Section 7. Risk Assessment

This section evaluates the potential risks to human health and the environment from exposure to chemicals in soil, intertidal sediment, and groundwater at Parcel E-2. Previous risk evaluations for human exposure to subsurface air emanating from the Parcel E-2 Landfill were discussed in Subsection 4.1.2.2. Previous and ongoing risk evaluation for ecological exposure to surface water runoff from the Parcel E-2 Landfill was discussed in Subsection 3.9.3. In the risk assessment process, the chemicals that may contribute to human health and ecological risk (referred to as COPCs for the ecological risk assessments performed in this report) are evaluated quantitatively. As a result, chemicals of concern (COCs) for human health and ecological endpoints are identified and numerical remediation goals are identified for each COC.

As discussed in Subsection 1.4, use of the landfill presumptive remedy typically allows for qualitative risk evaluations in lieu of more detailed quantitative evaluations. While the Landfill Area meets the criteria for application of the containment presumptive remedy, the adjacent areas (the Panhandle Area, East Adjacent Area, and Shoreline Area) do not meet these criteria. In addition, as part of the FS process, the Navy elected to evaluate excavation and disposal technologies as a point of comparison with the containment presumption. Considering these factors, a quantitative HHRA to support the remedial alternative evaluation in this RI/FS has been conducted. As an added benefit, the results of the quantitative HHRA are used to validate application of the containment presumption, as outlined in EPA guidance (EPA, 1993a; EPA, 1993b; EPA, 1996). Specifically, the HHRA results are used to determine whether risks attributed to the waste within the Landfill Area are "low-level" and therefore consistent with EPA's definition of municipal-type waste.

An initial baseline ecological risk assessment was conducted during the Parcel E RI, and follow up validation study was performed in 2000. As discussed in Subsection 3.5, this effort resulted in identifying COPCs and acceptable soil concentration thresholds for terrestrial receptors know as PSCs. PSCs are HPS-specific, risk-based criteria developed for the protection of terrestrial ecological receptors. PSCs were originally derived using 12 co-located soil and tissue samples collected from within Parcels E and E-2 (TtEMI and LFR, 2000b). The PSCs used site-specific prey tissue data to represent actual bioavailability of chemicals at the site rather than relying on bioaccumulation factors published in the scientific literature.

Since the derivation of the original PSCs, Parcel E-2 was split from Parcel E and additional soil data were collected during the SDGI. The new data set was evaluated to validate the COPC list used in the previous

baseline ERA for terrestrial receptors. As a result of this effort, additional chemicals were identified as COPCs and PSCs were calculated for these additional chemicals. In light of the updated information, the Navy updated the previous ecological assessments by performing a SLERA for onshore receptors (Appendix L) using the updated PSCs and surface soil data set. In addition, the Navy prepared a SLERA to evaluate potential risks to offshore receptors from exposure to intertidal sediment. The offshore SLERA was prepared in conjunction with the Shoreline Characterization Technical Memorandum (Appendix G).

Subsection 7.1 discusses the HHRA for the Landfill Area, Panhandle Area, and East Adjacent Area. Subsection 7.2 discusses the onshore and shoreline SLERAs, which evaluates potential risks to terrestrial receptors at Parcel E-2. Subsection 7.3 summarizes risk assessment findings.

7.1. HUMAN HEALTH RISK ASSESSMENT

The following subsections discuss the HHRA methodology and results, and presents remediation goals for the COCs identified in the HHRA.

7.1.1. Human Health Risk Assessment Methodology

The objectives of the revised HHRA were to:

- Estimate the potential human health risks associated with potential future land use scenarios
- Identify the environmental media and contaminants that pose the primary health concerns
- Identify the environmental media and contaminants that are likely to pose little or no threat to human health
- Provide a foundation for assessing the need for further response actions

An HHRA for the Landfill was originally conducted in 1997 as part of the Parcel E RI report (TtEMI, LFR, and Uribe, 1997). However, in 2004, the Navy decided to complete the RI/FS for the Parcel E-2 area separately from the other Parcel E sites to accelerate the CERCLA process. This HHRA includes data from the original RI investigation, with additional data generated from the SDGI and NDGI (TtEMI, 2005c; TtEMI, 2004f). In addition, groundwater data collected through March 2005 as part of the BGMP are included in this HHRA. Lastly, revisions were made to the HHRA based on agreements between the Navy and the BCT during 2003 and 2004.

The HHRA calculated cancer risks and noncancer hazards from exposure to COPCs in all affected environmental media for each pathway identified as potentially complete. Appendix K details the HHRA methodology and results. This section provides an overview of the exposure scenarios and pathways evaluated in the HHRA and summarizes the results of the HHRA. In addition, remediation goals are presented for the COCs for Parcel E-2, as identified from the results of the HHRA.

7.1.1.1. Exposure Scenarios and Pathways

Table 7-1 presents an exposure matrix that summarizes the exposure pathways identified as potentially complete for the receptors identified below.

Soil Exposure: The "Hunters Point Shipyard Redevelopment Plan" outlines the planned reuses for Parcel E-2, which was included as part of Parcel E at the time of publication (SFRA, 1997). Figure 1-15 shows the specific planned reuse for Parcel E-2. According to the redevelopment plan, most of the planned reuse for Parcel E-2 is open space. Other planned reuses of areas within Parcel E-2 include industrial and research and development (SFRA, 1997). As discussed in Subsection 1.8, land uses other than open space are incompatible with the landfill area, and restrictive covenants will address this incompatibility.

For this reason, the planned reuse exposure scenario evaluated for Parcel E-2 is limited to open space reuse. Open space reuse is associated with a recreational exposure scenario. Based on the planned reuses at Parcel E-2, the following potential receptors were selected for evaluation in this revised baseline HHRA:

- Recreational user (adult and child)
- Construction worker (adult)

Although not directly associated with a specific planned reuse for Parcel E-2, a construction worker scenario was also identified as a potential receptor because it is possible that exposure to site contaminants could occur as a result of excavation and trenching activities.

For purposes of the HHRA, Parcel E-2 was divided into 0.5-acre exposure areas (approximately 150 feet by 150 feet). The 0.5-acre exposure area size was selected by the HPS BCT and the city of San Francisco as a reasonable estimate for a light industrial lot in the San Francisco Bay Area. Recreational and construction worker exposures are assumed to occur over an area equivalent to the 0.5-acre exposure area, and were evaluated for each exposure area. This HHRA refers to each 0.5-acre exposure area at Parcel E-2 as an "open space grid." For purposes of the HHRA, each grid was assigned a unique identification number, referred to as the "grid number."

Risks from exposure to soil were evaluated for each grid for which sampling data are available, and from the sampling locations that have not been subject to removal actions. Exposure to soil was assessed for two depth intervals in the HHRA: surface soil (0 to 2 feet bgs) and subsurface soil (0 to 10 feet bgs). Exposure to recreational receptors was assumed to be limited to the shallower surface soil depth interval, based on the assumption that intrusive activities are not expected in areas planned for open space reuse. Construction worker receptors were assumed to be exposed to the deeper subsurface soil depth interval, based on the assumption that construction workers will be involved in intrusive soil excavation activities.

Groundwater Exposure: Based on the planned reuse of Parcel E-2 as open space, groundwater pathways are not considered complete for recreational receptors, which are the only receptors associated with

planned reuse. However, the potential beneficial use of groundwater in the B-aquifer at HPS includes drinking water. Accordingly, the HHRA includes an evaluation of B-aquifer groundwater for domestic use. Because of potential for vertical hydraulic communication between the A- and B-aquifers in some areas at Parcel E-2, the domestic use exposure pathway for the B-aquifer uses both B-aquifer and A-aquifer data.

Because A-aquifer groundwater water at Parcel E-2 is relatively shallow (an average of 9.8 feet bgs based on Quarter 18 through 21 water level measurements at Parcel E-2), construction workers were also assumed to be exposed to groundwater in the A-aquifer during trenching activities. Exposure pathways identified as potentially complete for the construction worker are dermal contact with A-aquifer groundwater and inhalation of volatile chemicals released from A-aquifer groundwater to outdoor air in a construction trench.

7.1.1.2. Total and Incremental Risks for Soil Exposure

Both total and incremental risks were evaluated for exposure to soil at Parcel E-2. For the total risk evaluation, all detected chemicals were included as COPCs regardless of concentration, except for the essential nutrients calcium, magnesium, potassium, and sodium. The total risk evaluation provides an estimate of the risks posed by all chemicals at the site, including those present at concentrations at or below background levels. For the incremental risk evaluation, the essential nutrients and metals with maximum measured concentrations below HPALs were excluded as COPCs. The incremental risk evaluation provides an estimate of risks posed by all chemicals at the site, except those that do not exceed background levels.

7.1.2. Human Health Risk Assessment Results

This subsection summarizes the results of the total and incremental risk evaluations for soil.

7.1.2.1. Human Health Risk Assessment Results for Recreational Exposure Scenario

For the recreational exposure scenario, risks from exposure to COPCs in soil were assessed for surface soil (0 to 2 feet bgs). Figure 7-1 summarizes the grid-specific total risk results for surface soil, based on the planned reuse of Parcel E-2 as open space. Figure 7-3 summarizes the grid-specific incremental risk results for surface soil. The results for each grid are shown relative to the cancer risk threshold of 1E-06, highest segregated noncancer hazard index (HI) threshold of 1.0, and HPS risk-based concentration (RBC) for lead (155 mg/kg) for recreational receptors. For the recreational exposure scenario (0 to 2 feet bgs), the specific calculated total and incremental cancer risk and noncancer HI results for each grid are listed in Tables 7-2 and 7-3, respectively.

The total risk for most exposure areas exceeds the cancer risk threshold of 1E-06, and the total HI also exceeds the threshold HI of 1.0 for eight areas for which data are available. Under the incremental risk evaluation, about half of the exposure areas at Parcel E-2 exceed the cancer risk threshold of 1E-06, and

eight exposure areas exceed the noncancer threshold HI of 1.0. Under both the total and incremental risk evaluations, 14 exposure areas exceed the RBC for lead.

Tables 7-4 and 7-5 present a risk characterization analysis, of total and incremental risk, respectively, for the grids in which the cancer risk exceeds 1E-06 or the highest segregated HI exceeds 1.0, for the recreational exposure scenario. For each of these grids, the tables identify the COCs and present their contribution to the calculated total risks and hazards for each potentially complete exposure pathway.

The chemicals listed in the table below were identified as COCs in at least one grid, based on the results of the total and incremental risk evaluation for soil for the recreational exposure scenario. As indicated in the table, the COCs for the total risk evaluation are the same as for the incremental risk evaluation.

Exposure Scenario	Chemicals of Concern	
	Surface Soil, Total Risk	Surface Soil, Incremental Risk
Recreational [a]	Antimony	Antimony
	Aroclor-1248	Aroclor-1248
	Aroclor-1260	Aroclor-1260
	Arsenic	Arsenic
	Benzo(a)anthracene	Benzo(a)anthracene
	Benzo(a)pyrene	Benzo(a)pyrene
	Benzo(b)fluoranthene	Benzo(b)fluoranthene
	Benzo(k)fluoranthene	Benzo(k)fluoranthene
	Dieldrin	Dieldrin
	Lead	Lead
	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene
	PCB-156	PCB-156

Note:
[a]COCs identified for this exposure scenario are based on the planned reuse for Parcel E-2 as open space.

7.1.2.2. Human Health Risk Assessment Results for Construction Worker Scenario

For the construction worker exposure scenario, risks from exposure to COPCs in soil were assessed for subsurface soil (0 to 10 feet bgs). Figure 7-2 summarizes the grid-specific total risk results for subsurface soil for the construction worker. Figure 7-4 summarizes the grid-specific incremental risk results for subsurface soil. The results for each grid are shown relative to the cancer risk threshold of 1E-06, highest segregated noncancer HI threshold of 1.0, and HPS RBC for lead (800 mg/kg for construction worker receptors). For the construction worker exposure scenario (0 to 2 feet bgs), Tables 7-6 and 7-7, respectively, present the specific calculated total and incremental cancer risk and noncancer HI results for each grid.

Table 7-8 summarizes the risk analysis results from exposure to A-aquifer groundwater for construction worker trench exposure. Incremental risks were not assessed for groundwater for the construction worker scenario because this scenario is not associated with a specific planned reuse for Parcel E-2. For the

construction worker exposure scenario (2 to 10 feet bgs), Tables 7-9 and 7-10 present the total and incremental risk characterization analyses, respectively, for the grids in which the cancer risk exceeds 1E-06 or the highest segregated HI exceeds 1.0. For each of these grids, the tables identify the COCs and present their contribution to the calculated total risks and hazards for each potentially complete exposure pathway.

The chemicals listed in the table below were identified as COCs in at least one grid, based on the results of the total and incremental risk evaluation for soil for the construction worker exposure scenario. As indicated in the table, the soil COCs for the total risk evaluation are the same as for the incremental risk evaluation.

Exposure Scenario	Chemicals of Concern		
	Subsurface Soil, Total Risk	Subsurface Soil, Incremental Risk	Groundwater, A-aquifer
Construction Worker [a]	2,3,4,7,8-PECDF	2,3,4,7,8-PeCDF	Arsenic
	Antimony	Antimony	Benzo(a)anthracene
	Aroclor-1016	Aroclor-1016	Benzo(a)pyrene
	Aroclor-1242	Aroclor-1242	Benzo(b)fluoranthene
	Aroclor-1248	Aroclor-1248	Benzo(k)fluoranthene
	Aroclor-1254	Aroclor-1254	Dibenz(a,h)anthracene
	Aroclor-1260	Aroclor-1260	Indeno(1,2,3-cd)pyrene
	Arsenic	Arsenic	Lead
	Benzo(a)anthracene	Benzo(a)anthracene	Naphthalene
	Benzo(a)pyrene	Benzo(a)pyrene	Tetrachloroethene
	Benzo(b)fluoranthene	Benzo(b)fluoranthene	
	Benzo(k)fluoranthene	Benzo(k)fluoranthene	
	Cadmium	Cadmium	
	Copper	Copper	
	Dibenz(a,h)anthracene	Dibenz(a,h)anthracene	
	Dieldrin	Dieldrin	
	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene	
	Iron	Iron	
	Lead	Lead	
	Naphthalene	Naphthalene	
	Vanadium	Vanadium	

Notes:

[a]The construction worker exposure scenario is not associated with a specific planned reuse for Parcel E-2.

PeCDF = pentachlorodibenzofuran

7.1.2.3. Human Health Risk Assessment Results for Domestic Use of Groundwater

As discussed in Subsection 7.1.1.1, domestic use of groundwater was evaluated for the B-aquifer. Table 7-11 summarizes the risk results for domestic use of the B-aquifer. As indicated in Subsection 7.1.1.1, data from the A-aquifer was also used in the domestic use evaluation of the B-Aquifer to account for potential hydraulic communication between the two aquifers in some areas of Parcel E-2. Table 7-11 presents a risk characterization analysis for those COCs for which the cancer risk exceeds 1E-06 or the highest segregated HI exceeds 1.0, for the groundwater exposure pathways associated domestic use of the B-aquifer. Table 7-11 identifies the groundwater COCs associated with the domestic use scenario and the percent contribution of each COC to the total cancer risk and HI calculated for the B-aquifer. Table 7-12 presents the results of the groundwater evaluation for lead. Lead was evaluated in groundwater by comparison to the California regulatory action level for lead of 15 µg/L. The following chemicals are identified as COCs based on domestic use of groundwater.

Exposure Scenario	Chemicals of Concern for B-Aquifer Groundwater[b]	
Domestic Use[a]	**1,1,2,2-Tetrachloroethane**	Chloroform
	1,1-Dichloroethane	Chromium VI
	1,2,3-Trichloropropane	Chrysene
	1,2-Dichloroethane	**Copper**
	1,4-Dichlorobenzene	**Dibenz(a,h)anthracene**
	4-Nitrophenol	**Dieldrin**
	Aluminum	**Gamma-Chlordane**
	Antimony	**Heptachlor**
	Aroclor-1242	**Heptachlor epoxide**
	Aroclor-1254	**Heptachlor epoxide A**
	Aroclor-1260	**Heptachlor epoxide B**
	Arsenic	**Indeno(1,2,3-cd)pyrene**
	Benzene	**Iron**
	Benzo(a)anthracene	Lead
	Benzo(a)pyrene	**Mercury**
	Benzo(b)fluoranthene	Naphthalene
	Benzo(k)fluoranthene	**Pentachlorophenol**
	Beta-BHC	Tetrachloroethene
	Bis(2-ethylhexyl)phthalate	Trans-1,3-dichloropropene
	Carbon tetrachloride	Trichloroethene
	Chloroethane	**Vinyl chloride**

Notes:

[a] As discussed in Subsection 7.1.1.1, data from the A-aquifer was also used in the domestic use evaluation to account for potential communication between the A- and B-Aquifers in some areas of Parcel E-2.

[b] Chemicals highlighted in bold have not been detected in the B-aquifer at concentrations that present an unacceptable risk. These chemicals were identified as COCs based on concentrations detected in the A-aquifer.

Although HGALs are available, the HGALs were only developed for the A-aquifer. Because the domestic use evaluation is based upon exposure to the B-aquifer, exclusion of inorganic chemicals as COPCs in groundwater based on comparison to HGALs is not appropriate. Therefore, incremental risks were not assessed for the groundwater domestic use evaluation.

7.1.3. Remediation Goals

Remediation goals were developed for the COCs identified for soil and groundwater, using the methodology described below. The development of remediation goals for soil was limited to the COC identified for soil based on the incremental risk evaluation results, which excludes the risks posed by metals at concentrations below ambient levels, in accordance with CERCLA guidance.

7.1.3.1. Soil

Remediation goals for COCs in soil were selected based on a comparison of the COC-specific RBC, laboratory practical quantitation limit (PQL) based on standard EPA analytical methods, and HPAL (metals only). For each COC, the highest of these three concentrations was selected as the remediation goal. With the exception of lead, exposure scenario-specific RBCs were calculated based on a target cancer risk level of 1E-06 and target noncancer hazard of 1.0, consistent with the exposure pathways and assumptions described in Appendix K used to assess human health risks. For lead, the exposure scenario-specific RBCs were based on modeled blood lead concentrations, as discussed in Subsection K7.4 of Appendix K. Table 7-13 presents the remediation goals for COCs in soil.

