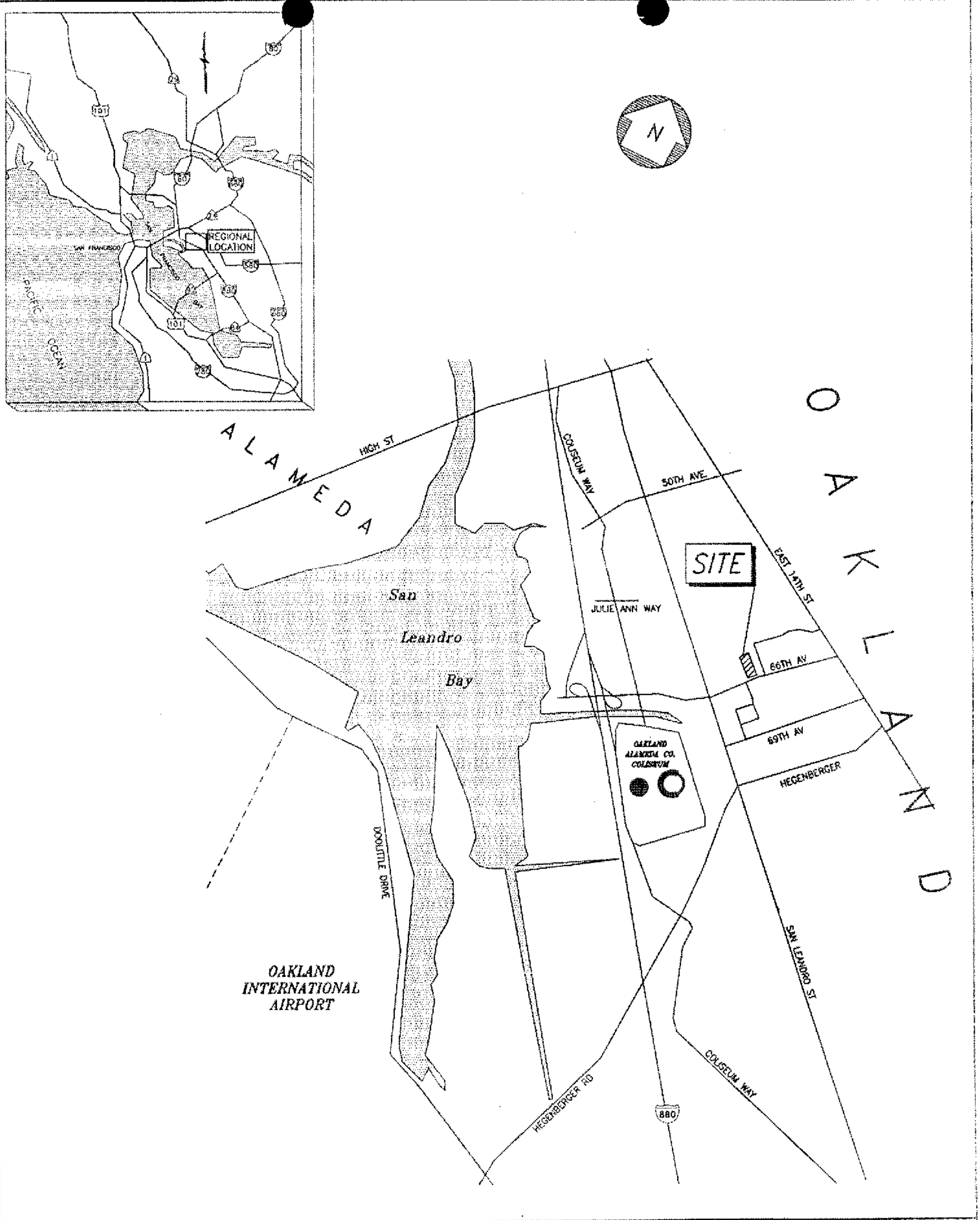
Ro 411



CSS

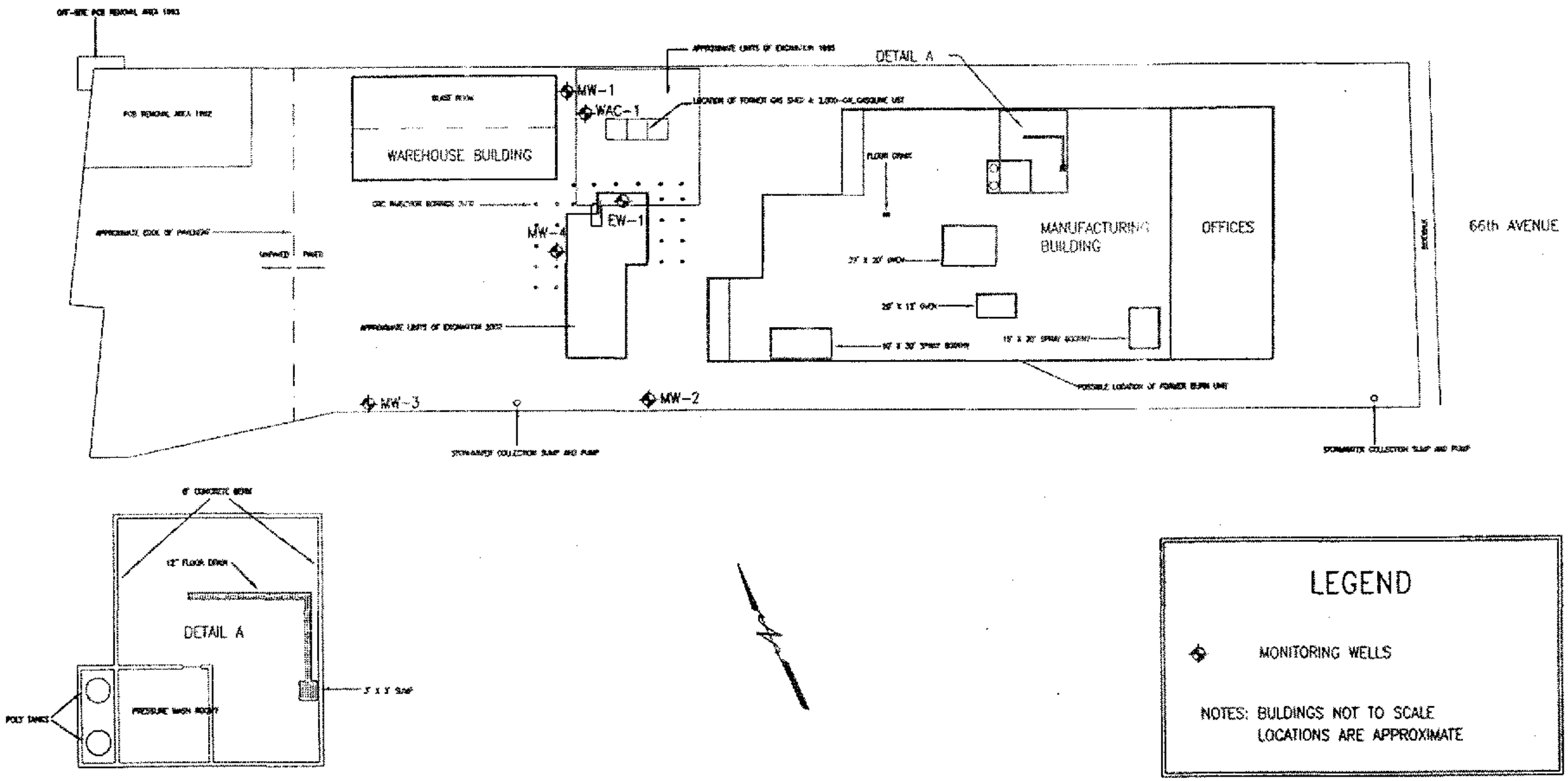
CSS ENVIRONMENTAL SERVICES, INC.

SITE LOCATION MAP

PROPOSED ASPIRE CHARTER SCHOOL SITE
1009 66TH AVENUE, OAKLAND, CA.
OAKLAND, CA 94610

JOB NUMBER	DATE	DRAWING	BY	REVISED
6287	12/04	6287LOC	JL/ZS	01/05

FIGURE
1



SCALE

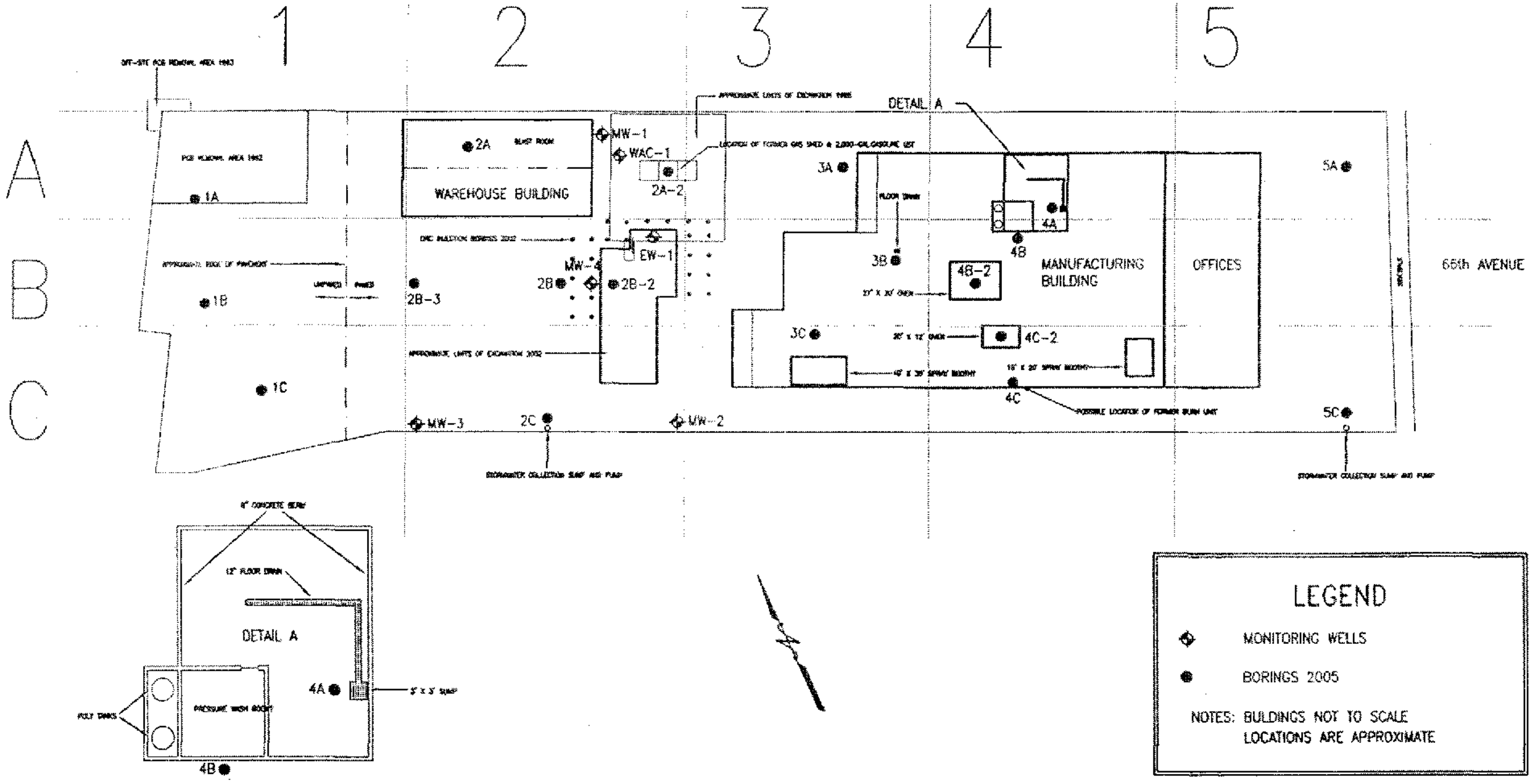
FEET 0 100 FEET

CSS

CSS ENVIRONMENTAL SERVICES, INC.

SITE PLAN AND MONITORING WELL LOCATIONS
PROPOSED ASPIRE CHARTER SCHOOL SITE
1009 66th AVENUE
OAKLAND, CALIFORNIA

JOB NUMBER	DATE	DRAWING	BY	REVISED	FIGURE
6287	01/05	PLAN	CSS	01/05	2



SCALE

FEET 0 100 FEET

CSS

CSS ENVIRONMENTAL SERVICES, INC.

SAMPLING LOCATIONS
PROPOSED ASPIRE CHARTER SCHOOL SITE
1009 66th AVENUE
OAKLAND, CALIFORNIA

JOB NUMBER	DATE	DRAWING	BY	REVISED
6287	01/05	PLAN	CSS	02/05

FIGURE
3

1.0 INTRODUCTION

Aspire Public Schools (Aspire), a not-for-profit organization, opens and operates public charter schools in California. Aspire wishes to acquire the 2.51-acre subject property (APN: 041-4056-003) from its current owner, Modad Properties, LLC, and develop a charter high school thereon. The location and layout of the subject property is shown on Figure 1 site Location Map and Figure 2 Site Plan. DTSC contracted CSS Environmental Services, Inc. (CSS) to: 1) assist in completing the Preliminary Endangerment Assessment (PEA) Workplan (CSS, 2005), 2) implementing the field investigation, and 3) preparing this PEA Report. The PEA Workplan was approved by DTSC is a letter dated March 4, 2005. This PEA Report was prepared in accordance with the guidelines of the DTSC, as detailed in the PEA Guidance Manual (DTSC, 1994) and associated DTSC guidance documents.

1.1 Summary PEA Sampling Activities and Results

On March 8 and 9 2005, PEA field activities were conducted at the site to evaluate the potential presence of chemical constituents in soil gas, soil, and groundwater. Table 1 presents the analytical dataq summary and Figure 3 provides the sample locations. Section 6 of this report provides a detailed description of field activities. A summary of the sample collection activities follows.

- Active soil gas samples were collected at depths of 3 to 5 feet below ground surface (bgs) at 16 locations. The soil gas samples were analyzed for VOCs by modified USEPA Method 8260B and for methane and hydrogen sulfide by a hand-held instruments. Table 1 provides the sample identification and analytical results.

  Tetrachloroethene was detected at one of the 16 soil gas sampling locations at a concentration of 1.1 µg/L. Benzene was found at 3 locations at concentrations ranging from 0.14 µg/L to 9.3 µg/L. At sample location 2B, toluene was detected at 1.7 µg/L sample; ethylbenzene at 1.6 µg/L; m,p-xylene at 5.7 µg/L, o-xylene at 1.0 µg/L, and MTBE at 1.3 µg/L; MTBE was also detected at 1.3 µg/L at location 2B-2.
- Soil matrix samples were collected from 19 locations and corresponding depths bgs and analytical results as shown in Tables 2, 3, 4, and 5.

  Hexavalent chromium was detected in 2 of 2 samples and nine Title 22 metals were detected in soil matrix samples. Arsenic was detected at a maximum concentration of 66 mg/kg and lead was detected in two samples at 320 mg/kg and 398 mg/kg. Dioxins were detected in 2 of 3 soil samples. The highest concentrations of VOCs were detected in soils near the former UST remediation area (location 2B, Figure 3). Benzene at this location was detected at 7,622 µg/kg. PCBs were detected at location 4B at 69,681 µg/kg and 21, 337 µg/kg at location 1C, followed by much lower detection at 6 locations. The highest concentrations of SVOCs were detected at locations 2B, 2B-2 and 5C. The SVOC benzo(a) pyrene, was detected at 4,534 μg/kg, 9,525 μg/kg, and 3,316 μg/kg at these locations, respectively. TPHs as gasoline was detected at 2 location (2B and 2B-3) at relatively moderate concentrations ranging from 1.2 mg/kg to 943 mg/kg. TPHs as oil was detected at 9 of 19 locations with concentrations ranging from 84 mg/kg to 1,556 mg/kg. No TPHs as diesel petroleum hydrocarbons were detected in soil samples.

- Groundwater samples were collected from 6 boring locations and from the 5 site groundwater monitoring wells. Tables 6 and 7 lists the sample location and analytical results for groundwater samples.

  SVOCs and VOCs were not detected in groundwater samples except in monitoring well MW-4. PCBs were detected at 2 location (1A and 1C) at 1.7 μg/L and 2 μg/L, respectively. Gasoline-range TPHs was detected at 3 well locations with concentrations ranging from 105 μg/L to 152,237 μg/L in well MW-4. Well MW-4, located adjacent to the former UST soil excavation area, has historically had the highest contaminate concentrations in groundwater. Oil-range TPHs were detected at 1 boring location (2C) with a concentration of 2,184 μg/L. This location is near the stormwater collection and pumping sump (Figure 3). No diesel range TPHs were detected in samples collected form boring or wells.

