01		1.9E-02	--	1.7E-03	--	2E-03
	2,2,4-Trimethylpentane[b]	1.18E+02		5.1E-02	--	1.7E-03	--	4E-03
	2-Butanone	6.69E+01		3.0E-02	--	1.4E+00	--	3E-06
	4-Methyl-2-pentanone	1.29E+02		5.7E-02	--	8.6E-01	--	9E-06
	Acetone	2.22E+03		1.0E+00	--	9.0E-01	--	2E-04
	Benzene	5.54E+01		2.5E-02	2.7E-02	8.6E-03	3E-08	4E-04
	Chloroform	5.41E+01		2.5E-02	8.1E-02	1.4E-02	1E-07	2E-04
	Cyclohexane[d]	3.50E+02		1.6E-01	--	5.7E-02	--	4E-04
	Ethylbenzene	5.12E+01		2.3E-02	--	2.9E-01	--	1E-05
	Heptane[d]	1.66E+03		7.8E-01	--	5.7E-02	--	2E-03
	Hexane	4.72E+01		2.2E-02	--	5.7E-02	--	5E-05
	Tetrachloroethene	6.44E+01		2.8E-02	2.1E-02	1.0E-02	3E-08	4E-04
	Tetrahydrofuran[e]	1.38E+02		6.3E-02	--	1.0E-03	--	9E-03
	Toluene	1.35E+02		6.0E-02	--	1.4E+00	--	6E-06
	Trichloroethene	5.54E+03		2.5E+00	4.0E-01	1.0E-02	5E-05	3E-02
	Trichlorofluoromethane	6.20E+01		2.8E-02	--	2.0E-01	--	2E-05
	Trichlorotrifluoroethane	2.01E+02		8.9E-02	--	8.6E+00	--	1E-06
	cis-1,2-Dichloroethene	3.40E+01		1.5E-02	--	1.0E-02	--	2E-04
	m,p-Xylene	5.97E+01		2.6E-02	--	2.9E-02	--	1E-04
	o-Xylene	4.82E+01		2.2E-02	--	2.9E-02	--	1E-04
						Total	**5E-05**	**5E-02**

TABLE 18: CANCER RISK AND NONCANCER HAZARD SUMMARY FOR THE COMMERCIAL/INDUSTRIAL RECEPTOR (Continued)

Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Building	Chemicals of Potential Concern in Soil Gas	Exposure Point Concentration (μg/m3)	Attenuation Factor[a]	Indoor Air Concentration[a] (μg/m^3)	Toxicity Values: Inhalation Cancer Slope Factor [(mg/kg-d)$^{-1}$]	Toxicity Values: Inhalation Reference Dose [mg/kg-d]	Risk Estimates: Cancer Risk	Risk Estimates: Hazard Index
163A	1,1,1-Trichloroethane	3.2E+01	0.0003	1.1E-02	--	6.3E-01	--	2E-06
	1,1-Dichlorethane	5.2E+01		1.8E-02	--	1.4E-01	--	2E-05
	1,2,4-Trimethylbenzene	7.1E+00		2.4E-03	--	1.7E-03	--	2E-04
	2,2,4-Trimethylpentane[b]	21		7.2E-03	--	1.7E-03	--	6E-04
	2-Butanone	8.4E+01		2.9E-02	--	1.4E+00	--	3E-06
	4-Methyl-2-pentanone	1.1E+02		3.8E-02	--	8.6E-01	--	6E-06
	Acetone	1.3E+02		4.7E-02	--	9.0E-01	--	7E-06
	Chloroform	1.4E+01		5.0E-03	8.1E-02	1.4E-02	2E-08	5E-05
	Tetrahydrofuran[e]	160		5.7E-02	--	1.0E-03	--	8E-03
	Toluene	2.1E+01		7.4E-03	--	1.4E+00	--	7E-07
	Trichloroethene	9.6E+03		3.4E+00	4.0E-01	1.0E-02	7E-05	5E-02
	Trichlorotrifluoroethane	2.6E+01		9.1E-03	--	8.6E+00	--	1E-07
	cis-1,2-Dichloroethene	5.8E+03		2.0E+00	--	1.0E-02	--	3E-02
	m,p-Xylene	7.2E+00		2.5E-03	--	2.9E-02	--	1E-05
	o-Xylene	5.6E+00		2.0E-03	--	2.9E-02	--	9E-06
	trans-1,2-Dichloroethene	2.6E+02		9.0E-02	--	2.0E-02	--	6E-04
						Total	**7E-05**	**8E-02**

TABLE 18: CANCER RISK AND NONCANCER HAZARD SUMMARY FOR THE COMMERCIAL/INDUSTRIAL RECEPTOR (Continued)

Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California

Building	Chemicals of Potential Concern in Soil Gas	Exposure Point Concentration (µg/m3)	Attenuation Factor[a]	Indoor Air Concentration[a] (µg/m³)	Toxicity Values: Inhalation Cancer Slope Factor [(mg/kg-d)⁻¹]	Toxicity Values: Inhalation Reference Dose [mg/kg-d]	Risk Estimates: Cancer Risk	Risk Estimates: Hazard Index
398	1,1,1-Trichloroethane	5.50E+01	0.0006	3.5E-02	--	6.3E-01	--	8E-06
	1,2-Dichloropropane	1.75E+02		1.1E-01	6.8E-02	1.1E-03	4E-07	1E-02
	2,2,4-Trimethylpentane[b]	5.66E+02		3.5E-01	--	1.7E-03	--	3E-02
	2-Butanone	1.27E+02		8.2E-02	--	1.4E+00	--	8E-06
	4-Methyl-2-pentanone	8.37E+01		5.4E-02	--	8.6E-01	--	9E-06
	Acetone	1.30E+02		8.6E-02	--	9.0E-01	--	1E-05
	Benzene	9.76E+01		6.3E-02	2.7E-02	8.6E-03	8E-08	1E-03
	Chloroform	2.70E+01		1.8E-02	8.1E-02	1.4E-02	7E-08	2E-04
	Ethylbenzene	1.40E+01		9.0E-03	--	2.9E-01	--	4E-06
	Heptane[d]	1.23E+02		8.3E-02	--	5.7E-02	--	2E-04
	Styrene	1.60E+01		1.0E-02	--	2.9E-01	--	5E-06
	Tetrachloroethene	7.60E+01		4.9E-02	2.1E-02	1.0E-02	5E-08	7E-04
	Tetrahydrofuran[e]	2.93E+02		1.9E-01	--	1.0E-03	--	3E-02
	Toluene	1.30E+01		8.4E-03	--	1.4E+00	--	8E-07
	Trichloroethene	1.18E+03		7.6E-01	4.0E-01	1.0E-02	1E-05	1E-02
	Trichlorotrifluoroethane	1.60E+01		1.0E-02	--	8.6E+00	--	2E-07
	m,p-Xylene	1.30E+01		8.3E-03	--	2.9E-02	--	4E-05
						Total	**2E-05**	**8E-02**

Notes:

a Attentuatio factor is calculated per building using DTSC's 2003 Vapor Intrusion Model (DTSC 2003), which is based upon Johnson and Ettinger (1991). Indoor air concentration i calculated using the following equation: Indoor air concentration = Attenuation factor (α) x Soil gas concentration.

b 1,3,5-Trimethylbenzene used as a surrogate.

c Toluene used as a surrogate.

d Hexane used as a surrogate.

e Furan used as a surrogate.

µg/m³ Microgram per cubic meter

mg/kg-d Milligram per kilogram per day

Reference:

Department of Toxic Substances Control (DTSC). 2003. "Johnson and Ettinger (1991) Model for Vapor Intrusion Into Buildings." Version 3.0-Modification 1. July.

APPENDIX A
DATA VALIDATION

DATA VALIDATION

All soil gas data collected during this investigation were validated by The Data Validation Group in Rancho Margarita, California. Data validation is a systematic process for reviewing and qualifying data against a set of criteria to determine whether they are adequate for their intended use. The laboratory analytical data were validated according to procedures outlined in the following documents:

- U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) National Functional Guidelines for Organic (EPA 1999a)
- Tetra Tech EM Inc. Data Validation Statement of Work (Tetra Tech 2005)
- Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan), Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda California. (SAP) (SulTech 2005)
- Analytical methods associated with "Compendium Method TO [Toxic Organics]-15, Determination of Volatile Organic Compounds (VOC) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry" (EPA 1999a)

Data validation occurred in two stages: (1) a cursory review of the analytical reports and the quality assurance (QA) and quality control (QC) information was conducted on 100 percent of the chemical data, and (2) a full review of the analytical reports, the QA and QC information, and the associated raw data was conducted on 10 percent of the chemical data. The cursory review evaluated the effect of the most critical QA and QC information, such as holding times, calibration requirements, and spiking accuracy, on the data. The full review evaluated additional QA and QC criteria and used the raw data to check calculations and analyte identifications. At each stage of validation, qualifiers were assigned to the results in the electronic database in accordance with EPA guidelines (EPA 1999a), the SAP (SulTech 2005), and Compendium Method TO-15 (EPA 1999b).

The overall objective of data validation was to determine whether the quality of the chemical data set was adequate for its intended purpose, as defined by the precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters in EPA guidance (EPA 1997). The following tasks were completed to assess PARCC parameters:

- Review precision and accuracy of laboratory QC data
- Review precision and accuracy of field QC data
- Review the overall analytical process, including holding times, calibrations, analytical or matrix performance, and analyte identification and quantitation

- Assign qualifiers to data affected when QA and QC criteria were not achieved
- Review and summarize implications of the frequency and severity of qualifiers in the validated data

EVALUATION SUMMARY

This section discusses the overall data quality, including the PARCC parameters, as determined by the data validation.

PRECISION

Precision is a measure of the reproducibility of an experimental value without regard to the true or reference value. The primary indicators of site data precision were the relative percent differences between the samples and the sample duplicates. Soil gas duplicate samples were collected from four locations, 014SG11, 162SG05, 162SG16, and 163SG01. Although several chemicals had relatively percent differences exceeding 25 percent in four samples, relative percent differences for all chemicals with detections exceeding the reporting limit were within 25 percent.

ACCURACY

Accuracy assesses the proximity of an experimental value to the true or reference value. The primary accuracy indicators were the recoveries of laboratory control samples (LCS) spikes. Although several chemicals were qualified as estimated due to low LCS recoveries, no data were rejected based on accuracy violations indicating the organic analyses were consistently accurate.

REPRESENTATIVENESS

Representativeness refers to the ability of sample data to reflect true environmental conditions. Determinants of representativeness include sampling locations, frequency, collection procedures, and possible compromises to sample integrity (such as cross-contamination) that can occur during collection, transport, and analysis. Selection of representative sampling sites is important to obtaining samples that accurately show site conditions. Correct sample collection, transport, and analytical procedures are important to ensure that samples closely resemble the medium sampled and to minimize contamination.