7.1.3.2. Groundwater

Remediation goals for COCs in groundwater in the A- and B-aquifers, as identified by the HHRA, are shown in Tables 7-14 and 7-15. Development of the remediation goals for groundwater was based on consideration of chemical-specific ARARs, exposure-scenario-specific RBCs, laboratory PQLs, and HGALs (for metals only). Chemical-specific ARARs are discussed further and identified in Subsection 10.1.1. Chemical-specific ARARs were only considered in the development of the remediation goals for the B-aquifer; none is available to address the construction worker scenario assessed for the A-aquifer. When available, project-required quantitation limits from the HPS basewide groundwater monitoring program (TtEMI, 2004b) were used as PQLs; otherwise, PQLs were based on standard EPA analytical methods. Exposure scenario-specific concentrations based on a target cancer risk of 1E-06 and a target noncancer HI of 1.0 were used as RBCs for groundwater; these RBCs were calculated consistent with the exposure pathways and assumptions used in the HHRA (Appendix K) to assess risks from exposure to groundwater. The RBCs for A-aquifer COCs were based on dermal contact and inhalation for a construction worker exposure scenario. For the B-aquifer, the RBCs were based on ingestion and inhalation during household use for a residential domestic use scenario.

For organic COCs, the chemical-specific ARAR is used as the remediation goal, if applicable, and when available. In the absence of chemical-specific ARARs, the chemical-specific RBC is used as the

remediation goal for organic COCs. However, the remediation goal defaults to the laboratory PQL if the ARAR- or RBC-based concentration is lower than the PQL, because the ARAR or RBC would not be detectable at concentrations below the PQL. For inorganic chemicals, this same hierarchy applies for selection of remediation goals except that the HGAL (metals only) is selected as the remediation goal if it exceeds either the chemical-specific ARAR or the RBC, and is greater than the laboratory PQL.

7.1.4. Sample Locations above Remediation Goals

A list of soil sampling locations above remediation goals was compiled to identify the locations at Parcel E-2 for which remedial action is required, based on planned reuse as open space. Table 7-16 shows the soil sampling locations with measured concentrations of COCs above remediation goals for surface soil.

7.2. SCREENING LEVEL ECOLOGICAL RISK ASSESSMENTS

A SLERA was conducted to update the previous ecological assessments at Parcel E-2. A summary of the Parcel E-2 SLERA (also referred to as the "onshore" SLERA) is presented in Section 7.2.1. A separate SLERA was performed to evaluate potential ecological risk to aquatic receptors exposed to intertidal sediment within the Shoreline Area of Parcel E-2. This shoreline SLERA (SulTech, 2005) is presented in Appendix G, and is summarized in Section 7.2.3.

7.2.1. Onshore SLERA

The SLERA was necessitated by the collection of additional data during the SDGI, which resulted in the identification of new COPCs and the calculation of corresponding PSCs. The objective of the SLERA is to determine the potential for significant risk to terrestrial receptors exposed to soil from 0 to 3 feet bgs at Parcel E-2 within the onshore area.

This subsection provides an overview of the findings of the onshore SLERA. A complete copy of the assessment is provided in Appendix L. The SLERA was performed in accordance with the EPA guidance (EPA, 1997) and the *Navy Policy for Conducting Ecological Risk Assessments* (Navy, 1999).

7.2.1.1. Summary of SLERA Process

The EPA guidance separates the ERA process into eight steps, three of which apply to the current ecological assessment at Parcel E-2:

- Step 1: Screening-level problem formulation and evaluation of ecological effects
- Step 2: Screening-level preliminary exposure estimate and risk calculation
- Step 3: Baseline ecological risk assessment (BERA) problem formulation

The substantive elements of Steps 1 and 2 constitute the SLERA. The onshore SLERA extends into the initial phase of Step 3, which corresponds to Step 3a "Refinement of Conservative Exposure Assumptions" of the Navy's ERA process. Step 3a focuses on refining the list of COPCs based on comparison with HPALs. Given that human health risk evaluations (Section 7.1, Appendix K) have

shown unacceptable risk to human health within the majority of Parcel E-2, and that the Navy has initiated a focused approach to the Parcel E-2 RI/FS, a detailed refinement of specific risks to birds and mammals in Parcel E-2 is not warranted. Therefore, this SLERA focuses on the refinement step solely as an evaluation of ambient concentrations, and foregoes food chain modeling.

As described in detail in Appendix L, the Parcel E-2 onshore SLERA characterizes the risk to terrestrial ecological receptors exposed to the near-surface soil at Parcel E-2, inland of the narrow "intertidal zone" along the Parcel E-2 shoreline. The onshore SLERA focused on birds and mammals that were identified in previous ecological studies at Parcel E and E-2.

The onshore SLERA performed for this report used all soil data collected from 0 to 3 feet bgs from all locations within Parcel E-2. A simple hazard quotient (HQ) approach was used to determine if any COPCs, on a sample by sample basis, present a potential risk at the site. The HQ is the ratio of the maximum detected soil concentration for a given COPC to its calculated PSC. The HQ approach is typical of Step 2 of a SLERA, and has been used in other HPS ecological risk assessments. Any HQ greater than 1.0 is considered to indicate potential risk. In the risk characterization step, compounds were also compared to HPALs, where appropriate.

7.2.1.2. Onshore SLERA Results

The estimation of potential risk to receptors exposed to COPCs was calculated for each of the three subareas (the Landfill Area, East Adjacent Area, and Panhandle Area) of Parcel E-2. In these areas, some potentially toxic chemicals were detected at concentrations exceeding HPALs and PSCs, indicating a potentially significant risk to receptors. Figure 7-5 shows the locations where soil concentrations exceeded PSCs for any chemical within Parcel E-2. Table 7-17 presents a statistical summary of samples analyzed as part of the SLERA. HPALs, PSCs, maximum concentrations in soil, and the number of samples exceeding respective PSCs are shown on this table.

Based on concentrations exceeding PSCs (HQ greater than 1) and HPALs, cadmium, copper, lead, vanadium and zinc pose a potential threat to birds and mammals exposed to soil in all three onshore study areas of Parcel E-2. Manganese poses a potential threat to receptors exposed to soil in the Panhandle Area, but not within the Landfill or East Adjacent Areas.

7.2.2. Shoreline SLERA

A shoreline investigation was performed in 2002 as part of the SDGI, and was necessitated by the Parcel F validation study which hypothesized that metals and PCBs along the shoreline were a source of contamination to Parcel F sediments. Intertidal sediment data collected during the shoreline investigation were evaluated in the Shoreline Characterization Technical Memorandum (SulTech, 2005) (Appendix G to this report), which included a shoreline SLERA. The objective of the shoreline SLERA was to determine whether contamination at suspected source areas along the shoreline of Parcel E-2 poses an unacceptable risk to ecological receptors exposed to sediment at the Shoreline Area.

This section provides an overview of the findings of the shoreline SLERA. A complete copy of the assessment is provided as an appendix to the Shoreline Characterization Technical Memorandum (SulTech, 2005) (Appendix G to this report). The SLERA was performed in accordance with the EPA guidance (EPA, 1997) and *Navy Policy for Conducting Ecological Risk Assessments* (Navy, 1999).

7.2.2.1. Summary of Shoreline SLERA Process

The shoreline SLERA characterizes risk to ecological receptors exposed to the narrow "intertidal zone" of Parcels E and E-2. The intertidal zone is the area that is marked between the low- and high-water lines. The SLERA focuses on benthic invertebrates, birds and mammals that forage along the Parcels E and E-2 shoreline in the intertidal zone. To meet the objective of the SLERA, concentrations of chemical contaminants in surface and subsurface sediment samples collected from the Parcels E and E-2 shoreline were screened against toxicological benchmarks for invertebrates, birds and mammals.

The shoreline SLERA evaluated surface shoreline sediment samples (collected from 0 to 0.5 feet bgs), and subsurface sediment samples (collected from 2.0 to 2.5 feet bgs). All chemicals detected in sediment samples from the shoreline area were screened to identify COPCs, except for essential mineral nutrients such as sodium, chloride, potassium, phosphorous, magnesium, and calcium. COPCs for benthic invertebrates were identified as those chemicals with concentrations exceeding their effects range-median (ER-M) values (Long and Morgan, 1991; National Oceanic and Atmospheric Administration, 1993).

In the evaluation of birds and mammals, chemicals were screened using food chain modeling against TRV. Selected COPCs also were compared against HPALs (PRC, 1995a), and ambient sediment concentrations of selected chemicals in San Francisco Bay (RWQCB, 1998; RWQCB, 2003a). Similar to the onshore SLERA, HQs were calculated on a sample by sample basis for each COPC. In the Shoreline SLERA, the HQ is defined as the ratio of exposure point concentrations in surface sediment to ER-M values. All detected inorganic and organic chemicals in surface and subsurface sediment were evaluated in the toxicological screen by evaluating the HQ. Chemicals with HQs greater than 1.0 were considered COPCs for benthic invertebrates.

7.2.2.2. Shoreline SLERA Results for Benthic Invertebrates

Benthic invertebrates are at risk from exposure to PCBs in surface and subsurface sediment along the Parcels E and E-2 shoreline. Benthic invertebrates in surface and subsurface sediment may be adversely affected by exposure to copper, lead, zinc, and DDTs. In subsurface sediment, mercury may pose an additional risk to benthic invertebrates. Appendix G of the Shoreline Characterization Technical Memorandum (Appendix G) presents the results of the shoreline SLERA.

7.2.2.3. Shoreline SLERA Results for Birds and Mammals

Significant risk to birds is indicated only for the willet exposed to PCBs. No significant risk to either the surf scoter or the red-tailed hawk was indicated by the food-chain modeling. Other chemicals for which

potential risk to birds is suggested include cadmium, copper, lead, mercury, PCBs, total DDTs, and dieldrin.

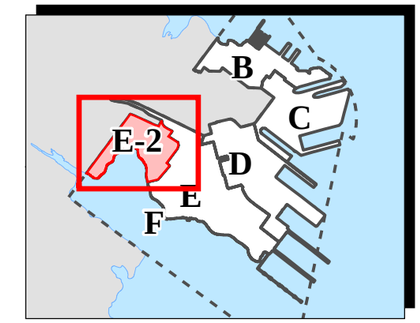
Birds and mammals are at risk from exposure to PCBs in surface and subsurface sediment along the Parcels E and E-2 shoreline. Ingestion of sediment and prey that contain cadmium, copper, molybdenum, zinc, and PCBs may pose a risk to the house mouse. The greatest significant risk (high TRV HQ) for mammals was indicated for PCBs ingested by the house mouse.

7.3. ECOLOGICAL RISK ASSESSMENT FOR EXPOSURE TO GROUNDWATER

A formal assessment of ecological risk to aquatic receptors exposed to potentially-contaminated groundwater at Parcel E-2 is not provided in this report. Although the nature and extent evaluation presented in Section 5 compared groundwater data against aquatic criteria, this comparison is not reflective of potential exposures when groundwater discharges into the Bay. A method for comparing groundwater data to aquatic criteria, in a manner that accounts for chemical attenuation and the near-shore mixing process, has not been agreed to by the Navy and the regulatory agencies. In addition, the RIECs used in the nature and extent evaluation were based on RWQCB ESLs, which conservatively use a combination of freshwater and saltwater aquatic criteria and include both promulgated and non-promulgated criteria. While use of such conservative criteria is considered appropriate for the Parcel E-2 nature and extent evaluation, potential risk to aquatic receptors in the Bay is more accurately evaluated by using only promulgated criteria for saltwater aquatic life.

A preliminary evaluation of ecological risk to aquatic receptors in the Bay is provided in Appendix M. The evaluation compares A- and B-aquifer groundwater data against promulgated criteria for saltwater aquatic life. This screening level evaluation is considered preliminary because groundwater near the shore mixes with Bay water prior to discharging into the Bay. Therefore, the direct comparison of groundwater data against saltwater aquatic criteria is used primarily as a tool in identifying COPCs in groundwater that may pose a risk to aquatic receptors in the Bay. The identified chemicals in Appendix M are considered COPCs (that is, of ***potential*** concern) given the qualitative nature of the analysis. A quantitative analysis that would identify COCs and specify risk-based remediation goals cannot be prepared at this time.

Figures



Location Map

- Recreational Lead Concentration > 155 mg/kg
- Recreational Cancer Risk > 1E-06
- Recreational Cancer Risk ≤ 1E-06
- Highest Segregated Hazard Index > 1
- No Data
- Extended E-2 Boundary
- Other Parcel Boundary
- Landfill
- Panhandle
- East Adjacent Area
- Shoreline Area
- 810 Building
- San Francisco Bay
- Non-Navy Property
- Road

Notes:

1. A 150-foot by 150-foot exposure area (industrial grid) is used to evaluate risks associated with recreational exposures.
2. Risks are based on nonradiological chemicals.

ft bgs Feet below ground surface
mg/kg Milligram per kilogram

N

0 250 500
Scale in Feet

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U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 7-1
TOTAL RISK - SURFACE SOIL
(0 TO 2 FT BGS),
RECREATIONAL EXPOSURE SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2

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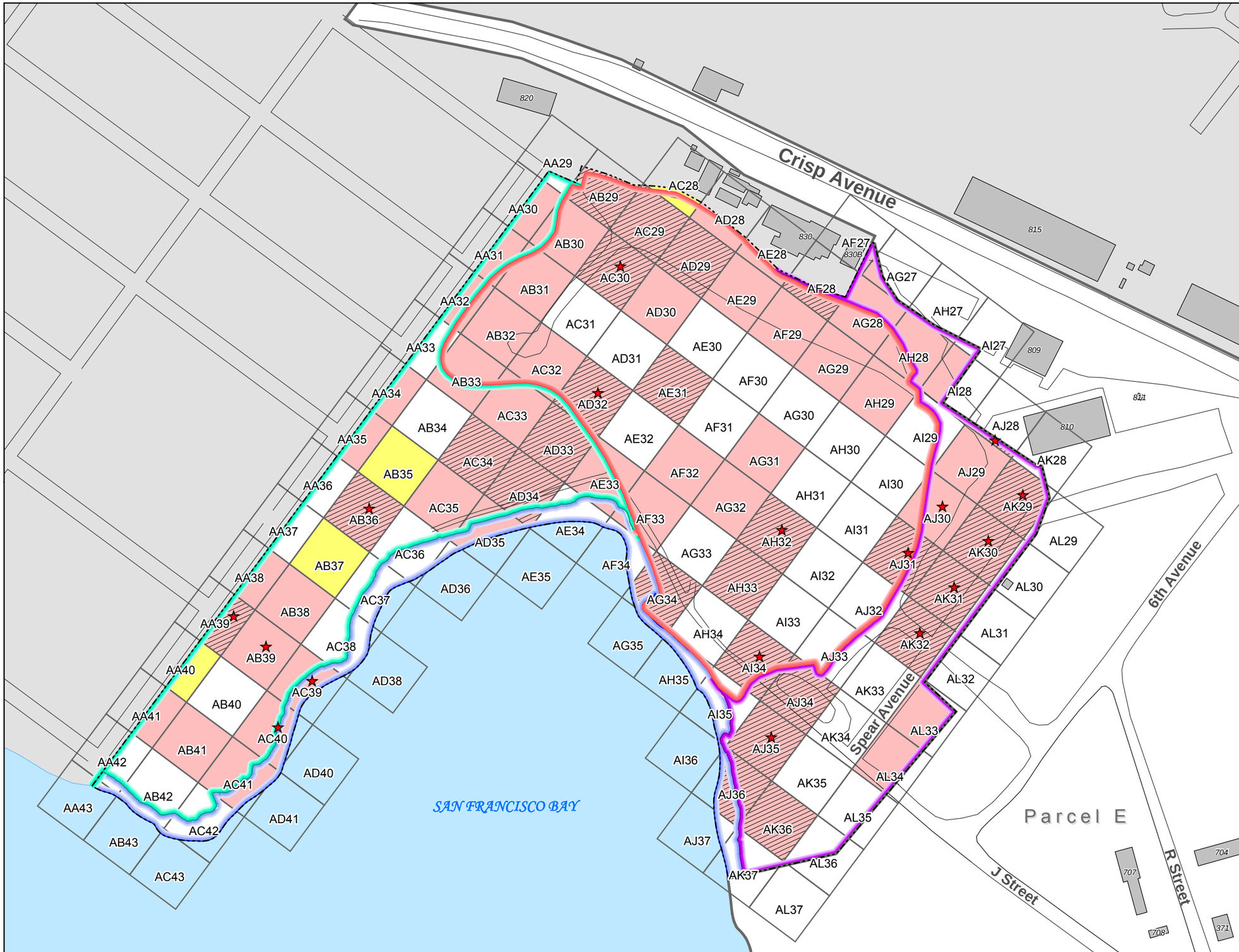

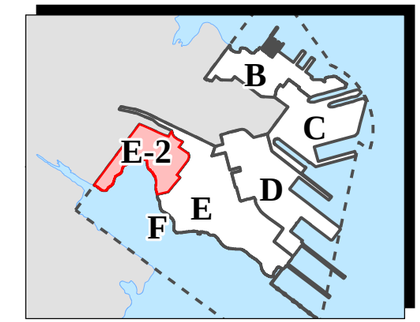

Location Map

- Industrial Lead Concentration > 800 mg/kg
- Construction Worker Cancer Risk > 1E-06
- Construction Worker Cancer Risk ≤ 1E-06
- Highest Segregated Hazard Index > 1
- No Data
- Extended E-2 Boundary
- Other Parcel Boundary
- Landfill
- Panhandle
- East Adjacent Area
- Shoreline Area
- Building
- Non-Navy Property
- San Francisco Bay
- Road

Notes:
1. A 150-foot by 150-foot exposure area (industrial grid) is used to evaluate risks associated with construction worker exposures.
2. Risks are based on nonradiological chemicals.

ft bgs Feet below ground surface
mg/kg Milligram per kilogram

0 250 500
Scale in Feet

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 7-2
TOTAL RISK - SUBSURFACE SOIL (0 TO 10 FT BGS), CONSTRUCTION WORKER EXPOSURE SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2

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Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 7-3
INCREMENTAL RISK - SURFACE SOIL (0 TO 2 FT BGS), RECREATIONAL EXPOSURE SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2

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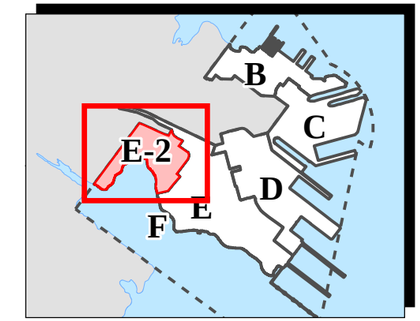