1.2 Summary Screening –Level Risk Evaluations

A detailed risk evaluation for this PEA is provided in Section 7; a summary of findings is presented below. The risk assessment results indicate that past activities at the site have impacted the environment and pose an unacceptable cancer risk (greater than 1.0E-04) and noncarcer hazard index (greater than 1). The pertinent carcinogenic risk drivers identified at the site are summarized below. Table 15 presents a compilation of site data used in the risk assessment.

Receptor Group	**Chemicals of Potential Concern (COPC)**	**Exposure Pathway Driving Risk**	**Total Risk From All Pathways**
Residential Receptors	VOC – benzene	Inhalation	1.07E-04
	PCBs	Dermal, Ingestion	8.04E-04
	SVOCs–benzo(a) pyrene	Dermal, Ingestion	2.64E-04
	Arsenic	Dermal, Ingestion	1.07E-03

Noncarcinogenic effects of chemicals are presented in Table 16. The estimated noncancer HIs for future onsite residents, both children and adults is shown in the Table 16. As indicated, the total HI for the onsite resident child is 28.6, and the total HI for the onsite adult is 4.56. The majority of the total noncancer hazard is attributable to PCBs. Other chemicals that contribute to the noncancer hazard include benzene and naphthalene.

Based on the maximum detected soil lead concentration of 398 mg/kg, the DTSC's Leadspread model predicts 99th percentile blood lead concentrations of 7.1 µg/dl for the adult resident and 15.8 µg/dl for the child resident. The predicted blood lead level for the child exceeds the target level of 10 µg/dl.

The ecological screening evaluation results indicated that it does not appear to be a significant pathway of exposure to non-human sensitive ecological species. The site is located within an inner- city area. Significant natural areas of habitat are not found on or adjacent to the site.

7.0 HUMAN HEALTH SCREENING EVALUATION

The purpose of the Human Health Screening Evaluation is to determine whether historical activities at the site have resulted in releases of chemicals that could adversely impact the health of school children or staff that will be present at the proposed Aspire Charter High School. Consistent with standard risk assessment guidance, a human health risk assessment consists of five major steps:

- Identification of Potentially Exposed Populations and Exposure Pathways;
- Chemical Selection and Quantification of Exposure;
- Toxicity Assessment;
- Risk Characterization; and
- Uncertainty Analysis.

The first step in this screening evaluation is to identify the populations who may be exposed to chemicals detected on site, and describe the complete pathways through which the exposures may occur. The second step is to identify the chemicals to be included in the risk assessment, and quantify the amount of chemical exposure that the populations may incur. The third step involves the selection of the appropriate toxicity values for each of the chemicals of concern. The fourth step integrates the exposure components and the toxicity information to calculate the risk and hazard for each chemical included in this assessment. The final step summarizes the basic assumptions and uncertainties of the human health screening evaluation.

7.1 Identification of Potentially Exposed Populations and Exposure Pathways

To assess whether the levels of chemicals present at the site would pose a risk to human populations, it is necessary to identify both the populations that may be present at the site and the pathways through which the potential exposures may occur. The identification of the potentially exposed populations is traditionally based on the human activities and land use patterns at and around the site. For screening risk evaluations, the conservative default assumption that is typically used is that the land will be used for residential purposes.

Once the potentially exposed populations are identified, the complete exposure pathways by which the individuals may be exposed to chemicals present in the environmental media must be determined. An exposure pathway is defined as "the course a chemical or pollutant takes from the source to the organism exposed" (USEPA 1988). An exposure route is defined as "the way a chemical or pollutant enters an organism after contact" (USEPA 1988). A complete exposure pathway for chemicals on a site requires four elements: chemical sources, migration routes (i.e., environmental transport), an exposure point for contact (i.e., soil, air or water; or collectively, "media"), and human exposure routes (i.e. oral, dermal, inhalation). A pathway is not considered to be complete unless all four elements are present. A Conceptual Site Model (CSM) is used to show the relationship between chemicals sources, exposure pathways and potential receptors for a site. The source-pathway-receptor relationships provide the basis for the quantitative exposure assessment. Only those complete source-pathway-receptor relationships are included in this risk assessment.

7.1.1 Chemical Sources and Potential Transport Mechanisms

As described in Section 2.0 and presented in Figure 2, the site is comprised of 2.51 acres occupying the area bounded by residential housing on the north and east, 66th Avenue on the south, and industrial buildings on the west.

The first industrial development of the property was in about 1948 when the current site's office, manufacturing, and warehouse buildings were constructed by Pacific Electric Motor (PEM). PEM occupied the site from 1948 to 2001. Activities at the site included: 1) manufacturing of specialty magnets, power supplies and components; and, 2) the repair of motors, generators, transformers, and magnets. A 2,000 gallon gasoline was reportedly installed at the site in 1975. In addition, a former shed in the fueling area is thought to have stored vehicle lubricants and oil for vehicle maintenance. Following the sale of the subject property to Modad Properties in 2001, the subject property facilities were operated by Bay Area Powder Coatings who recently declared bankruptcy and has equipment, but no operations at the facility. There are no details as to the specific processes of Bay Area Powder Coatings. Landeros Iron Works, who subleased from Bay Area Powder Coatings, continues its operations in the outdoor area southwest of the rear warehouse building. Their operations appear to be primarily welding and metal structure fabrication. The proposed future use of the property assumes the removal of the present structures and redevelopment of the site.

Documented releases of hazardous materials at the subject property by PEM include PCBs, presumably from their manufacture and service of transformers and other electrical equipment, and petroleum hydrocarbon compounds, from the former UST.

In Phase I ESAs performed for the subject property in 1997 and 2000 and, during a site reconnaissance conducted by CSS, Aspire, and DTSC personnel on January 20, 2005, housekeeping and hazardous materials and waste use, generation, and storage issues were identified including:

- Bay Area Air Quality Management District permits indicate the past use by PEM of a varnish impregnator, two varnish dip tanks, a paint spray booth, natural gas-fired burn-out ovens (2), a paint spray booth, an abrasive blast machine, and a natural gas-fired bake oven (Environ, 1997).
- Past wastewater discharges included sanitary wastewater, wastewater from steam cleaning operations, drill press water, air compressor condensate, and boiler blow-down (Environ, 1997).
- Two sumps were observed on-site which contain oily water. (Site Walk, 2005). In 1995, PEM was informed by the East Bay Municipal Utility District (EBMUD)

that a steam-cleaning sump was found to contain trace concentrations of PCBs (Environ, 1997).

- Various 55-gallon and 5-gallon drums are present. Many of these drums are unlabeled (Site Walk, 2005).
- Old equipment, vehicles, vehicle parts, pallets, and miscellaneous junk are present around the site (Site Walk, 2005).
- Stained surfaces are present inside the manufacturing building and in the drum storage area (Site Walk, 2005).

PEM conducted investigations and soil removal action for PCBs in 1992-1993 at the direction of the Alameda County Health Care Services Agency (ACHCSA), removing and disposing of approximately: 1) 400 cubic yards of PCB impacted soil from the northeast corner of the property (see Figure 2), and, 2) 4 cubic yards of PCB impacted soil from off the property boundary near the northwest corner. Soils in the northwest corner area were reportedly contaminated by the historic storage of transformers. The maximum concentration of PCBs detected prior to soil removal was reportedly 113,713 mg/kg, although this result is anecdotal. The highest documented concentration of PCBs was 45,470 mg/kg (as Ar-1260). A single Hydropunch™ groundwater sample was collected from the area and no PCBs were detected. Following remediation activities, PEM received a No Further Action letter from the ACHCSA. The cleanup objective for this removal action was 1 mg/kg total PCBs.

PEM removed the 2,000-gallon gasoline UST, and associated pump island, piping, storage shed and appurtenances in 1995. The UST was reportedly in good condition with no holes evident, however, free phase gasoline product was observed on the water surface in the tank excavation. The maximum detected concentrations of TPH as gasoline (TPH-g) and benzene in soil samples were 10,000 mg/kg and 73 mg/kg, respectively, from the excavation stockpile. The maximum detected groundwater concentrations of TPH-g and benzene in 1995 were 81 mg/L and 3.1 mg/L, respectively.

PEM performed a number of subsequent investigations and removal actions for soil and groundwater under the lead of the ACHCSA. Subsequent investigations and removal actions included:

- 1995 – Approximately 1,500 cubic yards of soil was removed in two excavation iterations and stockpiled on the northern portion of the site (Figure 2). Approximately 116,000 gallons of petroleum-hydrocarbon impacted groundwater was pumped from the excavation. Site investigation work during this time also included the installation of GeoProbe borings (between excavation iterations) in an attempt to define the lateral and vertical extent of gasoline constituents. A dewatering sump used during soil excavation was later converted to an 8-inch diameter well during backfilling operations (thought to be WAC-1, shown on Figure 2). Backfill reportedly consisted of clean imported fill material. Reports indicate that the stockpiled excavated soils were disposed in 1997. (W.A. Craig, various reports).

- June 1997 – A soil and groundwater investigation was completed consisting of the installation of three soil borings, converted to monitoring wells MW-1 through MW-3 (shown on Figure 2), in order to evaluate soil and groundwater conditions. (Environ, July 17, 1997).
- September 1998 – Additional soil and groundwater investigation was performed consisting of two soil borings within the backfill of the former UST excavation area and the installation of MW-4 (PES Environmental, 1998).
- April 2002 – A 30 by 70 by 9 feet deep excavation (shown on Figure 2) for the remediation of petroleum hydrocarbon impacted soils was completed to the south of the original UST remedial excavation. (Decon Environmental Services, 2002)
- May 2002 – Approximately 65,000 gallons of petroleum hydrocarbon impacted groundwater was removed from the excavation. Additional over-excavation was performed southeast of the 30 by 70 feet excavation. The approximate final extent of excavation is shown on Figure 2. During backfill operations an 8-inch diameter extraction well was installed (EW-1 on Figure 2). The excavation was backfilled with an unspecified depth of drain rock and 250 pounds of oxygen releasing compound (ORC™, manufactured by Regenisis) slurry was mixed into the gravel fill. Clean excavated native soil, followed by imported Class II base rock, comprised the balance of backfill. Approximately 219 tons of hydrocarbon impacted soil was disposed. (Decon Environmental Services, 2002)
- June 2002 – A total of 25 soil borings were installed to a depth of 13-ft. and each was backfilled with 8 pounds of ORC™ followed by neat cement (see Figure 2). ORC socks were also installed in wells MW-1 and WAC-1. (Decon Environmental Services, 2002)

Periodic groundwater monitoring of wells MW-1 through MW-4 has been performed over the period June 1997 to May 2003. Groundwater samples were collected from well EW-1 from December 2002 to May 2003 (PES Environmental, 2003). The maximum concentrations of TPH-g, benzene, and methyl-tertiary-butyl-ether (MTBE) reported for the most recent sampling event (May 2003) were 530 mg/L, 24 mg/L and 42 mg/L, respectively, detected in MW-4. Over the four most recent monitoring events, the only detected TPH compound in monitoring wells MW-2 and MW-3 has been MTBE at trace concentrations (maximum 0.016 mg/L). The subject property remains an open Leaking Underground Fuel Tank (LUFT) site under the lead of the ACHCSA.

The most recent site investigation was performed by CSS Environmental Services, Inc. in March of 2005. This investigation is described in this report. The investigation consisted of:

- Collection of active soil gas samples from 16 locations for evaluating the potential presence of volatile organic compounds (VOCs) in accordance with DTSC's *Advisory - Active Soil Gas Investigations* dated January 28, 2003 and California Regional Water Quality Control Board, Los Angeles Region's (LARWQCB's) *Interim Guidance for Active Soil Gas Investigation* dated February 25, 1997;

- Collection of soil matrix samples from 19 locations at selected depths and analysis for:
    - California Code of Regulations (CCR) Title 22 metals,
    - Volatile organic compounds (VOCs)
    - Polychlorinated biphenyls (PCBs),
    - Semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs),
    - Total petroleum hydrocarbons (TPHs) in the gasoline, diesel, and oil ranges,
    - Hexavalent chromium (Cr^{+6}) and, dioxin;
- Collection of first-encountered groundwater through 6 soil borings and from 5 site monitoring wells and analysis for Title 22 Metals, SVOCs, VOCs, TPHs, and PCBs.

Results of the CSS 2005 investigation, which are used in this screening risk evaluation, are summarized as follows:

Soil Vapor: Detected chemicals included benzene, toluene, ethylbenzene, and xylene (BTEX), MTBE, and tetrachloroethene (PCE).

Groundwater: Detected chemicals included BTEX, MTBE, naphthalene, 1-methylnaphthalene, TPH, PCBs, barium, cobalt, nickel, and zinc.

Soil: Detected chemicals included arsenic, barium, chromium, cobalt, copper, lead, nickel, vanadium, zinc, hexavalent chromium, BTEX, MTBE, TPH, PCBs, naphthalene, 1-methylnaphthalene, acenapthylene, dibenzofuran, barbazonle, phenanthrene, pluoranthene, anthracene, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene and dioxins.

Based on the historical and current uses of the site as well as sampling data, metals, TPH, PAHs, VOCs, and SVOCs are chemicals of potential concern at this site.

Once chemicals are released into the surface or subsurface soils, the potential secondary release mechanisms include the following:

- Volatilization of chemicals in soil and groundwater into ambient or indoor air;
- Wind erosion of surface soils and atmospheric dispersion of dusts;
- Migration of constituents from the subsurface soils down into the groundwater;
- Offsite transport of chemicals in soil through surface water runoff.

The mechanisms listed above represent the theoretically complete mechanisms through which chemicals at the site can be released and be transported from one environmental medium to another. A discussion of each of these transport mechanisms, including those that are considered to be incomplete, is incorporated into the subsequent sections. The Conceptual Site Model (CSM) schematic is presented in Appendix C.

7.1.2 Potentially Exposed Populations

The site is the proposed location for the Aspire Charter High School. As such, the populations who will be present onsite, and who could become exposed to chemicals present in either the soil or groundwater, include future students, teachers, and other school staff. However, per the *Preliminary Endangerment Assessment Guidance Manual* (PEA) (CalEPA 1994), the screening-level risk evaluation assumes that the site will be used for residential purposes, and that both children and adults could become exposed to chemicals present at the site. As residential populations are assumed to live at the site for an extended 30–year period, they will incur greater exposures than children, faculty and staff who will either attend or work at the high school. Accordingly, a determination that the site is appropriate and safe for future onsite residential use conservatively assumes that use of the site for the high school will not adversely impact the health of future students and faculty.

7.1.3 Exposure Pathways

The following section identifies the potentially complete exposure pathways through which the onsite residents could be exposed to chemicals detected at the site. The section also provides the rationale for excluding certain pathways from further consideration. All exposure pathways included in the risk evaluation are identified in the CSM, presented in Appendix C.

7.1.3.1 Complete Exposure Pathways

As indicated in the CSM schematic, the complete pathways through which future onsite residents may be exposed to chemicals detected at the site include the following:

- Inhalation of vapors (from soil and groundwater) and particulates (from soil);
- Soil ingestion; and
- Dermal absorption from soil.

These are the pathways that have been included in the risk assessment. These pathways are consistent with the relevant pathways described in the PEA (CalEPA 1994). A detailed description of each pathway follows.

7.1.3.1.1 Inhalation of Vapors and Particulates

The inhalation of vapors from soil and groundwater and particulates from soil are potentially complete exposure pathways at the site. Metals, petroleum hydrocarbons, select PAHs, VOCs, and SVOCs have been detected in the soil. The possible exposure routes for these compounds include inhalation of non-volatile chemicals that are adsorbed onto soil particles, and the inhalation of TPH, VOCs, some PAHs, and SVOCs as vapors from soil.

The inhalation of soil particulates was evaluated considering outdoor exposure only, as the level of soil particles indoors is lower than that of outdoors due to greater surface area for particulate settling provided by indoor environments. Accordingly, conclusions developed for an outdoor exposure to particulates would be considered protective of indoor exposure to particulates.