For the soil gas data presented in this report, the sampling locations, frequency, and collection protocols were described in the SAP (SulTech 2005). These protocols followed standard accepted methods of site characterization and were approved by the regulatory agencies. Thus, with respect to accepted site characterization approaches, existing guidance, and regulatory compliance, the sampling program for this investigation met all relevant requirements for data representativeness.

COMPLETENESS

Completeness is defined as the percentage of analytical results considered valid. Valid data are those identified as acceptable or qualified as estimated (J) during the data validation process. Data qualified as rejected (R) are considered unusable and not valid. For the soil gas investigation, no data were rejected during the cursory or full data validation review.

The assessment of completeness consisted of comparing the amount of acceptable and usable results to the total number of results. The data evaluated in this data validation summary indicate a completeness of 100 percent. The completeness goal of 90 percent for field samples and laboratory samples established in the SAP (SulTech 2005) was exceeded.

COMPARABILITY

Comparability is a qualitative assessment of how well one data set compares to another. The important determinants of comparability include the uniformity of sampling activities, analytical procedures, data reporting, and data validation. The use of EPA protocols, specific and well-documented analyses, approved laboratories, and the standardized process of data review and validation give the soil gas data a high degree of analytical comparability. The use of well-established analytical protocols ensures that the data are comparable.

CONCLUSIONS FOR DATA QUALITY AND DATA USABILITY

The EPA "Risk Assessment Guidance for Superfund" (RAGS) was used to determine the usability of the validated data (EPA 1989). Exhibit 5-5 in RAGS states that data qualified as estimated (J) based on data validation reports is acceptable for use in quantitative risk assessments. Although some qualifiers were added to the data, a final review of the data set with respect to the data quality objectives discussed previously indicated that the data are of high overall quality. The data meet all the requirements of the PARCC data quality indicators described in EPA guidance for quality assurance project plans (EPA 1997) and are usable for risk assessment. All supporting documentation and data are available upon request, including cursory and full validation reports and the database containing all sample results.

REFERENCES

Sullivan Consulting Group and Tetra Tech EM, Inc. (SulTech). 2005. "Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan), Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda California." November 18

Tetra Tech EM Inc. (Tetra Tech). 2005. "Data Validation Statement of Work." February 1.

U.S. Environmental Protection Agency (EPA). 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A." Office of Solid Waste and Environmental Response. December.

EPA. 1997. "USEPA Guidance for Quality Assurance Project Plans." EPA QA/G-5. Final.

EPA. 1999a. "Contract Laboratory Program (CLP) National Functional Guidelines for Organic." (EPA 1999b)

EPA. 1999b. "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)." Cincinnati, Ohio. EPA/625/R-96/010b. January.

APPENDIX B
ANALYTICAL RESULTS

TABLE B-1: SOIL GAS ANALYTICAL RESULTS

Building 14 Alameda Point, Alameda, California

Sample Location ID	014SG-01	014SG-02	014SG-03	014SG-04	014SG-05	014SG-06	014SG-08
Sample ID	014SG-01-001	014SG-02-001	014SG-03-001	014SG-04-001	014SG-05-001	014SG-06-001	014SG-08-001
Sample Date	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
1,1,1-TRICHLOROETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,1,2,2-TETRACHLOROETHANE	6 U	60 UJ	6 UJ	6 UJ	6 UJ	30 UJ	60 UJ
1,1,2-TRICHLOROETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,1-DICHLOROETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,1-DICHLOROETHENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,2,4-TRICHLOROBENZENE	20 U	200 UJ	20 UJ	20 UJ	20 UJ	100 UJ	200 UJ
1,2,4-TRIMETHYLBENZENE	**6.7**	50 UJ	**55 J**	5 UJ	5 UJ	25 UJ	**790 J**
1,2-DICHLOROBENZENE	10 U	100 UJ	10 UJ	10 UJ	10 UJ	50 UJ	100 UJ
1,2-DICHLOROETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,2-DICHLOROPROPANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,3,5-TRIMETHYLBENZENE	5 U	50 U	**18**	5 U	5 U	25 U	**120**
1,3-BUTADIENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
1,3-DICHLOROBENZENE	10 U	100 UJ	10 UJ	10 UJ	10 UJ	50 UJ	100 UJ
1,4-DICHLOROBENZENE	10 U	100 UJ	10 UJ	10 UJ	10 UJ	50 UJ	100 UJ
1,4-DIOXANE	5.5 U	55 U	5.5 U	5.5 U	5.5 U	28 U	55 U
2,2,4-TRIMETHYLPENTANE	**12**	**270**	**160**	5 U	**11**	**61**	**95**
2-BUTANONE	**7.1**	**120**	**76**	**42**	**18**	**73**	**260**
2-HEXANONE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
3-CHLOROPROPENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
4-ETHYL TOLUENE	5 U	50 UJ	**44**	5 U	5 U	25 UJ	**810 J**
4-METHYL-2-PENTANONE	5 U	**240**	**150**	**150**	**55**	**90**	**210**
ACETONE	**66**	**630**	**400**	**130**	**73**	**370**	**1,100**
BENZENE	5 U	50 U	**19**	5 U	5 U	25 U	50 U
BENZYL CHLORIDE	10 U	100 U	10 U	10 U	10 U	50 U	100 U
BROMODICHLOROMETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
BROMOFORM	5 U	50 U	5 U	5 U	5 U	25 U	50 U
BROMOMETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CARBON DISULFIDE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CARBON TETRACHLORIDE	5.5 U	55 U	5.5 U	5.5 U	5.5 U	28 U	55 U
CHLOROBENZENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CHLOROETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CHLOROFORM	5 U	50 U	**14**	**7.9**	5 U	25 U	50 U
CHLOROMETHANE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CIS-1,2-DICHLOROETHENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CIS-1,3-DICHLOROPROPENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
CYCLOHEXANE	5 U	**180**	**76**	5 U	5 U	25 U	50 U

TABLE B-1: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 14 Alameda Point, Alameda, California

Sample Location ID	014SG-01	014SG-02	014SG-03	014SG-04	014SG-05	014SG-06	014SG-08
Sample ID	014SG-01-001	014SG-02-001	014SG-03-001	014SG-04-001	014SG-05-001	014SG-06-001	014SG-08-001
Sample Date	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
DIBROMOCHLOROMETHANE	6.5 U	65 U	6.5 U	6.5 U	6.5 U	32 U	65 U
DICHLORODIFLUOROMETHANE	5.5 UJ	55 UJ	5.5 UJ	5.5 UJ	5.5 UJ	28 UJ	55 UJ
DICHLOROTETRAFLUOROETHANE	5.5 UJ	55 UJ	5.5 UJ	5.5 UJ	5.5 UJ	28 UJ	55 UJ
ETHYL ACETATE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
ETHYLBENZENE	5 U	50 U	**120**	**13**	5 U	25 U	**110**
ETHYLENE DIBROMIDE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
HEPTANE	5 U	**120**	**94**	5 U	5 U	25 U	**59**
HEXACHLOROBUTADIENE	11 UJ	110 UJ	11 UJ	11 UJ	11 UJ	55 UJ	110 UJ
HEXANE	5 U	50 U	**44**	5 U	5 U	25 U	50 U
ISOPROPYL ALCOHOL	10,000 U	**55,000**	**16,000**	**14,000**	10,000 U	**20,000**	**37,000**
M,P-XYLENE	**5.7**	50 U	**200**	**19**	5 U	25 U	**270**
METHYL-T-BUTYL ETHER	5 U	50 U	5 U	5 U	5 U	25 U	50 U
METHYLENE CHLORIDE	**5**	**87**	**6.5**	5 U	5 U	25 U	50 U
O-XYLENE	**5.1**	50 U	**170**	**18**	5 U	25 U	**360**
PROPYLENE	10 U	100 U	**53**	10 U	10 U	50 U	100 U
STYRENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
TETRACHLOROETHENE	5 U	50 U	**120**	**58**	5 U	25 U	**760**
TETRAHYDROFURAN	5 U	**240**	**130**	**54**	**20**	**170**	**230**
TOLUENE	**14**	**76**	**110**	**18**	**6.1**	25 U	**54**
TRANS-1,2-DICHLOROETHENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
TRANS-1,3-DICHLOROPROPENE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
TRICHLOROETHENE	5 U	**300**	**44**	**67**	**90**	25 U	50 U
TRICHLOROFLUOROMETHANE	5 U	50 U	**8.4**	5 U	5 U	25 U	50 U
TRICHLOROTRIFLUOROETHANE	6 U	**87**	**140**	**34**	**9.1**	30 U	60 U
VINYL ACETATE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
VINYL BROMIDE	5 U	50 U	5 U	5 U	5 U	25 U	50 U
VINYL CHLORIDE	5 U	50 U	5 U	5 U	5 U	25 U	50 U

TABLE B-1: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 14 Alameda Point, Alameda, California

Sample Location ID	014SG-09	014SG-10	014SG-11	014SG-11
Sample ID	014SG-09-001	014SG-10-001	014SG-11-001	014SG-11-002
Sample Date	01/25/2006	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)				
1,1,1-TRICHLOROETHANE	5 U	5 U	50 U	50 U
1,1,2,2-TETRACHLOROETHANE	6 UJ	6 UJ	60 UJ	60 UJ
1,1,2-TRICHLOROETHANE	5 U	5 U	50 U	50 U
1,1-DICHLOROETHANE	5 U	5 U	50 U	50 U
1,1-DICHLOROETHENE	5 U	5 U	50 U	50 U
1,2,4-TRICHLOROBENZENE	20 UJ	20 UJ	200 UJ	200 UJ
1,2,4-TRIMETHYLBENZENE	**12 J**	**7.5 J**	50 UJ	50 UJ
1,2-DICHLOROBENZENE	10 UJ	10 UJ	100 UJ	100 UJ
1,2-DICHLOROETHANE	5 U	5 U	50 U	50 U
1,2-DICHLOROPROPANE	5 U	5 U	50 U	50 U
1,3,5-TRIMETHYLBENZENE	5 U	5 U	50 U	50 U
1,3-BUTADIENE	5 U	5 U	50 U	50 U
1,3-DICHLOROBENZENE	10 UJ	10 UJ	100 UJ	100 UJ
1,4-DICHLOROBENZENE	10 UJ	10 UJ	100 UJ	100 UJ
1,4-DIOXANE	5.5 U	5.5 U	55 U	55 U
2,2,4-TRIMETHYLPENTANE	**95**	**11**	50 U	50 U
2-BUTANONE	**80**	**31**	**210**	**290**
2-HEXANONE	5 U	5 U	50 U	50 U
3-CHLOROPROPENE	5 U	5 U	50 U	50 U
4-ETHYL TOLUENE	**7.8**	5 U	50 UJ	50 UJ
4-METHYL-2-PENTANONE	**83**	**74**	**210**	**210**
ACETONE	**130**	**82**	200 U	200 U
BENZENE	5 U	5 U	50 U	50 U
BENZYL CHLORIDE	10 U	10 U	100 U	100 U
BROMODICHLOROMETHANE	5 U	5 U	50 U	50 U
BROMOFORM	5 U	5 U	50 U	50 U
BROMOMETHANE	5 U	5 U	50 U	50 U
CARBON DISULFIDE	5 U	5 U	50 U	50 U
CARBON TETRACHLORIDE	5.5 U	5.5 U	55 U	55 U
CHLOROBENZENE	5 U	5 U	50 U	50 U
CHLOROETHANE	5 U	5 U	50 U	50 U
CHLOROFORM	5 U	**12**	50 U	50 U
CHLOROMETHANE	5 U	5 U	50 U	50 U
CIS-1,2-DICHLOROETHENE	5 U	5 U	50 U	50 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	50 U	50 U
CYCLOHEXANE	5 U	5 U	50 U	50 U