Location Map

- Industrial Lead Concentration > 800 mg/kg
- Construction Worker Cancer Risk > 1E-06
- Construction Worker Cancer Risk ≤ 1E-06
- Highest Segregated Hazard Index > 1
- No Data
- Extended E-2 Boundary
- Other Parcel Boundary
- Landfill
- Panhandle
- East Adjacent Area
- Shoreline Area
- 810 Building
- Non-Navy Property
- San Francisco Bay
- Road

Notes:
1. A 150-foot by 150-foot exposure area (industrial grid) is used to evaluate risks associated with construction worker exposures.
2. Risks are based on nonradiological chemicals.

ft bgs Feet below ground surface
mg/kg Milligram per kilogram

N

0 250 500
Scale in Feet

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 7-4
INCREMENTAL RISK - SUBSURFACE SOIL (0 TO 10 FT BGS), CONSTRUCTION WORKER EXPOSURE SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2

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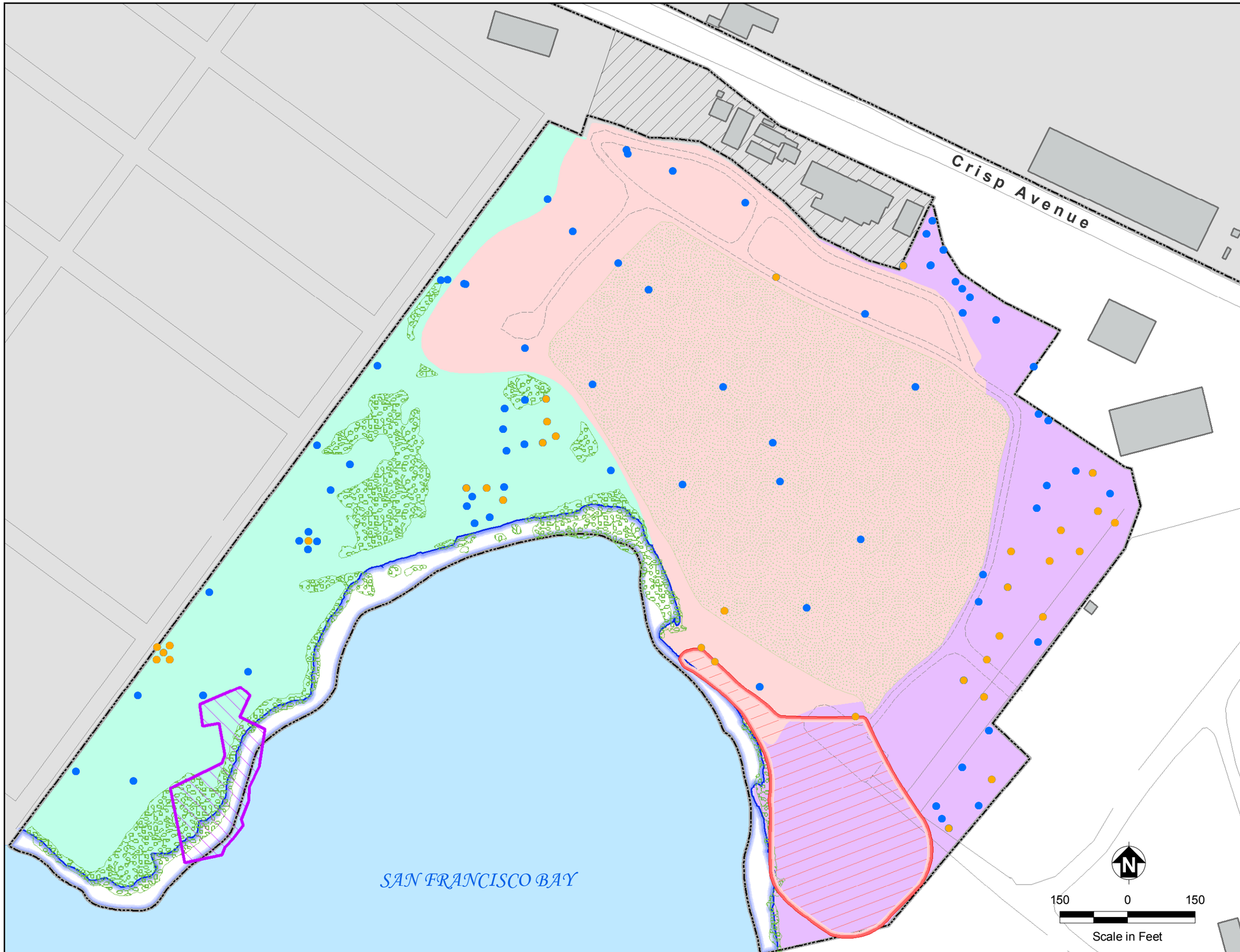

- Not Analyzed
- Analyte Not Detected
- Concentration Less Than PSC
- Concentration Greater Than PSC
- Road
- Gravel Road
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property
- Metal Slag Hotspot *
- PCB Hotspot *
- Wetland Area

Notes:

PSC = Protective Soil Concentration
mg/kg = milligrams per kilogram
ft bgs = feet below ground surface

* Results in PCB and Metal Slag hotspots are not shown since the areas are undergoing remediation. Post-excavation data will be presented in the draft final RI/FS.

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Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 7-5
LOCATIONS WITH CHEMICAL CONCENTRATIONS EXCEEDING THE PROTECTIVE SOIL CONCENTRATION IN 0 - 3' SOIL
Remedial Investigation/Feasibility Study for Parcel E-2

Tables

TABLE 7.1: HUMAN HEALTH RISK ASSESSMENT POTENTIALLY COMPLETE EXPOSURE PATHWAYS

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

		SOIL						GROUNDWATER						
		0 – 2 feet			0 – 10 feet			A-Aquifer				B-Aquifer		
Exposure Scenario	**Grid Size**	**Ingestion**	**Dermal**	**Inhalation (particulates and VOCs)**	**Ingestion**	**Dermal**	**Inhalation (particulates and VOCs)**	**Ingestion**	**Dermal**	**Inhalation (house-hold use)**	**Inhalation (construction trench)**	**Ingestion**	**Dermal**	**Inhalation (house-hold use)**
Recreational	0.5 acre	●	●	●	--	--	--	--	--	--	--	--	--	--
Construction	0.5 acre	--	--	--	●	●	●	--	●	--	●	--	--	--
Groundwater Domestic Use	Not applicable	--	--	--	--	--	--	--	--	--	--	● [a]	● [b]	● [a]

Notes:

a The groundwater domestic use pathways are incomplete for the A-aquifer. However, potential vertical hydraulic communication exists in some areas at Parcel E-2 between the A- and B-aquifers. Accordingly, the domestic use evaluation for the B-aquifer includes A-aquifer data.

b Addressed in Uncertainty Analysis (see Section K9.0 of Appendix K)

-- Not quantitatively evaluated in HHRA

● Quantitatively evaluated in HHRA

HHRA Human health risk assessment

VOC Volatile organic compound

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TABLE 7.2: TOTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR RECREATIONAL EXPOSURE SCENARIO[a], SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AA32	**1E-05**	<1	<1
AA34	**1E-05**	<1	<1
AA35	7E-10	<1	<1
AA38	**1E-05**	<1	<1
AA39	**6E-04**	5E+00	**2E+00**
AA40	**6E-06**	<1	<1
AA41	**7E-06**	<1	<1
AB29	**1E-05**	<1	<1
AB30	**6E-06**	<1	<1
AB32	**1E-05**	<1	<1
AB35	**6E-06**	<1	<1
AB36	**4E-05**	6E+00	**6E+00**
AB37	2E-07	<1	<1
AB38	**8E-06**	<1	<1
AB39	**1E-05**	<1	<1
AB41	**1E-05**	<1	<1
AC29	**2E-05**	<1	<1
AC30	**4E-05**	<1	<1
AC32	**2E-05**	<1	<1
AC33	**4E-05**	<1	<1
AC34	**5E-05**	<1	<1
AC35	**2E-05**	<1	<1
AD29	**2E-05**	<1	<1
AD30	3E-09	<1	<1
AD32	**2E-05**	<1	<1
AD33	**2E-04**	4E+00	**3E+00**
AD34	**6E-05**	4E+00	**4E+00**
AD35	**2E-05**	<1	<1
AE31	**1E-05**	<1	<1
AE33	**9E-06**	<1	<1
AF27	4E-09	<1	<1
AF32	**2E-05**	<1	<1
AG27	**2E-05**	<1	<1
AG28	**2E-05**	<1	<1
AG31	**1E-05**	<1	<1
AG32	**2E-05**	<1	<1
AG34	**4E-05**	<1	<1
AH28	**6E-06**	<1	<1
AH29	**2E-05**	<1	<1
AH32	**9E-06**	<1	<1
AH33	**7E-06**	<1	<1
AI28	**1E-05**	<1	<1
AI34	3E-07	<1	<1
AJ28	**9E-06**	<1	<1
AJ29	**1E-05**	<1	<1
AJ30	**5E-05**	<1	<1
AJ31	**3E-05**	<1	<1

TABLE 7.2: TOTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR RECREATIONAL EXPOSURE SCENARIO[a], SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AK29	**5E-05**	5E+00	**2E+00**
AK30	**5E-05**	5E+00	**4E+00**
AK31	**5E-05**	7E+00	**6E+00**
AK32	**7E-05**	1E+01	**9E+00**
AL33	**3E-05**	<1	<1
AL34	**3E-05**	<1	<1

Notes: Values shown in boldface exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

a Open space is the only planned reuse for Parcel E-2.
<1 Less than 1
bgs Below ground surface
HI Hazard index
RME Reasonable maximum exposure

TABLE 7.3: INCREMENTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR RECREATIONAL EXPOSURE SCENARIO[a], SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AA32	9E-08	<1	<1
AA34	2E-09	<1	<1
AA35	--	<1	<1
AA38	--	<1	<1
AA39	**6E-04**	5E+00	**2E+00**
AA40	4E-08	<1	<1
AA41	--	<1	<1
AB29	**3E-06**	<1	<1
AB30	6E-08	<1	<1
AB32	3E-08	<1	<1
AB35	3E-08	<1	<1
AB36	**4E-05**	6E+00	**6E+00**
AB37	2E-07	<1	<1
AB38	--	<1	<1
AB39	9E-08	<1	<1
AB41	8E-11	<1	<1
AC29	**5E-06**	<1	<1
AC30	**3E-05**	<1	<1
AC32	**4E-06**	<1	<1
AC33	**3E-05**	<1	<1
AC34	**3E-05**	<1	<1
AC35	**2E-06**	<1	<1
AD29	**3E-06**	<1	<1
AD30	2E-09	<1	<1
AD32	**1E-05**	<1	<1
AD33	**2E-04**	4E+00	**3E+00**
AD34	**6E-05**	4E+00	**4E+00**
AD35	7E-07	<1	<1
AE31	**6E-06**	<1	<1
AE33	3E-07	<1	<1
AF27	--	<1	<1
AF32	**9E-06**	<1	<1
AG27	7E-08	<1	<1
AG28	4E-07	<1	<1
AG31	6E-11	<1	<1
AG32	**1E-05**	<1	<1
AG34	**3E-05**	<1	<1
AH28	1E-07	<1	<1
AH29	**1E-05**	<1	<1
AH32	2E-09	<1	<1

TABLE 7.3: INCREMENTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES FOR RECREATIONAL EXPOSURE SCENARIO[a], SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AH33	--	<1	<1
AI28	8E-09	<1	<1
AI34	3E-07	<1	<1
AJ28	3E-07	<1	<1
AJ29	**2E-06**	<1	<1
AJ30	**3E-05**	<1	<1
AJ31	1E-07	<1	<1
AK29	**5E-05**	5E+00	**2E+00**
AK30	**2E-05**	4E+00	**4E+00**
AK31	**3E-05**	7E+00	**6E+00**
AK32	**5E-05**	1E+01	**9E+00**
AL33	**1E-05**	<1	<1
AL34	**2E-05**	<1	<1

Notes: Values shown in boldface exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

a Open space is the only planned reuse for Parcel E-2.
<1 Less than 1
-- Not applicable
bgs Below ground surface
HI Hazard index
RME Reasonable maximum exposure

TABLE 7.4: TOTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

											Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Percent Contribution by Exposure Pathway to Total RME HI				Metals
Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Chemical-specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	HPAL	RME EPC Exceeds HPAL?
AA32	1E-05	<1	<1	Metal	Arsenic	C	4.1 - 4.6	4.60E+00	2/2	1.24E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AA34	1E-05	<1	<1	Metal	Arsenic	C	4.3 - 4.3	4.30E+00	1/1	1.16E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AA38	1E-05	<1	<1	Metal	Arsenic	C	4.6 - 4.6	4.60E+00	1/1	1.24E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	186 - 186	1.86E+02	1/1	--	--	--	--	--	--	--	--	8.99	Yes
AA39	6E-04	5E+00	2E+00	Metal	Arsenic	C,NC	3.3 - 215	2.15E+02	3/5	5.79E-04	62.8%	37.2%	0.0%	1.60E+00	65.5%	34.4%	0.1%	11.1	Yes
					Antimony	NC	85 - 530	5.30E+02	2/5	--	--	--	--	1.94E+00	100.0%	0.0%	0.0%	9.05	Yes
					Lead	--	36 - 4900	4.90E+03	4/5	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.31 - 0.31	3.10E-01	1/5	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AA40	6E-06	<1	<1	Metal	Arsenic	C	2.1 - 2.1	2.10E+00	1/1	5.65E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AA41	7E-06	<1	<1	Metal	Arsenic	C	2.5 - 2.5	2.50E+00	1/1	6.73E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AB29	1E-05	<1	<1	Metal	Arsenic	C	2 - 2.9	2.90E+00	2/2	7.81E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.26 - 0.26	2.60E-01	1/2	1.99E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AB30	6E-06	<1	<1	Metal	Arsenic	C	1.5 - 2.1	2.10E+00	2/2	5.65E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AB32	1E-05	<1	<1	Metal	Arsenic	C	3.9 - 3.9	3.90E+00	1/1	1.05E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AB35	6E-06	<1	<1	Metal	Arsenic	C	1.9 - 2.1	2.10E+00	2/2	5.65E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AB36	4E-05	6E+00	6E+00	Metal	Arsenic	C	1.8 - 3	3.00E+00	3/6	8.08E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	54 - 6270	6.27E+03	6/6	--	--	--	--	--	--	--	--	8.99	Yes
				PCB	Aroclor-1260	C,NC	0.023 - 20	2.00E+01	2/4	2.69E-05	26.6%	73.4%	0.0%	5.04E+00	29.0%	71.0%	0.0%	--	--
					PCB-156	C	0.052 - 0.056	5.60E-02	2/2	2.83E-06	26.6%	73.4%	0.0%	--	--	--	--	--	--
AB38	8E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	8.34E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AB39	1E-05	<1	<1	Metal	Arsenic	C	3.4 - 5.1	5.10E+00	3/3	1.37E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	39.7 - 222	2.22E+02	3/3	--	--	--	--	--	--	--	--	8.99	Yes
AB41	1E-05	<1	<1	Metal	Arsenic	C	4.8 - 4.8	4.80E+00	1/1	1.29E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AC29	2E-05	<1	<1	Metal	Arsenic	C	4.4 - 4.4	4.40E+00	1/1	1.18E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.51 - 0.51	5.10E-01	1/1	3.90E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AC30	4E-05	<1	<1	Metal	Arsenic	C	5.3 - 5.3	5.30E+00	1/1	1.43E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	2.4 - 2.4	2.40E+00	1/1	1.84E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	2.9 - 2.9	2.90E+00	1/1	2.22E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AC32	2E-05	<1	<1	Metal	Arsenic	C	7.6 - 7.6	7.60E+00	1/1	2.05E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.43 - 0.43	4.30E-01	1/1	3.29E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--

TABLE 7.4: TOTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk			Chemical-specific HI	Percent Contribution by Exposure Pathway to Total RME HI			Metals	
											Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	HPAL	RME EPC Exceeds HPAL?
AC33	4E-05	<1	<1	Metal	Arsenic	C	3.2 - 6	6.00E+00	4/4	1.62E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)anthracene	C	0.16 - 6.1	6.10E+00	3/4	4.67E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(a)pyrene	C	0.25 - 1.9	1.90E+00	3/4	1.45E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	0.35 - 4.9	4.90E+00	3/4	3.75E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(k)fluoranthene	C	0.16 - 4	4.00E+00	3/4	3.06E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AC34	5E-05	<1	<1	Metal	Arsenic	C	4.7 - 8.2	8.20E+00	3/3	2.21E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	110 - 302	3.02E+02	3/3	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.09 - 3.1	3.10E+00	3/3	2.37E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	0.16 - 3.7	3.70E+00	3/3	2.83E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(k)fluoranthene	C	0.52 - 4.3	4.30E+00	2/3	3.29E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AC35	2E-05	<1	<1	Metal	Arsenic	C	7.5 - 7.5	7.50E+00	1/1	2.02E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AD29	2E-05	<1	<1	Metal	Arsenic	C	4.8 - 4.8	4.80E+00	1/1	1.29E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.3 - 0.3	3.00E-01	1/1	2.30E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AD32	2E-05	<1	<1	Metal	Arsenic	C	4.8 - 4.8	4.80E+00	1/1	1.29E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AD33	2E-04	4E+00	3E+00	Metal	Arsenic	C	4.8 - 11	1.04E+01	4/4	2.81E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	64 - 730	6.84E+02	4/4	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)anthracene	C	0.27 - 5.3	5.30E+00	3/4	4.06E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(a)pyrene	C	0.23 - 8.6	8.04E+00	4/4	6.15E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	0.25 - 12	1.11E+01	4/4	8.48E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(k)fluoranthene	C	0.27 - 4.5	4.50E+00	4/4	3.44E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	0.22 - 8.3	8.03E+00	4/4	6.14E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				Pest	Dieldrin	C	6.4 - 6.4	6.40E+00	1/4	5.45E-05	33.6%	66.4%	0.0%	<1	--	--	--	--	--
				PCB	Aroclor-1248	C,NC	0.12 - 12	1.20E+01	2/4	1.62E-05	26.6%	73.4%	0.0%	3.02E+00	29.0%	71.0%	0.0%	--	--
AD34	6E-05	4E+00	4E+00	Metal	Arsenic	C	2.8 - 13	1.30E+01	3/3	3.50E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	Yes
					Lead	--	20 - 530	5.30E+02	3/3	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.1 - 0.54	5.40E-01	3/3	4.13E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				PCB	Aroclor-1260	C,NC	0.098 - 14	1.40E+01	2/3	1.88E-05	26.6%	73.4%	0.0%	3.53E+00	29.0%	71.0%	0.0%	--	--
AD35	2E-05	<1	<1	Metal	Arsenic	C	6.5 - 6.6	6.60E+00	2/2	1.78E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AE31	1E-05	<1	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	8.34E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.56 - 0.56	5.60E-01	1/1	4.29E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AE33	9E-06	<1	<1	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/1	8.61E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AF32	2E-05	<1	<1	Metal	Arsenic	C	5.2 - 5.2	5.20E+00	1/1	1.40E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	0.86 - 0.86	8.60E-01	1/1	6.58E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--