The inhalation of vapors was evaluated for outdoor air in accordance with the PEA (CalEPA 1994). The inhalation of vapors was also evaluated considering indoor exposure, as concentrations indoors resulting from volatile migration are much higher than those outdoors because vapors emitted from soil and groundwater will be trapped and concentrated in the indoor environment compared to their dispersion and dilution in the outdoor. Inhalation of vapors in indoor air is evaluated using soil vapor data and groundwater data. If chemicals were detected in both soil vapor and groundwater, the data for soil vapor was used in the assessment. If volatile chemicals were detected in only groundwater and not soil vapor (e.g., naphthalene and 1-methylnaphthalene), the data for groundwater was used in the assessment. (see 7.1.3.2.2).

7.1.3.1.2 Soil Ingestion

In accordance with the PEA (CalEPA 1994), future onsite residents, both children and adults, could be exposed to chemicals at the site through the ingestion of soil. Accordingly, soil ingestion represents a complete exposure pathway at the site, and is included in the risk evaluation.

7.1.3.1.3 Dermal Absorption

In accordance with the PEA (CalEPA 1994), future onsite residents, both children and adults, could be exposed to chemicals at the site through dermal contact with soil, and the subsequent absorption of chemicals present in the soil. Accordingly, dermal contact with soil represents a complete exposure pathway at the site and is included in the risk evaluation.

7.1.3.2 Theoretically Complete But Insignificant Pathways

The theoretically complete but insignificant exposure pathways identified in this assessment are represented graphically in the CSM (Appendix C). As indicated in Figure 3, the following pathways are considered theoretically complete but insignificant at the site:

- Inhalation and ingestion of surface water; and
- Ingestion of groundwater.

The rationale for determining that each of these pathways are theoretically complete, but insignificant, is provided in the sections that follow.

7.1.3.2.1 Surface Water

The erosion and transport of chemicals in soil to surface water is a theoretically complete but practically insignificant pathway at the site. The nearest surface water body downgradient of the site is Lion Creek, southwest of the site (Figure 1). The runoff from the site is collected by storm drains located on the west side of the site. Given that runoff from the site is expected to be minimal, due to the fact that the development of the site will result in much of the site being covered by asphalt or buildings, and considering that the site runoff would be further diluted by the combined runoff of the stormwater system, the impact of surface water runoff on either human health or the environment is believed to be insignificant and is therefore not considered further in the risk assessment.

7.1.3.2.2 Groundwater

As described in Section 5.2, groundwater in the area of the site occurs between approximately 3 feet below ground surface to 6 feet below ground surface (we have assumed a value of 5 feet for modeling purposes). Existing wells at the site are used for monitoring purposes. The local enforcement agency has maintained the site's status as an open LUFT site. Groundwater concentrations of a number of petroleum hydrocarbon compound in site wells exceed their respective environment screening levels (ESLs) as promulgated by the SFRWQCB as well as state and federal maximum concentration limits (MCLs) for drinking water. It is our understanding that this groundwater is not currently used for potable purposes, therefore, household uses (e.g., drinking, showering) do not constitute viable exposure pathways. It is possible that chemicals in the groundwater can volatilize and migrate to areas above the ground surface. However, based on the Department of Toxic Substances Control's recent *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (CalEPA 2005), this pathway can be evaluated using the soil vapor data. Therefore, inhalation of volatile chemicals emanating from the groundwater is indirectly evaluated in this assessment. It should be noted that two chemicals, naphthalene and 1-methylnapthalene, were detected in groundwater but not soil vapor. Vapor intrusion into indoor air was evaluated using the groundwater data for these chemicals. Other pathways related to the groundwater at the site are not believed to be significant, and are therefore not evaluated further.

7.1.4 Exposure Assumptions

Intake of a chemical is dependent of various exposure assumptions including exposure duration, inhalation rate, soil ingestion range, dermal contact rate, body weight, and averaging time. The route-specific exposure assumptions used to estimate exposure to the chemicals detected in the soil at the site are presented in Table 9. As shown, these are the specific exposure assumptions that are used in the calculation of the intake of a chemical, as discussed in Section 7.4. Exposure assumptions used in this risk evaluation correspond directly to those recommended by the Cal/EPA (CalEPA 1994) with some modifications as suggested by DTSC (DTSC 2005a).

7.2 Chemical Selection and Estimation of Exposure Concentrations

The purpose of this section is to: 1) identify those chemicals of potential concern (COPC) to be included in the risk assessment; and 2) present the method for estimating the exposure concentrations for each of the COPCs.

7.2.1 Chemical Selection Criteria

The purpose of this step in the risk assessment is to identify those COPC to be included in the risk evaluation. The selection of COPCs to be included in this evaluation was based on a review of the data collected during the recent site investigation. The data review process involved two steps: data evaluation and grouping of chemicals. First, we performed an evaluation of all soil, soil vapor, and groundwater data collected during the investigation and summarized the data collected and analyzed for metals, VOCs, SVOCs (including PAHs), and TPH. Chemicals were then divided into groups according to similar properties and according to guidelines presented in the *Preliminary Endangerment Assessment Guidance Manual* (CalEPA 1994).

All chemicals detected during the site investigation were included on the initial list of chemicals to be included in the risk assessment. Consistent with DTSC policy (CalEPA 1997), the only chemicals that can be eliminated as chemicals of concern include the following:

- Metals that are present at naturally occurring levels
- Chemicals determined to be laboratory artifacts.

The determination as to whether metals are present at naturally occurring levels follows the methodology recommended by DTSC (CalEPA 1997). Specifically, the only metals that are allowed to be eliminated from this HRA include metals where the maximum detected concentration is lower than the local background levels. Consistent with DTSC policy, when few data are available to describe the ambient conditions, the point of comparison for determining whether site concentrations are elevated above background is an estimate of the mean background concentration. As recommended by DTSC, chemicals can be eliminated from the risk assessment if the maximum detected onsite concentration is lower than the 95% upper confidence limit (UCL) of the arithmetic mean background concentration. All metals detected at this site were included in the evaluation.

7.2.2 Chemicals Included in the Risk Assessment

As described in Section 6, soil samples collected during the site investigation were analyzed for a comprehensive suite of chemicals including metals, TPH, SVOCs, VOCs, PCBs, and dioxins. Groundwater samples collected during the site investigation were analyzed for metals, TPH, SVOCs, VOCs, and PCBs. Further, a soil vapor survey was conducted to screen those areas that were thought to have the greatest potential to be impacted by VOCs. The detection frequencies, range of concentrations, and comparison to background concentrations for each compound are presented in Table 10. All data from the site investigation is presented in Tables 1 to 9. The final list of chemicals included in this assessment is identified in the last column of Table 10.

The following paragraphs present a summary of those chemicals included in the risk assessment.

7.2.2.1 Metals

Table 10 presents the range of metals concentrations detected at the site. As indicated in Table 10, metals detected in soil at the site included arsenic, barium, chromium, hexavalent chromium, cobalt, copper, lead, nickel, vanadium and zinc. Barium, chromium, cobalt, nickel, and zinc were detected in groundwater. These metals are included in the quantitative risk assessment. Metals that were not detected at the site are assigned a value of zero for purposes of this assessment.

7.2.2.2 TPH

As indicated in Table 10, TPH in the gasoline (TPH-g) and oil (TPH-o) ranges were detected in groundwater and soil samples collected from the site. Consistent with the *PEA Guidance Manual*, individual chemical constituents have been used to evaluate the significance of the TPH. As each of these samples where TPH was detected was analyzed for SVOCs, VOCs and PAHs, the chemical-specific results for each of these constituents was used in the risk assessment to evaluate the significance of the TPH detections.

7.2.2.3 SVOCs and PAHs

As indicated in Table 10, a total of thirteen SVOCs and PAHs were detected in soil at the site. These chemicals included naphthalene, 1-methylnaphthalene, acenaphylene, dibenzofuran, carbazole, phenanthrene, fluoroanthene, anthracene, pyrene, benzo(a)anthracene, chrysene, benzo(k)fluoroanthene, and benzo(a)pyrene. SVOCs detected in groundwater included naphthalene and 1-methylnaphthalene. All of these SVOCs / PAHs are included in the risk assessment.

7.2.2.4 PCBs and Dioxins

As indicated in Table 10, soil samples were analyzed for the presence of PCBs and dioxins. Chemicals detected in soil included PCB 1260, 1,2,3,4,6,7,8 HpCDD (heptachlorodibenzodioxin), OCDD (octachlorodibenzodioxin), 2,3,7,8 TCDF (tetrachlorodibenzofuran), 1,2,3,4,6,7,8 HpCDF (heptachlorodibenzofuran), OCDF (octachlorodibenzofuran), 1,2,3,7,8,9 HxCDD (hexachlorodibenzodioxin), and 1,2,3,7,8,9 HxCDF (hexachlorodibenzofuran). All of these chemicals are included in the risk assessment.

7.2.2.5 VOCs

As indicated in Table 10, soil vapor samples, soil samples, and groundwater samples were analyzed for the presence of VOCs. Chemicals detected in soil vapor included BTEX, tetrachloroethene (PCE), and MTBE. VOCs detected in groundwater included BTEX and MTBE. VOCs detected in soil samples included BTEX and MTBE. In general, the VOCs were detected at the greatest concentrations toward the center of the site, near MW-4 (south of the Warehouse Building and west of the Manufacturing Building). All VOCs detected during the investigation are included in the risk assessment.

7.2.3 Estimation of Representative Exposure Concentrations

The following sections present the methods used to estimate the representative concentrations of the COPCs in the soil, air, and groundwater to which future onsite residential populations could be exposed. As previously discussed, because vapors from groundwater can be represented by the soil vapor data, chemical concentrations in groundwater are used in this assessment only if the chemicals were not detected in soil vapor. In this manner, all detected VOCs in groundwater are accounted for in the assessment either via the use of soil vapor or groundwater data.

7.2.3.1 Estimation of COPC Concentrations in Soil and Groundwater

The estimation of the exposure point concentration of each COPC in soil was determined using the sampling results described in Section 6. Because this is a screening-level evaluation, the maximum detected concentration has been used to estimate the exposure point concentration. Use of the maximum concentration as the exposure point concentration is extremely conservative, and results in estimates of long term 30-year exposure that are much greater than would actually occur at the site. In accordance with standard California (CalEPA 1992a) and USEPA (USEPA 1989) risk assessment guidance, exposures and risks should be based on an estimate of the average concentration to which an individual could be exposed over the given exposure period. However, for screening-purposes only, and consistent with the PEA (CalEPA 1994), use of the maximum concentration will provide a baseline for determining whether there are particular areas of the site that may warrant further evaluation.

The maximum concentrations of each chemical in soil, soil gas, and groundwater detected across the site are presented in Table 10.

7.2.3.2 Estimation of Indoor Air Concentrations

Models, provided by the DTSC, entitled *DTSC SG-Screen (Version 2.0; 04/04)* (DTSC 2005b) and *DTSC GW Screen (Version 3.0; 04/03, Interim Final 12/05, last modified 1/21/05* (DTSC 2005c), were to estimate indoor air concentrations from the chemical detected in soil vapor. DTSC's versions of the Johnson and Ettinger (1991) model (the "Model") were used estimate chemical concentrations in indoor air from soil vapor and groundwater. These models can estimate the rate of flux of a volatile subsurface chemical soil gas source (C_{source}) into an enclosed building. The development of the model is described in detail in the user's guide (USEPA 1997a). The user's guide presents a sensitivity analysis indicating that the most important factors affecting the average long-term building concentrations are the soil water-filled porosity, source-building separation, soil-building pressure differential, and soil permeability to VOC flux. In selecting the input parameters for the model, EPA-approved conservative default values specified in the user's guide were used in this risk assessment. Default values for soil properties (embedded into the model) were used in this assessment. The input and output from the soil vapor and groundwater models are presented in Appendix C. Resulting noncancer hazards and cancer risks are presented in Tables 14 and 15, respectively.

Following guidance provided by DTSC, only VOCs as defined by DTSC (CalEPA 1994) are modeled. DTSC defines a VOC as "a chemical with a vapor pressure of 0.001 mm Hg or higher and a Henry's Law constant of 1 x 10-5 or higher. Based on this definition, the only PAHs that were detected in soil vapor and/or groundwater that would be considered "volatile" include naphthalene and 1-methylnaphthalene. Accordingly, indoor air concentrations for these PAHs, in addition to all the VOCs, were modeled using the Johnson and Ettinger Model.

7.2.3.3 Estimation of Outdoor Particulate Concentrations

The estimation of the ambient air concentration of nonvolatile chemicals in soil particulates requires the determination of the quantitative relationship between chemical concentrations in the soil (mg/kg) and the concentration of respirable particulates (PM_{10}) in the air due to fugitive dust emissions. Particulate emissions are due to wind erosion and, therefore, depend on the erodibility of the surface material. For the fugitive dust inhalation pathway, inhalation of chemicals adsorbed to respirable particles (PM_{10}) were assessed using a default PEF equal to 1.316×10^9 m^3/kg that relates the chemical concentration in the soil with the concentration of respirable particles in the air due to fugitive dust emissions from contaminated soils. The generic PEF was derived using default values presented in the USEPA Region 9 Preliminary Remediation Goals (USEPA 2004b). The PEF corresponds to a receptor point concentration of approximately 0.76 micrograms per cubic meter (ug/m^3). The relationship is derived by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time (e.g. years). Calculations for particulate air concentrations are presented in Appendix C.

7.2.3.4 Estimation of Outdoor Volatile Concentrations

To estimate outdoor air concentrations, we used the emission model and box model and input parameters provided by the *Preliminary Endangerment Assessment Guidance Manual* (CalEPA 1994). The VOC emissions model is recommended by USEPA. Emission rates are calculated over the minimum dimensions of a residential lot in California, 5,000 square feet or 484 m^2. The box model is used to provide an estimate of ambient air concentration using the total emission rate calculated by the emission model. Calculations and results for the maximum concentration are provided in Appendix C.

7.3 Toxicity Values for COPCs

The toxicity assessment characterizes the relationship between the magnitude of exposure to a chemical and the potential adverse health effects. More specifically, the toxicity assessment identifies or derives toxicity values that can be used to estimate that the likelihood that the predicted exposures will result in adverse health effects.

Chemicals are evaluated for their potential health effects in two categories, carcinogenic and noncarcinogenic. This section presents the carcinogenic and noncarcinogenic toxicity values for each of the COPCs. The hierarchy of sources for the toxicity criteria used for this analysis generally correspond to the hierarchy outlined in the *Preliminary Endangerment Assessment Guidance Manual* (CalEPA 1994). Toxicity values, sources, route extrapolations, and assumptions for these COPCs are presented in Table 11.

7.3.1 Chronic Toxicity Assessment for Carcinogenic Effects

Current health risk assessment practice for carcinogens is based on the assumption that there is no threshold dose below which carcinogenic effects do not occur. This approach has generally been adopted by the regulatory agencies as a conservative practice to protect public health, and the “no-threshold”assumption has been used in the agency-derived cancer slope factors (CSFs) used in this risk assessment. Although the magnitude of risk declines with decreasing exposure, the risks are believed to be zero only at zero exposure.

CSFs are used to quantify the response potency of a potential carcinogen. The CSF represents the excess lifetime cancer risk due to a continuous, constant lifetime exposure to a specified level of a carcinogen. CSFs are generally reported as excess incremental cancer risk per milligram of chemical per kilogram body weight per day $(\text{mg/kg-day})^{-1}$. In accordance with DTSC guidance (CalEPA 1994), promulgated California CSFs are given priority over USEPA or other values. All CalEPA CSFs are now available on-line (CalEPA 2005). Table 11 presents the CSFs used in this risk assessment.

7.3.2 Chronic Toxicity Assessment for Noncarcinogenic Effects

The toxicity assessment for noncarcinogenic effects requires the estimation of an exposure level below which no adverse health effects in humans are expected to occur. USEPA refers to these levels as Reference Doses (RfDs) for oral exposures and Reference Concentrations (RfCs) for inhalation exposures (USEPA 1989). When available, USEPA-derived oral RfDs and inhalation RfCs are used to evaluate the noncarcinogenic effects of exposure to chemicals via the oral and inhalation routes, respectively. Both RfDs and RfCs are obtained from the USEPA’s on-line database (USEPA 2005). Table 11 presents the RfDs used in this evaluation.