TABLE B-1: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 14 Alameda Point, Alameda, California

Sample Location ID	014SG-09	014SG-10	014SG-11	014SG-11
Sample ID	014SG-09-001	014SG-10-001	014SG-11-001	014SG-11-002
Sample Date	01/25/2006	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)				
DIBROMOCHLOROMETHANE	6.5 U	6.5 U	65 U	65 U
DICHLORODIFLUOROMETHANE	5.5 UJ	5.5 UJ	55 UJ	55 UJ
DICHLOROTETRAFLUOROETHANE	5.5 UJ	5.5 UJ	55 UJ	55 UJ
ETHYL ACETATE	5 U	5 U	50 U	50 U
ETHYLBENZENE	**9.3**	**8**	50 U	50 U
ETHYLENE DIBROMIDE	5 U	5 U	50 U	50 U
HEPTANE	**6.6**	5 U	50 U	50 U
HEXACHLOROBUTADIENE	11 UJ	11 UJ	110 UJ	110 UJ
HEXANE	**6.2**	5 U	50 U	50 U
ISOPROPYL ALCOHOL	**11,000**	**12,000**	**46,000**	**57,000**
M,P-XYLENE	**21**	5 U	50 U	50 U
METHYL-T-BUTYL ETHER	5 U	5 U	50 U	50 U
METHYLENE CHLORIDE	5 U	5 U	50 U	50 U
O-XYLENE	**17**	5 U	50 U	50 U
PROPYLENE	10 U	10 U	100 U	100 U
STYRENE	5 U	5 U	50 U	50 U
TETRACHLOROETHENE	5 U	5 U	50 U	50 U
TETRAHYDROFURAN	**110**	**40**	**490**	**670**
TOLUENE	**56**	**14**	50 U	50 U
TRANS-1,2-DICHLOROETHENE	5 U	5 U	50 U	50 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	50 U	50 U
TRICHLOROETHENE	5 U	5 U	50 U	50 U
TRICHLOROFLUOROMETHANE	5 U	5 U	50 U	50 U
TRICHLOROTRIFLUOROETHANE	**22**	**12**	60 U	60 U
VINYL ACETATE	5 U	5 U	50 U	50 U
VINYL BROMIDE	5 U	5 U	50 U	50 U
VINYL CHLORIDE	5 U	5 U	50 U	50 U

Notes: Detected analytes are printed in bold.
- ID Identification
- J Estimated value
- U Nondetected

TABLE B-2: SOIL GAS ANALYTICAL RESULTS

Building 113 Alameda Point, Alameda, California

Sample Location ID	113SG-01	113SG-02	113SG-03
Sample ID	113SG-01-001	113SG-02-001	113SG-03-001
Sample Date	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR
EPA TO-15 (UG/M3)			
1,1,1-TRICHLOROETHANE	5 U	25 U	120 U
1,1,2,2-TETRACHLOROETHANE	6 UJ	30 UJ	150 UJ
1,1,2-TRICHLOROETHANE	5 U	25 U	120 U
1,1-DICHLOROETHANE	5 U	25 U	120 U
1,1-DICHLOROETHENE	5 U	25 U	120 U
1,2,4-TRICHLOROBENZENE	20 UJ	100 UJ	500 UJ
1,2,4-TRIMETHYLBENZENE	**12 J**	25 UJ	120 UJ
1,2-DICHLOROBENZENE	10 UJ	50 UJ	250 UJ
1,2-DICHLOROETHANE	5 U	25 U	120 U
1,2-DICHLOROPROPANE	5 U	25 U	120 U
1,3,5-TRIMETHYLBENZENE	5 U	25 U	120 U
1,3-BUTADIENE	5 U	25 U	120 U
1,3-DICHLOROBENZENE	10 UJ	50 UJ	250 UJ
1,4-DICHLOROBENZENE	10 UJ	50 UJ	250 UJ
1,4-DIOXANE	5.5 U	28 U	140 U
2,2,4-TRIMETHYLPENTANE	5 U	25 U	**380**
2-BUTANONE	**85**	**120**	120 U
2-HEXANONE	5 U	25 U	120 U
3-CHLOROPROPENE	5 U	25 U	120 U
4-ETHYL TOLUENE	**7.9**	25 UJ	120 UJ
4-METHYL-2-PENTANONE	**55**	**81**	120 U
ACETONE	**35**	100 U	500 U
BENZENE	5 U	25 U	**140**
BENZYL CHLORIDE	10 U	50 U	250 U
BROMODICHLOROMETHANE	5 U	25 U	120 U
BROMOFORM	5 U	25 U	120 U
BROMOMETHANE	5 U	25 U	120 U
CARBON DISULFIDE	5 U	25 U	120 U
CARBON TETRACHLORIDE	5.5 U	28 U	140 U
CHLOROBENZENE	5 U	25 U	120 U
CHLOROETHANE	5 U	25 U	120 U
CHLOROFORM	5 U	25 U	120 U
CHLOROMETHANE	5 U	25 U	120 U
CIS-1,2-DICHLOROETHENE	5 U	25 U	120 U
CIS-1,3-DICHLOROPROPENE	5 U	25 U	120 U
CYCLOHEXANE	5 U	25 U	120 U

TABLE B-2: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 113 Alameda Point, Alameda, California

Sample Location ID	113SG-01	113SG-02	113SG-03
Sample ID	113SG-01-001	113SG-02-001	113SG-03-001
Sample Date	01/25/2006	01/25/2006	01/25/2006
Matrix	AIR	AIR	AIR
EPA TO-15 (UG/M3)			
DIBROMOCHLOROMETHANE	6.5 U	32 U	160 U
DICHLORODIFLUOROMETHANE	5.5 UJ	28 UJ	140 UJ
DICHLOROTETRAFLUOROETHANE	5.5 UJ	28 UJ	140 UJ
ETHYL ACETATE	5 U	25 U	120 U
ETHYLBENZENE	**8.8**	25 U	120 U
ETHYLENE DIBROMIDE	5 U	25 U	120 U
HEPTANE	5 U	25 U	**170**
HEXACHLOROBUTADIENE	11 UJ	55 UJ	280 UJ
HEXANE	5 U	25 U	120 U
ISOPROPYL ALCOHOL	10,000 U	**21,000**	**100,000**
M,P-XYLENE	**5.4**	25 U	120 U
METHYL-T-BUTYL ETHER	5 U	25 U	120 U
METHYLENE CHLORIDE	5 U	25 U	120 U
O-XYLENE	**5.2**	25 U	120 U
PROPYLENE	10 U	50 U	250 U
STYRENE	5 U	25 U	120 U
TETRACHLOROETHENE	5 U	25 U	120 U
TETRAHYDROFURAN	**190**	**280**	120 U
TOLUENE	**9.1**	25 U	120 U
TRANS-1,2-DICHLOROETHENE	5 U	25 U	120 U
TRANS-1,3-DICHLOROPROPENE	5 U	25 U	120 U
TRICHLOROETHENE	**15**	**25**	**1,100**
TRICHLOROFLUOROMETHANE	5 U	25 U	120 U
TRICHLOROTRIFLUOROETHANE	6 U	30 U	150 U
VINYL ACETATE	5 U	25 U	120 U
VINYL BROMIDE	5 U	25 U	120 U
VINYL CHLORIDE	5 U	25 U	120 U

Notes: Detected analyates are printed in bold.