TABLE 7.4: TOTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk			Chemical-specific HI	Percent Contribution by Exposure Pathway to Total RME HI			Metals	
											Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	HPAL	RME EPC Exceeds HPAL?
AG27	2E-05	<1	<1	Metal	Arsenic	C	3.9 - 6.1	6.10E+00	2/2	1.64E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AG28	2E-05	<1	<1	Metal	Arsenic	C	1.3 - 5.6	5.60E+00	3/4	1.51E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AG31	1E-05	<1	<1	Metal	Arsenic	C	5.2 - 5.2	5.20E+00	1/1	1.40E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AG32	2E-05	<1	<1	Metal	Arsenic	C	4 - 4	4.00E+00	1/1	1.08E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AG34	4E-05	<1	<1	Metal	Arsenic	C	4.5 - 4.5	4.50E+00	1/1	1.21E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)anthracene	C	2.3 - 2.3	2.30E+00	1/1	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(a)pyrene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	4.1 - 4.1	4.10E+00	1/1	3.14E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AH28	6E-06	<1	<1	Metal	Arsenic	C	1.5 - 2.2	2.20E+00	2/2	5.92E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AH29	2E-05	<1	<1	Metal	Arsenic	C	4.5 - 4.5	4.50E+00	1/1	1.21E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
				PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AH32	9E-06	<1	<1	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/1	8.61E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AH33	7E-06	<1	<1	Metal	Arsenic	C	2.5 - 2.5	2.50E+00	1/1	6.73E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AI28	1E-05	<1	<1	Metal	Arsenic	C	1.8 - 4.5	4.50E+00	2/2	1.21E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AJ28	9E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	8.34E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AJ29	1E-05	<1	<1	Metal	Arsenic	C	3.5 - 3.5	3.50E+00	1/1	9.42E-06	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AJ30	5E-05	<1	<1	Metal	Arsenic	C	6.4 - 6.4	6.40E+00	1/1	1.72E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	5760 - 5760	5.76E+03	1/1	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)anthracene	C	2.3 - 2.3	2.30E+00	1/1	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(a)pyrene	C	3.4 - 3.4	3.40E+00	1/1	2.60E-05	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	6.6 - 6.6	6.60E+00	1/1	5.05E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(k)fluoranthene	C	2.1 - 2.1	2.10E+00	1/1	1.61E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
AJ31	3E-05	<1	<1	Metal	Arsenic	C	10.9 - 10.9	1.09E+01	1/1	2.93E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
AK29	5E-05	5E+00	2E+00	Metal	Arsenic	C	6.5 - 12.6	1.26E+01	4/4	3.39E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	Yes
					Lead	--	74.3 - 6920	6.92E+03	4/4	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/4	1.53E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				PCB	Aroclor-1260	C,NC	0.21 - 8.9	8.90E+00	3/4	1.20E-05	26.6%	73.4%	0.0%	2.24E+00	29.0%	71.0%	0.0%	--	--
AK30	5E-05	5E+00	4E+00	Metal	Arsenic	C	4.3 - 9.9	9.90E+00	3/3	2.66E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	3170 - 11200	1.12E+04	3/3	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/3	1.84E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				PCB	Aroclor-1260	C,NC	2.6 - 14	1.40E+01	3/3	1.88E-05	26.6%	73.4%	0.0%	3.53E+00	29.0%	71.0%	0.0%	--	--

TABLE 7.4: TOTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

											Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Percent Contribution by Exposure Pathway to Total RME HI			Metals	
Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Chemical-specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	HPAL	RME EPC Exceeds HPAL?
AK31	5E-05	7E+00	6E+00	Metal	Arsenic	C	3.7 - 7	7.00E+00	3/4	1.88E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	307 - 9000	8.56E+03	4/4	--	--	--	--	--	--	--	--	8.99	Yes
				PCB	Aroclor-1260	C,NC	0.15 - 25	2.50E+01	4/4	3.37E-05	26.6%	73.4%	0.0%	6.30E+00	29.0%	71.0%	0.0%	--	--
AK32	7E-05	1E+01	9E+00	Metal	Arsenic	C	4.2 - 5.6	5.60E+00	2/2	1.51E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	503 - 1500	1.50E+03	2/2	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.091 - 0.23	2.30E-01	2/2	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				Pest	Dieldrin	C	0.25 - 0.25	2.50E-01	1/2	2.13E-06	33.6%	66.4%	0.0%	<1	--	--	--	--	--
				PCB	Aroclor-1260	C,NC	26 - 37	3.70E+01	2/2	4.98E-05	26.6%	73.4%	0.0%	9.33E+00	29.0%	71.0%	0.0%	--	--
AL33	3E-05	<1	<1	Metal	Arsenic	C	2.9 - 6.5	6.50E+00	3/3	1.75E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	59.6 - 227	2.27E+02	3/3	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.19 - 0.61	6.10E-01	2/3	4.67E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				PCB	Aroclor-1260	C	0.59 - 1.9	1.90E+00	2/3	2.56E-06	26.6%	73.4%	0.0%	<1	--	--	--	--	--
AL34	3E-05	<1	<1	Metal	Arsenic	C	2 - 6.3	6.30E+00	3/3	1.70E-05	62.8%	37.2%	0.0%	<1	--	--	--	11.1	No
					Lead	--	11.6 - 160	1.60E+02	3/3	--	--	--	--	--	--	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.31 - 1.1	1.10E+00	3/3	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
					Benzo(b)fluoranthene	C	0.67 - 2.7	2.70E+00	3/3	2.07E-06	28.0%	71.9%	0.0%	--	--	--	--	--	--
				PCB	Aroclor-1260	C	1.3 - 1.4	1.40E+00	3/3	1.88E-06	26.6%	73.4%	0.0%	<1	--	--	--	--	--

Notes: All concentrations shown in mg/kg.

a	Open space is the only planned reuse for Parcel E-2.
<1	Less than 1
--	Not applicable or chemical is not a COC for this endpoint
%	Percent
C	Cancer effect
COC	Chemical of concern
CR	Cancer risk
DF	Detection Frequency
EPC	Exposure point concentration
HI	Hazard index
HPAL	Hunters Point Ambient Level
mg/kg	Milligram per kilogram
NC	Noncancer effect
PAH	Polynuclear aromatic hydrocarbon
Pest	Pesticide
RME	Reasonable maximum exposure

ERRG

TABLE 7.5: INCREMENTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk			Chemical-specific HI	Percent Contribution by Exposure Pathway to Total RME HI		
											Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)
AA38	--	<1	<1	Metal	Lead	--	186 - 186	1.86E+02	1/1	--	--	--	--	--	--	--	--
AA39	6E-04	5E+00	2E+00	Metal	Arsenic	C/NC	3.3 - 215	2.15E+02	3/5	5.79E-04	62.8%	37.2%	0.0%	1.60E+00	65.5%	34.4%	0.1%
					Antimony	NC	85 - 530	5.30E+02	2/5	--	--	--	--	1.94E+00	100.0%	0.0%	0.0%
					Lead	--	36 - 4900	4.90E+03	4/5	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.31 - 0.31	3.10E-01	1/5	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--
AB29	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.26 - 0.26	2.60E-01	1/2	1.99E-06	28.0%	71.9%	0.0%	--	--	--	--
AB36	4E-05	6E+00	6E+00	Metal	Lead	--	54 - 6270	6.27E+03	6/6	--	--	--	--	--	--	--	--
				PCB	Aroclor-1260	C/NC	0.023 - 20	2.00E+01	2/4	2.69E-05	26.6%	73.4%	0.0%	5.04E+00	29.0%	71.0%	0.0%
					PCB-156	C	0.052 - 0.056	5.60E-02	2/2	2.83E-06	26.6%	73.4%	0.0%	--	--	--	--
AB39	9E-08	<1	<1	Metal	Lead	--	39.7 - 222	2.22E+02	3/3	--	--	--	--	--	--	--	--
AC29	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.51 - 0.51	5.10E-01	1/1	3.90E-06	28.0%	71.9%	0.0%	--	--	--	--
AC30	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	2.4 - 2.4	2.40E+00	1/1	1.84E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	2.9 - 2.9	2.90E+00	1/1	2.22E-06	28.0%	71.9%	0.0%	--	--	--	--
AC32	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.43 - 0.43	4.30E-01	1/1	3.29E-06	28.0%	71.9%	0.0%	--	--	--	--
AC33	3E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.16 - 6.1	6.10E+00	3/4	4.67E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(a)pyrene	C	0.25 - 1.9	1.90E+00	3/4	1.45E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	0.35 - 4.9	4.90E+00	3/4	3.75E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(k)fluoranthene	C	0.16 - 4	4.00E+00	3/4	3.06E-06	28.0%	71.9%	0.0%	--	--	--	--
AC34	3E-05	<1	<1	Metal	Lead	--	110 - 302	3.02E+02	3/3	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.09 - 3.1	3.10E+00	3/3	2.37E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	0.16 - 3.7	3.70E+00	3/3	2.83E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(k)fluoranthene	C	0.52 - 4.3	4.30E+00	2/3	3.29E-06	28.0%	71.9%	0.0%	--	--	--	--
AD29	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.3 - 0.3	3.00E-01	1/1	2.30E-06	28.0%	71.9%	0.0%	--	--	--	--
AD32	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--
AD33	2E-04	4E+00	3E+00	Metal	Lead	--	64 - 730	6.84E+02	4/4	--	--	--	--	--	--	--	--
				PAH	Benzo(a)anthracene	C	0.27 - 5.3	5.30E+00	3/4	4.06E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(a)pyrene	C	0.23 - 8.6	8.04E+00	4/4	6.15E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	0.25 - 12	1.11E+01	4/4	8.48E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(k)fluoranthene	C	0.27 - 4.5	4.50E+00	4/4	3.44E-06	28.0%	71.9%	0.0%	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	0.22 - 8.3	8.03E+00	4/4	6.14E-06	28.0%	71.9%	0.0%	--	--	--	--
				Pest	Dieldrin	C	6.4 - 6.4	6.40E+00	1/4	5.45E-05	33.6%	66.4%	0.0%	<1	--	--	--
				PCB	Aroclor-1248	C/NC	0.12 - 12	1.20E+01	2/4	1.62E-05	26.6%	73.4%	0.0%	3.02E+00	29.0%	71.0%	0.0%

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TABLE 7.5: INCREMENTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk			Chemical-specific HI	Percent Contribution by Exposure Pathway to Total RME HI		
											Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)
AD34	6E-05	4E+00	4E+00	Metal	Arsenic	C	2.8 - 13	1.30E+01	3/3	3.50E-05	62.8%	37.2%	0.0%	<1	--	--	--
					Lead	--	20 - 530	5.30E+02	3/3	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.1 - 0.54	5.40E-01	3/3	4.13E-06	28.0%	71.9%	0.0%	--	--	--	--
				PCB	Aroclor-1260	C/NC	0.098 - 14	1.40E+01	2/3	1.88E-05	26.6%	73.4%	0.0%	3.53E+00	29.0%	71.0%	0.0%
AE31	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.56 - 0.56	5.60E-01	1/1	4.29E-06	28.0%	71.9%	0.0%	--	--	--	--
AF32	9E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.86 - 0.86	8.60E-01	1/1	6.58E-06	28.0%	71.9%	0.0%	--	--	--	--
AG32	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--
AG34	3E-05	<1	<1	PAH	Benzo(a)anthracene	C	2.3 - 2.3	2.30E+00	1/1	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(a)pyrene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	4.1 - 4.1	4.10E+00	1/1	3.14E-06	28.0%	71.9%	0.0%	--	--	--	--
					Indeno(1,2,3-cd)pyrene	C	3.1 - 3.1	3.10E+00	1/1	2.37E-06	28.0%	71.9%	0.0%	--	--	--	--
AH29	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.10E+00	1/1	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--
AJ29	2E-06	<1	<1		No COCs Identified												
AJ30	3E-05	<1	<1	Metal	Lead	--	5760 - 5760	5.76E+03	1/1	--	--	--	--	--	--	--	--
				PAH	Benzo(a)anthracene	C	2.3 - 2.3	2.30E+00	1/1	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(a)pyrene	C	3.4 - 3.4	3.40E+00	1/1	2.60E-05	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	6.6 - 6.6	6.60E+00	1/1	5.05E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(k)fluoranthene	C	2.1 - 2.1	2.10E+00	1/1	1.61E-06	28.0%	71.9%	0.0%	--	--	--	--
AK29	5E-05	5E+00	2E+00	Metal	Arsenic	C	6.5 - 12.6	1.26E+01	4/4	3.39E-05	62.8%	37.2%	0.0%	<1	--	--	--
					Lead	--	74.3 - 6920	6.92E+03	4/4	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/4	1.53E-06	28.0%	71.9%	0.0%	--	--	--	--
				PCB	Aroclor-1260	C/NC	0.21 - 8.9	8.90E+00	3/4	1.20E-05	26.6%	73.4%	0.0%	2.24E+00	29.0%	71.0%	0.0%
AK30	2E-05	4E+00	4E+00	Metal	Lead	--	3170 - 11200	1.12E+04	3/3	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/3	1.84E-06	28.0%	71.9%	0.0%	--	--	--	--
				PCB	Aroclor-1260	C/NC	2.6 - 14	1.40E+01	3/3	1.88E-05	26.6%	73.4%	0.0%	3.53E+00	29.0%	71.0%	0.0%
AK31	3E-05	7E+00	6E+00	Metal	Lead	--	307 - 9000	8.56E+03	4/4	--	--	--	--	--	--	--	--
				PCB	Aroclor-1260	C/NC	0.15 - 25	2.50E+01	4/4	3.37E-05	26.6%	73.4%	0.0%	6.30E+00	29.0%	71.0%	0.0%
AK32	5E-05	1E+01	9E+00	Metal	Lead	--	503 - 1500	1.50E+03	2/2	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.091 - 0.23	2.30E-01	2/2	1.76E-06	28.0%	71.9%	0.0%	--	--	--	--
				Pest	Dieldrin	C	0.25 - 0.25	2.50E-01	1/2	2.13E-06	33.6%	66.4%	0.0%	<1	--	--	--
				PCB	Aroclor-1260	C/NC	26 - 37	3.70E+01	2/2	4.98E-05	26.6%	73.4%	0.0%	9.33E+00	29.0%	71.0%	0.0%

TABLE 7.5: INCREMENTAL RISK -- RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) FOR RECREATIONAL EXPOSURE SCENARIO[a]

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk			Chemical-specific HI	Percent Contribution by Exposure Pathway to Total RME HI		
											Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)
AL33	1E-05	<1	<1	Metal	Lead	--	59.6 - 227	2.27E+02	3/3	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.19 - 0.61	6.10E-01	2/3	4.67E-06	28.0%	71.9%	0.0%	--	--	--	--
				PCB	Aroclor-1260	C	0.59 - 1.9	1.90E+00	2/3	2.56E-06	26.6%	73.4%	0.0%	<1	--	--	--
AL34	2E-05	<1	<1	Metal	Lead	--	11.6 - 160	1.60E+02	3/3	--	--	--	--	--	--	--	--
				PAH	Benzo(a)pyrene	C	0.31 - 1.1	1.10E+00	3/3	8.42E-06	28.0%	71.9%	0.0%	--	--	--	--
					Benzo(b)fluoranthene	C	0.67 - 2.7	2.70E+00	3/3	2.07E-06	28.0%	71.9%	0.0%	--	--	--	--
				PCB	Aroclor-1260	C	1.3 - 1.4	1.40E+00	3/3	1.88E-06	26.6%	73.4%	0.0%	<1	--	--	--

Notes: All concentrations shown in mg/kg.