7.3.3 Lead

The traditional RfD approach for the evaluation of chemicals is not applied to lead because most human health effects data are based on blood lead concentrations, rather than external dose (CalEPA 1992b). Blood lead concentration is an integrated measure of internal dose, reflecting total exposure from site -related and background sources. A clear no observed effects level (NOEL) has not been established for such lead-related endpoints as birth weight, gestation period, heme synthesis and neurobehavioral development in children and fetuses, and blood pressure in middle-aged men. Dose-response curves for these endpoints appear to extend down to 10 micrograms/deciliter (μg/dL) or less (ATSDR 1993). The CalEPA has developed a methodology for evaluating exposure and the potential for adverse health effects resulting from exposure to lead in the environment (CalEPA 1992b). The methodology presents an algorithm for estimating blood lead concentrations in children and adults based on a multi-pathway exposure analysis.

CalEPA has provided a spreadsheet (LEADSPREAD) based on its guidance for evaluating lead toxicity (CalEPA 1993). Consistent with that recommended by the PEA (CalEPA 1994), the updated version spreadsheet model, LEADSPREAD Version 7, has been used in this assessment. As recommended by CalEPA, the spreadsheet is used in this evaluation to estimate the 99th percentile blood lead concentration in future residential populations that would result from multi-pathway exposures to lead, both from the site and from background sources. As recommended by DTSC, a predicted total blood-lead concentration of 10 μg/dL is the target concentration of concern. The printout of the LEADSPREAD evaluation for the site is presented in Appendix C, and the results are summarized below, under risk characterization.

7.4 Risk Characterization

This section presents the results and conclusions of the health risk evaluation under the assumptions of residential exposure, as designated in the *Preliminary Endangerment Assessment Guidance Manual* (CalEPA 1994). The risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessment are integrated into quantitative estimates of potential health risks. Consistent with CalEPA and USEPA risk assessment policy, the potential for exposures to produce carcinogenic and noncarcinogenic health effects are characterized separately.

For carcinogens, risk is defined as "the theoretical probability of developing cancer from that chemical upon exposure to that medium" (CalEPA 1994). The hazard index (HI), calculated for both carcinogens and noncarcinogens, is a measure of the potential for the exposures to produce adverse noncarcinogenic health effects, and is expressed as a ratio of the estimated dose to a dose that is believed to produce no adverse health effects. USEPA has established acceptable incremental cancer risk levels to be within the risk range of 1 in 10,000 (1×10^{-4}) and 1 in 1 million (1×10^{-6}); risks greater than 1×10^{-4} are generally considered unacceptable, whereas risks within the range (i.e. risks that fall between 1×10^{-4} and 1×10^{-6}) are typically deemed to be acceptable. Cal/EPA has defined the 1 x 10^{-5} as the "no significant risk level" for carcinogens under California's Safe Water and Toxic Enforcement Act (Proposition 65). Further, most air districts use the 1 x 10^{-5} risk level as the notification trigger level under California's AB2588 Toxic Hot Spots Program. Thus, although regulatory agencies will exercise judgment in determining whether risks within the range of 1 x 10^{-4} and 1 x 10^{-6} require additional investigation, or some form of risk management, there is a general precedent that predicted cancer risks that are well within the acceptable risk range, or on the low end of this range, will generally be considered acceptable, and not warrant further evaluation. Similarly, a noncancer hazard index less than 1.0 indicates that the predicted exposures would not be expected to cause adverse noncancer health effects in exposed individuals.

We have used the recommended screening-level residential intake assumptions (CalEPA 1992a, 1994) to calculate the chronic daily intake (CDI) of each chemical included in the risk assessment. Per DTSC guidance, daily intakes are calculated separately for each relevant route of exposure (i.e., soil ingestion, dermal contact, inhalation of vapors, and inhalation of particulates). The specific equations used to calculate the chronic daily intakes are presented in Table 12, and correspond to the equations presented in the PEA guidance manual (CalEPA 1994). The calculated chronic daily intakes for each chemical and each route of exposure are presented in Tables 13 and 14, for carcinogens and noncarcinogens, respectively. The estimated cancer risks and noncancer hazard indices are discussed below.

7.4.1 Carcinogenic Effects

An estimate of the potential excess incremental cancer risk associated with exposure to a carcinogen (i.e., the incremental probability that an individual will develop cancer over the course of a lifetime) is obtained by multiplying the estimated chronic daily intake of the carcinogen by the chemical-specific cancer slope factor (CSF) for the appropriate exposure route. The estimated excess cancer risks for each chemical and exposure route are then summed to estimate the total excess cancer risk for the exposed individual.

Table 15 presents the estimated excess lifetime cancer risk for future onsite residents at the site. As indicated, the total excess cancer risk posed by the presence of chemicals in soil is 2.36 x 10^{-3}. The majority of this total risk is attributable to the presence of benzene, benzo(a)pyrene, and PCBs at the site.

7.4.2 Noncarcinogenic Effects

To assess the noncarcinogenic effects of chemicals, the estimated chronic daily intake of a chemical is divided by the oral or inhalation RfDs. The resulting ratio, referred to as the Hazard Quotient (HQ) is an estimate of the likelihood that noncarcinogenic effects will occur as a result of that specific chemical exposure. A hazard quotient less than or equal to 1 indicates that the predicted exposure to that chemical should not result in an adverse noncarcinogenic health effects (USEPA 1989). Consistent with CalEPA risk assessment guidance, the chemical-specific HQs are added together, to provide the Hazard Index (HI). A total, multichemical, multipathway HI of less than or equal to 1 indicates that potential noncancer health effects are not likely to occur.

Table 16 presents the estimated noncancer HIs for future onsite residents, both children and adults. As indicated, the total HI for the onsite resident child is 28.6, and the total HI for the onsite adult is 4.56. The majority of the total noncancer hazard is attributable to PCBs. Other chemicals that contribute to the noncancer hazard include benzene and naphthalene.

7.4.3 Health Effects Lead in Soil

As previously described, the reference dose approach, which is used for assessing potential noncarcinogenic effects, is not used to evaluate exposure to lead. Rather, the DTSC has developed specific guidance for evaluating exposure and the potential for adverse health effects resulting from exposure to lead in the environment using a model based on absorbed doses and estimated blood-lead concentrations. The guidance is implemented using a spreadsheet, obtained from DTSC, in which a multipathway algorithm is used for estimating blood-lead concentrations in children and adults.

Appendix C presents the output from LEADSPREAD. Using the maximum concentration of lead detected in soil (398 mg/kg), the 99th percentile blood lead level associated with exposure to lead from both the site and background sources in air, food and drinking water is 15.8 □g/dl for children (the most sensitive receptors), a level that is above the target concentration of 10 ug/dl, which was developed to be protective of children's health (CalEPA 1992b). Therefore, the 99th percentile blood lead level associated with exposure to lead from both the site and background sources in air, food and drinking water is at a level that above the target concentration of 10 ug/dl (printout from LEADSPREAD presented in Appendix C).

7.5 Uncertainty Analysis

Risk assessments include several uncertainties that warrant discussion. Many of the assumptions used in this risk assessment, regarding the representativeness of the sampling data, human exposures, and chemical toxicity are conservative, follow agency guidance, and reflect a 95% percentile or greater, rather than a typical or average value (a 50% percentile) for a give parameter. The use of conservative exposure and toxicity assumptions can introduce considerable uncertainty into the risk assessment. By using conservative exposure or toxicity estimates, the assessment can develop significant conservative bias that may result in the calculation of significantly higher cancer risk or noncancer hazard index than is actually posed by the chemicals present in site soils.

Some of the assumptions made in the risk assessment which contribute to the overall uncertainty in the evaluation are briefly outlined below:

- Risks presented in this screening-level evaluation are based on the assumption that the resident would be exposed to the maximum detected concentration continuously, for a 30 year exposure period. However, consistent with standard risk assessment guidance (CalEPA 1992a, USEPA 1989), exposures and risks should be based on an estimate of the average concentration to which an individual could be exposed over the given exposure period. The average concentration is typically used because 1) carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures; and 2) the average concentration is most representative of the concentration that would be contacted over a lifetime (USEPA 1992). As the maximum concentrations likely significantly overestimate an individual's average exposure, the actual risks posed by the chemicals present at the site would be expected to be significantly lower than those presented here, and may be lower than the *de minimis* level of 1×10^{-6}.

- Risks presented in this screening-level evaluation are completely driven by the conservative assumption that a house is built directly over the areas of greatest contamination, and that vapors migrate up from the groundwater and soil, through the soil column and accumulate in the indoor air environment. It is important to realize that risks associated with the inhalation of vapors that have migrated up from the groundwater and soil and through the soil column and have dispersed in the ambient (outdoor) air can be more than 1000 times LOWER than those predicted under the assumption used in this evaluation, where the house is built directly over the source area. Thus, these risks should not be construed to define risks associated with inhalation of ambient air. In fact, as long as a structure was not built directly over the source area, risks from the inhalation pathway may be considered acceptable.

- Cancer risks presented in this screening-level evaluation are based on residential land-use assumptions, under the assumption that a child is born on the site, resides at the site for a continuous 30-year period, and is directly exposed to chemicals in soil on a daily basis. However, given that the proposed use of the site is for a High School, students would actually only be exposed to chemicals onsite for a fraction of the total time assumed in this analysis. Further, given that the construction of the site for the use of a school will likely result in most of the soils at the site being either paved, or covered with landscaped materials or buildings, actual exposures would be significantly less than assumed in this analysis. Accordingly, the required residential land use scenario as the basis for determining whether the site is safe for use as a High School is extremely conservative, and results in estimates of risks and noncancer hazards that are much greater than would actually be incurred were the site to be used for its intended purpose.

- One factor not taken into account is the bioavailability of chemicals in soil. Recent studies have shown that certain organic chemicals, particularly highly lipophilic compounds such as the PAHs, tend to be tightly bound to soil (Kelsey et al. 1997). This phenomenon can substantially lower the bioavailability of chemicals to human expose to soil. A reduction in the bioavailability of the chemicals adsorbed would reduce any health risk associated with exposure to these soils. Low biovailability could substantially reduce estimated cancer risks below levels calculated using the default assumption that all chemicals are 100% bioavailable.

- The CalEPA-recommended Johnson and Ettinger model (the Model) is based on the assumption that there is convective transport of chemicals into the indoor environment. Convective transport into a building results from temperature differences between indoors and outdoors (the "stack or chimney effect"), and is most significant during the winter heating season. Due to our more moderate climate, the stack effect in California is less significant than in other, colder parts of the country. If this transport pathway were not to occur, the actual long-term exposures that may occur at the site are likely to be lower than assumed in the development of the indoor air concentrations.

- Risk assessments assume that adverse effects observed in animal toxicity experiments would also be observed in humans (animal-to-human extrapolation), and that the toxic effect observed after exposure by one route would occur following exposure by a different route (route-to-route extrapolation).

- In order to adjust for uncertainties that arise from the use of animal data, regulatory agencies of often base the reference dose for noncarcinogenic effects on the most sensitive animal species (i.e., the species that experiences adverse effects at the lowest dose) and adjust the dose via the use of safety or uncertainty factors. The adjustment compensates for the lack of knowledge regarding interspecies extrapolation and possibility that humans are more sensitive than the most sensitive experimental animal species tested. The use of uncertainty factors is considered to be health protective. Second, when route-specific toxicity data were unavailable, data were derived by route-to-route extrapolation, as described above, and equal absorption rates for both routes were assumed (i.e., oral to inhalation and inhalation to oral). Finally, for dermal exposure to soil, chemical-specific absorption data generally were not available. Instead, dermal absorption rates, which were based on the default assumptions provided by the CalEPA (1994), were assumed.

Table 1: Summary of Soil Vapor[1] Program

Sample Identification & Location	Depth (bgs)	Benzene	Toluene	Ethyl benzene	m,p-Xylene	o-Xylene	Tetrachloroethene (Perk)	Methyl-t-butyl-ether (MTBE)	Difluoroehtane[2]	Methane (CH_4)[3]	Hydrogen Sulfide (H_2S)[4]
1A	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1B	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1C	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2A	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2A-2	5	**0.14**	ND	ND	ND	ND	ND	ND	ND	**0.32**	ND
2B	4	**9.3** (*6.1*)[5]	**1.7** (*1.1*)	**1.6** (*ND*)	**5.7** (*2.8*)	**1.0** (*ND*)	ND (*ND*)	**1.3** (*ND*)	ND (*ND*)	ND	ND
2B-2	5	**0.23**	ND	ND	ND	ND	ND	**1.3**	ND	**0.25**	ND
2B-3	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2C	0.5 H_2O	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3A	5	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND (*ND*)	ND	ND
3B	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3C	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4A	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4B	3	ND	ND	ND	ND	ND	**1.1**	ND	ND	ND	ND
4C	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5A	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5C	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Reporting Limit		**0.1 ug/L**	**1.0 µg/L**	**1.0 ug/L**	**1.0 ug/L**	**1.0 ug/L**	**1.0 ug/L**	**1.0 ug/L**	**10 ug/L**	**<0.1 %$_v$**	**0.5 ppm$_v$**

[1] VOCs in micrograms per liter (*u*g/L) by USEPA Method 8260B, all other VOCs not above method detection limit.

[2] Soil gas tracer compound.

[3] Hand held PhotoVac MicroFID with charcoal filter.

[4] Hand held Q-RAE Plus.

[5] (#) duplicate sample concentration.

Table 2: Title 22 Metal Concentrations in Soil Matrix Samples

Sample Identification & Location	Antimony RL = 5 mg/kg	Arsenic RL = 2 mg/kg	Barium RL = 5 mg/kg	Beryllium RL = 1 mg/kg	Cadmium RL = 5 mg/kg	Chromium RL = 5 mg/kg	Hexavanent Chromium RL = 0.5 mg/kg	Cobalt RL = 5 mg/kg	Copper RL =1 mg/kg	Lead RL = 1 mg/kg	Mercury RL = 0.1 mg/kg	Molybdenum RL = 4 mg/kg	Nickel RL = 5 mg/kg	Selenium RL = 1 mg/kg	Silver RL = 1 mg/kg	Thallium RL = 2 mg/kg	Vanadium RL = 4 mg/kg	Zinc RL = 1 mg/kg
1A @ 0.5	ND *(ND)*[1]	ND *(16)*	68 *(93)*	ND *(ND)*	ND *(ND)*	6 *(26)*	NA	ND *(6)*	6 *(13)*	ND *(19)*	ND *(ND)*	ND *(ND)*	8 *(18)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	13 *(20)*	39 *(53)*
1A @ 5	ND	ND	91	ND	ND	28	NA	ND	21	ND	ND	ND	37	ND	ND	ND	27	37
1A @ 10	ND	ND	83	ND	ND	30	NA	12	19	ND	ND	ND	56	ND	ND	ND	23	35
1B @ 0.5	ND *(ND)*	ND *(ND)*	33 (77)	ND *(ND)*	ND *(ND)*	ND *(ND)*	NA	6 *(ND)*	4 (6)	2 (12)	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	18 (17)	54 (63)
1B @ 5	ND	5	106	ND	ND	ND	NA	8	27	ND	ND	ND	51	ND	ND	ND	29	56
1C @ 0.5	ND *(ND)*	8 *(ND)*	31 *(19)*	ND *(ND)*	ND *(ND)*	2 *(ND)*	NA	ND *(ND)*	9 *(17)*	2 *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	14 *(16)*	54 *(52)*
1C @ 5	ND	ND	93	ND	ND	28	NA	8	18	3	ND	ND	32	ND	ND	ND	32	31
1C @ 10	ND	ND	67	ND	ND	21	NA	ND	18	4	ND	ND	34	ND	ND	ND	20	45
2A @ 0.5	ND	12	148	ND	ND	52	3.02	7	47	3	ND	ND	24	ND	ND	ND	41	59
2A @ 5	ND	66	94	ND	ND	30	NA	ND	24	3	ND	ND	21	ND	ND	ND	25	36
2A-2 @ 0.5	ND	5	62	ND	ND	17	NA	ND	17	30	ND	ND	17	ND	ND	ND	15	43
2A-2 @ 5	ND	ND	20	ND	ND	ND	NA	ND	6	ND	ND	ND	ND	ND	ND	ND	11	55
2B @ 0.5	ND	19	79	ND	ND	6	NA	5	18	18	ND	ND	7	ND	ND	ND	25	83
2B @ 5[1]	ND (ND)	5 *(3)*	108 *(51)*	ND *(ND)*	ND *(ND)*	33 *(34)*	NA	12 *(ND)*	15 *(21)*	4 *(2)*	ND *(ND)*	ND *(ND)*	28 *(24)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	35 *(28)*	34 *(37)*
2B @ 10	ND	6	117	ND	ND	43	NA	12	31	2	ND	ND	81	ND	ND	ND	35	55
2B @ 15	ND	ND	68	ND	ND	36	NA	5	19	ND	ND	ND	80	ND	ND	ND	19	26
2B @ 24	ND	ND	81	ND	ND	28	NA	6	15	2	ND	ND	43	ND	ND	ND	19	28
2B-2 @ 0.5	ND	5	63	ND	ND	50	NA	5	19	14	ND	ND	18	ND	ND	ND	20	73
2B-2 @ 3.5	ND *(ND)*	5 *(3)*	149 *(72)*	ND *(ND)*	ND *(ND)*	19 *(29)*	NA	5 *(ND)*	21 *(17)*	10 *(84)*	ND *(ND)*	ND *(ND)*	21 *(24)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	23 *(23)*	38 *(31)*
2B-3 @ 0.5	ND	4	246	ND	ND	101	NA	15	61	ND	ND	ND	43	ND	ND	ND	86	45
2B-3 @ 5	ND *(ND)*	8 *(ND)*	95 *(51)*	ND *(ND)*	ND *(ND)*	25 *(29)*	NA	6 *(ND)*	12 *(16)*	2 *(ND)*	ND *(ND)*	ND *(ND)*	18 *(17)*	ND *(ND)*	ND *(ND)*	ND *(ND)*	28 *(24)*	24 *(28)*
2C @ 0.5	ND	17	62	ND	ND	8	NA	5	18	24	ND	ND	8	ND	ND	ND	21	85
2C @ 5	ND	31	81	ND	ND	23	NA	7	18	10	ND	ND	13	ND	ND	ND	20	86
3A @ O.5	ND	ND	34	ND	ND	71	NA	11	19	ND	ND	ND	24	ND	ND	ND	27	35
3A @ 5	ND	ND	108	ND	ND	41	NA	9	24	2	ND	ND	113	ND	ND	ND	31	47
3B @ 0.5	ND	3	108	ND	ND	22	NA	6	19	5	ND	ND	26	ND	ND	ND	29	54
3B @ 5	ND	ND	102	ND	ND	35	NA	ND	21	2	ND	ND	32	ND	ND	ND	28	33
3C @ 0.5	ND	ND	49	ND	ND	6	1.77	6	19	9	ND	ND	ND	ND	ND	ND	25	128
3C @ 5	ND	ND	110	ND	ND	36	NA	6	19	51	ND	ND	29	ND	ND	ND	31	50
4A @ 0.5	ND	5	231	ND	ND	15	NA	12	27	9	ND	ND	16	ND	ND	ND	42	221
4A @ 5	ND	ND	94	ND	ND	29	NA	8	25	ND	ND	ND	42	ND	ND	ND	29	40
4B @ 0.5	ND	ND	24	ND	ND	ND	NA	ND	10	2	ND	ND	ND	ND	ND	ND	14	55