ID Identification

J Estimated value

U Nondetected

TABLE B-3: SOIL GAS ANALYTICAL RESULTS
Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-01	162SG-02	162SG-03	162SG-04	162SG-05	162SG-05	162SG-06
Sample ID	162SG-01-001	162SG-02-001	162SG-03-001	162SG-04-001	162SG-05-001	162SG-05-002	162SG-06-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/27/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
1,1,1-TRICHLOROETHANE	**51**	50 U	**38**	25 U	25 U	25 U	**30**
1,1,2,2-TETRACHLOROETHANE	60 UJ	60 UJ	30 UJ	30 UJ	30 UJ	30 UJ	30 UJ
1,1,2-TRICHLOROETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,1-DICHLOROETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,1-DICHLOROETHENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,2,4-TRICHLOROBENZENE	200 UJ	200 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
1,2,4-TRIMETHYLBENZENE	**50 J**	50 UJ	25 UJ	25 UJ	25 UJ	25 UJ	25 UJ
1,2-DICHLOROBENZENE	100 UJ	100 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
1,2-DICHLOROETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,2-DICHLOROPROPANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,3,5-TRIMETHYLBENZENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,3-BUTADIENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
1,3-DICHLOROBENZENE	100 UJ	100 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
1,4-DICHLOROBENZENE	100 UJ	100 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
1,4-DIOXANE	55 U	55 U	28 U	28 U	28 U	28 U	28 U
2,2,4-TRIMETHYLPENTANE	**99**	50 U	**33**	25 U	25 U	25 U	25 U
2-BUTANONE	**72**	**110**	**81**	**50**	25 U	25 U	**41**
2-HEXANONE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
3-CHLOROPROPENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
4-ETHYL TOLUENE	50 U	50 U	25 U	25 U	25 UJ	25 U	25 UJ
4-METHYL-2-PENTANONE	**120**	**94**	**78**	**130**	**54**	**72**	**62**
ACETONE	200 U	200 U	**160**	100 U	100 U	100 U	100 U
BENZENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
BENZYL CHLORIDE	100 U	100 U	50 U	50 U	50 U	50 U	50 U
BROMODICHLOROMETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
BROMOFORM	50 U	50 U	25 U	25 U	25 U	25 U	25 U
BROMOMETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CARBON DISULFIDE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CARBON TETRACHLORIDE	55 U	55 U	28 U	28 U	28 U	28 U	28 U
CHLOROBENZENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CHLOROETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CHLOROFORM	**53**	50 U	25 U	25 U	25 U	25 U	**25**
CHLOROMETHANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CIS-1,2-DICHLOROETHENE	50 U	50 U	25 U	**34**	25 U	25 U	**25**
CIS-1,3-DICHLOROPROPENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
CYCLOHEXANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-01	162SG-02	162SG-03	162SG-04	162SG-05	162SG-05	162SG-06
Sample ID	162SG-01-001	162SG-02-001	162SG-03-001	162SG-04-001	162SG-05-001	162SG-05-002	162SG-06-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/27/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
DIBROMOCHLOROMETHANE	65 U	65 U	32 U	32 U	32 U	32 U	32 U
DICHLORODIFLUOROMETHANE	55 UJ	55 UJ	28 UJ	28 UJ	28 UJ	28 UJ	28 UJ
DICHLOROTETRAFLUOROETHANE	55 UJ	55 UJ	28 UJ	28 UJ	28 UJ	28 UJ	28 UJ
ETHYL ACETATE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
ETHYLBENZENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
ETHYLENE DIBROMIDE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
HEPTANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
HEXACHLOROBUTADIENE	110 UJ	110 UJ	55 UJ	55 UJ	55 UJ	55 UJ	55 UJ
HEXANE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
ISOPROPYL ALCOHOL	**36,000**	**37,000**	**23,000**	**22,000**	**17,000**	**19,000**	**21,000**
M,P-XYLENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
METHYL-T-BUTYL ETHER	50 U	50 U	25 U	25 U	25 U	25 U	25 U
METHYLENE CHLORIDE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
O-XYLENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
PROPYLENE	100 U	100 U	50 U	50 U	50 U	50 U	50 U
STYRENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
TETRACHLOROETHENE	50 U	50 U	**53**	25 U	25 U	25 U	25 U
TETRAHYDROFURAN	**170**	**200**	**150**	**96**	25 U	**28**	**71**
TOLUENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
TRANS-1,2-DICHLOROETHENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
TRANS-1,3-DICHLOROPROPENE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
TRICHLOROETHENE	**3,000**	**310**	**3,600**	**1,100**	**520**	**500**	**2,700**
TRICHLOROFLUOROMETHANE	50 U	50 U	25 U	25 U	25 U	25 U	**26**
TRICHLOROTRIFLUOROETHANE	60 U	60 U	30 U	30 U	30 U	30 U	**36**
VINYL ACETATE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
VINYL BROMIDE	50 U	50 U	25 U	25 U	25 U	25 U	25 U
VINYL CHLORIDE	50 U	50 U	25 U	25 U	25 U	25 U	25 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-07	162SG-08	162SG-09	162SG-10	162SG-11	162SG-12	162SG-13
Sample ID	162SG-07-001	162SG-08-001	162SG-09-001	162SG-10-001	162SG-11-001	162SG-12-001	162SG-13-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
1,1,1-TRICHLOROETHANE	50 U	**40**	**58**	25 U	**11**	25 U	50 U
1,1,2,2-TETRACHLOROETHANE	60 UJ	30 UJ	60 UJ	30 UJ	6 UJ	30 UJ	60 UJ
1,1,2-TRICHLOROETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,1-DICHLOROETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,1-DICHLOROETHENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,2,4-TRICHLOROBENZENE	200 UJ	100 UJ	200 UJ	100 UJ	20 UJ	100 UJ	200 UJ
1,2,4-TRIMETHYLBENZENE	50 UJ	25 UJ	50 UJ	25 UJ	**5.6 J**	25 UJ	50 UJ
1,2-DICHLOROBENZENE	100 UJ	50 UJ	100 UJ	50 UJ	10 UJ	50 UJ	100 UJ
1,2-DICHLOROETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,2-DICHLOROPROPANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,3,5-TRIMETHYLBENZENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,3-BUTADIENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
1,3-DICHLOROBENZENE	100 UJ	50 UJ	100 UJ	50 UJ	10 UJ	50 UJ	100 UJ
1,4-DICHLOROBENZENE	100 UJ	50 UJ	100 UJ	50 UJ	10 UJ	50 UJ	100 UJ
1,4-DIOXANE	55 U	28 U	55 U	28 U	5.5 U	28 U	55 U
2,2,4-TRIMETHYLPENTANE	50 U	25 U	**68**	25 U	5 U	**53**	50 U
2-BUTANONE	50 U	**52**	**66**	**36**	**51**	**42**	50 U
2-HEXANONE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
3-CHLOROPROPENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
4-ETHYL TOLUENE	50 UJ	25 UJ	50 UJ	25 UJ	5 U	25 U	50 U
4-METHYL-2-PENTANONE	**150**	**82**	**160**	25 U	**81**	**190**	**95**
ACETONE	200 U	100 U	200 U	100 U	**46**	100 U	**280**
BENZENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
BENZYL CHLORIDE	100 U	50 U	100 U	50 U	10 U	50 U	100 U
BROMODICHLOROMETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
BROMOFORM	50 U	25 U	50 U	25 U	5 U	25 U	50 U
BROMOMETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CARBON DISULFIDE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CARBON TETRACHLORIDE	55 U	28 U	55 U	28 U	5.5 U	28 U	55 U
CHLOROBENZENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CHLOROETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CHLOROFORM	50 U	**99**	50 U	25 U	**11**	25 U	50 U
CHLOROMETHANE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CIS-1,2-DICHLOROETHENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CIS-1,3-DICHLOROPROPENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
CYCLOHEXANE	50 U	25 U	50 U	25 U	5 U	25 U	**1,300**