1	Open space is the only planned reuse for Parcel E-2.
<1	Less than 1
--	Not applicable or chemical is not a COC for this endpoint
%	Percent
C	Cancer effect
COC	Chemical of concern
CR	Cancer risk
DF	Detection Frequency
EPC	Exposure point concentration
HI	Hazard index
HPAL	Hunters Point Ambient Level
HPS	Hunters Point Shipyard
mg/kg	Milligram per kilogram
NC	Noncancer effect
PAH	Polynuclear aromatic hydrocarbon
Pest	Pesticide
RME	Reasonable maximum exposure

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TABLE 7.6: TOTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AA30	**2E-06**	<1	<1
AA31	**2E-06**	<1	<1
AA32	**3E-06**	2E+00	<1
AA34	**3E-06**	<1	<1
AA35	**4E-06**	<1	<1
AA38	**3E-06**	<1	<1
AA39	**2E-04**	2E+01	**6E+00**
AA40	1E-06	<1	<1
AA41	**4E-06**	<1	<1
AB29	**5E-06**	7E+00	**3E+00**
AB30	**4E-06**	<1	<1
AB31	**4E-06**	2E+00	<1
AB32	**4E-06**	2E+00	<1
AB33	**2E-05**	<1	<1
AB35	1E-06	<1	<1
AB36	**9E-06**	1E+01	**1E+01**
AB37	4E-08	<1	<1
AB38	**2E-06**	<1	<1
AB39	**1E-05**	2E+00	<1
AB41	**3E-06**	<1	<1
AC28	5E-07	<1	<1
AC29	**1E-05**	3E+01	**2E+01**
AC30	**2E-05**	1E+02	**1E+02**
AC32	**5E-06**	<1	<1
AC33	**9E-06**	<1	<1
AC34	**1E-05**	5E+00	**3E+00**
AC35	**5E-06**	<1	<1
AC39	**1E-05**	2E+00	<1
AC40	**2E-05**	2E+00	<1
AC41	**6E-06**	<1	<1
AD28	**4E-06**	<1	<1
AD29	**1E-04**	2E+02	**2E+02**
AD30	**5E-06**	<1	<1
AD32	**7E-06**	5E+00	**2E+00**
AD33	**9E-05**	2E+01	**1E+01**
AD34	**1E-05**	1E+01	**7E+00**
AD35	**4E-06**	<1	<1
AE28	**4E-06**	2E+00	<1
AE29	**5E-06**	2E+00	<1
AE31	**3E-05**	4E+01	**2E+01**
AE33	**4E-06**	<1	<1
AF27	**3E-06**	<1	<1
AF28	**5E-06**	5E+00	**3E+00**
AF29	**4E-06**	2E+00	<1
AF32	**5E-06**	<1	<1
AF33	**8E-06**	<1	<1
AG27	**6E-06**	<1	<1

TABLE 7.6: TOTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AG28	**2E-06**	<1	<1
AG29	**3E-06**	<1	<1
AG31	**7E-06**	2E+00	<1
AG32	**1E-05**	2E+00	<1
AG34	**1E-05**	5E+00	**3E+00**
AH28	**3E-06**	<1	<1
AH29	**7E-06**	2E+00	<1
AH32	**1E-04**	1E+02	**7E+01**
AH33	**2E-05**	5E+00	**2E+00**
AH34	**1E-05**	2E+01	**2E+01**
AI28	**3E-05**	<1	<1
AI34	**7E-05**	1E+02	**1E+02**
AJ28	**7E-05**	4E+00	**2E+00**
AJ29	**1E-05**	3E+00	<1
AJ30	**1E-05**	3E+00	<1
AJ31	**1E-05**	8E+00	**6E+00**
AJ34	**2E-05**	3E+01	**3E+01**
AJ35	**1E-03**	2E+03	**2E+03**
AJ36	**1E-04**	2E+02	**2E+02**
AK29	**9E-06**	9E+00	**3E+00**
AK30	**1E-05**	9E+00	**7E+00**
AK31	**7E-06**	1E+01	**7E+00**
AK32	**5E-05**	7E+01	**7E+01**
AK36	**3E-05**	3E+01	**3E+01**
AL33	**6E-06**	3E+00	<1
AL34	**7E-06**	3E+00	<1

Notes: Values shown in boldface exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1	Less than 1
--	Not applicable
bgs	Below ground surface
HI	Hazard index
RME	Reasonable maximum exposure

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TABLE 7.7: INCREMENTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AA30	5E-08	<1	<1
AA31	6E-08	<1	<1
AA32	6E-07	<1	<1
AA34	2E-09	<1	<1
AA35	--	<1	<1
AA38	--	<1	<1
AA39	**2E-04**	2E+01	**6E+00**
AA40	7E-09	<1	<1
AA41	2E-08	<1	<1
AB29	**2E-06**	6E+00	**3E+00**
AB30	2E-07	<1	<1
AB31	5E-07	<1	<1
AB32	8E-07	2E+00	<1
AB33	**1E-05**	<1	<1
AB35	6E-09	<1	<1
AB36	**7E-06**	1E+01	**1E+01**
AB37	4E-08	<1	<1
AB38	6E-09	<1	<1
AB39	**1E-05**	2E+00	<1
AB41	2E-11	<1	<1
AC28	4E-08	<1	<1
AC29	**9E-06**	3E+01	**2E+01**
AC30	**1E-05**	1E+02	**1E+02**
AC32	8E-07	<1	<1
AC33	**6E-06**	<1	<1
AC34	**7E-06**	4E+00	**3E+00**
AC35	4E-07	<1	<1
AC39	**1E-05**	2E+00	<1
AC40	**2E-05**	2E+00	<1
AC41	1E-06	<1	<1
AD28	3E-08	<1	<1
AD29	**1E-04**	2E+02	**2E+02**
AD30	2E-11	<1	<1
AD32	**3E-06**	4E+00	<1
AD33	**8E-05**	2E+01	**1E+01**
AD34	**1E-05**	1E+01	**7E+00**
AD35	1E-07	<1	<1
AE28	2E-07	<1	<1
AE29	2E-11	<1	<1
AE31	**3E-05**	4E+01	**2E+01**
AE33	3E-07	<1	<1
AF27	--	<1	<1
AF28	**2E-06**	4E+00	**3E+00**
AF29	3E-07	<1	<1
AF32	**2E-06**	<1	<1

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TABLE 7.7: INCREMENTAL RISK -- SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
AF33	**8E-06**	<1	<1
AG27	1E-08	<1	<1
AG28	9E-08	<1	<1
AG29	2E-08	<1	<1
AG31	**3E-06**	<1	<1
AG32	**1E-05**	2E+00	<1
AG34	**8E-06**	4E+00	**3E+00**
AH28	4E-07	<1	<1
AH29	**3E-06**	<1	<1
AH32	**1E-04**	1E+02	**7E+01**
AH33	**2E-05**	5E+00	**2E+00**
AH34	**1E-05**	2E+01	**2E+01**
AI28	**3E-05**	<1	<1
AI34	**7E-05**	1E+02	**1E+02**
AJ28	**7E-05**	3E+00	**2E+00**
AJ29	**1E-05**	2E+00	<1
AJ30	**7E-06**	2E+00	<1
AJ31	**1E-05**	8E+00	**6E+00**
AJ34	**2E-05**	3E+01	**3E+01**
AJ35	**1E-03**	2E+03	**2E+03**
AJ36	**1E-04**	2E+02	**2E+02**
AK29	**9E-06**	8E+00	**3E+00**
AK30	**4E-06**	8E+00	**7E+00**
AK31	**7E-06**	1E+01	**7E+00**
AK32	**4E-05**	7E+01	**7E+01**
AK36	**3E-05**	3E+01	**3E+01**
AL33	**2E-06**	2E+00	<1
AL34	**3E-06**	2E+00	<1

Notes: Values shown in boldface exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1 Less than 1
-- Not applicable
bgs Below ground surface
HI Hazard index
RME Reasonable maximum exposure

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TABLE 7.8: RISK CHARACTERIZATION SUMMARY FOR A-AQUIFER GROUNDWATER, CONSTRUCTION WORKER SCENARIO

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	RME Segregated HI for Exposure Pathway	Chemicals of Concern		Basis for Chemical of Concern	Detection Frequency	RME Concentration	Chemical-Specific Cancer Risk	Percent Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent Contribution to Total RME HI for Exposure Pathway
Parcel E-2	2E-04	2E+00	<1	Trench Vapor Inhalation	A	3E-06	2E+00	<1		No COCs Identified	--	--	--	--	--	--	--
				Trench Dermal Contact	A	2E-04	<1	<1	PAH	Benzo(a)anthracene	C	8 / 194	5.2E+00	7.7E-06	5	--	--
										Benzo(a)pyrene	C	5 / 192	3.5E+00	7.8E-05	50.2	--	--
										Benzo(b)fluoranthene	C	5 / 192	6.0E+00	1.3E-05	8.6	--	--
										Benzo(k)fluoranthene	C	1 / 192	1.1E+00	2.4E-06	1.6	--	--
										Dibenz(a,h)anthracene	C	1 / 192	1.3E+00	3.8E-05	24.3	--	--
										Indeno(1,2,3-cd)pyrene	C	3 / 192	3.0E+00	9.5E-06	6.1	--	--
									VOC	Tetrachloroethene	C	20 / 213	6.2E+01	2.9E-06	1.9	--	--

Notes: All concentrations shown in micrograms per liter.

-- Not applicable or chemical is not a chemical of concern for this endpoint
A A-aquifer
C Cancer effect
HI Hazard index
PAH Polynuclear aromatic hydrocarbon
RME Reasonable maximum exposure
VOC Volatile organic compound

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TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI		Chemicals of Concern	Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI	Metals	
												HPAL	Maximum Concentration Exceeds HPAL?
AA30	2.39E-06	<1	<1	Metal	Arsenic	C	3.8 - 3.8	3.8E+00	1/1	2.34E-06	<1	11.1	No
AA31	2.34E-06	<1	<1	Metal	Arsenic	C	3.6 - 3.7	3.7E+00	2/2	2.28E-06	<1	11.1	No
AA32	3.28E-06	1.68E+00	<1	Metal	Arsenic	C	3.9 - 4.6	4.4E+00	5/5	2.71E-06	<1	11.1	No
AA34	2.66E-06	<1	<1	Metal	Arsenic	C	2.5 - 4.3	4.3E+00	4/4	2.65E-06	<1	11.1	No
AA35	4.07E-06	<1	<1	Metal	Arsenic	C	3.4 - 6.6	6.6E+00	3/4	4.07E-06	<1	11.1	No
AA38	2.84E-06	<1	<1	Metal	Arsenic	C	3.1 - 4.6	4.6E+00	2/4	2.84E-06	<1	11.1	No
AA39	1.97E-04	1.76E+01	6.22E+00	Metal	Antimony	NC	10.4 - 530	5.3E+02	6/12	--	4.28E+00	9.05	Yes
					Arsenic	C,NC	3.3 - 315	3.2E+02	10/12	1.94E-04	4.80E+00	11.1	Yes
					Iron	NC	14000 - 217000	1.8E+05	12/12	--	1.90E+00	58000	Yes
					Lead	--	24.7 - 9300	9.3E+03	11/12	--	--	8.99	Yes
					Vanadium	NC	17 - 620	6.2E+02	12/12	--	2.00E+00	117.17	Yes
				PAH	Naphthalene	C	1.2 - 120	1.2E+02	9/16	1.59E-06	<1	--	--
AA41	3.50E-06	<1	<1	Metal	Arsenic	C	2.5 - 5.8	5.6E+00	4/4	3.48E-06	<1	11.1	No
AB29	5.05E-06	6.78E+00	2.90E+00	Metal	Antimony	NC	0.12 - 350	3.5E+02	5/10	--	2.83E+00	9.05	Yes
					Arsenic	C	1.6 - 7.6	4.7E+00	10/10	2.87E-06	<1	11.1	No
				Pest/PCB	Aroclor-1016	NC	13 - 13	1.3E+01	1/10	1.23E-07	1.76E+00	--	--
AB30	4.10E-06	<1	<1	Metal	Arsenic	C	1.5 - 6.5	6.4E+00	4/4	3.92E-06	<1	11.1	No
AB31	4.13E-06	1.69E+00	<1	Metal	Arsenic	C	3.9 - 5.9	5.9E+00	3/3	3.64E-06	<1	11.1	No
AB32	4.12E-06	1.99E+00	<1	Metal	Arsenic	C	3.7 - 5.9	5.3E+00	6/6	3.30E-06	<1	11.1	No
AB33	1.66E-05	<1	<1	Metal	Arsenic	C	1.2 - 4.9	4.9E+00	3/3	3.02E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	6.9 - 6.9	6.9E+00	1/3	1.07E-05	--	--	--
AB36	9.22E-06	1.24E+01	1.15E+01	Metal	Arsenic	C	0.2 - 3	3.0E+00	5/11	1.84E-06	<1	11.1	No
					Lead	--	3.4 - 6270	2.5E+03	11/11	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	C,NC	0.023 - 20	2.0E+01	2/9	5.41E-06	9.48E+00	--	--
AB38	2.41E-06	<1	<1	Metal	Arsenic	C	2.5 - 3.9	3.9E+00	4/4	2.40E-06	<1	11.1	No
AB39	1.39E-05	1.84E+00	<1	Metal	Arsenic	C	3.4 - 14	1.2E+01	4/4	7.70E-06	<1	11.1	Yes
					Lead	--	39.7 - 1900	1.9E+03	4/4	--	--	8.99	Yes
				Dioxin	2,3,4,7,8-PECDF	C	0.000452 - 0.000452	4.5E-04	1/1	2.21E-06	--	--	--
AB41	3.39E-06	<1	<1	Metal	Arsenic	C	4.8 - 5.5	5.5E+00	2/2	3.39E-06	<1	11.1	No

TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI		Chemicals of Concern	Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI	Metals	
												HPAL	Maximum Concentration Exceeds HPAL?
AC29	1.17E-05	3.00E+01	1.76E+01	Metal	Arsenic	C	3.3 - 4.6	4.6E+00	3/3	2.84E-06	<1	11.1	No
				Pest/PCB	Aroclor-1016	C,NC	130 - 130	1.3E+02	1/3	1.23E-06	1.76E+01	--	--
					Aroclor-1260	C,NC	24 - 24	2.4E+01	1/3	6.50E-06	1.14E+01	--	--
AC30	1.59E-05	1.02E+02	1.00E+02	Metal	Arsenic	C	3.7 - 5.6	5.6E+00	4/4	3.45E-06	<1	11.1	No
					Lead	--	5.3 - 1020	1.0E+03	4/4	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.05 - 2.4	2.4E+00	2/4	3.71E-06	--	--	--
				Pest/PCB	Aroclor-1016	C,NC	740 - 740	7.4E+02	1/4	7.01E-06	1.00E+02	--	--
AC32	5.47E-06	<1	<1	Metal	Arsenic	C	3.1 - 7.6	7.6E+00	2/4	4.69E-06	<1	11.1	No
AC33	9.04E-06	<1	<1	Metal	Arsenic	C	3.2 - 6	5.3E+00	8/8	3.28E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	0.051 - 1.9	1.9E+00	5/8	2.94E-06	--	--	--
AC34	1.16E-05	4.59E+00	2.83E+00	Metal	Arsenic	C	3 - 10	8.1E+00	8/8	5.01E-06	<1	11.1	No
					Iron	NC	16000 - 471000	2.6E+05	8/8	--	2.83E+00	58000	Yes
				PAH	Benzo(a)pyrene	C	0.072 - 3.1	3.1E+00	6/8	4.80E-06	--	--	--
AC35	5.07E-06	<1	<1	Metal	Arsenic	C	6.6 - 7.5	7.5E+00	2/2	4.62E-06	<1	11.1	No
AC39	1.39E-05	2.42E+00	<1	Metal	Arsenic	C	14 - 20	2.0E+01	2/2	1.23E-05	<1	11.1	Yes
					Lead	--	420 - 1400	1.4E+03	2/2	--	--	8.99	Yes
AC40	1.69E-05	2.35E+00	<1	Metal	Arsenic	C	8.8 - 25	2.3E+01	5/5	1.39E-05	<1	11.1	Yes
					Lead	--	910 - 5600	5.0E+03	5/5	--	--	8.99	Yes
AC41	6.12E-06	<1	<1	Metal	Arsenic	C	4.3 - 7.6	7.6E+00	3/3	4.69E-06	<1	11.1	No
AD28	3.80E-06	<1	<1	Metal	Arsenic	C	4 - 6.1	6.1E+00	2/2	3.76E-06	<1	11.1	No
AD29	1.10E-04	1.82E+02	1.79E+02	Metal	Arsenic	C	4.2 - 12.6	1.1E+01	4/4	7.02E-06	<1	11.1	Yes
				Pest/PCB	Aroclor-1254	C,NC	7.1 - 7.1	7.1E+00	1/2	1.92E-06	3.36E+00	--	--
					Aroclor-1260	C,NC	8.6 - 370	3.7E+02	2/2	1.00E-04	1.75E+02	--	--
AD30	5.43E-06	<1	<1	Metal	Arsenic	C	8.8 - 8.8	8.8E+00	1/2	5.43E-06	<1	11.1	No
AD32	6.93E-06	4.74E+00	1.60E+00	Metal	Arsenic	C	3.9 - 6.2	6.1E+00	4/4	3.74E-06	<1	11.1	No
					Lead	--	58 - 3840	3.4E+03	4/4	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.052 - 1.1	1.1E+00	2/4	1.70E-06	--	--	--

TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI		Chemicals of Concern	Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI	Metals	
												HPAL	Maximum Concentration Exceeds HPAL?
AD33	8.52E-05	1.70E+01	1.44E+01	Metal	Arsenic	C	4.1 - 11	8.7E+00	7/8	5.34E-06	<1	11.1	No
				PAH	Benzo(a)anthracene	C	0.058 - 51	5.1E+01	6/8	7.89E-06	--	--	--
					Benzo(a)pyrene	C	0.059 - 16	1.6E+01	6/8	2.48E-05	--	--	--
					Benzo(b)fluoranthene	C	0.064 - 64	6.4E+01	7/8	9.91E-06	--	--	--
					Benzo(k)fluoranthene	C	0.058 - 53	5.3E+01	6/8	8.20E-06	--	--	--
					Dibenz(a,h)anthracene	C	5.3 - 5.3	5.3E+00	1/8	4.99E-06	--	--	--
					Indeno(1,2,3-cd)pyrene	C	0.053 - 17	1.7E+01	7/8	2.63E-06	--	--	--
				Pest/PCB	Aroclor-1248	C,NC	0.12 - 12	1.2E+01	2/8	3.25E-06	5.69E+00	--	--
					Aroclor-1254	C,NC	0.037 - 17	1.7E+01	2/8	4.60E-06	8.05E+00	--	--
					Dieldrin	C	3.2 - 6.4	6.4E+00	2/8	1.13E-05	<1	--	--
AD34	1.18E-05	1.19E+01	7.00E+00	Metal	Arsenic	C	2.8 - 13	1.1E+01	6/6	6.52E-06	<1	11.1	Yes
					Vanadium	NC	31 - 2100	1.1E+03	6/6	--	3.49E+00	117.17	Yes
				Pest/PCB	Aroclor-1260	C,NC	0.072 - 14	1.4E+01	5/6	3.79E-06	6.63E+00	--	--
AD35	4.21E-06	<1	<1	Metal	Arsenic	C	3.8 - 6.6	6.6E+00	4/4	4.07E-06	<1	11.1	No
AE28	3.76E-06	1.66E+00	<1	Metal	Arsenic	C	3.2 - 6.7	5.8E+00	5/6	3.56E-06	<1	11.1	No
AE29	5.37E-06	1.60E+00	<1	Metal	Arsenic	C	6.4 - 8.7	8.7E+00	3/3	5.36E-06	<1	11.1	No
AE31	3.34E-05	3.87E+01	1.58E+01	Metal	Antimony	NC	42.5 - 1930	1.9E+03	2/2	--	1.56E+01	9.05	Yes
					Arsenic	C	3 - 47.8	4.8E+01	4/4	2.95E-05	<1	11.1	Yes
					Copper	NC	42 - 167000	1.7E+05	4/4	--	1.46E+01	124.31	Yes
				Pest/PCB	Aroclor-1242	C,NC	0.024 - 7.2	6.2E+00	4/4	1.68E-06	2.94E+00	--	--
AE33	4.04E-06	<1	<1	Metal	Arsenic	C	3.2 - 6.4	6.0E+00	6/6	3.71E-06	<1	11.1	No
AF27	3.15E-06	<1	<1	Metal	Arsenic	C	5.1 - 5.1	5.1E+00	1/2	3.14E-06	<1	11.1	No
AF28	5.12E-06	4.81E+00	3.47E+00	Metal	Arsenic	C	1.4 - 5.1	5.1E+00	2/2	3.14E-06	<1	11.1	No
				Pest/PCB	Aroclor-1260	C,NC	0.056 - 7.2	7.2E+00	2/2	1.95E-06	3.41E+00	--	--
AF29	4.25E-06	1.58E+00	<1	Metal	Arsenic	C	4.3 - 6.8	6.5E+00	4/4	3.99E-06	<1	11.1	No
AF32	4.97E-06	<1	<1	Metal	Arsenic	C	4.1 - 5.2	5.2E+00	2/2	3.21E-06	<1	11.1	No
AF33	7.62E-06	<1	<1	Metal	Arsenic	C	11.3 - 12.2	1.2E+01	2/2	7.52E-06	<1	11.1	Yes
AG27	5.75E-06	<1	<1	Metal	Arsenic	C	3.9 - 9.3	9.3E+00	3/6	5.73E-06	<1	11.1	No
AG28	2.50E-06	<1	<1	Metal	Arsenic	C	1.3 - 5.6	3.9E+00	9/10	2.40E-06	<1	11.1	No
AG29	3.47E-06	<1	<1	Metal	Arsenic	C	2.1 - 5.6	5.6E+00	3/3	3.45E-06	<1	11.1	No

TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI		Chemicals of Concern	Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI	Metals	
												HPAL	Maximum Concentration Exceeds HPAL?
AG31	6.63E-06	1.70E+00	<1	Metal	Arsenic	C	2.7 - 5.5	5.5E+00	4/4	3.39E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	1.3 - 1.3	1.3E+00	1/4	2.01E-06	--	--	--
AG32	1.21E-05	2.18E+00	<1	Metal	Arsenic	C	4 - 17.4	1.6E+01	4/4	9.67E-06	<1	11.1	Yes
				PAH	Benzo(a)pyrene	C	0.18 - 1.1	1.1E+00	2/4	1.70E-06	--	--	--
AG34	1.12E-05	4.66E+00	2.82E+00	Metal	Arsenic	C	1 - 5.1	4.8E+00	5/5	2.96E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	0.093 - 3.1	3.1E+00	3/5	4.80E-06	--	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.26 - 5.9	5.9E+00	3/5	1.60E-06	2.80E+00	--	--
AH28	3.42E-06	<1	<1	Metal	Arsenic	C	1.5 - 6.5	4.9E+00	5/6	3.03E-06	<1	11.1	No
AH29	7.16E-06	1.99E+00	<1	Metal	Arsenic	C	3.5 - 9.1	7.3E+00	5/5	4.53E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.1E+00	1/5	1.70E-06	--	--	--
AH32	1.02E-04	1.03E+02	7.05E+01	Metal	Antimony	NC	487 - 675	6.8E+02	2/2	--	5.45E+00	9.05	Yes
					Arsenic	C	3.2 - 66.6	5.7E+01	4/4	3.54E-05	<1	11.1	Yes
					Cadmium	NC	10.3 - 330	3.3E+02	2/4	1.05E-08	2.17E+00	3.14	Yes
					Copper	NC	55.5 - 175000	1.5E+05	4/4	--	1.32E+01	124.31	Yes
					Iron	NC	30200 - 165000	1.5E+05	4/4	--	1.59E+00	58000	Yes
					Lead	--	7.7 - 3720	3.6E+03	4/4	--	--	8.99	Yes
					Vanadium	NC	58.3 - 24900	2.1E+04	4/4	--	6.74E+01	117.17	Yes
				PAH	Benzo(a)anthracene	C	1.3 - 80	8.0E+01	2/4	1.24E-05	--	--	--
					Benzo(a)pyrene	C	0.13 - 16	1.6E+01	2/4	2.48E-05	--	--	--
					Benzo(b)fluoranthene	C	0.52 - 43	4.3E+01	2/4	6.66E-06	--	--	--
					Benzo(k)fluoranthene	C	0.11 - 13	1.3E+01	2/4	2.01E-06	--	--	--
					Naphthalene	C,NC	2.2 - 1400	1.4E+03	2/4	1.86E-05	7.59E+00	--	--
AH33	2.21E-05	5.27E+00	2.10E+00	Metal	Arsenic	C	2.5 - 4.9	4.9E+00	4/4	3.01E-06	<1	11.1	No
				PAH	Benzo(a)anthracene	C	0.1 - 11	1.1E+01	3/4	1.70E-06	--	--	--
					Benzo(a)pyrene	C	0.1 - 7.5	7.5E+00	3/4	1.16E-05	--	--	--
					Benzo(b)fluoranthene	C	0.13 - 10	1.0E+01	3/4	1.55E-06	--	--	--
				Pest/PCB	Aroclor-1260	NC	1.6 - 3.4	3.4E+00	2/4	9.20E-07	1.61E+00	--	--

TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI		Chemicals of Concern	Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI	Metals	
												HPAL	Maximum Concentration Exceeds HPAL?
AH34	1.20E-05	1.95E+01	1.51E+01	Metal	Antimony	NC	16 - 270	2.7E+02	3/4	--	2.18E+00	9.05	Yes
					Arsenic	C	2 - 4	4.0E+00	3/4	2.47E-06	<1	11.1	No
					Lead	--	36 - 1600	1.5E+03	4/4	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	C,NC	0.43 - 31	3.1E+01	4/4	8.39E-06	1.47E+01	--	--
AI28	2.94E-05	<1	<1	Metal	Arsenic	C	1.8 - 5.5	5.5E+00	4/4	3.39E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	12 - 12	1.2E+01	1/3	1.86E-05	--	--	--
					Benzo(b)fluoranthene	C	17 - 17	1.7E+01	1/3	2.63E-06	--	--	--
					Dibenz(a,h)anthracene	C	2 - 2	2.0E+00	1/3	1.88E-06	--	--	--
AI34	7.03E-05	1.11E+02	1.09E+02	Metal	Arsenic	C	1.5 - 7.9	4.4E+00	8/11	2.74E-06	<1	11.1	No
					Lead	--	10 - 5200	5.2E+03	10/11	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	0.23 - 2.1	2.1E+00	3/10	3.25E-06	--	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.11 - 230	2.3E+02	6/11	6.23E-05	1.09E+02	--	--
AJ28	6.54E-05	3.69E+00	1.62E+00	Metal	Arsenic	C,NC	3.1 - 106	1.1E+02	3/3	6.54E-05	1.62E+00	11.1	Yes
					Lead	--	67.9 - 893	8.9E+02	3/3	--	--	8.99	Yes
AJ29	1.47E-05	2.62E+00	<1	Metal	Arsenic	C	2.6 - 22.5	2.3E+01	4/4	1.39E-05	<1	11.1	Yes
AJ30	1.14E-05	2.87E+00	<1	Metal	Arsenic	C	6.4 - 6.4	6.4E+00	1/4	3.95E-06	<1	11.1	No
					Lead	--	119 - 5760	5.8E+03	2/4	--	--	8.99	Yes
				PAH	Benzo(a)pyrene	C	3.4 - 3.4	3.4E+00	1/4	5.26E-06	--	--	--
AJ31	1.03E-05	8.31E+00	6.18E+00	Metal	Antimony	NC	3.9 - 762	7.6E+02	2/6	--	6.15E+00	9.05	Yes
					Arsenic	C	4.1 - 24.5	1.5E+01	4/6	9.32E-06	<1	11.1	Yes
					Lead	--	11.3 - 113000	1.1E+05	6/6	--	--	8.99	Yes
AJ34	1.78E-05	2.78E+01	2.70E+01	Metal	Arsenic	C	3.6 - 3.6	3.6E+00	1/4	2.22E-06	<1	11.1	No
				Pest/PCB	Aroclor-1260	C,NC	17 - 57	5.7E+01	2/4	1.54E-05	2.70E+01	--	--
AJ35	1.39E-03	2.42E+03	2.42E+03	Metal	Arsenic	C	3.4 - 7.8	5.9E+00	4/6	3.64E-06	<1	11.1	No
				Pest/PCB	Aroclor-1260	C,NC	18 - 5100	5.1E+03	6/6	1.38E-03	2.42E+03	--	--
AJ36	1.34E-04	2.29E+02	2.28E+02	Metal	Arsenic	C	5.9 - 5.9	5.9E+00	1/2	3.64E-06	<1	11.1	No
				Pest/PCB	Aroclor-1260	C,NC	15 - 480	4.8E+02	2/2	1.30E-04	2.27E+02	--	--

TABLE 7.9: TOTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

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												HPAL	Maximum Concentration Exceeds HPAL?
AK29	9.15E-06	8.68E+00	3.39E+00	Metal	Antimony	NC	7.5 - 409	4.1E+02	7/9	--	3.30E+00	9.05	Yes
					Arsenic	C	0.6 - 20.6	1.2E+01	8/11	7.38E-06	<1	11.1	Yes
					Lead	--	1.6 - 6920	6.9E+03	11/11	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	NC	0.05 - 8.9	4.8E+00	5/11	1.31E-06	2.28E+00	--	--
AK30	1.05E-05	8.65E+00	6.66E+00	Metal	Arsenic	C	0.92 - 9.9	9.9E+00	5/9	6.10E-06	<1	11.1	No
					Lead	--	1.6 - 11200	1.1E+04	9/9	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	C,NC	2.6 - 14	1.4E+01	3/9	3.79E-06	6.63E+00	--	--
AK31	6.83E-06	1.20E+01	7.36E+00	Metal	Antimony	NC	6.5 - 976	9.1E+02	7/12	--	7.32E+00	9.05	Yes
					Arsenic	C	2.5 - 14.1	7.1E+00	7/12	4.40E-06	<1	11.1	Yes
					Lead	--	3 - 256000	2.6E+05	8/12	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	C,NC	0.15 - 25	6.5E+00	6/12	1.76E-06	3.08E+00	--	--
AK32	4.59E-05	7.33E+01	7.11E+01	Metal	Arsenic	C	1.8 - 10.4	6.9E+00	8/9	4.24E-06	<1	11.1	No
					Lead	--	4.6 - 5570	5.6E+03	9/9	--	--	8.99	Yes
				Pest/PCB	Aroclor-1260	C,NC	1.5 - 150	1.5E+02	6/9	4.06E-05	7.11E+01	--	--
AK36	2.98E-05	3.23E+01	2.98E+01	Metal	Arsenic	C	1.9 - 21	1.2E+01	9/9	7.18E-06	<1	11.1	Yes
				PAH	Benzo(a)pyrene	C	0.038 - 3.5	2.3E+00	4/9	3.48E-06	--	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.55 - 120	6.2E+01	8/9	1.67E-05	2.92E+01	--	--
AL33	6.05E-06	2.78E+00	<1	Metal	Arsenic	C	2.9 - 7	6.5E+00	5/5	3.99E-06	<1	11.1	No
AL34	6.64E-06	2.58E+00	<1	Metal	Arsenic	C	2 - 7.4	5.6E+00	7/8	3.45E-06	<1	11.1	No
				PAH	Benzo(a)pyrene	C	0.31 - 1.1	1.1E+00	3/8	1.70E-06	--	--	--

Notes: All concentrations shown in mg/kg.

-- Not applicable or chemical is not a COC for this endpoint
bgs Below ground surface
C Cancer effect
EPC Exposure point concentration
HI Hazard index
HPAL Hunters Point ambient level
mg/kg Milligram per kilogram
NC Noncancer effect
PAH Polynuclear aromatic hydrocarbon
PCB Polychlorinated biphenyl
PECDF Pentachlorodibenzofuran
Pest Pesticide
RME Reasonable maximum exposure

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TABLE 7.10: INCREMENTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI
AA39	2E-04	2E+01	6E+00	Metal	Antimony	NC	10.4 - 530	5.3E+02	6/12	--	4.28E+00
					Arsenic	C,NC	3.3 - 315	3.2E+02	10/12	1.94E-04	4.80E+00
					Iron	NC	14000 - 217000	1.8E+05	12/12	--	1.90E+00
					Lead	--	24.7 - 9300	9.3E+03	11/12	--	--
					Vanadium	NC	17 - 620	6.2E+02	12/12	--	2.00E+00
				PAH	Naphthalene	C	1.2 - 120	1.2E+02	9/16	1.59E-06	<1
AB29	2E-06	6E+00	3E+00	Metal	Antimony	NC	0.12 - 350	3.5E+02	5/10	--	2.83E+00
				Pest/PCB	Aroclor-1016	NC	13 - 13	1.3E+01	1/10	1.23E-07	1.76E+00
AB33	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	6.9 - 6.9	6.9E+00	1/3	1.07E-05	--
AB36	7E-06	1E+01	1E+01	Metal	Lead	--	3.4 - 6270	2.5E+03	11/11	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.023 - 20	2.0E+01	2/9	5.41E-06	9.48E+00
AB39	1E-05	2E+00	<1	Metal	Arsenic	C	3.4 - 14	1.2E+01	4/4	7.70E-06	<1
					Lead	--	39.7 - 1900	1.9E+03	4/4	--	--
				Dioxin	2,3,4,7,8-PECDF	C	0.000452 - 0.000452	4.5E-04	1/1	2.21E-06	--
AC29	9E-06	3E+01	2E+01	Pest/PCB	Aroclor-1016	C,NC	130 - 130	1.3E+02	1/3	1.23E-06	1.76E+01
					Aroclor-1260	C,NC	24 - 24	2.4E+01	1/3	6.50E-06	1.14E+01
AC30	1E-05	1E+02	1E+02	Metal	Lead	--	5.3 - 1020	1.0E+03	4/4	--	--
				PAH	Benzo(a)pyrene	C	0.05 - 2.4	2.4E+00	2/4	3.71E-06	--
				Pest/PCB	Aroclor-1016	C,NC	740 - 740	7.4E+02	1/4	7.01E-06	1.00E+02
AC33	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.051 - 1.9	1.9E+00	5/8	2.94E-06	--
AC34	7E-06	4E+00	3E+00	Metal	Iron	NC	16000 - 471000	2.6E+05	8/8	--	2.83E+00
				PAH	Benzo(a)pyrene	C	0.072 - 3.1	3.1E+00	6/8	4.80E-06	--
AC39	1E-05	2E+00	<1	Metal	Arsenic	C	14 - 20	2.0E+01	2/2	1.23E-05	<1
					Lead	--	420 - 1400	1.4E+03	2/2	--	--
AC40	2E-05	2E+00	<1	Metal	Arsenic	C	8.8 - 25	2.3E+01	5/5	1.39E-05	<1
					Lead	--	910 - 5600	5.0E+03	5/5	--	--
AD29	1E-04	2E+02	2E+02	Metal	Arsenic	C	4.2 - 12.6	1.1E+01	4/4	7.02E-06	<1
				Pest/PCB	Aroclor-1254	C,NC	7.1 - 7.1	7.1E+00	1/2	1.92E-06	3.36E+00
					Aroclor-1260	C,NC	8.6 - 370	3.7E+02	2/2	1.00E-04	1.75E+02
AD32	3E-06	4E+00	<1	Metal	Lead	--	58 - 3840	3.4E+03	4/4	--	--
				PAH	Benzo(a)pyrene	C	0.052 - 1.1	1.1E+00	2/4	1.70E-06	--

TABLE 7.10: INCREMENTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI
AD33	8E-05	2E+01	1E+01	PAH	Benzo(a)anthracene	C	0.058 - 51	5.1E+01	6/8	7.89E-06	--
					Benzo(a)pyrene	C	0.059 - 16	1.6E+01	6/8	2.48E-05	--
					Benzo(b)fluoranthene	C	0.064 - 64	6.4E+01	7/8	9.91E-06	--
					Benzo(k)fluoranthene	C	0.058 - 53	5.3E+01	6/8	8.20E-06	--
					Dibenz(a,h)anthracene	C	5.3 - 5.3	5.3E+00	1/8	4.99E-06	--
					Indeno(1,2,3-cd)pyrene	C	0.053 - 17	1.7E+01	7/8	2.63E-06	--
				Pest/PCB	Aroclor-1248	C,NC	0.12 - 12	1.2E+01	2/8	3.25E-06	5.69E+00
					Aroclor-1254	C,NC	0.037 - 17	1.7E+01	2/8	4.60E-06	8.05E+00
					Dieldrin	C	3.2 - 6.4	6.4E+00	2/8	1.13E-05	<1
AD34	1E-05	1E+01	7E+00	Metal	Arsenic	C	2.8 - 13	1.1E+01	6/6	6.52E-06	<1
					Vanadium	NC	31 - 2100	1.1E+03	6/6	--	3.49E+00
				Pest/PCB	Aroclor-1260	C,NC	0.072 - 14	1.4E+01	5/6	3.79E-06	6.63E+00
AE31	3E-05	4E+01	2E+01	Metal	Antimony	NC	42.5 - 1930	1.9E+03	2/2	--	1.56E+01
					Arsenic	C	3 - 47.8	4.8E+01	4/4	2.95E-05	<1
					Copper	NC	42 - 167000	1.7E+05	4/4	--	1.46E+01
				Pest/PCB	Aroclor-1242	C,NC	0.024 - 7.2	6.2E+00	4/4	1.68E-06	2.94E+00
AF28	2E-06	4E+00	3E+00	Pest/PCB	Aroclor-1260	C,NC	0.056 - 7.2	7.2E+00	2/2	1.95E-06	3.41E+00
AF32	2E-06	<1	<1	--	No COCs Identified	--	--	--	--	--	--
AF33	8E-06	<1	<1	Metal	Arsenic	C	11.3 - 12.2	1.2E+01	2/2	7.52E-06	<1
AG31	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	1.3 - 1.3	1.3E+00	1/4	2.01E-06	--
AG32	1E-05	2E+00	<1	Metal	Arsenic	C	4 - 17.4	1.6E+01	4/4	9.67E-06	<1
				PAH	Benzo(a)pyrene	C	0.18 - 1.1	1.1E+00	2/4	1.70E-06	--
AG34	8E-06	4E+00	3E+00	PAH	Benzo(a)pyrene	C	0.093 - 3.1	3.1E+00	3/5	4.80E-06	--
				Pest/PCB	Aroclor-1260	C,NC	0.26 - 5.9	5.9E+00	3/5	1.60E-06	2.80E+00
AH29	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	1.1 - 1.1	1.1E+00	1/5	1.70E-06	--
AH32	1E-04	1E+02	7E+01	Metal	Antimony	NC	487 - 675	6.8E+02	2/2	--	5.45E+00
					Arsenic	C	3.2 - 66.6	5.7E+01	4/4	3.54E-05	<1
					Cadmium	NC	10.3 - 330	3.3E+02	2/4	1.05E-08	2.17E+00
					Copper	NC	55.5 - 175000	1.5E+05	4/4	--	1.32E+01
					Iron	NC	30200 - 165000	1.5E+05	4/4	--	1.59E+00
					Lead	--	7.7 - 3720	3.6E+03	4/4	--	--
					Vanadium	NC	58.3 - 24900	2.1E+04	4/4	--	6.74E+01