Table 2: Title 22 Metal Concentrations in Soil Matrix Samples

Sample Identification & Location	Antimony RL = 5 mg/kg	Arsenic RL = 2 mg/kg	Barium RL = 5 mg/kg	Beryllium RL = 1 mg/kg	Cadmium RL = 5 mg/kg	Chromium RL = 5 mg/kg	Hexavanent Chromium RL = 0.5 mg/kg	Cobalt RL = 5 mg/kg	Copper RL = 1 mg/kg	Lead RL = 1 mg/kg	Mercury RL = 0.1 mg/kg	Molybdenum RL = 4 mg/kg	Nickel RL = 5 mg/kg	Selenium RL = 1 mg/kg	Silver RL = 1 mg/kg	Thallium RL = 2 mg/kg	Vanadium RL = 4 mg/kg	Zinc RL = 1 mg/kg
4B @ 5	ND	5	60	ND	ND	31	NA	ND	17	ND	ND	ND	23	ND	ND	ND	32	26
4C @ 0.5	ND	ND	76	ND	ND	11	NA	6	20	11	ND	ND	14	ND	ND	ND	24	88
4C @ 5	ND	ND	49	ND	ND	29	NA	17	ND	ND	ND	ND	26	ND	ND	ND	24	27
5A @ O.5	ND	7	181	ND	ND	77	NA	15	34	320	ND	ND	170	ND	ND	ND	36	156
5A @ 5^2	ND	ND	142	ND	ND	34	NA	92	15	3	ND	ND	44	ND	ND	ND	31	29
5C @ 0.5	ND	4	189	ND	ND	71	NA	17	32	398	ND	ND	179	ND	ND	ND	29	128
5C @ 5	ND	ND	126	ND	NO	27	NA	8	16	4	ND	ND	42	ND	ND	ND	21	32
Max Conc.	***2.5***	***66***	***246***	***0.5***	***2.5***	***101***	***3.02***	***92***	***61***	***398***	***0.1***	***4***	***179***	***1***	***1***	***2***	***86***	***221***
95% UCL	***NA***	***13.9***	***129.9***	***NA***	***NA***	***43.8***	***NA***	***18.8***	***27.2***	***78.3***	***NA***	***NA***	***63.3***	***NA***	***NA***	***NA***	***35.1***	***84.9***
Mean Concen.	***2.5***	***6.2***	***96***	***0.5***	***2.5***	***29***	***NA***	***9.3***	***20***	***25***	***0.1***	***4***	***87***	***1***	***1***	***2***	***26***	***58***

[1] (#) Duplicate Sample Concentration

Table 3: VOCs, TPHs, PCBs, Compound Concentrations in Soil Matrix Samples

	VOCs All VOCs µg/kg										
Sample Identification & Location	**VOCs**	**Benzene RL = 2 µg/kg**	**Toluene RL = 2 µg/kg**	**Ethylbenzene RL = 2 µg/kg**	**Xylene RL = 2µg/kg**	**MTBE RL = 5 µg/kg**	**TPH, C8-C12 (GasolineRange) RL = 0.1 mg/kg**	**TPH, C13-C23 (Diesel Range) RL = 5 mg/kg**	**TPH, C24-C40 (Oil Range) RL = 50 mg/kg**	**PCBs PCBs RL = 50 µg/kg**	**ODORs (Light, *Moderate*, Strong)**
1A @ 0.5	NA	NA	NA	NA	NA	NA	ND (*ND*)	ND (*ND*)	**84** (*ND*)	ND (*ND*)	ND
1A @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	**203**	ND
1B @ 0.5	NA	NA	NA	NA	NA	NA	ND (*ND*)	ND (*ND*)	ND (*ND*)	**716** *(825)*	ND
1B @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
1C @ 0.5	NA	NA	NA	NA	NA	NA	ND (*ND*)	ND (*ND*)	**133** (*ND*)	**21,337** *(1,510)*	ND
1C @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
2A @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
2A @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
2A-2 @ 0.5	NA	NA	NA	NA	NA	NA	ND	. ND	**1,307**	ND	ND
2A-2 @ 5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2B @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	**1,560**	ND	ND
2B @ 5	ND	**139**(143)[1]	**13**(*19*)	**31**(*41*)	**101**(*122*)	**19**(19)	**1.2** (*1.8*)	ND (*ND*)	**847** *(135)*	ND (*ND*)	ND
2B @ 10	ND	**7,622**	**37,378**	**14,044**	**52,141**	**206**	**943**	ND	ND	NA	**172/*M***
2B @ 15	NA	NA	NA	NA	NA	NA	**544**	ND	ND	NA	**29/*L***
2B @ 20	ND	ND	ND	ND	ND	**22**[2]	**4.5**	ND	ND	NA	ND
2B @ 24	NA	NA	NA	NA	NA	NA	**12**	ND	ND	NA	**5/ND**
2B-2 @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	**1,319**	100	ND
2B-2 @ 3.5	ND	ND	ND	ND	ND	ND	ND (*ND*)	ND (*ND*)	**1,467***(924)*	ND *(87)*	ND
2B-3 @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	**51**	ND
2B-3 @ 5	ND	ND	ND	ND	ND	ND	ND (*ND*)	ND (*ND*)	**614** (*ND*)	ND (*ND*)	ND
2B-3 @ 15	ND	ND	**1,770**	**1,772**	**5,937**	ND	**125**	ND	ND	NA	**ND/M**
2C @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	**1,346**	**428**	ND
2C @ 5	NA	NA	NA	NA	NA	NA	ND	ND	**491**	**2,100**	**ND/L**

Table 3: VOCs, TPHs, PCBs, Compound Concentrations in Soil Matrix Samples

Sample Identification & Location	VOCs All VOCs µg/kg						TPH, C8-C12 (GasolineRange) RL = 0.1 mg/kg	TPH, C13-C23 (Diesel Range) RL = 5 mg/kg	TPH, C24-C40 (Oil Range) RL = 50 mg/kg	PCBs PCBs RL = 50 µg/kg	ODORs (Light, Moderate, Strong)
	VOCs	Benzene RL = 2 µg/kg	Toluene RL = 2 µg/kg	Ethylbenzene RL = 2 µg/kg	Xylene RL = 2µg/kg	MTBE RL = 5 µg/kg					
3A @ O.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
3A @ 5	ND	ND	ND	ND	ND	ND	ND	ND	ND	63	ND
3B @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	987	ND
3B @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
3C @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
3C @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
4A @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
4A @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
4B @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	69,681	ND
4B @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	108	ND
4C @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
4C @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
5A @ O.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
5A @ 5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
5C @ 0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
5C @ 5	NA	NA	NA	NA	NA	NA	ND	639	1,556	ND	ND

[1] (#) Duplicate Sample Concentration

[2] The fuel oxygenate detected at 4,448 µg/kg.

Table 4: SVOCs[1] Compound Concentrations in Soil Matrix Samples

Sample Identification & Location	Naphthalene RL = 250 µg/kg	1-Methylnaphthalene RL = 250 µg/kg	Acenaphthylene RL = 250 µg/kg	Dibenzofuran RL = 250 µg/kg	Carbazole RL = 250 µg/kg	Phenanthrene RL = 1000 µg/kg	Fluoranthene RL = 250 µg/kg	Anthrcene RL = 1000 µg/kg	Pyrene RL = 250 µg/kg	Benzo(a)Anthracene RL = 250 µg/kg	Chrysene RL = 250 µg/kg	Benzo(k) Fluoranthene RL = 250 µg/kg	Benzo(a) Pyrene RL = 250 µg/kg
1A @ 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2B @ 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6,647**	**4,534**
2B @ 5[1]	ND	ND	ND	ND	ND	ND	*(282 J)*	ND	*(480 J)*	**ND**	*(292 J)*	**3,982** *(3,561)*	**3,160**
2B @ 10	**5,357**	**2,762**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2B @ 20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2B-2 @ 0.5	ND	ND	ND	ND	ND	**377 J**	**4,485**	ND	**9,455**	**2,500**	**3,902**	**15,919**	**9,525**
2B-2 @ 3.5[1]	ND	ND	ND	ND	ND	**666** *(382 J)*[3]	**584** *(4,690 J)*	ND	**1,844** *(6,462 J)*		**602** *(256 J)*	**ND** *(2,415 J)*	**ND** (2,080 J)
2B-3 @ 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2B-3 @ 5[1,2]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2C @ 0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2C @ 5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5A @ 5[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5C @ 5	**1,146**	ND	**4,702**	**7,788**	**5,786**	**55,310**	**28,320**	**10,044**	**26,074**	**10,210**	**9,572**	**4,868**	**3,316**

[1] Detected SVOCs only. All other SVOCs not above reporting limits.

[2] J = Concentration detected between MDL and RL.

[3] (#) Duplicate Sample Concetration

Table 5: Dioxins in Soils[1]

Sample Identification & Location	Depth (bgs)	1,2,3,4,6,7,8-HpCDD	OCDD	OCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	2,3,7,8-TCDF	1,2,3,7,8,9-HxCDF
4B-2	0.5	60	250	11	6.2	ND	ND	1.9	ND
4C	0.5	ND	ND	ND	ND	ND	ND	ND	ND
4C-2	0.5	48	190	7.2	4.9	8.5	48	ND	11

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[1] Detected dioxins in picograms per gram (*pg*/g) by USEPA Method 8290, all other dioxins not above method reporting limits.

Table 6: Title 22 Metal Concentrations in Groundwater Samples

Sample Identification & Location	Antimony RL = 10 µg/L	Arsenic RL = 10 µg/L	Barium RL = 10 µg/L	Beryllium RL = 5µg/L	Cadmium RL = 5µg/L	Chromium RL = 5µg/L	Cobalt RL = 5µg/L	Copper RL = 5µg/L	Lead RL = 5 µg/L	Mercury RL = 0.2 µg/L	Molybdenum RL = 5µg/L	Nickel RL = 5µg/L	Selenium RL = 10 µg/L	Silver RL = 5µg/L	Thallium RL = 10 µg/L	Vanadium RL = 5µg/L	Zinc RL = 5µg/L
1A	ND	ND	**34**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1C	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4A	ND	ND	**17**	ND	ND	ND	**69**	ND	ND	ND	ND	**367**	ND	ND	ND	ND	**25**
5A	ND	ND	**79**	ND	ND	ND	ND	ND	ND	ND	ND	**12**	ND	ND	ND	ND	**29**
5C	ND	ND	**35**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**17**
MW-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**23**
MW-2	ND	ND	**14**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	ND	ND	**270**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4 Dup. (designated MW-5 on COC)	ND	ND	**298**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EW-1	ND	**13**	ND	ND	ND	**133**	ND	ND	ND	ND	**33**	ND	ND	ND	ND	**6**	ND
EB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**11**

Table 7: VOCs, SVOCs, TPHs, PCBs, Compound Concentrations in Groundwater Samples

Sample Identification & Location	VOCs All VOCs µg/L						SVOCs All SVCs	TPH, C8-C12 (GasolineRange) RL = 50 µg/L	TPH, C13-C23 (Diesel Range) RL = 500 µg/L	TPH, C24-C40 (Oil Range) RL = 1000 µg/L	PCBs All PCBs RL = 0.5 µg/L	ODORs (Light, *Moderate*, Strong)
	VOCs	Benzene RL = 50 µg/L	Toluene RL = 50 µg/L	Ethylbenzene RL = 50 µg/L	Xylene RL = 50 µg/L	MTBE RL = 200 µg/L						
1A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7[1]	ND
1C	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.0[1]	ND
2C	ND	ND	ND	ND	ND	ND	NA	ND	ND	2,184	NA	***M***
3A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5C	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1	ND	ND	ND	ND	ND	ND	ND	230	ND	ND	ND	ND
MW-2	ND	ND	ND	ND	ND	15	ND	ND	ND	ND	ND	ND
MW-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	ND	22,053	17,310	3,981	13,969	5,841	382[2], 44[3]	152,237	ND	ND	ND	***M***
MW-5 (duplicate of MW-4)	ND	21,536	16,547	3,900	13,786	6,026	364[2], 43[3]	162,863	ND	ND	ND	ND
EW-1	ND	ND	ND	ND	ND	8	ND	105	ND	ND	ND	ND
EB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA

[1] PCB-1260

[2] Naphthalene, RL = 10 µg/L

[3] 1-Methylnaphthalene, RL = 10 µg/L

Table 8: Geotechnical Parameters of Soil Matrix Samples(1)

Sample Location & Identification	Sample Depth (bgs)	Specific Gravity	Total Porosity % Vb²	Wet Density (g/cm³)	Dry Density (g/cc)	Moisture Content (% wt)	Total Organic Carbon (mg/kg)	pH	Hydraulic Conductivity (cm/sec)	Soil Classification
2B-3 (Lab I.D. 50310C-25)	5 feet	2.66	0.32		1.81	17.46		7.1		
5A (Lab I.D. 50310C-26)	5 feet	2.63	0.39		1.59	24.50		6.9		

[1] See Appendix B laboratory report.
[2] Vb = Bulk Volume

Table 9: Exposure Assumptions

Parameter	Symbol	Scenario		Units
		On-Site Resident Child	On-Site Resident Adult	
Inhalation of Soil Particulates				
Breathing Rate[a]	BR	10	20	(m^3/day)
Transfer Coefficient[b]	TF	7.6E-10	7.6E-10	(mg/m^3)/(mg/kg)
Dermal contact of soil				
Surface Area[c]	SA	2800	5700	(cm^2/day)
Adherence Factor[d]	AF	0.2	0.07	(mg/cm^2)
Absorption Factor-PAHs [e]	ABS-PAH	0.15	0.15	unitless
Absorption Factor-Metals [e]	ABS-Met	0.01	0.01	unitless
Absorption Factor-Arsenic [e]	ABS-As	0.03	0.03	unitless
Absorption Factor-DDT and isomers[c]	ABS-DDT	0.03	0.03	unitless
Absorption Factor-Organics [e]	ABS-Org	0.1	0.1	unitless
Conversion Factor	CF	1.0E-06	1.0E-06	(kg/mg)
Ingestion of Soil				
Ingestion Rate	IR	200	100	(mg/day)
Conversion Factor	CF	1.0E-06	1.0E-06	(kg/mg)
Inhalation of Vapors				
Breathing Rate[a]	BR	10	20	(m^3/day)
Population-Specific Intake Parameters				
Exposure Frequency	EF	350	350	(days/yr)
Exposure Duration	ED	6	30	(years)
Body Weight	BW	15	70	(kg)
Averaging Time-Carcinogens	AT_c	25550	25550	(days)
Averaging Time-Noncarcinogens	AT_{nc}	2190	10950	(days)

Notes:

NA = Not applicable (i.e., this exposure pathway is not considered complete for this population).