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-07	162SG-08	162SG-09	162SG-10	162SG-11	162SG-12	162SG-13
Sample ID	162SG-07-001	162SG-08-001	162SG-09-001	162SG-10-001	162SG-11-001	162SG-12-001	162SG-13-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
DIBROMOCHLOROMETHANE	65 U	32 U	65 U	32 U	6.5 U	32 U	65 U
DICHLORODIFLUOROMETHANE	55 UJ	28 UJ	55 UJ	28 UJ	5.5 UJ	28 UJ	55 UJ
DICHLOROTETRAFLUOROETHANE	55 UJ	28 UJ	55 UJ	28 UJ	5.5 UJ	28 UJ	55 UJ
ETHYL ACETATE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
ETHYLBENZENE	50 U	25 U	50 U	25 U	5 U	25 U	**98**
ETHYLENE DIBROMIDE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
HEPTANE	50 U	25 U	50 U	25 U	5 U	25 U	**6,400**
HEXACHLOROBUTADIENE	110 UJ	55 UJ	110 UJ	55 UJ	11 UJ	55 UJ	110 UJ
HEXANE	50 U	25 U	50 U	25 U	5 U	25 U	**73**
ISOPROPYL ALCOHOL	**42,000**	**26,000**	**46,000**	**24,000**	**10,000**	**37,000**	10,000 U
M,P-XYLENE	50 U	25 U	50 U	25 U	5 U	25 U	**140**
METHYL-T-BUTYL ETHER	50 U	25 U	50 U	25 U	5 U	25 U	50 U
METHYLENE CHLORIDE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
O-XYLENE	50 U	25 U	50 U	25 U	5 U	25 U	**82**
PROPYLENE	100 U	50 U	100 U	50 U	10 U	50 U	100 U
STYRENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
TETRACHLOROETHENE	50 U	**32**	**76**	25 U	5 U	25 U	50 U
TETRAHYDROFURAN	50 U	**110**	**130**	**98**	**110**	**67**	50 U
TOLUENE	50 U	25 U	50 U	25 U	**6.2**	25 U	**450**
TRANS-1,2-DICHLOROETHENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
TRANS-1,3-DICHLOROPROPENE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
TRICHLOROETHENE	**3,700**	**4,200**	**1,900**	25 U	**7.5**	**2,200**	**12,000**
TRICHLOROFLUOROMETHANE	50 U	25 U	50 U	25 U	5 U	**28**	**110**
TRICHLOROTRIFLUOROETHANE	**220**	**790**	**130**	**74**	6 U	30 U	60 U
VINYL ACETATE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
VINYL BROMIDE	50 U	25 U	50 U	25 U	5 U	25 U	50 U
VINYL CHLORIDE	50 U	25 U	50 U	25 U	5 U	25 U	50 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-14	162SG-15	162SG-16	162SG-16	162SG-17	162SG-18	162SG-19
Sample ID	162SG-14-001	162SG-15-001	162SG-16-001	162SG-16-002	162SG-17-001	162SG-18-001	162SG-19-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/27/2006	01/27/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
1,1,1-TRICHLOROETHANE	25 U	100 U	25 U	**10**	50 U	50 U	50 U
1,1,2,2-TETRACHLOROETHANE	30 UJ	120 UJ	30 UJ	12 UJ	60 UJ	60 UJ	60 UJ
1,1,2-TRICHLOROETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,1-DICHLOROETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,1-DICHLOROETHENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,2,4-TRICHLOROBENZENE	100 UJ	400 UJ	100 UJ	40 UJ	200 UJ	200 UJ	200 UJ
1,2,4-TRIMETHYLBENZENE	25 UJ	100 UJ	25 UJ	10 UJ	50 UJ	50 UJ	50 UJ
1,2-DICHLOROBENZENE	50 UJ	200 UJ	50 UJ	20 UJ	100 UJ	100 UJ	100 UJ
1,2-DICHLOROETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,2-DICHLOROPROPANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,3,5-TRIMETHYLBENZENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,3-BUTADIENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
1,3-DICHLOROBENZENE	50 UJ	200 UJ	50 UJ	20 UJ	100 UJ	100 UJ	100 UJ
1,4-DICHLOROBENZENE	50 UJ	200 UJ	50 UJ	20 UJ	100 UJ	100 UJ	100 UJ
1,4-DIOXANE	28 U	110 U	28 U	11 U	55 U	55 U	55 U
2,2,4-TRIMETHYLPENTANE	25 U	**400**	25 U	10 U	50 U	50 U	50 U
2-BUTANONE	**66**	100 U	25 U	**17**	50 U	**64**	50 U
2-HEXANONE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
3-CHLOROPROPENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
4-ETHYL TOLUENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
4-METHYL-2-PENTANONE	**150**	100 U	**52**	**34**	**160**	**150**	**170**
ACETONE	**160**	400 U	100 U	**41**	200 U	200 U	**8,500**
BENZENE	25 U	**140**	25 U	10 U	50 U	50 U	50 U
BENZYL CHLORIDE	50 U	200 U	50 U	20 U	100 U	100 U	100 U
BROMODICHLOROMETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
BROMOFORM	25 U	100 U	25 U	10 U	50 U	50 U	50 U
BROMOMETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CARBON DISULFIDE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CARBON TETRACHLORIDE	28 U	110 U	28 U	11 U	55 U	55 U	55 U
CHLOROBENZENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CHLOROETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CHLOROFORM	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CHLOROMETHANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CIS-1,2-DICHLOROETHENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CIS-1,3-DICHLOROPROPENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
CYCLOHEXANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-14	162SG-15	162SG-16	162SG-16	162SG-17	162SG-18	162SG-19
Sample ID	162SG-14-001	162SG-15-001	162SG-16-001	162SG-16-002	162SG-17-001	162SG-18-001	162SG-19-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/27/2006	01/27/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)							
DIBROMOCHLOROMETHANE	32 U	130 U	32 U	13 U	65 U	65 U	65 U
DICHLORODIFLUOROMETHANE	28 UJ	110 UJ	28 UJ	11 UJ	55 UJ	55 UJ	55 UJ
DICHLOROTETRAFLUOROETHANE	28 UJ	110 UJ	28 UJ	11 UJ	55 UJ	55 UJ	55 UJ
ETHYL ACETATE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
ETHYLBENZENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
ETHYLENE DIBROMIDE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
HEPTANE	25 U	**170**	25 U	10 U	50 U	50 U	50 U
HEXACHLOROBUTADIENE	55 UJ	220 UJ	55 UJ	22 UJ	110 UJ	110 UJ	110 UJ
HEXANE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
ISOPROPYL ALCOHOL	**30,000**	20,000 U	5,000 U	**7,100**	**39,000**	**42,000**	**43,000**
M,P-XYLENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
METHYL-T-BUTYL ETHER	25 U	100 U	25 U	10 U	50 U	50 U	50 U
METHYLENE CHLORIDE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
O-XYLENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
PROPYLENE	50 U	200 U	50 U	20 U	100 U	100 U	100 U
STYRENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
TETRACHLOROETHENE	**53**	100 U	25 U	**13**	50 U	**150**	50 U
TETRAHYDROFURAN	**120**	100 U	25 U	**24**	**100**	**120**	**95**
TOLUENE	**30**	100 U	25 U	10 U	50 U	50 U	50 U
TRANS-1,2-DICHLOROETHENE	25 U	100 U	25 U	**13**	50 U	50 U	50 U
TRANS-1,3-DICHLOROPROPENE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
TRICHLOROETHENE	**11,000**	**8,300**	**4,500**	**4,300**	**72**	**740**	50 U
TRICHLOROFLUOROMETHANE	**100**	100 U	25 U	10 U	50 U	50 U	50 U
TRICHLOROTRIFLUOROETHANE	**41**	**280**	**340**	**250**	60 U	**66**	60 U
VINYL ACETATE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
VINYL BROMIDE	25 U	100 U	25 U	10 U	50 U	50 U	50 U
VINYL CHLORIDE	25 U	100 U	25 U	10 U	50 U	50 U	50 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-20	162SG-21
Sample ID	162SG-20-001	162SG-21-001
Sample Date	01/26/2006	01/27/2006
Matrix	AIR	AIR
EPA TO-15 (UG/M3)		
1,1,1-TRICHLOROETHANE	25 U	50 U
1,1,2,2-TETRACHLOROETHANE	30 UJ	60 UJ
1,1,2-TRICHLOROETHANE	25 U	50 U
1,1-DICHLOROETHANE	25 U	50 U
1,1-DICHLOROETHENE	25 U	50 U
1,2,4-TRICHLOROBENZENE	100 UJ	200 UJ
1,2,4-TRIMETHYLBENZENE	25 UJ	50 UJ
1,2-DICHLOROBENZENE	50 UJ	100 UJ
1,2-DICHLOROETHANE	25 U	50 U
1,2-DICHLOROPROPANE	25 U	50 U
1,3,5-TRIMETHYLBENZENE	25 U	50 U
1,3-BUTADIENE	25 U	50 U
1,3-DICHLOROBENZENE	50 UJ	100 UJ
1,4-DICHLOROBENZENE	50 UJ	100 UJ
1,4-DIOXANE	28 U	55 U
2,2,4-TRIMETHYLPENTANE	25 U	50 U
2-BUTANONE	**73**	**130**
2-HEXANONE	25 U	50 U
3-CHLOROPROPENE	25 U	50 U
4-ETHYL TOLUENE	25 U	50 U
4-METHYL-2-PENTANONE	**110**	**170**
ACETONE	100 U	200 U
BENZENE	25 U	50 U
BENZYL CHLORIDE	50 U	100 U
BROMODICHLOROMETHANE	25 U	50 U
BROMOFORM	25 U	50 U
BROMOMETHANE	25 U	50 U
CARBON DISULFIDE	25 U	50 U
CARBON TETRACHLORIDE	28 U	55 U
CHLOROBENZENE	25 U	50 U
CHLOROETHANE	25 U	50 U
CHLOROFORM	25 U	50 U
CHLOROMETHANE	25 U	50 U
CIS-1,2-DICHLOROETHENE	25 U	50 U
CIS-1,3-DICHLOROPROPENE	25 U	50 U
CYCLOHEXANE	25 U	50 U

TABLE B-3: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 162 Alameda Point, Alameda, California

Sample Location ID	162SG-20	162SG-21
Sample ID	162SG-20-001	162SG-21-001
Sample Date	01/26/2006	01/27/2006
Matrix	AIR	AIR
EPA TO-15 (UG/M3)		
DIBROMOCHLOROMETHANE	32 U	65 U
DICHLORODIFLUOROMETHANE	28 UJ	55 UJ
DICHLOROTETRAFLUOROETHANE	28 UJ	55 UJ
ETHYL ACETATE	25 U	50 U
ETHYLBENZENE	25 U	50 U
ETHYLENE DIBROMIDE	25 U	50 U
HEPTANE	25 U	50 U
HEXACHLOROBUTADIENE	55 UJ	110 UJ
HEXANE	25 U	50 U
ISOPROPYL ALCOHOL	**22,000**	10,000 U
M,P-XYLENE	25 U	50 U
METHYL-T-BUTYL ETHER	25 U	50 U
METHYLENE CHLORIDE	25 U	50 U
O-XYLENE	25 U	50 U
PROPYLENE	50 U	100 U
STYRENE	25 U	50 U
TETRACHLOROETHENE	25 U	**74**
TETRAHYDROFURAN	**170**	**280**
TOLUENE	25 U	50 U
TRANS-1,2-DICHLOROETHENE	25 U	50 U
TRANS-1,3-DICHLOROPROPENE	25 U	50 U
TRICHLOROETHENE	**1,700**	**3,000**
TRICHLOROFLUOROMETHANE	25 U	50 U
TRICHLOROTRIFLUOROETHANE	**72**	**190**
VINYL ACETATE	25 U	50 U
VINYL BROMIDE	25 U	50 U
VINYL CHLORIDE	25 U	50 U

Notes: Detected analytes are printed in bold.

ID Identification

J Estimated value

U Nondetected

TABLE B-4: SOIL GAS ANALYTICAL RESULTS

Building 163A Alameda Point, Alameda, California

Sample Location ID	163SG-01	163SG-01	163SG-02
Sample ID	163SG-01-001	163SG-01-002	163SG-02-001
Sample Date	01/27/2006	01/27/2006	01/27/2006
Matrix	AIR	AIR	AIR
EPA TO-15 (UG/M3)			
1,1,1-TRICHLOROETHANE	**32**	**14**	**12**
1,1,2,2-TETRACHLOROETHANE	6 UJ	6 UJ	12 UJ
1,1,2-TRICHLOROETHANE	5 U	5 U	10 U
1,1-DICHLOROETHANE	**22**	**9.5**	**52**
1,1-DICHLOROETHENE	5 U	5 U	10 U
1,2,4-TRICHLOROBENZENE	20 UJ	20 UJ	40 UJ
1,2,4-TRIMETHYLBENZENE	**7.1 J**	**6.9 J**	10 UJ
1,2-DICHLOROBENZENE	10 UJ	10 UJ	20 UJ
1,2-DICHLOROETHANE	5 U	5 U	10 U
1,2-DICHLOROPROPANE	5 U	5 U	10 U
1,3,5-TRIMETHYLBENZENE	5 U	5 U	10 U
1,3-BUTADIENE	5 U	5 U	10 U
1,3-DICHLOROBENZENE	10 UJ	10 UJ	20 UJ
1,4-DICHLOROBENZENE	10 UJ	10 UJ	20 UJ
1,4-DIOXANE	5.5 U	5.5 U	11 U
2,2,4-TRIMETHYLPENTANE	5 U	**17**	**21**
2-BUTANONE	**18**	**17**	**84**
2-HEXANONE	5 U	5 U	10 U
3-CHLOROPROPENE	5 U	5 U	10 U
4-ETHYL TOLUENE	5 U	5 U	10 U
4-METHYL-2-PENTANONE	**27**	**18**	**110**
ACETONE	**65**	**51**	**130**
BENZENE	5 U	5 U	10 U
BENZYL CHLORIDE	10 U	10 U	20 U
BROMODICHLOROMETHANE	5 U	5 U	10 U
BROMOFORM	5 U	5 U	10 U
BROMOMETHANE	5 U	5 U	10 U
CARBON DISULFIDE	5 U	5 U	10 U
CARBON TETRACHLORIDE	5.5 U	5.5 U	11 U
CHLOROBENZENE	5 U	5 U	10 U
CHLOROETHANE	5 U	5 U	10 U
CHLOROFORM	**6.8**	5 U	**14**
CHLOROMETHANE	5 U	5 U	10 U
CIS-1,2-DICHLOROETHENE	**260**	**110**	**5,800**
CIS-1,3-DICHLOROPROPENE	5 U	5 U	10 U
CYCLOHEXANE	5 U	5 U	10 U

TABLE B-4: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 163A Alameda Point, Alameda, California