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TABLE 7.10: INCREMENTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI
AH32	1E-04	1E+02	7E+01	PAH	Benzo(a)anthracene	C	1.3 - 80	8.0E+01	2/4	1.24E-05	--
					Benzo(a)pyrene	C	0.13 - 16	1.6E+01	2/4	2.48E-05	--
					Benzo(b)fluoranthene	C	0.52 - 43	4.3E+01	2/4	6.66E-06	--
					Benzo(k)fluoranthene	C	0.11 - 13	1.3E+01	2/4	2.01E-06	--
					Naphthalene	C,NC	2.2 - 1400	1.4E+03	2/4	1.86E-05	7.59E+00
AH33	2E-05	5E+00	2E+00	PAH	Benzo(a)anthracene	C	0.1 - 11	1.1E+01	3/4	1.70E-06	--
					Benzo(a)pyrene	C	0.1 - 7.5	7.5E+00	3/4	1.16E-05	--
					Benzo(b)fluoranthene	C	0.13 - 10	1.0E+01	3/4	1.55E-06	--
				Pest/PCB	Aroclor-1260	NC	1.6 - 3.4	3.4E+00	2/4	9.20E-07	1.61E+00
AH34	1E-05	2E+01	2E+01	Metal	Antimony	NC	16 - 270	2.7E+02	3/4	--	2.18E+00
					Lead	--	36 - 1600	1.5E+03	4/4	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.43 - 31	3.1E+01	4/4	8.39E-06	1.47E+01
AI28	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	12 - 12	1.2E+01	1/3	1.86E-05	--
					Benzo(b)fluoranthene	C	17 - 17	1.7E+01	1/3	2.63E-06	--
					Dibenz(a,h)anthracene	C	2 - 2	2.0E+00	1/3	1.88E-06	--
AI34	7E-05	1E+02	1E+02	Metal	Lead	--	10 - 5200	5.2E+03	10/11	--	--
				PAH	Benzo(a)pyrene	C	0.23 - 2.1	2.1E+00	3/10	3.25E-06	--
				Pest/PCB	Aroclor-1260	C,NC	0.11 - 230	2.3E+02	6/11	6.23E-05	1.09E+02
AJ28	7E-05	3E+00	2E+00	Metal	Arsenic	C,NC	3.1 - 106	1.1E+02	3/3	6.54E-05	1.62E+00
					Lead	--	67.9 - 893	8.9E+02	3/3	--	--
AJ29	1E-05	2E+00	<1	Metal	Arsenic	C	2.6 - 22.5	2.3E+01	4/4	1.39E-05	<1
AJ30	7E-06	2E+00	<1	Metal	Lead	--	119 - 5760	5.8E+03	2/4	--	--
				PAH	Benzo(a)pyrene	C	3.4 - 3.4	3.4E+00	1/4	5.26E-06	--
AJ31	1E-05	8E+00	6E+00	Metal	Antimony	NC	3.9 - 762	7.6E+02	2/6	--	6.15E+00
					Arsenic	C	4.1 - 24.5	1.5E+01	4/6	9.32E-06	<1
					Lead	--	11.3 - 113000	1.1E+05	6/6	--	--
AJ34	2E-05	3E+01	3E+01	Pest/PCB	Aroclor-1260	C,NC	17 - 57	5.7E+01	2/4	1.54E-05	2.70E+01
AJ35	1E-03	2E+03	2E+03	Pest/PCB	Aroclor-1260	C,NC	18 - 5100	5.1E+03	6/6	1.38E-03	2.42E+03
AJ36	1E-04	2E+02	2E+02	Pest/PCB	Aroclor-1260	C,NC	15 - 480	4.8E+02	2/2	1.30E-04	2.27E+02

TABLE 7.10: INCREMENTAL RISK: RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern		Basis for Chemical of Concern	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Chemical-specific HI
AK29	9E-06	8E+00	3E+00	Metal	Antimony	NC	7.5 - 409	4.1E+02	7/9	--	3.30E+00
					Arsenic	C	0.6 - 20.6	1.2E+01	8/11	7.38E-06	<1
					Lead	--	1.6 - 6920	6.9E+03	11/11	--	--
				Pest/PCB	Aroclor-1260	NC	0.05 - 8.9	4.8E+00	5/11	1.31E-06	2.28E+00
AK30	4E-06	8E+00	7E+00	Metal	Lead	--	1.6 - 11200	1.1E+04	9/9	--	--
				Pest/PCB	Aroclor-1260	C,NC	2.6 - 14	1.4E+01	3/9	3.79E-06	6.63E+00
AK31	7E-06	1E+01	7E+00	Metal	Antimony	NC	6.5 - 976	9.1E+02	7/12	--	7.32E+00
					Arsenic	C	2.5 - 14.1	7.1E+00	7/12	4.40E-06	<1
					Lead	--	3 - 256000	2.6E+05	8/12	--	--
				Pest/PCB	Aroclor-1260	C,NC	0.15 - 25	6.5E+00	6/12	1.76E-06	3.08E+00
AK32	4E-05	7E+01	7E+01	Metal	Lead	--	4.6 - 5570	5.6E+03	9/9	--	--
				Pest/PCB	Aroclor-1260	C,NC	1.5 - 150	1.5E+02	6/9	4.06E-05	7.11E+01
AK36	3E-05	3E+01	3E+01	Metal	Arsenic	C	1.9 - 21	1.2E+01	9/9	7.18E-06	<1
				PAH	Benzo(a)pyrene	C	0.038 - 3.5	2.3E+00	4/9	3.48E-06	--
				Pest/PCB	Aroclor-1260	C,NC	0.55 - 120	6.2E+01	8/9	1.67E-05	2.92E+01
AL33	2E-06	2E+00	<1	--	No COCs Identified	--	--	--	--	--	--
AL34	3E-06	2E+00	<1	PAH	Benzo(a)pyrene	C	0.31 - 1.1	1.1E+00	3/8	1.70E-06	--

Notes: All concentrations shown in mg/kg.

--	Not applicable or chemical is not a chemical of concern for this endpoint
bgs	Below ground surface
C	Cancer effect
EPC	Exposure point concentration
HI	Hazard index
HPAL	Hunters Point ambient level
mg/kg	Milligram per kilogram
NC	Noncancer effect
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PECDF	Pentachlorodibenzofuran
Pest	Pesticide
RME	Reasonable maximum exposure

TABLE 7.11: RISK CHARACTERIZATION ANALYSIS FOR B-AQUIFER GROUNDWATER BASED ON DOMESTIC USE

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	Chemical of Concern		Basis for Chemical of Concern	Detection Frequency	RME Concentration (µg/L)	Chemical-Specific Cancer Risk	Percent Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent Contribution to Total RME HI for Exposure Pathway
Parcel E-2	9E-03	1E+02	7E+01	Domestic Use	B [a]	9E-03	1E+02	Metal	Antimony	NC	97 / 245	3.89E+01	--	--	2.66E+00	2.5%
									Arsenic	C,NC	146 / 254	3.68E+01	5.23E-03	57.4%	3.36E+00	3.1%
									Copper	NC	87 / 250	2.91E+03	--	--	1.99E+00	1.9%
									Iron	NC	118 / 169	3.24E+04	--	--	2.96E+00	2.8%
									Mercury	NC	26 / 249	1.61E+02	--	--	1.47E+01	13.7%
								PAH	Benzo(a)anthracene	C	9 / 256	4.74E+00	8.57E-05	0.9%	--	--
									Benzo(a)pyrene	C	6 / 254	2.94E+00	5.31E-04	5.8%	--	--
									Benzo(b)fluoranthene	C	7 / 254	4.11E+00	7.33E-05	0.8%	--	--
									Benzo(k)fluoranthene	C	2 / 254	1.20E+00	2.14E-05	0.2%	--	--
									Chrysene	C	15 / 256	4.74E+00	2.25E-05	0.2%	--	--
									Dibenz(a,h)anthracene	C	1 / 254	1.30E+00	1.41E-04	1.5%	--	--
									Indeno(1,2,3-cd)pyrene	C	3 / 254	3.00E+00	5.42E-05	0.6%	--	--
								Pest/PCB	Aroclor-1242	C,NC	8 / 239	2.89E+01	8.58E-04	9.4%	3.95E+01	37.0%
									Aroclor-1254	C,NC	9 / 239	3.16E+00	9.40E-05	1.0%	4.33E+00	4.1%
									Aroclor-1260	C,NC	38 / 239	1.18E+01	3.51E-04	3.8%	1.61E+01	15.1%
									Dieldrin	C	2 / 235	1.25E-01	2.97E-05	0.3%	<1	--
									gamma-Chlordane	C	5 / 235	8.00E-02	1.57E-06	0.0%	<1	--
									Heptachlor	C	8 / 235	7.25E-01	4.85E-05	0.5%	<1	--
									Heptachlor epoxide	C	2 / 197	6.60E-02	8.93E-06	0.1%	<1	--
									Heptachlor epoxide A	C	3 / 38	3.70E-02	5.01E-06	0.1%	<1	--
									Heptachlor epoxide B	C	3 / 38	1.50E-02	2.03E-06	0.0%	<1	--
								SVOC	4-Nitrophenol	NC	1 / 250	7.50E+00	--	--	2.21E+00	2.1%
									Bis(2-ethylhexyl)phthalate	C	2 / 256	1.60E+02	3.33E-05	0.4%	<1	--
									Pentachlorophenol	C	2 / 250	6.00E+00	1.07E-05	0.1%	<1	--
								VOC	1,1,2,2-Tetrachloroethane	C	1 / 277	2.25E+00	5.20E-06	0.1%	<1	--
									1,1-Dichloroethane	C	25 / 278	5.00E+01	2.54E-05	0.3%	<1	--
									1,2,3-Trichloropropane	C	1 / 110	5.50E-01	9.82E-05	1.1%	<1	--
									1,2-Dichloroethane	C	15 / 278	2.11E+00	1.71E-05	0.2%	<1	--
									1,4-Dichlorobenzene	C	47 / 282	9.88E+00	3.33E-05	0.4%	<1	--
									Benzene	C	91 / 278	4.19E+00	3.79E-05	0.4%	<1	--
									Carbon tetrachloride	C	1 / 278	3.00E+00	4.07E-05	0.4%	<1	--
									Chloroform	C	16 / 278	1.93E+00	1.27E-05	0.1%	<1	--
									Naphthalene	C,NC	48 / 256	4.07E+01	4.38E-04	4.8%	6.57E+00	6.1%
									Tetrachloroethene	C	21 / 277	6.20E+01	5.95E-04	6.5%	1.02E+00	1.0%
									trans-1,3-Dichloropropene	C	1 / 278	6.70E-01	3.79E-06	0.0%	<1	--
									Trichloroethene	C,NC	30 / 278	1.76E+02	1.26E-04	1.4%	<1	--
									Vinyl chloride	C	12 / 278	2.55E+00	8.07E-05	0.9%	<1	--

Notes: All concentrations shown in micrograms per liter (µg/L).

a As indicated in Section K3.5.2 of Appendix K, the domestic use evaluation for the B-aquifer included data from the A-aquifer.
-- Not applicable or chemical is not a COC for this endpoint
C Cancer effect
HI Hazard index
NC Noncancer effect
PAH Polynuclear aromatic hydrocarbon
PCB Polychlorinated biphenyl
Pest Pesticide
RME Reasonable maximum exposure
SVOC Semivolatile organic compound
VOC Volatile organic compound

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TABLE 7.12: LEAD EVALUATION FOR GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Chemical of Potential Concern	Aquifer	Location of Maximum	Detection Frequency	Maximum Concentration	95 UCL	RME EPC	California Regulatory Action Level	Maximum Detected Concentration Exceeds Action Level?	RME EPC Exceeds Action Level?
Lead	B [a]	IR01MWI-9	79 / 251	6,520	443	443	15	Yes	Yes

Notes: All concentrations shown in micrograms per liter (µg/L).

a As indicated in Section K3.5.2 of Appendix K, the domestic use evaluation for the B-aquifer included data from the A-aquifer.

95 UCL One-sided 95 percent upper confidence limit of the mean

EPC Exposure point concentration

RME Reasonable maximum exposure

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TABLE 7.13: REMEDIATION GOALS FOR CHEMICALS OF CONCERN IN SOIL

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Exposure Scenario	Chemical of Concern[a]	Risk-Based Concentration	Hunters Point Ambient Level	Laboratory Reporting Limit	Remediation Goal
Recreational	Antimony	270	9.05	0.5	270
	Aroclor-1248	0.74	--	0.01	0.74
	Aroclor-1260	0.74	--	0.01	0.74
	Arsenic	0.37	11.1	0.2	11.1
	Benzo(a)anthracene	1.3	--	0.3	1.3
	Benzo(a)pyrene	0.13	--	0.33	0.33
	Benzo(b)fluoranthene	1.3	--	0.33	1.3
	Benzo(k)fluoranthene	1.3	--	0.33	1.3
	Dieldrin	0.12	--	0.004	0.12
	Indeno(1,2,3-cd)pyrene	1.3	--	0.33	1.3
	Lead	155	8.99	0.6	155
	PCB-156	0.02	--	0.03	0.03
Construction Worker	2,3,4,7,8-Pentachlorodibenzofuran	0.0002	--		0.0002
	Antimony	120	9.05	0.5	120
	Aroclor-1016	7.4	--	0.01	7.4
	Aroclor-1242	2.1	--	0.01	2.1
	Aroclor-1248	2.1	--	0.01	2.1
	Aroclor-1254	2.1	--	0.01	2.1
	Aroclor-1260	2.1	--	0.01	2.1
	Arsenic	1.62	11.1	0.2	11.1
	Benzo(a)anthracene	6.5	--	0.33	6.5
	Benzo(a)pyrene	0.65	--	0.33	0.65
	Benzo(b)fluoranthene	6.5	--	0.33	6.5
	Benzo(k)fluoranthene	6.5	--	0.33	6.5
	Cadmium	150	3.14	0.04	150
	Copper	11,000	124.31	0.1	11,000
	Dibenz(a,h)anthracene	1.1	--	0.33	1.1
	Dieldrin	0.57	--	0.004	0.57
	Indeno(1,2,3-cd)pyrene	6.5	--	0.33	6.5
	Iron	93,000	58,000	0.6	93,000
	Lead	800	8.99	0.6	800
	Naphthalene	75	--	0.004	75
	Vanadium	310	117.17	0.1	310

Notes: All concentrations shown in milligrams per kilogram.

a Chemicals of concern shown are based on the results of the incremental risk evaluation for soil

-- Not applicable

PCB Polychlorinated biphenyl

TABLE 7.14: REMEDIATION GOALS FOR CHEMICALS OF CONCERN IN A-AQUIFER GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Exposure Scenario	Chemical of Concern	Risk-Based Concentration	Hunters Point Groundwater Ambient Level	Laboratory Reporting Limit	Remediation Goal
Construction Worker	Arsenic	40	27.30	1	40
	Benzo(a)anthracene	0.67	--	2	2
	Benzo(a)pyrene	0.045	--	2	2
	Benzo(b)fluoranthene	0.45	--	2	2
	Benzo(k)fluoranthene	0.45	--	2	2
	Dibenz(a,h)anthracene	0.034	--	2	2
	Indeno(1,2,3-cd)pyrene	0.31	--	2	2
	Lead	--	14.44	1	14.44
	Naphthalene	17	--	1	17
	Tetrachloroethene	18	--	1	18

Notes: All concentrations shown in micrograms per liter.