[a] Recommended breathing rates for adults (20 m^3/day) and children (10 m^3/day) (Cal/EPA 1992; Cal/EPA 1994).

[b] Soil-to-air transfer coefficient recommended in the USEPA Region 9 Preliminary Remediation Goals (USEPA 2004).
to the National Ambient Air Quality Standard (Cal/EPA 1994).

[c] USEPA 2004 (Risk Assessment Guidance for Superfund Volume I: Human Health Evauation Manual (Part E, Supplemental Guidance for De

[d] USEPA 2004 (Risk Assessment Guidance for Superfund Volume I: Human Health Evauation Manual (Part E, Supplemental Guidance for De

[e] Dermal absorption factors for specific compound classes from Cal/EPA 1994.

<u>Sources:</u>

California Environmental Protection Agency (Cal/EPA). 1994. *Preliminary Endangerment Assessment Guidance Manual.* Department of Toxic Substances Control (DTSC). January.

California Environmental Protection Agency (Cal/EPA). 1992. *Supplemental Guidance for Human Health Multimedia Risk Assessment of Hazardous Waste Sites and Permitted Facilities.* Sacramento, CA. July.

U.S. Environmental Protection Agency (USEPA). 2004. *Risk Assessment Guidance for Superfund. Vol. I: Human Health Evaluation Manual. Part E. Supplemental Guidance For Dermal Risk Assessment. Final.*

Table 10: Summary of Soil and Groundwater Data - Identification of Chemicals Included in the Risk Assessment

	Site Soil Data				Site Groundwater Data				Site Soil Vapor Data		
Chemicals	Detection Frequency	Minimum (mg/kg)	Maximum (mg/kg)	95%UCL1 (mg/kg)	Detection Frequency	Minimum (ug/l)	Maximum (ug/l)	95%UCL1(ug/L)	Detection Frequency	Minimum (ug/L)	Maximum (ug/L)
Volatile Organic Compounds											
Benzene		nd	7.62				22053			nd	9.3
Ethylbenzene		nd	14				3981			nd	1.6
m,p-Xylenes		nd	52.1				13969			nd	5.7
Methyl-t-Butyl ether (MTBE)		nd	0.206				6926			nd	1.3
o-Xylene		nd	see m,p xylene				see m,p xylene			nd	1
Tetrachloroethene		nd	nd			nd	nd			nd	1.1
Toluene		nd	27			nd	17310			nd	1.7
PCBs / Dioxins											
PCB 1260		nd	69.7	NC		nd	2				
1,2,3,4,6,7,8 HpCDD			6.00E-08								
OCDD			2.50E-07								
2,3,7,8 TCDF			1.90E-09								
1,2,3,4,6,7,8 HpCDF			6.20E-09								
OCDF			1.10E-08								
1,2,3,7,8,9 HxCDD			8.50E-09								
1,2,3,7,8,9 HxCDF			1.10E-08								
Polycyclic Aromatic Hydrocarbons[4]											
Acenaphthylene			4.7								
Anthracene			10.044								
Benz(a)anthracene			10.21								
Benzo(a)pyrene			9.525								
Benzo(k)fluoranthene			15.9								
Chrysene			9.57								
Fluoranthene			28.32								
Phenanthrene			55.31								
Pyrene			26.07								
Semi-Volatile Organic Compounds											
1-Methylnaphthalene		nd	2.7			nd	44				
Naphthalene		nd	5.3			nd	382				
Dibenzofuran		nd	7.788								
Carbazole		nd	5.786								
Metals											
Antimony		nd	nd	na	0		nd				
Arsenic		nd	66.00	13.9	0		nd				
Barium		nd	246.00	129.9	7		298.00				
Beryllium		nd	nd	na	0		nd				
Cadmium		nd	nd	na	0		nd				
Chromium		nd	101.00	43.8	1		133.00				
Hexavalent Chromium			3.02		na		na				
Cobalt		nd	92.00	18.8	1		69.00				
Copper		nd	61.00	27.2	0		nd				
Lead		nd	398.00	78.3	0		nd				
Mercury		nd	nd	na	0		nd				
Molybdenum		nd	nd	na	1		33.00				
Nickel		nd	179.00	63.3	1		nd				
Selenium		nd	nd	na	0		nd				
Silver		nd	nd	na	0		nd				
Thallium		nd	nd	na	0		nd				
Vanadium		nd	86.00	35.1	1		6.00				
Zinc		26.00	221.00	84.9	5		29.00				
TPH											
Gasoline		nd	943.00			nd	162863				
Diesel		nd	nd			nd	nd				
Oil		nd	1560			nd	2184				

NOTES:

95% UCL = Corresponds to the 95% Upper Confidence Limit calculated using USEPA's ProUCL (USEPA 2006b)

ND = Not detected

NC = Not calculated. The maximum concentration was used as exposure point concentration.

NS = Not sampled.

[1] Includes non-detects at half the detection limit. As this is a SCREENING-LEVEL evaluation, discussion of risks are generally based on the maximum detected concentration.

Table 11: Toxicity Values

	Cancer Slope Factors (CSFs)				Chronic Noncancer Reference Doses (RfDs)			
	(mg/kg-day)-1				(mg/kg-day)			
Chemical	Inhalation	Source	Oral	Source	Inhalation	Source	Oral	Source
Volatile Organic Compounds								
Benzene	1.00E-01	3	1.00E-01	3	8.60E-03	2	4.00E-03	2
Ethylbenzene	NC	3	NC	3	2.90E-01	2	1.00E-01	2
mp -Xylenes	NC	3	NC	3	2.90E-02	2	2.00E-01	2
Methyl Tert Butyl Ether	9.10E-04	3	1.80E-03	3	8.60E-01	2	8.60E-01	2a
o-Xylene	NC	3	NC	3	2.90E-02	2	2.00E-01	2
Tetrachloroethylene	2.10E-02	3	5.40E-01	3	1.00E-02	3	1.00E-02	2
Toluene	NC	3	NC	3	1.10E-01	2	2.00E-01	2
PCBs / Dioxins								
PBC 1260	2.00E+00	3	5.00E+00	3	7.00E-05	2	7.00E-05	2a
1,2,3,4,6,7,8 HpCDD	1.30E+03	3	1.30E+03	3	na	2	na	2
OCDD	1.30E+01	3	1.30E+01	3	na	2	na	2
2,3,7,8 TCDF	1.30E+04	3	1.30E+04	3	na	2	na	2
1,2,3,4,6,7,8 HpCDF	1.30E+03	3	1.30E+03	3	na	2	na	2
OCDF	1.30E+01	3	1.30E+01	3	na	2	na	2
1,2,3,7,8,9 HxCDD	1.30E+04	3	1.30E+04	3	na	2	na	2
1,2,3,7,8,9 HxCDF	1.30E+04	3	1.30E+04	3	na	2	na	2
Polycyclic Aromatic Hydrocarbons								
Acenaphthylene	NC	3	NC	3	6.00E-02	2a	6.00E-02	2
Anthracene	NC	3	NC	3	3.00E-01	2a	3.00E-01	2
Benz(a)anthracene	3.90E-01	3	1.20E+00	3	8.57E-04	2b	2.00E-02	2b
Benzo(a)pyrene	3.90E+00	3	1.20E+01	3	8.57E-04	2b	2.00E-02	2b
Benzo(k)fluoranthene	3.90E-01	3	1.20E+00	3	8.57E-04	2b	2.00E-02	2b
Chrysene	3.90E-02	3	1.20E-01	3	8.57E-04	2b	2.00E-02	2b
Fluoranthene	NC	3	NC	3	4.00E-02	2a	4.00E-02	2
Phenanthrene	NC	3	NC	3	8.57E-04	2b	2.00E-02	2b
Pyrene	NC	3	NC	3	3.00E-02	2a	3.00E-02	2
Semi-Volatile Compounds								
1-Methylnaphthalene	NC	3	NC	3	8.57E-04	2b	2.00E-02	2b
Naphthalene	1.20E-01	3	NC	3	8.60E-04	2	2.00E-02	2
Dibenzofuran	NC	3	NC	3	2.00E-03	4a	2.00E-03	4
Carbazole	NC	3	NC	3	4.00E-02	5	4.00E-02	5
Metals								
Antimony	NC	3	NC	3	4.00E-04	a	4.00E-04	2
Arsenic	1.20E+01	3	9.50E+00	3	3.00E-04	a	3.00E-04	2
Barium	NC	3	NC	3	1.40E-04	1	7.20E-04	2
Beryllium	8.40E+00	3	NC	3	5.70E-06	2	2.00E-03	2
Cadmium	1.50E+01	3	3.80E-01	3	5.00E-04	a	5.00E-04	2

Table 11: Toxicity Values

	Cancer Slope Factors (CSFs)				Chronic Noncancer Reference Doses (RfDs)			
	(mg/kg-day)-1				(mg/kg-day)			
Chemical	Inhalation	Source	Oral	Source	Inhalation	Source	Oral	Source
Chromium	NC	3	NC	3	1.50E+00	a	1.50E+00	2
Chromium, Hexavalent	5.10E+02	3	NC	3	2.20E-06	2	3.00E-03	2
Cobalt	NC	3	NC	3	2.00E-02		2.00E-02	
Copper	NC	3	NC	3	4.00E-02	a	4.00E-02	1
Lead	NA	c	NA	c	NA	c	NA	c
Mercury	NC	3	NC	3	3.00E-04	a	3.00E-04	2
Molybdenum	NC	3	NC	3	5.00E-02	a	5.00E-03	2
Nickel	9.10E-01	3	NC	3	2.00E-02	a	2.00E-02	2
Selenium	NC	3	NC	3	5.00E-03	a	5.00E-03	2
Silver	NC	3	NC	3	5.00E-03	a	5.00E-03	2
Thallium	NC	3	NC	3	6.60E-05	a	6.60E-05	2
Vanadium	NC	3	NC	3	1.00E-03	a	1.00E-03	4
Zinc	NC	3	NC	3	3.00E-01	a	3.00E-01	2

Notes:

NA - Not available. Route-specific toxicity value for this compound was not available.

NC - Not considered to be a carcinogen.

[a] Route-to-route extrapolation.

[b] Because the USEPA has not developed an RfD for this chemical, the noncancer RfD for naphthalene is used as a surrogate value

[c] Lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. See Section 4.4.2.3.

Sources:

1. United States Environmental Protection Agency (USEPA). 1997. *Health Effects Assessment Summary Tables. FY 1997 Update.* July.
2. United States Environmental Protection Agency (USEPA). 2005. *Integrated Risk Information System Database.*
3. California Environmental Protection Agency (Cal/EPA). 2005. *Toxicity Criteria Database.* Maintained online at www.oehha.org.

   Office of Environmental Health Hazard Assessment (OEHHA).
4. NCEA. National Center for Environmental Assessment from Region IX PRG table. Found at www.epa.gov/region09/waste/sfund/prg/
5. Used fluorone as surrogate for carbazole as there is no toxicity value available for carbazole

Table 12: Equations Used to Calculate Chronic Daily Intakes

Chronic Daily Intake: Vapor Inhalation

Noncancer

$$CDI_{inhv,\ child} = \frac{C_a \times BR_{child} \times EF \times ED_{child}}{BW_{child} \times AT_{nc,\ child}} \qquad CDI_{inhv,\ adult} = \frac{C_a \times BR_{adult} \times EF \times ED_{adult}}{BW_{adult} \times AT_{nc,\ adult}}$$

Cancer

$$CDI_{inhv,\ age\ adjusted} = \frac{C_a \times BR_{child} \times EF \times ED_{child}}{BW_{child} \times AT_c} + \frac{C_a \times BR_{adult} \times EF \times ED_{adult,\ age\ adjusted}}{BW_{adult} \times AT_c}$$

Chronic Daily Intake: Soil Particulate Inhalation

Noncancer

$$CDI_{inhp,\ child} = \frac{C_s \times TF_p \times BR_{child} \times EF \times ED_{child}}{BW_{child} \times AT_{nc,\ child}} \qquad CDI_{inhp,\ adult} = \frac{C_s \times TF_p \times BR_{adult} \times EF \times ED_{adult}}{BW_{adult} \times AT_{nc,\ adult}}$$

Cancer

$$CDI_{inhp,\ age\ adjusted} = \frac{C_s \times TF_p \times BR_{child} \times EF \times ED_{child}}{BW_{child} \times AT_c} + \frac{C_s \times TF_p \times BR_{adult} \times EF \times ED_{adult,\ age\ adjusted}}{BW_{adult} \times AT_c}$$

Chronic Daily Intake: Dermal Contact

Noncancer

$$CDI_{derm,\ child} = \frac{C_s \times SA_{child} \times AF_{child} \times ABS \times EF \times ED_{child} \times CF}{BW_{child} \times AT_{nc,\ child}} \qquad CDI_{derm,\ adult} = \frac{C_s \times SA_{adult} \times AF_{adult} \times ABS \times EF \times ED_{adult} \times CF}{BW_{adult} \times AT_{nc,\ adult}}$$

Cancer

$$CDI_{derm,\ age\ adjusted} = \frac{C_s \times SA_{child} \times AF_{child} \times ABS \times EF \times ED_{child} \times CF}{BW_{child} \times AT_c} + \frac{C_s \times SA_{adult} \times AF_{adult} \times ABS \times EF \times ED_{adult,\ age\ adjusted} \times CF}{BW_{adult} \times AT_c}$$

Table 12: Equations Used to Calculate Chronic Daily Intakes

Chronic Daily Intake: Soil Ingestion

Noncancer

$$CDI_{ing,\ child} = \frac{C_s \times IR_{child} \times CF \times EF \times ED_{child}}{BW_{child} \times AT_{nc,\ child}} \qquad CDI_{ing,\ adult} = \frac{C_s \times IR_{adult} \times CF \times EF \times ED_{adult}}{BW_{adult} \times AT_{nc,\ adult}}$$

Cancer

$$CDI_{ing.\ age\ adjusted} = \frac{C_s \times IR_{child} \times TF_p \times EF \times ED_{child}}{BW_{child} \times AT_c} + \frac{C_s \times IR_{adult} \times TF_p \times EF \times ED_{adult,\ age\ adjusted}}{BW_{adult} \times AT_c}$$

Where:

ABS = Absorption Factor [-]

AF = Soil to Skin Adherence Factor [mg/cm^2]

AT_c = Averaging Time for Carcinogenic Compounds [years]

AT_{nc} = Averaging Time for Noncarcinogenic Compounds [years]

BR = Breathing Rate [m^3/day]

BW = Body Weight [kg]

CF = Conversion Factor [kg/mg]

ED = Exposure Duration [years]

EF = Exposure Frequency [days/year]

CDI_{derm} = Chronic Daily Intake: Dermal Contact [$mg_{chemical}/kg_{body\ weight}$-day]

CDI_{ing} = Chronic Daily Intake: Ingestion [$mg_{chemical}/kg_{body\ weight}$-day]

$CDI_{inh,\ p}$ = Chronic Daily Intake: Soil Particulate Inhalation [$mg_{chemical}/kg_{body\ weight}$-day]

$CDI_{inh,\ v}$ = Chronic Daily Intake: Vapor Inhalation [$mg_{chemical}/kg_{body\ weight}$-day]

C_s = Concentration of Chemical in Soil [mg/kg]

C_a = Concentration of Chemical in Air [mg/m^3]