Sample Location ID	163SG-01	163SG-01	163SG-02
Sample ID	163SG-01-001	163SG-01-002	163SG-02-001
Sample Date	01/27/2006	01/27/2006	01/27/2006
Matrix	AIR	AIR	AIR
EPA TO-15 (UG/M3)			
DIBROMOCHLOROMETHANE	6.5 U	6.5 U	13 U
DICHLORODIFLUOROMETHANE	5.5 UJ	5.5 UJ	11 UJ
DICHLOROTETRAFLUOROETHANE	5.5 UJ	5.5 UJ	11 UJ
ETHYL ACETATE	5 U	5 U	10 U
ETHYLBENZENE	5 U	5 U	10 U
ETHYLENE DIBROMIDE	5 U	5 U	10 U
HEPTANE	5 U	5 U	10 U
HEXACHLOROBUTADIENE	11 UJ	11 UJ	22 UJ
HEXANE	5 U	5 U	10 U
ISOPROPYL ALCOHOL	10,000 U	10,000 U	**14,000**
M,P-XYLENE	**7.2**	**7.6**	10 U
METHYL-T-BUTYL ETHER	5 U	5 U	10 U
METHYLENE CHLORIDE	5 U	5 U	10 U
O-XYLENE	**5.6**	**5.4**	10 U
PROPYLENE	10 U	10 U	20 U
STYRENE	5 U	5 U	10 U
TETRACHLOROETHENE	5 U	5 U	10 U
TETRAHYDROFURAN	**16**	**19**	**160**
TOLUENE	**9.1**	**19**	**21**
TRANS-1,2-DICHLOROETHENE	**42**	**18**	**260**
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	10 U
TRICHLOROETHENE	**2,500**	**940**	**9,600**
TRICHLOROFLUOROMETHANE	5 U	5 U	10 U
TRICHLOROTRIFLUOROETHANE	**26**	**14**	12 U
VINYL ACETATE	5 U	5 U	10 U
VINYL BROMIDE	5 U	5 U	10 U
VINYL CHLORIDE	5 U	5 U	10 U

Notes: Detected analyates are printed in bold.

ID Identification

J *Estimated value*

U Nondetected

TABLE B-5: SOIL GAS ANALYTICAL RESULTS

Building 398 Alameda Point, Alameda, California

Sample Location ID	398SG-01	398SG-02	398SG-03	398SG-04	398SG-05	398SG-06
Sample ID	398SG-01-001	398SG-02-001	398SG-03-001	398SG-04-001	398SG-05-001	398SG-06-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)						
1,1,1-TRICHLOROETHANE	**71**	25 U	**32**	**39**	**47**	100 U
1,1,2,2-TETRACHLOROETHANE	60 UJ	30 UJ	12 UJ	30 UJ	30 UJ	120 UJ
1,1,2-TRICHLOROETHANE	50 U	25 U	10 U	25 U	25 U	100 U
1,1-DICHLOROETHANE	50 U	25 U	10 U	25 U	25 U	100 U
1,1-DICHLOROETHENE	50 U	25 U	10 U	25 U	25 U	100 U
1,2,4-TRICHLOROBENZENE	200 UJ	100 UJ	40 UJ	100 UJ	100 UJ	400 UJ
1,2,4-TRIMETHYLBENZENE	50 UJ	25 UJ	10 UJ	25 UJ	25 UJ	100 UJ
1,2-DICHLOROBENZENE	100 UJ	50 UJ	20 UJ	50 UJ	50 UJ	200 UJ
1,2-DICHLOROETHANE	50 U	25 U	10 U	25 U	25 U	100 U
1,2-DICHLOROPROPANE	50 U	25 U	10 U	25 U	25 U	**190**
1,3,5-TRIMETHYLBENZENE	50 U	25 U	10 U	25 U	25 U	100 U
1,3-BUTADIENE	50 U	25 U	10 U	25 U	25 U	100 U
1,3-DICHLOROBENZENE	100 UJ	50 UJ	20 UJ	50 UJ	50 UJ	200 UJ
1,4-DICHLOROBENZENE	100 UJ	50 UJ	20 UJ	50 UJ	50 UJ	200 UJ
1,4-DIOXANE	55 U	28 U	11 U	28 U	28 U	110 U
2,2,4-TRIMETHYLPENTANE	50 U	25 U	10 U	25 U	25 U	**630**
2-BUTANONE	**130**	**140**	**66**	**77**	**120**	100 U
2-HEXANONE	50 U	25 U	10 U	25 U	25 U	100 U
3-CHLOROPROPENE	50 U	25 U	10 U	25 U	25 U	100 U
4-ETHYL TOLUENE	50 UJ	25 UJ	10 UJ	25 UJ	25 UJ	100 UJ
4-METHYL-2-PENTANONE	**97**	**71**	**42**	**62**	**81**	100 U
ACETONE	200 U	**130**	**89**	100 U	100 U	400 U
BENZENE	50 U	25 U	10 U	25 U	25 U	**100**
BENZYL CHLORIDE	100 U	50 U	20 U	50 U	50 U	200 U
BROMODICHLOROMETHANE	50 U	25 U	10 U	25 U	25 U	100 U
BROMOFORM	50 U	25 U	10 U	25 U	25 U	100 U
BROMOMETHANE	50 U	25 U	10 U	25 U	25 U	100 U
CARBON DISULFIDE	50 U	25 U	10 U	25 U	25 U	100 U
CARBON TETRACHLORIDE	55 U	28 U	11 U	28 U	28 U	110 U
CHLOROBENZENE	50 U	25 U	10 U	25 U	25 U	100 U
CHLOROETHANE	50 U	25 U	10 U	25 U	25 U	100 U
CHLOROFORM	50 U	25 U	10 U	**27**	25 U	100 U
CHLOROMETHANE	50 U	25 U	10 U	25 U	25 U	100 U
CIS-1,2-DICHLOROETHENE	50 U	25 U	10 U	25 U	25 U	100 U
CIS-1,3-DICHLOROPROPENE	50 U	25 U	10 U	25 U	25 U	100 U
CYCLOHEXANE	50 U	25 U	10 U	25 U	25 U	100 U

TABLE B-5: SOIL GAS ANALYTICAL RESULTS (Continued)

Building 398 Alameda Point, Alameda, California

Sample Location ID	398SG-01	398SG-02	398SG-03	398SG-04	398SG-05	398SG-06
Sample ID	398SG-01-001	398SG-02-001	398SG-03-001	398SG-04-001	398SG-05-001	398SG-06-001
Sample Date	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006	01/26/2006
Matrix	AIR	AIR	AIR	AIR	AIR	AIR
EPA TO-15 (UG/M3)						
DIBROMOCHLOROMETHANE	65 U	32 U	13 U	32 U	32 U	130 U
DICHLORODIFLUOROMETHANE	55 UJ	28 UJ	11 UJ	28 UJ	28 UJ	110 UJ
DICHLOROTETRAFLUOROETHANE	55 UJ	28 UJ	11 UJ	28 UJ	28 UJ	110 UJ
ETHYL ACETATE	50 U	25 U	10 U	25 U	25 U	100 U
ETHYLBENZENE	50 U	25 U	**14**	25 U	25 U	100 U
ETHYLENE DIBROMIDE	50 U	25 U	10 U	25 U	25 U	100 U
HEPTANE	50 U	25 U	10 U	25 U	25 U	**130**
HEXACHLOROBUTADIENE	110 UJ	55 UJ	22 UJ	55 UJ	55 UJ	220 UJ
HEXANE	50 U	25 U	10 U	25 U	25 U	100 U
ISOPROPYL ALCOHOL	**36,000**	**29,000**	**13,000**	**21,000**	**23,000**	**42,000**
M,P-XYLENE	50 U	25 U	**13**	25 U	25 U	100 U
METHYL-T-BUTYL ETHER	50 U	25 U	10 U	25 U	25 U	100 U
METHYLENE CHLORIDE	50 U	25 U	10 U	25 U	25 U	100 U
O-XYLENE	50 U	25 U	10 U	25 U	25 U	100 U
PROPYLENE	100 U	50 U	20 U	50 U	50 U	200 U
STYRENE	50 U	25 U	**16**	25 U	25 U	100 U
TETRACHLOROETHENE	50 U	25 U	**76**	**38**	25 U	100 U
TETRAHYDROFURAN	**270**	**310**	**150**	**180**	**300**	100 U
TOLUENE	50 U	25 U	**13**	25 U	25 U	100 U
TRANS-1,2-DICHLOROETHENE	50 U	25 U	10 U	25 U	25 U	100 U
TRANS-1,3-DICHLOROPROPENE	50 U	25 U	10 U	25 U	25 U	100 U
TRICHLOROETHENE	50 U	25 U	**1,300**	**230**	25 U	100 U
TRICHLOROFLUOROMETHANE	50 U	25 U	10 U	25 U	25 U	100 U
TRICHLOROTRIFLUOROETHANE	60 U	30 U	**16**	30 U	30 U	120 U
VINYL ACETATE	50 U	25 U	10 U	25 U	25 U	100 U
VINYL BROMIDE	50 U	25 U	10 U	25 U	25 U	100 U
VINYL CHLORIDE	50 U	25 U	10 U	25 U	25 U	100 U

Notes: Detected analytes are printed in bold.
- ID Identification
- J Estimated value
- U Nondetected

APPENDIX C
RESPONSES TO REGULATORY AGENCY COMMENTS

RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT TECHNICAL MEMORANDUM, SUBSLAB SOIL GAS INVESTIGATION OF BUILDINGS 14, 113, 162, 163A, AND 398 ALAMEDA POINT, ALAMEDA, CALIFORNIA

This document presents the Navy's responses to comments submitted by the regulatory agencies on the "Draft Technical Memorandum Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda, California," dated July 25, 2006. The comments addressed below were received from U.S. Environmental Protection Agency (EPA) on August 31, 2006; from the Department of Toxic Substances Control (DTSC) Geological Services Unit (GSU) on August 16, 2006; from the DTSC on October 3, 2006.

RESPONSES TO COMMENTS FROM EPA

General Comments

1. **Comment:** **The statistical summaries for each building included in Tables 5 through 9 are helpful, but a summary of detected analytical results by sample location should also be included.**

   Response: The analytical results by sampling location are provided on the compact disc included in the Draft Technical Memorandum. Sorting column Q for blanks will provide a summary of detected results. A summary of the detected analytical results will be included as an appendix in the Draft Final Technical Memorandum.

2. **Comment:** **A table that specifies samples that required dilution and the dilution factor used for those samples is needed to facilitate evaluation of the analytical data. Please provide a table that specifies which samples required dilution and the dilution factor used.**

   Response: A table specifying the samples that required dilution and the dilution factor used will be included in the Draft Final Technical Memorandum.