-- Not applicable

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TABLE 7.15: REMEDIATION GOALS FOR CHEMICALS OF CONCERN IN B-AQUIFER GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Exposure Scenario	Chemical of Concern	Risk-Based Concentration	Hunters Point Groundwater Ambient Level	Laboratory Reporting Limit	Maximum Contaminant Level[a]	Remediation Goal
Domestic Use	1,1,2,2-Tetrachloroethane	0.43	--	1	1[b]	1
	1,1-Dichloroethane	2.0	--	0.5	5[b]	5
	1,2,3-Trichloropropane	0.0056	--	1	NA	1
	1,2-Dichloroethane	0.12	--	0.5	0.5[b]	0.5
	1,4-Dichlorobenzene	0.30	--	1	5[b]	5
	4-Nitrophenol	3.4	--	0.5	NA	3.4
	Aluminum	36,499	--	50	200[k]	200
	Antimony	15	43.26	6	6[c]	43.26
	Aroclor-1242	0.034	--	0.2	0.5[c,d]	0.5
	Aroclor-1254	0.034	--	0.2	0.5[c,d]	0.5
	Aroclor-1260	0.034	--	0.2	0.5[c,d]	0.5
	Arsenic	0.007	27.3	1	10[e]	27.3
	Benzene	0.11	--	0.5	1[b]	1
	Benzo(a)anthracene	0.055	--	2	0.2[c,f]	2
	Benzo(a)pyrene	0.0055	--	2	0.2	2
	Benzo(b)fluoranthene	0.056	--	2	0.2[c,f]	2
	Benzo(k)fluoranthene	0.056	--	2	0.2[c,f]	2
	beta-BHC	0.037	--	0.05	NA	0.05
	Bis(2-ethylhexyl)phthalate	4.8	--	5	4[b]	5
	Carbon tetrachloride	0.074	--	0.5	0.5[b]	0.5
	Chloroethane	4.6	--	0.5	NA	4.6
	Chloroform	0.15	--	1	80[e,g]	80
	Chromium VI	109	--	10	NA	109
	Chrysene	0.21	--	2	0.2[c,f]	2
	Copper	1,460	28.08	5	1,300[c]	1,300
	Dibenz(a,h)anthracene	0.0092	--	2	0.2[c,f]	2
	Dieldrin	0.0042	--	0.02	NA	0.02
	Gamma-Chlordane	0.051	--	0.01	0.1[b,h]	0.1
	Heptachlor	0.015	--	0.01	0.01[b]	0.01
	Hepatachlor epoxide	0.0074	--	0.01	0.01[b]	0.01
	Hepatachlor epoxide A	0.0074	--	0.01	0.01[b,i]	0.01
	Hepatachlor epoxide B	0.0074	--	0.01	0.01[b,i]	0.01
	Indeno(1,2,3-cd)pyrene	0.055	--	2	0.2[c,f]	2
	Iron	10,950	2,380	50	NA[j]	10,950
	Lead	--	14.44	1	15[k]	15
	Mercury	11	0.6	0.1	2[c]	2
	Naphthalene	0.093	--	1	NA	1
	Pentachlorophenol	0.56	--	5	1[c]	5
	Tetrachloroethene	0.1	--	1	5[c]	5
	Trans-1,3-dichloropropene	0.18	--	0.5	0.5[b]	0.5
	Trichloroethene	0.028	--	1	5[c]	5
	Vinyl chloride	0.032	--	0.5	0.5[b]	0.5

TABLE 7.15: REMEDIATION GOALS FOR CHEMICALS OF CONCERN IN B-AQUIFER GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Notes: All concentrations shown in micrograms per liter.

a	Primary MCLs are provided for chemicals of concern for the domestic use exposure scenario. For each chemical, the MCL shown is the lowest between the Federal and State of California MCL.
b	Value shown is the State of California MCL
c	Value shown is both the Federal and State of California MCL (Federal and State regulatory standard is the same).
d	Value shown is for polychlorinated biphenyls
e	Value shown is the Federal MCL
f	Value shown is for benzo(a)pyrene
g	Value shown is for total trihalomethanes
h	Value shown is for chlordane
i	Value shown is for heptachlor epoxide
j	A primary MCL is not available for iron; the Federal secondary MCL for iron is 300 micrograms per liter.
j	Value shown for aluminum is the State of California secondary MCL, which is lower than the State of California primary MCL.
--	Not applicable
MCL	Maximum Contaminant Level
NA	Not available

TABLE 7.16: RISK AND HAZARD DRIVERS AND ASSOCIATED SAMPLING LOCATIONS EXCEEDING REMEDIATION GOALS FOR RECREATIONAL RECEPTOR SCENARIO, SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI	Chemicals of Concern		Chemical-Specific Cancer Risk	Chemical-Specific HI	Detection Frequency	RME EPC (mg/kg)	Remediation Goal	Significant Sampling Information			
											Sampling Location	Sampling Top Depth (feet bgs)	Sampling Bottom Depth (feet bgs)	Detected Concentration (mg/kg)
AA38	--	<1	<1	Metal	Lead	--	--	1/1	1.86E+02	1.55E+02	WE18D	3	3	166
AA39	6E-04	5E+00	2E+00	Metal	Arsenic	5.79E-04	1.60E+00	3/5	2.15E+02	1.11E+01	IR01B368	1	2	36
											IR01MW58A	1.25	1.25	215
					Antimony	--	1.94E+00	2/5	5.30E+02	2.70E+02	IR01B368	1	2	530
					Lead	--	--	4/5	4.90E+03	1.55E+02	IR01B368	1	2	4900
											IR01MW58A	1.25	1.25	379
				PAH	Benzo(a)pyrene	2.37E-06	--	1/5	3.10E-01	3.30E-01	No samples exceed remediation goals			
AB29	3E-06	<1	<1	PAH	Benzo(a)pyrene	1.99E-06	--	1/2	2.60E-01	3.30E-01	No samples exceed remediation goals			
AB36	4E-05	6E+00	6E+00	Metal	Lead	--	--	6/6	6.27E+03	1.55E+02	IR01SW2	0	0.5	6200
											IR01B372	1	2	300
				PCB	Aroclor-1260	2.69E-05	5.04E+00	2/4	2.00E+01	7.40E-01	IR01B372	1	2	20
					PCB-156	2.83E-06	--	2/2	5.60E-02	2.00E-02	IR01SW2	0	0.5	0.052
											IR01SW2	0	0.5	0.056
AB39	9E-08	<1	<1	Metal	Lead	--	--	3/3	2.22E+02	1.55E+02	IR01PH1	0	0.5	221
AC29	5E-06	<1	<1	PAH	Benzo(a)pyrene	3.90E-06	--	1/1	5.10E-01	3.30E-01	IR01B004	1.91	1.91	0.51
AC30	3E-05	<1	<1	PAH	Benzo(a)pyrene	1.84E-05	--	1/1	2.40E+00	3.30E-01	IR01MW16A	1.25	1.25	2.4
					Benzo(b)fluoranthene	2.37E-06	--	1/1	3.10E+00	1.30E+00	IR01MW16A	1.25	1.25	3.1
					Indeno(1,2,3-cd)pyrene	2.22E-06	--	1/1	2.90E+00	1.30E+00	IR01MW16A	1.25	1.25	2.9
AC32	4E-06	<1	<1	PAH	Benzo(a)pyrene	3.29E-06	--	1/1	4.30E-01	3.30E-01	IR01B030	1.75	1.75	0.43
AC33	3E-05	<1	<1	PAH	Benzo(a)anthracene	4.67E-06	--	3/4	6.10E+00	1.30E+00	IR01B383	1	2	1.4
											IR01B385	1	2	6.1
					Benzo(a)pyrene	1.45E-05	--	3/4	1.90E+00	3.30E-01	IR01B383	1	2	1.9
											IR01B385	1	2	0.74
					Benzo(b)fluoranthene	3.75E-06	--	3/4	4.90E+00	1.30E+00	IR01B383	1	2	2.1
											IR01B385	1	2	4.9
					Benzo(k)fluoranthene	3.06E-06	--	3/4	4.00E+00	1.30E+00	IR01B383	1	2	2.1
											IR01B385	1	2	4
AC34	3E-05	<1	<1	Metal	Lead	--	--	3/3	3.02E+02	1.55E+02	IR01B378	1	2	160
											IR01MW53B	1.25	1.25	302
				PAH	Benzo(a)pyrene	2.37E-05	--	3/3	3.10E+00	3.30E-01	IR01B378	1	2	3.1
											IR01B397	1	2	0.53
					Benzo(b)fluoranthene	2.83E-06	--	3/3	3.70E+00	1.30E+00	IR01B378	1	2	3.7
					Benzo(k)fluoranthene	3.29E-06	--	2/3	4.30E+00	1.30E+00	IR01B378	1	2	4.3
AD29	3E-06	<1	<1	PAH	Benzo(a)pyrene	2.30E-06	--	1/1	3.00E-01	3.30E-01	No samples exceed remediation goals			
AD32	1E-05	<1	<1	PAH	Benzo(a)pyrene	8.42E-06	--	1/1	1.10E+00	3.30E-01	IR01B029	1.25	1.25	1.1
AD33	2E-04	4E+00	3E+00	Metal	Lead	--	--	4/4	6.84E+02	1.55E+02	IR01B386	1	2	380
											IR01B389	1	2	220
											IR01B394	1	2	730
				PAH	Benzo(a)anthracene	4.06E-06	--	3/4	5.30E+00	1.30E+00	IR01B390	1	2	5.3
											IR01B394	1	2	4
					Benzo(a)pyrene	6.15E-05	--	4/4	8.04E+00	3.30E-01	IR01B386	1	2	3.2
											IR01B390	1	2	8.6
											IR01B394	1	2	3.8

TABLE 7.16: RISK AND HAZARD DRIVERS AND ASSOCIATED SAMPLING LOCATIONS EXCEEDING REMEDIATION GOALS FOR RECREATIONAL RECEPTOR SCENARIO, SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI	Chemicals of Concern		Chemical-Specific Cancer Risk	Chemical-Specific HI	Detection Frequency	RME EPC (mg/kg)	Remediation Goal	Significant Sampling Information			
											Sampling Location	Sampling Top Depth (feet bgs)	Sampling Bottom Depth (feet bgs)	Detected Concentration (mg/kg)
AD33	2E-04	4E+00	3E+00	PAH	Benzo(b)fluoranthene	8.48E-06	--	4/4	1.11E+01	1.30E+00	IR01B386	1	2	4.4
											IR01B390	1	2	12
											IR01B394	1	2	4.7
					Benzo(k)fluoranthene	3.44E-06	--	4/4	4.50E+00	1.30E+00	IR01B386	1	2	4.5
											IR01B390	1	2	4.4
											IR01B394	1	2	3.9
					Indeno(1,2,3-cd)pyrene	6.14E-06	--	4/4	8.03E+00	1.30E+00	IR01B386	1	2	4.5
											IR01B390	1	2	8.3
											IR01B394	1	2	3.4
				Pest	Dieldrin	5.45E-05	<1	1/4	6.40E+00	1.20E-01	IR01B394	1	2	6.4
				PCB	Aroclor-1248	1.62E-05	3.02E+00	2/4	1.20E+01	7.40E-01	IR01B386	1	2	12
AD34	6E-05	4E+00	4E+00	Metal	Arsenic	3.50E-05	<1	3/3	1.30E+01	1.11E+01	IR01B374	1	2	13
					Lead	--	--	3/3	5.30E+02	1.55E+02	IR01B373	1	2	180
											IR01B374	1	2	530
				PAH	Benzo(a)pyrene	4.13E-06	--	3/3	5.40E-01	3.30E-01	IR01B396	1	2	0.34
											IR01B373	1	2	0.54
				PCB	Aroclor-1260	1.88E-05	3.53E+00	2/3	1.40E+01	7.40E-01	IR01B374	1	2	14
AE31	6E-06	<1	<1	PAH	Benzo(a)pyrene	4.29E-06	--	1/1	5.60E-01	3.30E-01	IR01B018G	1.25	1.25	0.56
AF32	9E-06	<1	<1	PAH	Benzo(a)pyrene	6.58E-06	--	1/1	8.60E-01	3.30E-01	IR01MW38A	1	1	0.86
AG32	1E-05	<1	<1	PAH	Benzo(a)pyrene	8.42E-06	--	1/1	1.10E+00	3.30E-01	IR01MW26B	1.25	1.25	1.1
AG34	3E-05	<1	<1	PAH	Benzo(a)anthracene	1.76E-06	--	1/1	2.30E+00	1.30E+00	IR01B275	1.25	1.25	2.3
					Benzo(a)pyrene	2.37E-05	--	1/1	3.10E+00	3.30E-01	IR01B275	1.25	1.25	3.1
					Benzo(b)fluoranthene	3.14E-06	--	1/1	4.10E+00	1.30E+00	IR01B275	1.25	1.25	4.1
					Indeno(1,2,3-cd)pyrene	2.37E-06	--	1/1	3.10E+00	1.30E+00	IR01B275	1.25	1.25	3.1
AH29	1E-05	<1	<1	PAH	Benzo(a)pyrene	8.42E-06	--	1/1	1.10E+00	3.30E-01	IR01B011	1.25	1.25	1.1
AJ29	2E-06	<1	<1	--	No Chemicals of Concern Identified	--	--	--	--	--	--	--	--	--
AJ30	3E-05	<1	<1	Metal	Lead	--	--	1/1	5.76E+03	1.55E+02	IR01TA06B	1	1	5760
				PAH	Benzo(a)anthracene	1.76E-06	--	1/1	2.30E+00	1.30E+00	IR01TA06B	1	1	2.3
					Benzo(a)pyrene	2.60E-05	--	1/1	3.40E+00	3.30E-01	IR01TA06B	1	1	3.4
					Benzo(b)fluoranthene	5.05E-06	--	1/1	6.60E+00	1.30E+00	IR01TA06B	1	1	6.6
					Benzo(k)fluoranthene	1.61E-06	--	1/1	2.10E+00	1.30E+00	IR01TA06B	1	1	2.1
AK29	5E-05	5E+00	2E+00	Metal	Arsenic	3.39E-05	<1	4/4	1.26E+01	1.11E+01	IR04B030	1.25	1.25	12.6
					Lead	--	--	4/4	6.92E+03	1.55E+02	IR01SS350	0.5	0.5	514
											IR04B030	1.25	1.25	6920
											IR04B007	1.75	1.75	441
				PAH	Benzo(a)pyrene	1.53E-06	--	1/4	2.00E-01	3.30E-01	No samples exceed remediation goals			
				PCB	Aroclor-1260	1.20E-05	2.24E+00	3/4	8.90E+00	7.40E-01	IR01SS350	0.5	0.5	1.4
											IR04B030	1.25	1.25	8.9
AK30	2E-05	4E+00	4E+00	Metal	Lead	--	--	3/3	1.12E+04	1.55E+02	IR04B047	1.25	1.25	11200
											IR04B015	1.25	1.25	3170
											IR04B028	1.25	1.25	4180
				PAH	Benzo(a)pyrene	1.84E-06	--	1/3	2.40E-01	3.30E-01	No samples exceed remediation goals			
				PCB	Aroclor-1260	1.88E-05	3.53E+00	3/3	1.40E+01	7.40E-01	IR04B047	1.25	1.25	2.6
											IR04B015	1.25	1.25	14

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TABLE 7.16: RISK AND HAZARD DRIVERS AND ASSOCIATED SAMPLING LOCATIONS EXCEEDING REMEDIATION GOALS FOR RECREATIONAL RECEPTOR SCENARIO, SURFACE SOIL (0 TO 2 FEET BGS)

Remedial Investigation/Feasibility Study for Parcel E-2, Hunters Point Shipyard, San Francisco, California

Grid Number	RME Cancer Risk	RME HI	RME Segregated HI	Chemicals of Concern		Chemical-Specific Cancer Risk	Chemical-Specific HI	Detection Frequency	RME EPC (mg/kg)	Remediation Goal	Significant Sampling Information			
											Sampling Location	Sampling Top Depth (feet bgs)	Sampling Bottom Depth (feet bgs)	Detected Concentration (mg/kg)
											IR04B028	1.25	1.25	3.7
AK31	3E-05	7E+00	6E+00	Metal	Lead	--	--	4/4	8.56E+03	1.55E+02	IR04B025	1.75	1.75	2410
											IR04B017	1.75	1.75	9000
											IR04MW13A	1.75	1.75	4920
											IR04B004	1.75	1.75	307
				PCB	Aroclor-1260	3.37E-05	6.30E+00	4/4	2.50E+01	7.40E-01	IR04B025	1.75	1.75	0.98
											IR04B017	1.75	1.75	2.8
											IR04MW13A	1.75	1.75	25
AK32	5E-05	1E+01	9E+00	Metal	Lead	--	--	2/2	1.50E+03	1.55E+02	IR12B041	0.72	2.72	503
											IR12B042	0.77	2.77	1500
				PAH	Benzo(a)pyrene	1.76E-06	--	2/2	2.30E-01	3.30E-01	No samples exceed remediation goals			
				Pest	Dieldrin	2.13E-06	<1	1/2	2.50E-01	1.20E-01	IR12B041	0.72	2.72	0.25
				PCB	Aroclor-1260	4.98E-05	9.33E+00	2/2	3.70E+01	7.40E-01	IR12B041	0.72	2.72	26
											IR12B042	0.77	2.77	37
AL33	1E-05	<1	<1	Metal	Lead	--	--	3/3	2.27E+02	1.55E+02	IR12SS19	0	0	227
				PAH	Benzo(a)pyrene	4.67E-06	--	2/3	6.10E-01	3.30E-01	IR12SS19	0	0	0.61
				PCB	Aroclor-1260	2.56E-06	<1	2/3	1.90E+00	7.40E-01	IR12SS19	0	0	1.9
AL34	2E-05	<1	<1	Metal	Lead	--	--	3/3	1.60E+02	1.55E+02	IR12B037	0.55	2.55	160
				PAH	Benzo(a)pyrene	8.42E-06	--	3/3	1.10E+00	3.30E-01	IR12B037	0.55	2.55	1.1
											IR02TA11A	1.56	1.56	0.72
					Benzo(b)fluoranthene	2.07E-06	--	3/3	2.70E+00	1.30E+00	IR12B037	0.55	2.55	1.6
											IR02TA11A	1.56	1.56	2.7
				PCB	Aroclor-1260	1.88E-06	<1	3/3	1.40E+00	7.40E-01	IR12B038	0	2	1.3
											IR12B037	0.55	2.55	1.4
											IR02TA11A	1.56	1.56	1.3

Notes:

<1	Less than 1
--	Not applicable
bgs	Below ground surface
EPC	Exposure point concentration
HI	Hazard index
mg/kg	Milligram per kilogram
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated Biphenyl
Pest	Pesticide
RME	Reasonable maximum exposure

Table 7-17 Summary Statistics for Parcel E-2 Onshore SLERA
Hunters Point Shipyard Parcel E-2, Remedial Investigation/Feasibility Study

Chemical	HPAL (mg/kg)	PSC (mg/kg)	Maximum Soil Concentrations (mg/kg)			Number of Samples Exceeding PSC		
			Landfill Area	East Adjacent Area	Panhandle Area	Landfill Area	East Adjacent Area	Panhandle Area
Beryllium	0.71	134.76	1.4	1.1	1.2	0	0	0
Cadmium	3.14	4.24	12	11.8	8.9	1	7	6
Chromium VI	SS	668.71	ND	1.5	10	0	0	0
Copper	124.3	469.63	1,430	3,320	5,300	1	12	11
Lead	8.99	441.9	750	11,200	9,300	1	13	9
Manganese	1,431.2	2,433.21	1,550	1,810	2,800	0	0	3
Nickel	SS	1,941.38	982	1,500	1,600	0	0	0
Selenium	1.95	9.82	1.7	4.5	0.76	0	0	0
Thallium	0.81	88.48	0.54	6.9	4.3	0	0	0
Vanadium	117.2	117.2	132	209	2,100	1	1	5
Zinc	109.9	719.32	1,020	4,100	6,900	1	10	11
Dieldrin	NA	18.38	ND	0.25	6.4	0	0	0
Methoxychlor	NA	508.76	ND	1.3	4.2	0	0	0
Total DDT	NA	3.53	0.036	0.66	0.087	0	0	0
Total Aroclors	NA	36.92	5.9	37	20	0	1[a]	0
HMW PAHs	NA	231.41	14	6.9	84	0	0	0
LMW PAHs	NA	10,056.0	5	1.3	47	0	0	0

Table 7-17 Summary Statistics for Parcel E-2 Onshore SLERA
Hunters Point Shipyard Parcel E-2, Remedial Investigation/Feasibility Study

Notes:

a	One sample exceeded the PSC for total Aroclors. The concentration of total Aroclors in this sample was very close to the PSC, and is not considered to be a potential risk to receptors.
DDT	dichlorodiphenytrichloroethane
HMW	high molecular weight
HPAL	Hunters Point ambient level
LMW	low molecular weight
mg/kg	milligram per kilogram
NA	not applicable
ND	non-detected
PAH	polynuclear aromatic hydrocarbon
PSC	Protective Soil Concentration
SLERA	screening-level ecological risk assessment
SS	soil specific