IR = Soil Ingestion Rate [mg/day]

SA = Surface Area of Exposed Skin [cm^2/day]

TF_p = Soil Particulate-to-Air Transfer Factor [(mg/m3)/(mg/kg)]

Table 13: Chronic Daily Intakes-Carcinogens

Chemical	CDI from Soil, On-Site Resident[1]		
	Chronic Daily Intake Outdoor Inhalation Pathway (mg/kg-day)	**Chronic Daily Intake-Dermal Exposure Pathway (mg/kg-day)**	**Chronic Daily Intake-Soil Investigation Exposure Pathway (mg/kg-day)**
Volatile Organic Compounds			
Benzene	5.37E-05	3.77E-06	1.19E-05
Ethylbenzene	4.33E-05	6.92E-06	2.19E-05
mp -Xylenes	1.40E-04	2.58E-05	8.16E-05
Methyl Tert Butyl Ether	1.48E-06	1.02E-07	3.23E-07
o-Xylene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethylene	0.00E+00	0.00E+00	0.00E+00
Toluene	1.60E-04	1.83E-05	5.79E-05
PCBs / Dioxins			
PBC 1260	7.88E-09	5.17E-05	1.09E-04
1,2,3,4,6,7,8 HpCDD	6.78E-18	8.90E-15	9.39E-14
OCDD	2.83E-17	3.71E-14	3.91E-13
2,3,7,8 TCDF	2.15E-18	2.82E-16	2.97E-15
1,2,3,4,6,7,8 HpCDF	7.01E-19	9.19E-16	9.71E-15
OCDF	1.24E-18	1.63E-15	1.72E-14
1,2,3,7,8,9 HxCDD	9.61E-19	1.26E-16	1.33E-04
1,2,3,7,8,9 HxCDF	1.24E-18	1.63E-16	1.72E-14
Polycyclic Aromatic Hydrocarbons			
Acenaphthylene	1.46E-06	3.48E-06	7.36E-06
Anthracene	1.02E-06	7.45E-06	1.57E-05
Benz(a)anthracene	1.15E-09	7.57E-06	1.60E-05
Benzo(a)pyrene	1.08E-09	7.06E-06	1.49E-05
Benzo(k)fluoranthene	1.80E-09	1.18E-05	2.49E-05
Chrysene	1.08E-09	7.09E-06	1.50E-05

Table 13: Chronic Daily Intakes-Carcinogens

	CDI from Soil, On-Site Resident[1]		
Chemical	**Chronic Daily Intake Outdoor Inhalation Pathway (mg/kg-day)**	**Chronic Daily Intake-Dermal Exposure Pathway (mg/kg-day)**	**Chronic Daily Intake-Soil Investigation Exposure Pathway (mg/kg-day)**
Fluoranthene	3.20E-09	2.10E-05	4.43E-05
Phenanthrene	1.24E-06	4.10E-05	8.66E-05
Pyrene	1.06E-07	1.93E-05	4.08E-05
Semi-Volatile Compounds			
1-Methylnaphthalene	9.97E-07	2.00E-06	4.23E-06
Naphthalene	1.96E-06	3.93E-06	8.30E-06
Dibenzofuran	2.92E-07	1.15E-06	1.22E-05
Carbazole	1.84E-08	4.29E-06	9.06E-05
Metals			
Antimony	0.00E+00	0.00E+00	0.00E+00
Arsenic	7.46E-09	9.79E-06	1.03E-04
Barium	2.78E-08	1.22E-05	3.85E-04
Beryllium	0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00	0.00E+00	0.00E+00
Chromium	1.14E-08	4.99E-06	1.58E-04
Chromium, Hexavalent	3.41E-10	0.00E+00	4.73E-06
Cobalt	8.59E-11	4.55E-06	1.44E-04
Copper	6.89E-09	3.01E-06	9.55E-05
Lead	4.50E-08	1.97E-05	6.23E-04
Mercury	0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00	0.00E+00	0.00E+00
Nickel	2.02E-08	8.85E-06	2.80E-04
Selenium	0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00

Table 13: Chronic Daily Intakes-Carcinogens

Chemical	CDI from Soil, On-Site Resident[1]		
	Chronic Daily Intake Outdoor Inhalation Pathway (mg/kg-day)	Chronic Daily Intake-Dermal Exposure Pathway (mg/kg-day)	Chronic Daily Intake-Soil Investigation Exposure Pathway (mg/kg-day)
Vanadium	9.72E-09	4.25E-06	1.35E-04
Zinc	2.50E-08	1.09E-05	3.46E-04

Notes:

CDI = Chronic Daily Intake

ND = This chemical not detected in this medium.

NC = This chemical is not considered a carcinogen.

NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] Per Cal/EPA guidance, cancer risks for future on-site residents are calculated using an age-adjusted approach to account for the higher exposures per body weight that occur during the childhood years. Accordingly, the evaluation assumes that the resident is a child for the first 6 years of exposure and an adult for the remaing 24 years.

Table 14: Chronic Daily Inta[illegible]oncarcinogens

	On-Site Resident Adult		
Chemical	Chronic Daily Intake-Outdoor Inhalation Pathway (mg/kg-day)	Chronic Daily Intake-Dermal Exposure Pathway (mg/kg-day)	Chronic Daily Intake-Soil Ingestion Exposure Pathway (mg/kg-day)
Volatile Organic Compounds			
Benzene	9.89E-05	4.16E-06	1.04E-05
Ethylbenzene	3.19E-04	7.65E-06	1.92E-05
mp -Xylenes	1.03E-03	2.85E-05	7.14E-05
Methyl Tert Butyl Ether	1.09E-05	1.13E-07	2.82E-07
o-Xylene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethylene	0.00E+00	0.00E+00	0.00E+00
Toluene	1.18E-03	2.02E-05	5.07E-05
PCBs / Dioxins			
PBC 1260	5.80E-08	5.71E-05	9.55E-05
1,2,3,4,6,7,8 HpCDD	5.00E-17	9.84E-15	8.22E-14
OCDD	2.08E-16	4.10E-14	3.42E-13
2,3,7,8 TCDF	1.58E-18	3.12E-16	2.60E-15
1,2,3,4,6,7,8 HpCDF	5.16E-18	1.02E-15	8.49E-15
OCDF	9.16E-18	1.80E-15	1.51E-14
1,2,3,7,8,9 HxCDD	7.08E-18	1.39E-15	1.16E-14
1,2,3,7,8,9 HxCDF	9.16E-18	1.80E-15	1.51E-14
Polycyclic Aromatic Hydrocarbons			
Acenaphthylene	1.08E-05	3.85E-06	6.44E-06
Anthracene	7.54E-06	8.23E-06	1.38E-05
Benz(a)anthracene	8.50E-09	8.37E-06	1.40E-05
Benzo(a)pyrene	7.93E-09	7.81E-06	1.30E-05
Benzo(k)fluoranthene	1.32E-08	1.30E-05	2.18E-05
Chrysene	7.97E-09	7.85E-06	1.31E-05
Fluoranthene	2.36E-08	2.32E-05	3.88E-05
Phenanthrene	9.12E-06	4.53E-05	7.58E-05
Pyrene	7.79E-07	2.14E-05	3.57E-05
Semi-Volatile Compounds			
1-Methylnaphthalene	7.35E-06	2.21E-06	3.70E-06
Naphthalene	1.44E-05	4.35E-06	7.26E-06
Dibenzofuran	2.15E-06	1.28E-06	1.07E-05
Carbazole	1.36E-07	4.74E-06	7.93E-06
Metals			
Antimony	0.00E+00	0.00E+00	0.00E+00
Arsenic	5.50E-08	1.08E-05	9.04E-05
Barium	2.05E-07	1.34E-05	3.37E-04
Beryllium	0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00	0.00E+00	0.00E+00
Chromium	8.41E-08	5.52E-06	1.38E-04
Chromium, Hexavalent	2.51E-09	0.00E+00	4.14E-06
Cobalt	6.33E-10	5.03E-06	1.26E-04
Copper	5.08E-08	3.33E-06	8.36E-05
Lead	3.31E-07	2.18E-05	5.45E-04
Mercury	0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00	0.00E+00	0.00E+00
Nickel	1.49E-07	9.78E-06	2.45E-04
Selenium	0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00
Vanadium	7.16E-08	4.70E-06	1.18E-04
Zinc	1.84E-07	1.21E-05	3.03E-04

Notes:

CDI = Chronic Daily Intake

ND   This chemical not detected in this medium.

NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] Per Cal/EPA guidance, cancer risks for future on-site residents are calculated using an age-adjusted approach to account for the higher exposures per body weight that occur during the childhood years. Accordingly, the evaluation assumes that the resident is a child for the first 6 years of exposure and an adult for the remaining 24 years.

Table 14: Chronic Dai[illegible]takes-Noncarcinogens

Chemical	On-Site Resident Child Chronic Daily Intake- Outdoor Inhalation Pathway (mg/kg-day)	 Chronic Daily Intake-Dermal Exposure Pathway (mg/kg-day)	 Chronic Daily Intake-Soil Ingestion Exposure Pathway (mg/kg-day)
Volatile Organic Compounds			
Benzene	2.31E-04	2.73E-05	9.74E-05
Ethylbenzene	1.86E-04	5.01E-05	1.79E-04
mp -Xylenes	6.03E-04	1.87E-04	6.66E-04
Methyl Tert Butyl Ether	6.37E-06	7.37E-07	2.63E-06
o-Xylene	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethylene	0.00E+00	0.00E+00	0.00E+00
Toluene	6.87E-04	1.32E-04	4.73E-04
PCBs / Dioxins			
PBC 1260	3.39E-08	3.74E-04	8.91E-04
1,2,3,4,6,7,8 HpCDD	2.91E-17	6.44E-14	7.67E-13
OCDD	1.21E-16	2.68E-13	3.20E-12
2,3,7,8 TCDF	9.23E-19	2.04E-15	2.43E-14
1,2,3,4,6,7,8 HpCDF	3.01E-18	6.66E-15	7.93E-14
OCDF	5.34E-18	1.18E-14	1.41E-13
1,2,3,7,8,9 HxCDD	4.13E-18	9.13E-15	1.09E-13
1,2,3,7,8,9 HxCDF	5.34E-18	1.18E-14	1.41E-13
Polycyclic Aromatic Hydrocarbons			
Acenaphthylene	6.27E-06	2.52E-05	6.01E-05
Anthracene	4.40E-06	5.39E-05	1.28E-04
Benz(a)anthracene	4.96E-09	5.48E-05	1.31E-04
Benzo(a)pyrene	4.63E-09	5.11E-05	1.22E-04
Benzo(k)fluoranthene	7.72E-09	8.54E-05	2.03E-04
Chrysene	4.65E-09	5.14E-05	1.22E-04
Fluoranthene	1.38E-08	1.52E-04	3.62E-04
Phenanthrene	5.32E-06	2.97E-04	7.07E-04
Pyrene	4.55E-07	1.40E-04	3.33E-04
Semi-Volatile Compounds			
1-Methylnaphthalene	4.29E-06	1.45E-05	3.45E-05
Naphthalene	8.41E-06	2.85E-05	6.78E-05
Dibenzofuran	1.26E-06	8.36E-06	9.96E-05
Carbazole	7.92E-08	3.11E-05	7.40E-05
Metals			
Antimony	0.00E+00	0.00E+00	0.00E+00
Arsenic	3.21E-08	7.09E-05	8.44E-04
Barium	1.19E-07	8.81E-05	3.15E-03
Beryllium	0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00	0.00E+00	0.00E+00
Chromium	4.91E-08	3.62E-05	1.29E-03
Chromium, Hexavalent	1.47E-09	0.00E+00	3.86E-05
Cobalt	3.69E-10	3.29E-05	1.18E-03
Copper	2.96E-08	2.18E-05	7.80E-04
Lead	1.93E-07	1.42E-04	5.09E-03
Mercury	0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00	0.00E+00	0.00E+00
Nickel	8.70E-08	6.41E-05	2.29E-03
Selenium	0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00
Vanadium	4.18E-08	3.08E-05	1.10E-03
Zinc	1.07E-07	7.91E-05	2.83E-03

Notes:

CDI Chronic Daily Intake

ND This chemical not detected in this medium.

NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] Per Cal EPA guidance, cancer risks for future on-site residents are calculated using an age-adjusted approach to account for the higher exposures per body weight that occur during the childhood years. Accordingly, the evaluation assumes that the resident is a child for the first 6 years of exposure and an adult for the remaining 24 years.

Table 15: Cancer Risk Estimates

	On-Site Resident[1]				
Chemical	**Risk Associated with Ourdoor Inhalation Pathway**	**Risk Associated with Indoor Inhalation Pathway[2]**	**Risk Associated with Dermal Exposure Pathway**	**Risk Associated with Ingestion Exposure Pathway**	**Total Risk**
Benzene	5.37E-06	1.00E-04	3.77E-07	1.19E-06	1.07E-04
Ethylbenzene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
m,p-Xylenes	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Methyl-t-Butyl ether (MTBE)	1.35E-09	1.40E-07	1.83E-10	5.81E-10	1.42E-07
o-Xylene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	0.00E+00	2.20E-06	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
PCB 1260	1.58E-08		2.58E-04	5.46E-04	8.04E-04
1,2,3,4,6,7,8 HpCDD	8.82E-15		1.16E-11	1.22E-10	1.34E-10
OCDD	3.67E-16		4.82E-13	5.09E-12	5.57E-12
2,3,7,8 TCDF	2.79E-15		3.66E-12	3.87E-11	4.23E-11
1,2,3,4,6,7,8 HpCDF	9.11E-16		1.20E-12	1.26E-11	1.38E-11
OCDF	1.62E-17		2.12E-14	2.24E-13	2.45E-13
1,2,3,7,8,9 HxCDD	1.25E-14		1.64E-11	1.73E-10	1.89E-10
1,2,3,7,8,9 HxCDF	1.62E-14		2.12E-11	2.24E-10	2.45E-10
Acenaphthylene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Anthracene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Benz(a)anthracene	4.50E-10		9.08E-06	1.92E-05	2.83E-05
Benzo(a)pyrene	4.20E-09		8.47E-05	1.79E-04	2.64E-04
Benzo(k)fluoranthene	7.01E-10		1.41E-05	2.99E-05	4.40E-05
Chrysene	4.22E-11		8.51E-07	1.80E-06	2.65E-06
Fluoranthene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Pyrene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Naphthalene	2.35E-07	3.60E-05	0.00E+00	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Carbazole	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Antimony	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Arsenic	8.95E-08		9.30E-05	9.82E-04	1.07E-03
Barium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Beryllium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Chromium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Hexavalent Chromium	1.74E-07		0.00E+00	0.00E+00	1.74E-07
Cobalt	0.00E+00		0.00E+00	0.00E+00	0.00E+00

Table 15: Cancer Risk Estimates

	On-Site Resident[1]				
Chemical	Risk Associated with Ourdoor Inhalation Pathway	Risk Associated with Indoor Inhalation Pathway[2]	Risk Associated with Dermal Exposure Pathway	Risk Associated with Ingestion Exposure Pathway	Total Risk
Copper	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Lead	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Mercury	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Nickel	1.84E-08		0.00E+00	0.00E+00	0.00E+00
Selenium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Vanadium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Zinc	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Cumulative	**5.91E-06**	**1.38E-04**	**4.61E-04**	**1.76E-03**	**2.36E-03**

Notes:

ND = This chemical not detected in this medium.

NC = This chemical is not considered a carcinogen.

0 = No risk associated with this chemical.

NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] Per DTSC guidance, cancer risks for future on-site residents are calculated using an age-adjusted approach to account for the higher exposures per body weight that occur during the childhood years. Accordingly, the evaluation assumes that the resident is a child for the first 6 years of exposure and an adult for the remaining 24 years. RISKS PRESENTED HERE ARE SCREENING-LEVEL VALUES, BASED ON THE ASSUMPTION THAT RESIDENTS ARE EXPOSED TO THE MAXIMUM CONCENTRATION DETECTED ONSITE FOR A CONTINUOUS 30-YEAR PERIOD.

[2] Risk from indoor air used data from soil vapor and groundwater. If chemicals were detected in both media, data from soil vapor was used.