3. **Comment:** **The significance of the finding that leak testing indicated that leaks were detected in 80 percent of the samples is not discussed, so it is unclear whether the analytical data should be considered biased low. In addition, the significance of this for the human health risk assessment (HHRA) is not discussed. Please discuss the significance of the leak testing results on the analytical data and for the HHRA.**

   Response: Section 3.1 states: "Based on the average IPA concentration detected per building and the leak rate relationship presented, the leak volume introduced ranges from 0.0025 to 0.006 percent." Based on the information provided in the article by Benton and Shafer for evaluating leaks in soil gas, the isopropyl alcohol (IPA) tracer was not detected at concentrations high enough in any samples to affect the results used in the human health risk assessment.

For example, trichloroethane (TCE) was detected at 4,500 micrograms per cubic meter (μg/m$^{3)}$ in sample 162SG16, and the IPA tracer used for leak testing was not detected. A duplicate sample (162SG16 DUP) was also collected at this location. The TCE concentration in the duplicate sample was 4,800 μg/m^3, and the IPA tracer was detected at a concentration of 7.1 micrograms per liter (μg/L). The relative percent difference (RPD) for the duplicate was very low at 4.5 percent, further indicating leaking had a negligible effect on the reported concentrations.

Specific Comments

1. **Comment:** **Section 1.2, Facility Background, Page 2: The fact that Alameda Point was placed on the National Priorities List (NPL) and the date on which this occurred are missing from the summary of site history (facility background). Please include this information.**

Response: The following paragraph will be added to Section 1.2:

"The Navy began investigations of contaminated sites in 1982 under the auspices of the Navy Assessment and Control of Installation Pollutants (NACIP) program. The Navy's procedures and priorities for conducting environmental investigations and cleanups have evolved, partly in response to events such as the closure of NAS Alameda in April 1997, under the Base Closure and Realignment Act, and the designation of Alameda Point as a National Priority List (NPL) site in July 1999 (U.S. Environmental Protection Agency [EPA] 1999). When NAS Alameda was listed for closure, responsibility for the environmental cleanup program at Alameda Point passed to the Base Realignment and Closure (BRAC) Cleanup Team (BCT). At Alameda Point, the BCT comprises representatives from Navy, EPA, and the California Environmental Protection Agency's Department of Toxic Substances Control Board (DTSC) and San Francisco Bay Regional Water Quality Control Board (Water Board). The listing of Alameda Point on the NPL invokes the applicable requirements of the NCP and requires EPA concurrence prior to the final classification of any property as uncontaminated. The Navy and EPA negotiated and signed a Federal Facility Agreement in 2001, and DTSC and Water Board signed the agreement in 2005."

2. **Comment:** **Section 1.5.1, Findings, Site 11, Page 5: The text states that the presence of methylene chloride "is likely the result of laboratory**

contamination," but methylene chloride was used in paint stripping operations and possibly as a solvent for other purposes at Alameda Point. Therefore, it should not be assumed that methylene chloride is only related to laboratory contamination; it should be considered a site contaminant.

Response: Section 1.5.1 of the Draft Final Technical Memorandum will be revised as follows: "Methylene chloride may be associated with solvents used during paint stripping operations at Alameda Point or possibly is the result of laboratory contamination during analysis of samples. Chlorobenzene is likely associated with the petroleum USTs or fuel lines located southwest of Building 14."

3. **Comment:** **Section 2.1, Investigation Objectives, Page 7: The text in the second paragraph in this section states that samples were collected near utility lines, but it appears than only one sample (14SG09) was taken in the immediate vicinity of the utility lines. It is unclear if sample 14SG11 was collected in sufficient proximity to the sanitary sewer line to evaluate whether a preferential pathway is associated with the sanitary sewer line. It also appears that samples could have been collected in the southern portion of Buildings 398 and 162, and that the sample locations could have been closer to utility lines in these buildings.**

Please provide a list of the sample locations, and the distance between each these samples and the closest utility lines to validate the statement that samples were collected near utility lines.

Response: The table below lists the sample probes installed to assess the utilities lines and this table will be added to the Draft Final Technical Memorandum.

Probe Identification No.	Utility Line Investigated	Distance from Probe to Utility Line
14SG09	Fuel line	Within 2 feet
14SG11	Sewer and fuel lines	Within 1 foot of sewer line and within 10 feet of fuel line
162SG02	Sewer line	Within 3 feet
162SG18	Electrical line	Within 3 feet

4. **Comment:** **Section 3.3.2, Building 113, Page 12: The last three sentences appear to compare detected concentrations of carbon tetrachloride, 1,1,2,2-trichlorethane, and vinyl chloride to the environmental screening level (ESL) and the California Human Health screening level (CHHSL) criteria, but based on Table 6, these**

sentences should have compared the reporting limits for these chemicals with the ESL and CHHSL criteria. Please resolve this discrepancy.

Response: The last three sentences of Section 3.3.2 are correct as written. As shown in the second column (Number of Detections) of Table 6, carbon tetrachloride, 1,1,2,2-trichlorethane, and vinyl chloride were not detected in the three samples collected from Building 113. However, for more clarification, the text will be revised as follows: "Carbon tetrachloride, 1,1,2,2-trichloroethane (1,1,2,2-TCA) and vinyl chloride were not detected in the sample collected from probe 113SG03; however, the reporting limit exceeded the screening criteria. The reporting limit for carbon tetrachloride exceeded the CHHSL but did not exceed the ESL. The reporting limit for 1,1,2,2-TCA exceeded the ESL and no CHHSL is available for this chemical. The reporting limit for vinyl chloride exceed both the ESL and CHHSL value.

5. **Comment:** **Section 3.3.3, Building 162, Page 12 and Figure 6 Soil Gas Results, Building 113, 162 and 398: When trichloroethene (TCE) data presented in the inset table on page 12 and the data provided in the Soil Gas Results Excel ™ file are plotted to evaluate the spatial distribution of contaminants, it appears that the dilution of samples may be influencing the results and the spatial distribution of TCE concentrations. For example, sample number 162SG02 has a reported analytical value of 320 micrograms per cubic meter (ug/m3), but the samples located adjacent to the west (162SG01), south (162SG07), and east (162SG03), of 162SG02 have results that are approximately ten times greater or 3000 ug/m3, 3700 ug/m3, 3600 ug/m3, respectively. The TCE concentration at 162SG02 appears low. Please verify that the 320 ug/m3 result is accurate for location 162SG02.**

Also, please indicate if diluted samples were multiplied by the dilution factor when reported in the analytical results file.

Response: The analysis of TCE in the sample collected from location 162SG02 was reviewed and the TCE concentration of 320 micrograms per cubic meters is correct.

The results in the analytical results file have been multiplied by the dilution factor.

6. **Comment:** **Table 1, Data Quality Objectives: It is unclear how the second Data Quality Objective (DQO) listed in Table 1 under Step 2, "Identify the Decision," has been addressed in this investigation. The second objective for this step states, "Are utility corridors a preferential pathway for transport of VOCs (volatile organic compounds) vapors**

into these buildings?" However, there is no indication in the text that this objective was addressed during the investigation because only one sample was collected in the immediate vicinity of a utility corridor. Please explain how this objective was addressed and specify the sample locations and the results of analyses that answer this question.

Response: The objective of Step 2 in Table 1 was achieved by installing soil gas probes at the following locations:

- Probe 14SG11 installed to assess the sanitary sewer line and fuel lines.
- Probe 14SG09 installed to assess the fuel line.
- Probe 162SG02 installed to assess the sewer line (6-inch diameter) coming up through the slab foundation (not shown on Figure 6); this probe was installed within 3 feet of the sewer line.
- Probe 162SG18 installed to assess electrical lines identified by the utility locating subcontractor.

Utilities lines are not present beneath Buildings 113 and 163A, and the fuel lines shown beneath Building 398 could not be located by the utility locating subcontractor. As a result, soil gas probes were not needed to address Step 2 for Buildings 113, 163A, and 398.

As shown on Figures 5 and 6, volatile organic compounds (VOC) detected in soil gas are not clustered near the utility lines nor are they detected at higher concentrations compared with other probe locations. As a result, the utility lines do not appear to be a preferential pathway of VOCs.

7. **Comment:** **Soil Gas Results File: The laboratory and data validation qualifiers used in this file should be defined in the text and within the file. In addition, the soil gas results file should be included in this document as a hard copy. Please include a hard copy of analytical results presented in the Soil Gas Results file and provide definitions of laboratory qualifiers used in this file in the text and in this file.**

Response: The laboratory and data validation qualifiers are provided on the statistical summary tables (see Tables 5 through 9), and will be provided in the soil gas results file in the Draft Final Technical Memorandum.

RESPONSES TO COMMENTS FROM DTSC

General Comments

1. **Comment:** **Naphthalene should be added to the list of analytes for the next round of subslab soil gas sampling. Naphthalene can apparently be accurately measured by EPA method TO-15 as long as correct naphthalene standards with appropriate moisture content are used.**

The process for identifying soil gas compounds to carry forward in the determination of risk and/or hazard should be amended to include several more compounds.

Response: Table B-1 of the work plan (SulTech 2005) provides the list of analytes that will be analyzed for by TO-15, which was reviewed by the regulatory agencies. Naphthalene is not included on Table B-1; therefore, it was not analyzed for. The Navy will add naphthalene to the analyte list for the second round of soil gas sampling.

The process for identifying soil gas compound has been amended to include all detected compounds.

Specific Comments

1. **Comment:** **Given the extensive area of Alameda Point with low level soil concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) previously studied (Section 1.5.1, page 4), naphthalene should be added to the list of analytes for the next round of subslab soil gas sampling. Naphthalene can apparently be accurately measured by EPA method TO-15 being used in this investigation as long as correct naphthalene standards with appropriate moisture content are used (http://www.airtoxics.com/literature/AirToxics8260vTO15.pdf).**

Response: Please see the response to General Comment 1 for DTSC.

2. **Comment:** **The Technical Memorandum states that the Sampling and Analysis Plan indicated that the soil gas probe would consist of a 0.25-inch diameter brass or stainless steel pipe with a permeable probe tip. Instead, all 42 tubes installed for the investigation were constructed with polyethylene tubing with a permeable probe tip. Please provide a detailed explanation of why this substitution was made (Section 2.5, page 9).**

Response: Flexible polyethylene tubing was used instead of the ridged brass or stainless steel pipe because it is easier to install. Polyethylene tubing is inert and commonly used for soil gas studies and an acceptable material to use when analyzing for VOCs. Additional text will be added to the Draft Final Technical Memorandum explain this substitution.