Table 16: Noncancer Hazard Indices

Chemical	On-Site Resident Child[1]				
	HI Associated with Outdoor Inhalation Pathway	HI Associated with Indoor Inhalation Pathway[2]	HI Associated with Dermal Exposure Pathway	HI Associated with Ingestion Exposure Pathway	Total HI for Child Resident
Benzene	2.68E-02	2.70E-01	6.82E-03	2.44E-02	3.28E-01
Ethylbenzene	6.42E-04	1.30E-03	5.01E-04	1.79E-03	4.23E-03
m,p-Xylenes	2.08E-02	4.30E-02	9.33E-04	3.33E-03	6.80E-02
Methyl-t-Butyl ether (MTBE)	7.41E-06	4.20E-04	8.58E-07	3.06E-06	4.31E-04
o-Xylene	0.00E+00	8.80E-03	0.00E+00	0.00E+00	8.80E-03
Tetrachloroethene	0.00E+00	2.40E-02	0.00E+00	0.00E+00	2.40E-02
Toluene	6.24E-03	5.00E-03	6.62E-04	2.37E-03	1.43E-02
PCB 1260	4.84E-04		5.35E+00	1.27E+01	1.81E+01
1,2,3,4,6,7,8 HpCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
OCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
2,3,7,8 TCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,4,6,7,8 HpCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
OCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,7,8,9 HxCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,7,8,9 HxCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	1.05E-04		4.21E-04	1.00E-03	1.53E-03
Anthracene	1.47E-05		1.80E-04	4.28E-04	6.22E-04
Benz(a)anthracene	5.79E-06		2.74E-03	6.53E-03	9.27E-03
Benzo(a)pyrene	5.40E-06		2.56E-03	6.09E-03	8.65E-03
Benzo(k)fluoranthene	9.01E-06		4.27E-03	1.02E-02	1.44E-02
Chrysene	5.42E-06		2.57E-03	6.12E-03	8.69E-03
Fluoranthene	3.44E-07		3.80E-03	9.05E-03	1.29E-02
Phenanthrene	6.21E-03		1.49E-02	3.54E-02	5.64E-02
Pyrene	1.52E-05		4.67E-03	1.11E-02	1.58E-02
1-Methylnaphthalene	5.00E-03	9.50E-02	7.25E-04	1.73E-03	1.02E-01
Naphthalene	9.78E-03	8.30E-01	1.42E-03	3.39E-03	8.45E-01
Dibenzofuran	6.28E-04		4.18E-03	4.98E-02	5.46E-02
Carbazole	1.98E-06		7.77E-04	1.85E-03	2.63E-03
Antimony	0.00E+00		0.00E+00	0.00E+00	0.00E+00

Table 16: Noncancer Hazard Indices

Chemical	On-Site Resident Child[1]				
	HI Associated with Outdoor Inhalation Pathway	**HI Associated with Indoor Inhalation Pathway[2]**	**HI Associated with Dermal Exposure Pathway**	**HI Associated with Ingestion Exposure Pathway**	**Total HI for Child Resident**
Arsenic	1.07E-04		2.36E-01	2.81E+00	3.05E+00
Barium	8.54E-04		1.22E-01	4.37E+00	4.49E+00
Beryllium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Chromium	3.27E-08		2.41E-05	8.61E-04	8.85E-04
Hexavalent Chromium	6.67E-04		0.00E+00	1.29E-02	1.35E-02
Cobalt	1.85E-08		1.65E-03	5.88E-02	6.05E-02
Copper	7.41E-07		5.46E-04	1.95E-02	2.00E-02
Lead	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Mercury	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Nickel	4.35E-06		3.20E-03	1.14E-01	1.18E-01
Selenium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Vanadium	4.18E-05		3.08E-02	1.10E+00	1.13E+00
Zinc	3.58E-07		2.64E-04	9.42E-03	9.68E-03
Cumulative	**7.85E-02**	**1.28E+00**	**5.79E+00**	**2.14E+01**	**2.86E+01**

Notes:

ND = This chemical not detected in this medium.

NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] HAZARD INDICES PRESENTED HERE ARE SCREENING-LEVEL VALUES, BASED ON THE ASSUMPTION THAT RESIDENTS ARE EXPOSED TO THE MAXIMUM CONCENTRATION DETECTED ONSITE FOR A CONTINUOUS 30-YEAR PERIOD.

[2] HIs for indoor air pathway based on data from groundwater and soil vapor. If a chemical was detected in both media, data from soil vapor was used.

Table 16: Noncancer Hazard Indices

Chemical	On-Site Resident Adult[1]				
	HI Associated with Outdoor Inhalation Pathway	HI Associated with Indoor Inhalation Pathway[2]	HI Associated with Dermal Exposure Pathway	HI Associated with Ingestion Exposure Pathway	Total HI for Adult
Benzene	1.15E-02	2.70E-01	1.04E-03	2.61E-03	2.85E-01
Ethylbenzene	1.10E-03	1.30E-03	7.65E-05	1.92E-04	2.67E-03
m,p-Xylenes	3.56E-02	4.30E-02	1.42E-04	3.57E-04	7.91E-02
Methyl-t-Butyl ether (MTBE)	1.27E-05	4.20E-04	1.31E-07	3.28E-07	4.33E-04
o-Xylene	0.00E+00	8.80E-03	0.00E+00	0.00E+00	8.80E-03
Tetrachloroethene	0.00E+00	2.40E-02	0.00E+00	0.00E+00	2.40E-02
Toluene	1.07E-02	5.00E-03	1.01E-04	2.53E-04	1.61E-02
PCB 1260	8.29E-04		8.16E-01	1.36E+00	2.18E+00
1,2,3,4,6,7,8 HpCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
OCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
2,3,7,8 TCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,4,6,7,8 HpCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
OCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,7,8,9 HxCDD	0.00E+00		0.00E+00	0.00E+00	0.00E+00
1,2,3,7,8,9 HxCDF	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	1.79E-04		6.42E-05	1.07E-04	3.51E-04
Anthracene	2.51E-05		2.74E-05	4.59E-05	9.84E-05
Benz(a)anthracene	9.92E-06		4.19E-04	6.99E-04	1.13E-03
Benzo(a)pyrene	9.26E-06		3.90E-04	6.52E-04	1.05E-03
Benzo(k)fluoranthene	1.54E-05		6.52E-04	1.09E-03	1.76E-03
Chrysene	9.30E-06		3.92E-04	6.55E-04	1.06E-03
Fluoranthene	5.90E-07		5.80E-04	9.70E-04	1.55E-03
Phenanthrene	1.06E-02		2.27E-03	3.79E-03	1.67E-02
Pyrene	2.60E-05		7.12E-04	1.19E-03	1.93E-03
1-Methylnaphthalene	8.57E-03	9.50E-02	1.11E-04	1.85E-04	1.04E-01
Naphthalene	1.68E-02	8.30E-01	2.17E-04	3.63E-04	8.47E-01
Dibenzofuran	1.08E-03		6.39E-04	5.33E-03	7.05E-03
Carbazole	3.40E-06		1.19E-04	1.98E-04	3.20E-04
Antimony	0.00E+00		0.00E+00	0.00E+00	0.00E+00

Table 16: Noncancer Hazard Indices

	On-Site Resident Adult[1]				
Chemical	HI Associated with Outdoor Inhalation Pathway	HI Associated with Indoor Inhalation Pathway[2]	HI Associated with Dermal Exposure Pathway	HI Associated with Ingestion Exposure Pathway	Total HI for Adult
Arsenic	1.83E-04		3.61E-02	3.01E-01	3.38E-01
Barium	1.46E-03		1.87E-02	4.68E-01	4.88E-01
Beryllium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Chromium	5.61E-08		3.68E-06	9.22E-05	9.60E-05
Hexavalent Chromium	1.14E-03		0.00E+00	1.38E-03	2.52E-03
Cobalt	3.16E-08		2.51E-04	6.30E-03	6.55E-03
Copper	1.27E-06		8.34E-05	2.09E-03	2.17E-03
Lead	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Mercury	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Nickel	7.45E-06		4.89E-04	1.23E-02	1.28E-02
Selenium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00		0.00E+00	0.00E+00	0.00E+00
Vanadium	7.16E-05		4.70E-03	1.18E-01	1.23E-01
Zinc	6.13E-07		4.03E-05	1.01E-03	1.05E-03
Cumulative	**1.00E-01**	**1.28E+00**	**8.85E-01**	**2.29E+00**	**4.56E+00**

Notes:

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NA = Not applicable. Potential lead exposure is evaluated using Cal/EPA's LEADSPREAD Model. Please see text for discussion.

VOC = Volatile Organic Compound.

[1] HAZARD INDICES PRESENTED HERE ARE SCREENING-LEVEL VALUES, BASED ON THE ASSUMPTION THAT RESIDENTS ARE EXPOSED TO THE MAXIMUM CONCENTRATION DETECTED ONSITE FOR A CONTINUOUS 30-YEAR PERIOD.

[2] HIs for indoor air pathway based on data from groundwater and soil vapor. If a chemical was detected in both media, data from soil vapor was used.

LEAD RISK ASSESSMENT SPREADSHEET

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

INPUT		OUTPUT								
MEDIUM	LEVEL		percentiles						PRG-99	PRG-95
LEAD IN AIR (ug/m^3)	0.18		50th	90th	95th	98th	99th		(ug/g)	(ug/g)
LEAD IN SOIL (ug/g)	398.0	BLOOD Pb, ADULT (ug/dl)	3.1	4.9	5.5	6.4	7.1		846.4	1264.0
LEAD IN WATER (ug/l)	15	BLOOD Pb, CHILD (ug/dl)	7.0	10.9	12.4	14.3	15.8		123.7	254.3
PLANT UPTAKE? 1=YES 0=N	1	BLOOD Pb, PICA CHILD (ug/dl)	27.6	43.2	49.0	56.6	62.4		18.8	38.6
RESPIRABLE DUST (ug/m^3)	50	BLOOD Pb, INDUSTRIAL (ug/dl)	2.2	3.4	3.9	4.5	4.9		4203.1	6247.1

EXPOSURE PARAMETERS

	units	residential			industrial
neral		adults	children	children with pica	adults
Days per week	days/wk	7	7	7	5
rmal Contact					
Skin area	cm^2	3700	2800	2800	5800
Soil adherence	mg/cm^2	0.5	0.5	0.5	0.5
Route-specific constant	(ug/dl)/(ug/day)	0.00011	0.00011	0.00011	0.00011
il ingestion					
Soil ingestion	mg/day	25	55	790	25
Route-specific constant	(ug/dl)/(ug/day)	0.0176	0.0704	0.0704	0.0176
halation					
Breathing rate	m^3/day	20	10	10	20
Route-specific constant	(ug/dl)/(ug/day)	0.082	0.192	0.192	0.082
ater ingestion					
Water ingestion	l/day	1.4	0.4	0.4	1.4
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
od ingestion					
Food ingestion	kg/day	2.2	1.3	1.3	2.2
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
Dietary concentration	ug/kg	19.3	19.3	19.3	10.0
Lead in produce	ug/kg	179.1	179.1	179.1	

PATHWAYS, ADULTS

	Residential		Industrial		
Pathway	Blood Pb ug/dl	percent of total	Blood Pb ug/dl	percent of total	Concentration in medium
SOIL CONTACT:	0.08	2%	0.09	4%	398 ug/g
SOIL INGESTION:	0.18	6%	0.13	6%	398 ug/g
INHALATION:	0.33	11%	0.23	11%	0.20 ug/m^3
WATER INGESTION:	0.84	27%	0.84	39%	15 ug/l
FOOD INGESTION:	1.70	54%	0.88	41%	19.3 ug Pb/kg diet

PATHWAYS, CHILDREN

	Typical		with pica		
Pathway	Blood Pb ug/dl	percent of total	Blood Pb ug/dl	percent of total	concentration in medium
SOIL CONTACT:	0.06	1%	0.06	0%	398 ug/g
SOIL INGESTION:	1.54	22%	22.14	80%	398 ug/g
INHALATION:	0.38	6%	0.38	1%	0.20 ug/m^3
WATER INGESTION:	0.96	14%	0.96	3%	15 ug/l
FOOD INGESTION:	4.01	58%	4.01	15%	19.3 ug Pb/kg diet

Calculation of Outdoor Air Concentrations

Chemical	mg/kg	mg kg * 10-6	Hc	Koc	foc	Kd	Di	Ei	Ca
Benzene	7.62	62E-06	5.60E-03	5.90E+0	0.02	1.18	8.80E-02	3.57E-02	3.61E-04
Ethylbenzene	14.00	40E-05	7.90E-03	3.60E+0	0.02	7.2000	7.50E-02	2.88E-02	2.91E-04
m,p-Xylene	52.10	21E-05	7.30E-03	4.10E+0	0.02	8.2000	7.00E-02	9.33E-02	9.43E-04
MTBE	0.21	06E-07	6.22E-04	7.26E+0	0.02	0.1452	1.02E-01	9.87E-04	9.97E-06
o-Xylene	0.00	00E+00	7.30E-03	4.10E+0	0.02	8.2000	7.00E-02	0.00E+00	0.00E+00
Tetrachloroethylene	nd	00E+00	1.49E-02	660.69	0.02	13.2138	0.072	0.00E+00	0.00E+00
Toluene	37.00	70E-05	6.60E-03	80E+02	0.02	3.6000	8.70E-02	1.06E-01	1.07E-03
PCB 1260	69.70								5.30E-08
1,2,3,4,6,7,8 HpCDD	6.00E-08								4.56E-17
OCDD	2.50E-07								1.90E-16
2,3,7,8 TCDF	1.90E-09								1.44E-18
1,2,3,4,6,7,8 HpCDF	6.20E-09								4.71E-18
OCDF	1.10E-08								8.36E-18
1,2,3,7,8,9 HxCDD	8.50E-09								6.46E-18
1,2,3,7,8,9 HxCDF	1.10E-08								8.36E-18
Acenaphthylene	4.70	4.70E-06	1.20E-03	4600	0.02	92.0000	0.064	9.72E-04	9.82E-06
Anthracene	10.04	3.40E-05	3.40E-05	12589	0.02	251.7800	0.058	6.81E-04	6.88E-06
Benz(a)anthracene	10.21								7.76E-09
Benzo(a)pyrene	9.53								7.24E-09
Benzo(k)fluoranthene	15.90								1.21E-08
Chrysene	9.57								7.27E-09
Fluoroanthene	28.32								2.15E-08
Phenathrene	55.31	5.53E-05	6.50E-05	2.40E+04	0.02	480.0000	3.20E-02	8.24E-04	8.32E-06
Pyrene	26.07	2.61E-05	1.10E-05	1.05E+05	0.02	2100.0000	2.72E-02	7.04E-05	7.11E-07
1-Methylnaphthalene	2.70	2.70E-06	4.80E-04	1.20E+03	0.02	24.0000	5.90E-02	6.64E-04	6.70E-06
Naphthalene	5.30	5.30E-06	4.80E-04	1.20E+03	0.02	24.0000	5.90E-02	1.30E-03	1.32E-05
Dibenzofuran	7.79	7.79E-06	1.26E-05	1230	0.02	24.6000	2.38E-02	1.95E-04	1.97E-06
Carbazole	5.79	5.79E-06	5.09E-07	11300	0.02	226.0000	0.039	1.23E-05	1.24E-07
Antimony	0.00								0.00E+00
Aresenic	66.00								5.02E-08
Barium	246.00								1.87E-07
Beryllium	0.00								0.00E+00
Cadmium	0.00								0.00E+00
Chromium	101.00								7.67E-08
Chromium, hexavalent	3.02								2.29E-09
Cobalt	0.76								5.78E-10
Copper	61.00								4.64E-08
Lead	398.00								3.02E-07
Mercury	0.00								0.00E+00
Molybdenum	0.00								0.00E+00
Nickel	179.00								1.36E-07
Selenium	0.00								0.00E+00
Silver	0.00								0.00E+00
Thallium	0.00								0.00E+00
Vanadium	86.00								6.53E-08
Zinc	221.00								1.68E-07

used napthalene as surrogate for methylnapthalene

mg/kg = 95% upper confidence limit concentration of chemical in soil, mg/kg x (10^{-6} kg/mg)

Hc = chemical-specific Henry's Constant (atm-m^3/mol)

Koc = chemical-specific organic carbon to water partition coefficient (l/kg)

foc = fraction of organic carbon in soil (conservatively assumed to be .02)

Kd = soil-water partition coefficient, (cm^3/g)

Di = diffusion coefficient in air of component (cm2/sec)

Ei = average emission rate of chemical i over the residential lot during the exposure interval (mg/sec)

Ca = concentration in air (mg/m^3)