3. **Comment:** **Please indicate whether the chlorinated solvent plume boundary (Figure 3) refers to concentrations of chlorinated solvents in groundwater or in soil gas. Figure 3 presents the extent of volatile organic compounds (VOC) concentrations in soil, groundwater and Non-Aqueous Phase Liquid (NAPL) (Section 1.5.1, page 6), as**

bounded areas encompassing all or a portion of the buildings evaluated in the Technical Memorandum. However, no soil gas sample points are indicated outside the demarcated area of the chlorinated solvent plume. Thus, the basis by which the Navy defined the boundaries is unclear, or if the boundaries are defined by soil gas or by groundwater.

Response: Figure 3 presents total VOC concentrations detected in soil gas samples collected at OU2B. The chlorinated solvent plume boundaries shown on Figure 3 are based on concentrations of chlorinated solvents detected in groundwater at OU2B. The "Chlorinated Solvent Plume" text in the legend on Figure 3 will be changed to "Chlorinated Solvent Plume in Groundwater."

4. **Comment** **A single concentration inhalation screening criterion (Table 10) should not be used to select a significantly reduced set of Contaminants of Concern (COCs) (Tables 11 through 15). Certainly, VOCs detected at concentrations orders of magnitude less than a protective inhalation screening criterion may be eliminated from this site investigation to concentrate on the VOCs contributing the majority of risk and/or hazard. However, VOCs detected at significant fractions of the inhalation screening criterion (e.g., one twentieth [0.05] the inhalation screening criterion) must be carried through any evaluation of inhalation risk and/or hazard or a complete multi-pathway Human Health Risk Assessment (HHRA). Using one twentieth the inhalation screening criterion would add the following COCs to the risk and/or hazard drivers:**

Additional VOCs Based on one-twentieth the inhalation screening criterion	
Building 14	**Benzene, trichloroethene**
Building 113	**1,2,4-trimethylbenzene, tricloroethene**
Building 162	**1,2,4-trimethylbenzene, tetrachloroethene**
Building 163A	**1,2,4-trimethylbenzene, cis-1,2-dichloroethene**
Building 398	**1,2-dichloropropane, benzene, tetrachloroethene, trichloroethene**

Response: For the Draft Final Technical Memorandum, all detected VOCs will be evaluated for the indoor air vapor intrusion pathway. For VOCs without physical, chemical, or toxicological information, appropriate surrogates will be selected.

5. **Comment:** **HERD was able to approximate the attenuation factors listed (Section 4.3.4, page 16) for several of the buildings evaluated using the**

Johnson and Ettinger model parameters provided (Table 16). Please provide a copy of the Johnson and Ettinger DATAENTER, INTERCALCS and RESULTS worksheets for HERD review prior to preparation of the Draft Final Technical Memorandum. These worksheets can be furnished informally via electronic mail to jpolisin@dtsc.ca.gov.

Response: The worksheets will be provided for HERD review.

6. **Comment:** **The cancer risk and non-cancer hazard values presented in the text are those presented in the detailed table (Table 17). Final review of the inhalation risk and/or hazard for VOCs detected in soil gas cannot be completed until the COCs are amended (Specific Comment number 4) and the Johnson and Ettinger worksheets requested (Specific Comment number 5) are provided.**

Response: Please see the response to DTSC Specific Comments 4 and 5.

7. **Comment:** **The statistical methods applied (Helsel, 2005) to calculate the Exposure Point Concentration (EPC) using samples reported as 20 to 85 percent non-detect (Tables 11 through 15, footnote b) have not yet been validated by HERD. However, given the relative small difference between the maximum concentration and the calculated EPC using these methods HERD accepts the application of these methods for this investigation.**

Response: Comment noted.

8. **Comment:** **The process for identification of soil gas compounds to carry forward in determination of inhalation risk and/or hazard should include compounds which were detected at significant fractions of the screening criteria.**

Response: See response to Specific Comment 4 from DTSC.

9. **Comment:** **Several Johnson and Ettinger worksheets should be submitted to DTSC HERD for verification of the attenuation factors to complete this review. These worksheets can be forwarded informally to jpolisin@dtsc.ca.gov.**

Response: See response to Specific Comment 5 from DTSC.

10. **Comment:** **This assessment of current inhalation risk in an industrial scenario provides a focused evaluation of the inhalation exposure pathway under current conditions. The HHRA of the area of Operable Unit 2B influenced by the VOC contamination should include a residential (unrestricted use) scenario to evaluate whether land use restrictions are necessary as part of any final remedial action.**

Response: Comment noted. The evaluation of whether land use restrictions are necessary as part of any final remedial action is outside to scope of this investigation.

RESPONSES TO COMMENTS FROM DTSC GEOLOGICAL SERVICES UNIT (GSU)

General Comments

1. **Comment:** **The Technical Memorandum should provide supporting field documentation such as daily field logs, audit reports, daily quality control reports, and field instrumentation calibration logs. Please provide copies of the raw analytical data from the laboratory including information regarding the condition of samples upon receipt and chain-of-custody records. Please also provide the output data files from the vapor intrusion modeling. This information may be provided separately in hard copy or on a compact disk to DTSC only, if the other agencies do not wish to review the supporting documentation.**

Response: Copies of the field logbook, field data sheets, chain-of-custody forms, laboratory analytical reports, data validation reports, and data files from the vapor intrusion modeling will be provided on a compact disc in the Draft Final Technical Memorandum. Audit reports and quality control reports were not requirements of the work plan (SulTech 2005). Field instruments were not required to perform the soil gas sampling; therefore, field instrument calibration logs were not required.

Specific Comments

1. **Comment:** **<u>Section 1.0 – Introduction</u>. Please provide the dates/duration of the sampling event discussed in this document and the proposed dates for the second sampling event.**

Response: The first round of soil gas sampling began on January 26, 2006 and completed on January 28, 2006. The second round of soil gas sampling is schedule for the last week of September 2006. This information will be added to Section 1.0 of the Draft Final Technical Memorandum.

2. **Comment:** **<u>Section 2.1 – Investigation Objectives</u>. The SAP specified that additional soil gas probes would be installed in fill material where utility lines enter the buildings, if present. The draft Technical Memorandum states that soil gas samples were collected from fill near utility lines beneath the buildings. However, the probes that were installed to evaluate utility lines are not identified. Please clarify which buildings contained utility lines that were targeted for sampling, and identify which sample probes were installed to investigate these utility lines.**

Response: Buildings 14 and 162 contained utility lines that were targeted for sampling. Please also see the response to EPA Specific Comments 3 and 6.

3. **Comment:** **<u>Section 2.3.1 – Probe Installation</u>. The following comments pertain to this section:**

- **Please provide the dates of probe installation.**
- **There are differences in the information provided on the diagrams in Figures 4 (Conceptual Diagram) and 8 (Schematic Diagram). For example, Figure 8 indicates metal tubing while Figure 4 indicates polyethylene tubing. Also, the thickness information for the concrete slab and subslab fill differ. Schematic and conceptual diagrams are useful in the planning stages of a project, but not after the field work has been completed. Please use consistent information on these diagrams and use the illustration that most correctly depicts the subslab soil gas probes that were installed for this investigation.**

Response: The probe installation dates are provided in Table 2 of the Draft Technical Memorandum. The inconsistencies between Figures 4 and 8 will be corrected.

4. **Comment:** **<u>Section 2.3.2 – Soil Gas Sampling</u>. Please provide the dates of soil gas sample collection.**

Response: The Draft Final Technical Memorandum will contain the field sampling sheet, which includes the sampling dates.

5. **Comment:** **<u>Section 2.4 – Analytical Methods</u>. Please clarify why the laboratory used to analyze the soil gas samples was not included on the list of approved laboratories provided in Appendix D of the SAP, and verify that the selected laboratory meets the qualifications specified in the SAP.**

Response: H&P Mobile Geochemistry (H&P), the laboratory that performed the analyses, is an EPA-certified laboratory and meets all the qualifications that were specified in the SAP.

6. **Comment:** **<u>Section 2.5 – Deviations from Sampling and Analysis Plan</u>. The following comments pertain to this section:**

- **It appears that, in addition to the omission of sample 14SG07, some of the probe locations in Building 14 were changed from the original locations specified in the final SAP. Please clarify the reasons that sample locations in Building 14 were moved from the proposed locations specified in the SAP.**
- **The soil gas probes were purged using a syringe rather than a vacuum pump as specified in the SAP. Please discuss this and any other deviations from the purging and sampling methodologies specified in the SAP.**

Response: The following two bullets will be added to Section 2.5 of the Draft Final Technical Memorandum:

- Some of the probe locations in Building 14 were moved to assess if the utility corridors are a preferential pathway for transport of VOCs (see Table 1, Step 2, Item 2). As stated in Section 1.2.1 of the SAP (SulTech 2005): "Additionally, soil gas samples will be collected from the fill near utility lines beneath these buildings, if utilities are present beneath the foundation." As a result, probe 14SG01 was moved to target both the sanitary sewer and fuel lines, and probe 14SG09 was moved to target the fuel lines.
- Section 2.2.1 of the SAP indicated three purge volumes would be extracted using a vacuum pump before sampling to ensure stagnant or ambient air is removed before the sampling system (SulTech 2005b). However, a syringe was used instead of a vacuum pump to extract the three purge volumes.

7. **Comment:** **<u>Section 3.2 – Data Quality</u>. Please clarify that none of the soil gas data from this investigation were rejected during data validation.**

Response: None of the soil gas data were rejected during the data validation. The Draft Final Technical Memorandum will provide the data validation reports on the compact disc included with the document.

8. **Comment:** **<u>Section 4.1 – Selection of Chemicals of Potential Concern</u>. Chemicals that were detected at concentrations below their respective screening criteria were not considered chemicals of potential concern (COPCs) for this investigation. It appears that chemicals that were not selected**

as COPCs were not carried through the human health risk assessment. This methodology may be questionable because the risks contributed by individual chemicals are cumulative. GSU defers to the Human and Ecological Risk Division as to whether or not this methodology is appropriate for the risk evaluation presented in this document.

Response: See response to Specific Comment 4 from DTSC.

REFERENCES

Department of Toxic Substances Control (DTSC). 2006. "Review of Technical Memorandum, Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A, and 398, Alameda Point, Alameda County." From Dot Lofstrom, Project Manager. To Mr. Thomas L. Macchiarella, Code BPMOW.TLM. October 3.

Sullivan Consulting Group and Tetra Tech EM, Inc (SulTech). 2005. "Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan), Subslab Soil Gas Investigation of Buildings 14, 113, 162, 163A and 398, Alameda Point Alameda, California." November 18.

U.S. Environmental Protection Agency. 2006. "Technical Memorandum Subslab Soil Gas Investigation of Building 14, 113, 162, 163A, and 398, Alameda Point." From Anna-Marie Cook, Remedial Project Manager. To Mr. Thomas L. Macchiarella, Code 06CA.TM. August 31.